

Holborn Barn
Therfield, Royston

Flood Risk Assessment

HSP2025-C4479-C&S-FRAS1-1747
May 2025



CIVIL | STRUCTURAL | GEOTECHNICAL & ENVIRONMENTAL | TRAFFIC AND TRANSPORT

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APPENDIX 1

- Site Location Plan
- Proposed Site Plan
- Proposed Catchment Plan

APPENDIX 2

- Topographical Survey

APPENDIX 3

- EA Consultation Response
- LLFA Consultation Response (Awaited)

APPENDIX 4

- Flood Map For Planning
- Long Term Flood Risk Mappings

APPENDIX 5

- Greenfield Rates
- Brownfield Runoff Rates
- Attenuation Estimates

APPENDIX 6

- Drainage Maintenance Schedule

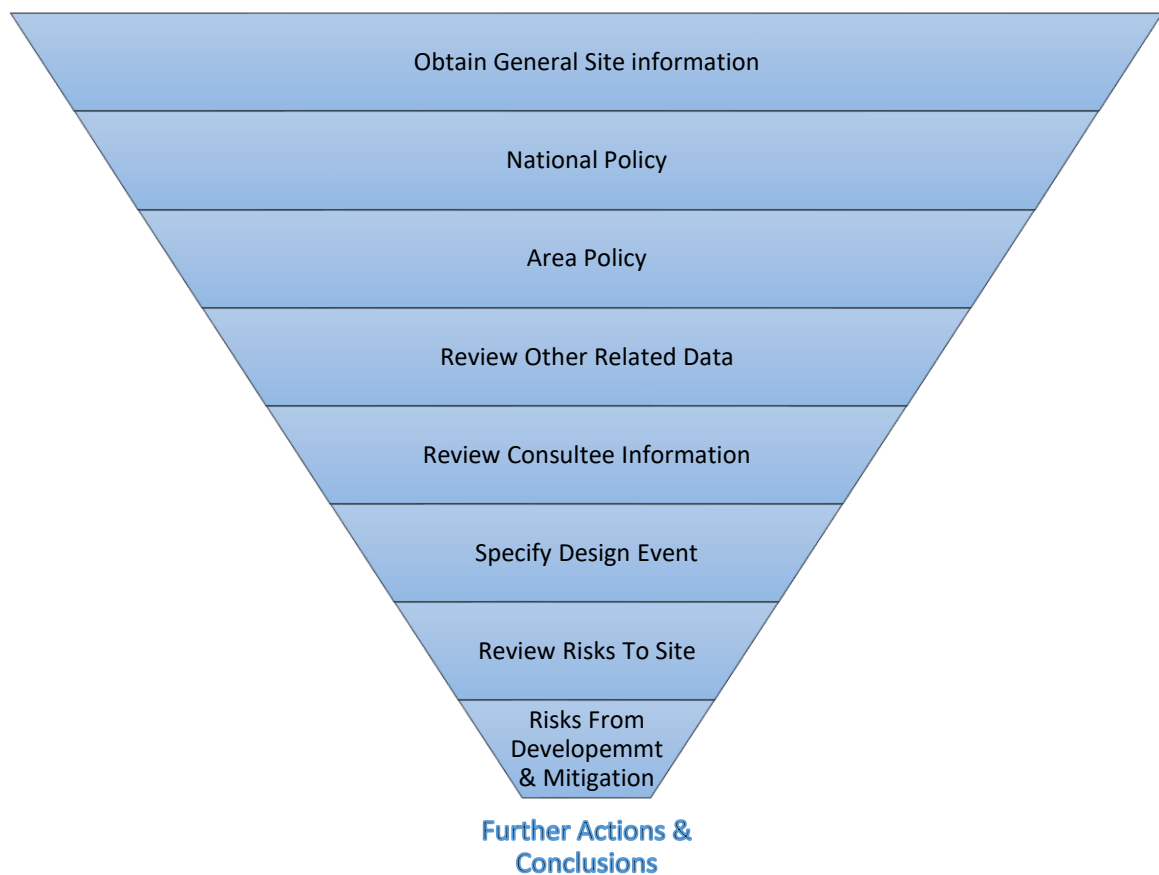
1 Introduction

1.1 General

- 1.1.1 HSP Consulting Engineers Ltd has been commissioned to undertake a Flood Risk Assessment in support of a planning application for the proposed Minor Development on Holborn Barn, Therfield, Royston.

1.2 Format of this Report

- 1.2.1 This report is reliant upon publicly available information and/or that provided by Consultees which is then reviewed, in outline terms, in accordance with the graphic below:



1.3 Sources of Data

This report is based on information from the following principal sources of information:

- i. Environment Agency (EA) Flood Zone (for Planning) Mapping
- ii. Government Long Term Flood Risk Mapping
- iii. Lead Local Flood Authority
- iv. Local Flood Risk Management Strategy
- v. Preliminary Flood Risk Assessment
- vi. Level 1 Strategic Flood Risk Assessment

2 Site Location, Description & Proposed Development

2.1 Site Location

2.1.1 The site is notionally centred at National Grid reference (NGR) E534720, N236125 (approximately).

2.1.2 The site is located at the following address:

Holborn Farm,
Dane End,
Therfield,
Royston,
SG8 9RH

2.1.3 A site location plan is been reproduced in Appendix 1

2.1.4 The Lead Local Flood Authority (LLFA) is Hertfordshire County Council (HCC) and the Sewerage Undertaker is Thames Water (TW).

2.2 Description

2.2.1 The site is irregular in shape and occupies an area of approximately 1,027 m².

2.2.2 The site is located off Dane End, within the grounds of Holborn Farm House, and is situated in a rural setting.

2.2.3 There are a number of existing structures, including Holborn Barn, and more modern additions that serve as extensions to the barn. The rest of the site comprises hard-paved areas interspersed with limited soft landscaping.

2.2.4 Boundaries for the respective parcels are formed as follows:

- i.* North: Holborn Farm House (Sister Site).
- ii.* East: Farm buildings associated with neighbouring farm.
- iii.* South: Assumed neighbour with farm buildings.
- iv.* West: Dane End, with tributary to River Bib beyond.

2.2.5 A schematic layout of the existing site has been reproduced in Appendix 1.

2.3 Proposed Development

2.3.1 The development plans include converting the barn into a dwelling, reducing the existing building footprint.

2.3.2 The existing areas of concrete are to be demolished; however, the proposed driveway and car parking areas will remain hard-drained. The concrete at the rear of the building is to be demolished and replaced with soft landscaping, with the exception of an outdoor dining area.

2.3.3 It is anticipated that the proposed development will result in a hard-drained area of approximately 561 m². This figure is subject to change during detailed design stage.

2.3.4 For clarity development proposals and a catchment plan has been reproduced in Appendix 1.

2.4 Topography

2.4.1 A Topographical Survey has been conducted and provided by the Architect. The following commentary provides a summary of the findings of the survey report.

2.4.2 The site exhibits a general slope from northeast to southwest, with ground levels varying from approximately 137.5 mAOD to 134.7 mAOD.

2.4.3 The Topographical Survey has been reproduced in Appendix 2.

3 Geology, Hydrogeology, Hydrology

3.1 Site Investigation

3.1.1 At the time of preparation, an intrusive site investigation was not available for review.

3.1.2 For guidance, the following information has been sourced from both British Geological Survey (BGS) mapping and Magic Maps.

3.2 Geology

3.2.1 Made Ground:

BGS mapping does not indicate any Made Ground on the site. However, given the existing development, Made Ground is anticipated over the full extent of the site.

3.2.2 Superficial Deposits:

The site is located in the vicinity of the boundary between the Lowestoft Formation and Head.

The Lowestoft Formation comprises an extensive layer of chalky till, accompanied by outwash sands, gravels, silts, and clays, and is characterised by a high content of chalk and flint.

Head deposits typically consist of clay, silt, sand, and gravel.

3.2.3 Bedrock:

The site is underlain by the Lewes Nodular Chalk Formation and Seaford Chalk Formation.

3.3 Hydrogeology

3.3.1 The Groundwater Vulnerability Map of England, MagicMap and the Environment Agency (EA) website have been reviewed to determine the hydrology and aquifer designations. .

3.3.2 These sources show that:

- i. The site is located within Source Protection Zone III (Total Catchment - SPZ3). The EA defines SPZ3 zones as:

'The area around a supply source within which all the groundwater ends up at the abstraction point. This is the point from where the water is taken. This could extend some distance from the source point.'

- ii. Groundwater vulnerability is designated as "medium" with "Soluble rock risk". BGS defines areas of medium vulnerability as:

'Medium priority groundwater resources that have some natural protection resulting in a moderate overall groundwater risk. Activities in these areas should as a minimum follow good practice to ensure they do not cause groundwater pollution.'

- iii. The Bedrock is depicted as being a "Principal" aquifer. The EA defines unproductive aquifers as:

'Strata that is largely unable to provide usable water supplies and are unlikely to have surface water and wetland ecosystems dependent on them.'

- iv. The superficial deposit is depicted as being a "Secondary undifferentiated" aquifer. The EA defines secondary undifferentiated aquifers as:

'aquifers where it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type. These have only a minor value.'

- v. Magic Map describes the Soilscape as 'Lime-rich loamy and clayey soils with impeded drainage'.

3.4 Hydrology

- 3.4.1 The nearest main river is the River Rib, and is located approximately 10 m – 15 m beyond the site's western boundary and to the west of Dane Road.
- 3.4.2 Ordinary watercourses (tributaries of the River Rib and unnamed upon the mapping reviewed) are evident in the vicinity of the site. These are estimated to be in excess of 400 m from the subject site.

4 National Planning Framework

4.2 General

- 4.2.1 Flood Risk Assessments in England are undertaken using the prescriptive procedures and guidance within the National Planning Policy Framework (NPPF) and "Planning practice Guide – Flood Risk and Coastal Change" (PPG) produced by Communities and Local Government, in addition to the details set out in BS 8533:2017 "Assessing and managing flood risk in development - Code of practice".
- 4.2.2 NPPF provides a directive which seeks to ensure that development does not take place in areas at risk or increase flood risk in offsite areas. NPPF acknowledges that developments vary in their sensitivity to flooding and enables the correlation between proposed use and the underlying environs (flood risk) through the application of the Sequential Test.

4.3 The Sequential Test

- 4.3.1 The aim of the Sequential Test is to steer new development into areas with the lowest and/or appropriate probability of flooding.
- 4.3.2 The sequential test provides the potential to compare the subject site with other available sites to determine which has the lowest flood risk.
- 4.3.3 Table 1 of PPG prescribes three principal flood risk zones:
- Zone 1 (Low Probability) - land assessed as having a less than 0.1% (1 in 1000) annual probability of river or sea flooding;

- Zone 2 (Medium Probability) - land assessed as having between a 1% (1 in 100) and 0.1% (1 in 1000) annual probability of river flooding; or between a 0.5% (1 in 200) and 0.1% (1 in 1000) annual probability of sea flooding;
- Zone 3a (High Probability) - land assessed as having a 1% (1 in 100) or greater annual probability of river flooding or a 0.5% (1 in 200) or greater annual probability of flooding from the sea;
- Zone 3b (The Functional Floodplain) - land where water has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. However, land which would naturally flood with an annual probability of 1 in 20 (5%) or greater in any year, is typically assumed to be functional floodplain.

4.3.4 The Sequential Test is not normally required for developments in Flood Zone 1 (i.e. the lowest probability of flooding), unless other flood related issues exist within the area of the development; for example, a critical drainage area.

4.3.5 Similarly, a Sequential Test is not required in respect of the intended Planning Application if one has already been undertaken for a development of the type proposed (e.g. a residential development) on the subject site. This may be the case where the site is 'allocated' in the Authorities Local Plan.

4.3.6 A Sequential Test is required where both of the following apply:

- The proposed development is in Flood Zone 2 or 3
- A sequential test has not already been undertaken for a development of the type which is planned.

4.4 Land Use and Development

4.4.1 Current guidance accepts that it is not always possible to direct developments into areas of low flood risk and that the type of development/end use materially affects flood risk sensitivity.

4.4.2 Table 3 of "Planning Practice Guide – Flood Risk and Coastal Change", reproduced below, provides the outline mechanism for assessing the suitability of a development within a specific Flood Zone.

Reproduction of Table 3 of “Planning Practice Guide – Flood Risk and Coastal Change”					
Flood risk vulnerability classification	Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception Test required	✓	✓
Zone 3a	Exception Test required	✓	×	Exception Test required	✓
Zone 3b	Exception Test required	✓	×	×	×
Key: ✓ Development is appropriate × Development should not be permitted					

4.4.3 For guidance, Table 2 of “Planning Practice Guide – Flood Risk and Coastal Change”, is reproduced below to illustrate Flood Risk Vulnerability classifications.

Reproduction of Table 2 of “Planning Practice Guide – Flood Risk and Coastal Change”	
Essential Infrastructure	• Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. • Wind turbines.
Highly Vulnerable	• Police stations, Ambulance stations and Fire stations and Command Centres and telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as ‘Essential Infrastructure’).
More Vulnerable	• Hospitals. • Residential institutions such as residential care homes, children’s homes, social services homes, prisons and hostels. • Buildings used for: dwelling houses; student halls of residence; drinking establishments; nightclubs; and hotels. • Non-residential uses for health services, nurseries and educational establishments. • Landfill and sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable	• Police, ambulance and fire stations which are not required to be operational during flooding. • Buildings used for: shops; financial, professional and other services; restaurants and cafes; hot food takeaways; offices; general industry; storage and distribution;

Reproduction of Table 2 of "Planning Practice Guide – Flood Risk and Coastal Change"	
	non-residential institutions not included in 'more vulnerable'; and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment works which do not need to remain operational during times of flood. • Sewage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place).
Water compatible Development	• Flood control infrastructure. • Water transmission infrastructure and pumping stations. • Sewage transmission infrastructure and pumping stations. • Sand and gravel workings. • Docks, marinas and wharves. • Navigation facilities. • MOD defence installations. • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping accommodation). • Lifeguard and coastguard stations. • Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. • Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

4.5 The Exception Test

4.5.1 The Exception Test may be applied where, following application of the Sequential Test, it is not possible for the development to be located in zones with a lower probability of flooding.

4.5.2 For the Exception Test to be passed both of the following conditions must be met:

- i. It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk; and,
- ii. A site-specific flood risk assessment must demonstrate that 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.

5 Local Planning Framework

5.1 Local Flood Risk Management Strategy, 2019 (LFRMS)

5.1.1 The Hertfordshire Local Flood Risk Management Strategy (LFRMS) was produced by Hertfordshire County Council in February 2013 and was later revised in February 2019. The aim of the LFRMS is to give an understanding of local flood risk in Hertfordshire and the actions that will be taken to manage it appropriately within available resources. This will be achieved via the following objectives:

- i. Taking a risk-based approach to local flood risk management.
- ii. Working in partnership to manage flood risk in the county.
- iii. Improving our understanding of flood risk to better inform decision making.
- iv. Supporting those at risk of flooding to manage that risk.
- v. Working to reduce the likelihood of flooding where possible.
- vi. Ensuring that flood risk arising from new development is managed.

5.1.2 While the LFRMS holds no salient site specific information, it does highlight relevant policies sourced from 'HCC Guidance for SuDS in Hertfordshire'

5.1.3 Policy 15: Runoff rates from previously developed sites

'Previously developed sites should aim to discharge at the original pre-development greenfield rate for the whole site area where possible. If not, a significant reduction in the current rate of discharge should be achieved and evidence provided as to why greenfield rates are not viable.'

The volume of attenuation storage that would be required for the site should be based on the 1 in 100 year critical storm duration with an allowance for climate change and the allowable discharge rate.'

5.1.4 The LFRMS provides no further relevant information in relation to this site-specific appraisal.

5.2 Preliminary Flood Risk Assessment, 2011 (PFRA):

5.2.1 A Preliminary Flood Risk Assessment (PFRA) was published by Hertfordshire County Council in August 2011. This report provides an overview of the local flood risk in Hertfordshire based on a review of records of flooding and data derived from modelling of potential future flooding.

5.2.2 The scope of the report relates to local flood risk from surface water, ordinary watercourses and ground water, with the aim of identifying areas of potential flood risk. The process will provide the framework for the development of a strategy for the management of local flood risk.

5.2.3 To achieve these objectives, the document has aimed to present the following:

- i. Records of historic flooding from surface runoff, groundwater and ordinary watercourses will be collated and assessed to help with understanding past forms of flooding.
- ii. Data sources that will help with mapping potential future flood risk will be identified.

- iii.* A PFRA report which satisfies the requirements of the Flood Risk Regulations 2009 will be produced.
- iv.* The national assessment of indicative Flood Risk Areas will be reviewed and if applicable additions and amendments will be suggested and justified in the light of local circumstances.

5.2.4 While the PFRA does provide an overview of the administrative responsibilities, no definitive data relevant to the site is presented within the report.

5.3 Level 1 Strategic Flood Risk Assessment, 2008

5.3.1 The North Hertfordshire District Council (NHDC) Level 1 Strategic Flood Risk Assessment (SFRA) was published by WSP Consulting on behalf of NHDC in 2008. Updates to the 2008 SFRA were produced by NHDC in 2016

5.3.2 The key objectives of the 2008 Level 1 SFRA are:

- i.* Ensure that NHDC fulfil their obligations under the current PPS25.
- ii.* Provide a reference and policy document to support the LDF process.
- iii.* Provide a reference and policy document to advise and inform private and commercial developers of their obligations under the PPS25

5.3.3 The NHDC provides no substantive information in relation to this site-specific appraisal.

6 Consultation Responses

6.1 Environment Agency

6.1.1 The EA has been consulted with respect to the proposed development site and their response has been reproduced in Appendix 3.

6.1.2 In summary, the EA has not undertaken detailed flood modelling for the subject site area and holds no records of historic fluvial flooding in the vicinity. However, the absence of such records does not definitively indicate that flooding has never occurred, as the available data may not be comprehensive.

6.1.3 In addition to their response, publicly available material has been reviewed and its content has been summarised below.

Flood Map for Planning

6.1.4 The EA 'Flood Map for Planning' service indicates that the site is located within Flood Zone 1; that is, land assessed as having between less than 0.1% annual probability of river or sea flooding.

6.1.5 The respective Flood Map for Planning reports have been reproduced in Appendix 4.

Flood Risk from Rivers or the Sea

6.1.6 The EA's "Flood Risk from Rivers or the Sea" map categorises risk as follows:

- i.* High - a chance of flooding of greater than 3.3%.
- ii.* Medium - a chance of flooding of between 1% and 3.3%.
- iii.* Low - a chance of flooding of between 0.1% and 1%.
- iv.* Very Low - a chance of flooding of less than 0.1%.

6.1.7 These risk categories take into account the effect of any flood defences in the area. Where defences exist, these will reduce, but not completely stop, the chance of flooding as they can be overtopped or fail.

6.1.8 The site is depicted as having no associated risks of flooding from rivers or the sea.

6.1.9 That said, Dame End is identified as being at 'high' risk of fluvial flooding.

6.1.10 The "Flood Risk from Rivers or the Sea" map has been reproduced in Appendix 4.

Flood Risk from Surface Water

6.1.11 The EA's "Flood Risk from Surface Water" map categorises surface water flooding as follows:

- i.* High - a chance of flooding of greater than 3.3%.
- ii.* Medium - a chance of flooding of between 1% and 3.3%.
- iii.* Low - a chance of flooding of between 0.1% and 1%.
- iv.* Very Low - a chance of flooding of less than 0.1%.

6.1.12 The site is depicted as having no associated risks of flooding from surface water.

Reservoir/Failure of Infrastructure

6.1.13 The site is not located within an area depicted as being at risk or flooding from reservoirs.

Groundwater Flooding

6.1.14 The EA's "Long Term Flood Risk" service states that the groundwater flooding is unlikely in the area.

6.2 Lead Local Flood Authority (LLFA)

- 6.2.1 have been consulted with respect to the proposed development site and their response is currently awaited. Upon acquisition, their response will be reproduced within Appendix 3.

6.3 Public Sewers/Local Drainage Infrastructure

- 6.3.1 Public sewer records were not available during the preparation of this appraisal. However, given the anticipated surface water drainage strategy (see later discussion) this is not considered to be a significant omission.
- 6.3.2 For reference, the sewerage undertaker for this area is Thames Water (TW).

7 Planning Policy & Compatibility of the Proposed Development

- 7.1 Table 2 of PPG categorises the development proposals as “More Vulnerable”.
- 7.2 Table 3 of PPG indicates that More Vulnerable end uses in Flood Zone 1 are appropriate.

8 Existing Drainage

8.1 Site Specific Existing Surface Water Drainage

- 8.1.1 At the time of preparation, specific details of existing drainage were not available for review.
- 8.1.2 However, the topographical survey indicates that surface water drainage infrastructure is present.

9 Climate Change and Design Event

9.1 Lifetime of Development

- 9.1.1 For the purposes of this appraisal and adopting a conservative approach, the development is assumed to have a typical design life of 100 years.

9.2 Peak Rainfall Intensity

- 9.2.1 The table below, taken from the “Peak Rainfall Allowances Map” from EA guidance “Flood risk assessments: climate change allowances”, outlines the climate change allowances that should be applied to peak rainfall intensity when considering the Upper Lee Management Catchment.

Annual Exceedance Rainfall Event	Allowance	Total potential change anticipated for the '2050s' (up to 2060)	Total potential change anticipated for the '2070s' (2061 to 2125)
3.3% (1 in 30 years)	Central	20%	20%
	Upper end	35%	35%
1% (1 in 100 years)	Central	20%	25%
	Upper end	40%	40%

9.2.2 Development with a lifetime beyond 2100, this includes development proposed in applications or local plan allocations should include an appraisal of upper end allowances. This should include the 1% (100 year) and 3.3% (30 year) annual exceedance probability events for the 2070s epoch (2061 to 2125), albeit the 1% (100 year) event is likely to define the attenuation requirements.

9.2.3 Development with a lifetime between 2061 and 2100 should utilise a similar approach but use the central allowance for the 2070s epoch (2061 to 2125).

9.3 Design Event (Drainage)

9.3.1 Notwithstanding the design life variability, using the precautionary principal and the anticipated Regulator's prescriptive requirements, it is considered appropriate to study the development, and in particular the surface water drainage design, relative to the 1 in 100-year event, including an uplift of 40% for the effects of climate change.

9.3.2 It should be noted that this analysis must determine if the impacts of the 40% allowance are significant and lead to any unacceptable flood risks (it is not normally expected that the site would not flood in this scenario, only that if this storm were to occur the impacts would be minimal). The design may need to be modified to avoid any unacceptable risks, but may also need additional mitigation allowances, for example a higher freeboard on attenuation features and/or provision of exceedance routes.

9.3.3 An additional allowance for urban creep may be required during the design process.

9.3.4 Rainfall Runoff Management for Developments, jointly published by the Department for Food & Rural Affairs and the EA, recommends the following:

“Urban creep is now an acknowledged issue which results in an increase in runoff from an estate over time. An allowance should be made by factoring the impermeability percentage by 1.1 (10% increase) ...”

- 9.3.5 Using the precautionary principal it is recommended that the surface water drainage design includes a 10% uplift for Urban Creep.

10 Potential Sources of Flooding

10.1 General

- 10.1.1 BS 8533: 2011 “Assessing and managing flood risk in development – Code of practice” provides recommendations and guidance the assessment and management of flood risk for proposed development within the UK.
- 10.1.2 Assessment should include an appraisal of risk both to- and from- the development from all sources of flooding, including:
- i.* Tidal and fluvial flooding – flooding from main rivers, ordinary watercourses and the sea.
 - ii.* Surface water flooding – flooding from overland flow due to rainfall.
 - iii.* Flooding from sewers and drains – flooding from surcharging of below ground drainage systems.
 - iv.* Groundwater flooding – flooding related to the water table, where ground water levels rise above surface levels.
 - v.* Flooding caused by the failure of infrastructure, such as from reservoir, canal or land drainage infrastructure, usually as a result of catastrophic failure.

11 Flooding Risks to the Development

11.1 Tidal Flood Risk

- 11.1.1 The site is not located within the influence of tidal watercourses and is therefore not considered to be at risk of tidal flooding.

11.2 Fluvial Flood Risk

- 11.2.1 The site is located within Flood Zone 1; that is, land assessed as having a less than 0.1% (1 in 1000) annual probability of river or sea flooding.
- 11.2.2 However, Dame End is depicted as having ‘high’ risk of fluvial flooding. It is anticipated that access to the site will be afforded in all but extreme events and in all situations a safe refuge will be availed on site. It is recommended that occupants monitor sources of flood warning to further assist in mitigation.

11.3 Groundwater Flooding

- 11.3.1 The EA's 'Long Term Flood Risk' service states that flooding from groundwater is unlikely in the area.
- 11.3.2 However, a site-specific ground water investigation is recommended to assess the potential for groundwater to impact the site most notably where infiltration drainage solutions are proposed.

11.4 Pluvial Flood Risk

- 11.4.1 The site is identified as being at "very low" risk of surface water flooding. That is, land assessed as having a less than 0.1% (1 in 1000) annual probability of flooding from surface water.

11.5 Sewer Flooding

- 11.5.1 At the time of writing, there is a paucity of information regarding the site specific risk posed by sewer flooding.
- 11.5.2 However, given that the site is located in a rural setting and positive fall towards the highway, no significant risk is inferred.

11.6 Infrastructure/Reservoir Flood Risk

- 11.6.1 Flood risk mapping indicates that there is no risk from Infrastructure/Reservoir flooding.

12 Effect of Development on Flooding & Design Inclusions

12.1 Surface Water Drainage

- 12.1.1 It is inferred from the proposals that the hard area of the site will be reduced by approximately 450 sq.m by the introduction of gardens to the rear. Therefore, the proposed development is expected to have a reduced impact with respect to surface water runoff.
- 12.1.2 While clarification is required on how surface water is currently managed, assuming on-parcel drainage is appropriately managed, the development will not have an adverse impact on the site or surrounding area.
- 12.1.3 Appropriate management will require consideration of discharge:
 - i. Rate
 - ii. Quantity
 - iii. Quality

12.1.4 Assuming on-parcel drainage is designed:

- i.* In accordance with good practice;
- ii.* To attenuate flows to existing greenfield rates;
- iii.* To accommodate the 1 in 100 year plus 40% (for climate change) event.

The development will not have an adverse impact on surface water drainage.

12.1.5 The design of the surface water drainage system is outside of the scope of this assessment. However, Section 14 of this report provides additional guidance and commentary on surface water drainage.

12.2 Foul Water Drainage

12.2.1 The design of foul water drainage is outside of the scope of this assessment.

12.2.2 At the time of writing, there is insufficient information on how foul water drainage is managed.

12.3 Overland Flows

12.3.1 The site does not appear to be a preferential route for off-site originating overland flows.

12.3.2 Notwithstanding the above, it is recommended that doorways are, where practicable, elevated above the adjacent land to reduce the potential for water intrusion. Similarly, where practicable, preferential flow routes away from the building (e.g. by localised lowering/reprofiling of the external areas) are provided.

12.4 Floodplain/Displacement of Floodwaters

12.4.1 The development area is located within Flood Zone 1; that is, land assessed as having a less than 0.1% (1 in 1000) annual probability of river or sea flooding. Therefore, the displacement of floodwaters is not considered to be problematic.

12.4.2 Given the “very low” fluvial flood risk, it is suggested that floodplain compensation should not be a prerequisite of the development works.

12.5 Means of Access/Egress

12.5.1 Access/egress to the site is via Dane End, the new property benefits from using the neighbouring access and gaining access from the Holborn Farmhouse courtyard.

12.5.2 Based upon long-term flood risk mapping available during the preparation of this assessment, Dame End is depicted as having areas of elevated risk of surface water flooding.

- 12.5.3 However, in practicable terms, the site is likely to be afforded a means of safe escape during all but the most extreme events.

12.6 Groundwater

- 12.6.1 Groundwater is an unquantified risk; however, based upon the available information, it is not considered to be significant. However, particularly where infiltration drainage is proposed, groundwater investigation is recommended.
- 12.6.2 Consideration may also be required for construction activities, for example, drainage trenches. Where features such as permeable paving are proposed, these may require the installation of an impermeable liner where groundwater is relatively shallow.

13 Proposed Surface Water Drainage Strategy

13.1 Preface

- 13.1.1 The management and/or disposal of surface water is a material planning matter.
- 13.1.2 Building Regulations (Part H) and other contemporary guidance require that surface water should be disposed of according to the following hierarchy:
- i. Infiltration to ground.
 - ii. Discharge to a local watercourse.
 - iii. Discharge to the local sewerage network.
- 13.1.3 At the time of writing, there is an absence of information on the infiltration capacity of the underlying strata. The use of infiltration systems may be viable but required further investigation. However, given the inferred geology, including chalk and clay, it is considered unlikely that infiltration will be viable
- 13.1.4 Mindful of the above, it is considered likely that an outfall to the River Rib will be the most practicable means of disposing of surface water.
- 13.1.5 Nevertheless, the existing disposal regime should be investigated and replicated where practicable.

13.2 Sustainability: Discharge Rate and Attenuation Volume

- 13.2.1 Outlined in Section 5, the LFRMS states the following policy.

Previously developed sites should aim to discharge at the original pre-development greenfield rate for the whole site area where possible. If not, a significant reduction in the current rate of discharge should be achieved and evidence provided as to why greenfield rates are not viable.

The volume of attenuation storage that would be required for the site should be based on the 1 in 100 year critical storm duration with an allowance for climate change and the allowable discharge rate.

- 13.2.2 The UK SuDs online Greenfield Runoff Rate Estimation Tool has been used to estimate the greenfield runoff rate using the ICP SuDs methodology, from the existing site. The results are summarised in the table below:

Greenfield Runoff Rate		
Period	Runoff (l/s)*	Runoff (l/s/ha)*
Qbar	0.24	2.32
1 year	0.23	2.19
30 year	0.66	6.29
100 year	0.95	9.05
*Based on existing developed area of approximately 0.103 ha		

- 13.2.3 Given the scale of the site (0.103 ha), achieving equivalent greenfield runoff rate is considered impracticable. In order to limit the potential for blockage and accommodating attenuation, it is suggested that a minimum discharge rate, assuming a discharge to watercourse, will be in the range of 2 l/s and 4 l/s. This nominated rate should not be inferred to be deliverable and must be confirmed by the drainage designer. For example, invert levels and available space may restrict the deliverability of attenuation.
- 13.2.4 For illustrative purposes, the following table estimates the runoff from the existing development and may be used as a reference for betterment.

Existing Brownfield Runoff Rate	
Period	Runoff (l/s)
1 year	28.2
30 year	64.4
100 year	80.3
Based on existing developed area of approximately 0.103 ha Approximate estimating only. Detailed network modelling not undertaken.	

- 13.2.5 For guidance, Causeway Flow's Quick Storage Estimate tool has been used to calculate the required volume of attenuation for a range of outfall scenarios. The table below summarises findings:

Required Attenuation Volumes Based off 0.058 ha*	
Discharge Rate (l/s)	100 year + 40% Attenuation *** (cu.m)
2.00 (Greenfield)**	20 – 30
*It is inferred from proposals that the hard drained area will be reduced from 0.103 ha to 0.056 ha. **2 l/s/ha assumed as practicable minimum. Where discharge rate exceeds 2 l/s, it is to be based upon a pro-rata allowance of Qbar for the development area. Simple, single rate control used. ***Based upon FSR inputs.	

- 13.2.6 The attenuation estimate is based on Flood Studies Report (FSR) inputs. Where the site is designed using Flood Estimation Handbook (FEH) derived storm events, attenuation is generally 10% to 20% greater than that for FSR events. However, during detailed design, it is often found that FEH attenuation provisions are at the upper end of the generic FSR estimates.
- 13.2.7 Refer to Appendix 5 for reproductions of calculations.

13.3 Sustainability: Discharge Volume

- 13.3.1 In the absence of infiltration, as the drained area increases, the volume of water disposed off-site will also increase. Given the proposals depict a reduction in the hard-drained area, it is expected that the surface water discharge volume will similarly be reduced.
- 13.3.2 Nevertheless, controlling the volume of runoff from the site can be a significant contributor when considering off-site flood risks.
- 13.3.3 LLFA typically require:
- Discharge rates to mimic existing greenfield runoff rates for the 1:1 year, 1:30 year, and 1:100-year storm events, provided that long-term storage is utilized for flow volumes exceeding the greenfield volume for the 1:100-year, 6-hour event.
 - The long-term storage volume must discharge at a rate no greater than 2 l/s/ha and the total flow rate must not exceed the 1:100-year greenfield flow rate.
 - If long term storage is not designed for, Qbar should be applied to all events.

13.3.4 Using the precautionary principle, it is assumed that discharge will be restricted Q_{bar} for all events (i.e. simple controls used). Where this is the case, the LLFA's requirements are likely to be achieved without significant additional consideration of long term attenuation. However, this assertion should be verified, and remedied if appropriate, during the detailed drainage design process.

13.4 Sustainability: Discharge Quality and Inclusion of Sustainable Drainage Systems (SuDS)

13.4.1 The management of water quality is a significant issue, and it is envisaged that measures will be required.

13.4.2 CIRCIA C753 "The SuDS Manual" provides guidance of treatment measures (also known as the treatment train) required to offset contaminant and sediment loads.

13.4.3 The following is for indicative purposes only and it is envisioned that this design philosophy be further developed upon detailed design.

13.4.4 For ease of reference, the following information has been sourced from the CIRCIA C753 "The SuDS Manual". To ensure that appropriate SuDS are implemented, it is advised that the simple index approach be adopted as outlined in box 26.2 in the CIRCIA C753 "The SuDS Manual". The following tables have been sourced from the SuDS Manual.

13.4.5 Pollution Hazard Indices are given for different land uses in "Table 26.2" of the SuDS Manual. For ease of reference, the table has been reproduced below.

13.4.6 The SuDS manual recommends that the selected SuDS components should have a total SuDS Mitigation Index for each contaminant type that either equals or exceeds the Pollution Hazard Index to provide adequate treatment. The following will have to be achieved for the surface water running off the site:

Total SuDS mitigation index $\geq$ pollution hazard index

TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways ¹	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways ¹	High	0.8 ²	0.8 ²	0.9 ²

Notes

- 1 Motorways and trunk roads should follow the guidance and risk assessment process set out in Highways Agency (2009).
- 2 These should only be used if considered appropriate as part of a detailed risk assessment – required for all these land use types (Table 4.3). When dealing with high hazard sites, the environmental regulator should first be consulted for pre-permitting advice. This will help determine the most appropriate approach to the development of a design solution.

Where a site land use falls outside the defined categories, the indices should be adapted (and agreed with the drainage approving body) or else the more detailed risk assessment method should be adopted.

Where nutrient or bacteria and pathogen removal is important for a particular receiving water, equivalent indices should be developed for these pollutants (if acceptable to the drainage approving body) or the risk assessment method adopted.

13.4.7 The SuDS mitigation index has been obtained from Table 26.3 of the SuDS Manual (for surface water) which summarises the mitigation indices associated with SuDS components. For ease of reference, the table has been reproduced below.

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters

Type of SuDS component	Mitigation indices ¹		
	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4 ²	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond ⁴	0.7 ³	0.7	0.5
Wetland	0.8 ³	0.8	0.8
Proprietary treatment systems ^{5,6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Notes

- 1 SuDS components only deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters.
- 2 Filter drains can remove coarse sediments, but their use for this purpose will have significant implications with respect to maintenance requirements, and this should be taken into account in the design and Maintenance Plan.
- 3 Ponds and wetlands can remove coarse sediments, but their use for this purpose will have significant implications with respect to the maintenance requirements and amenity value of the system. Sediment should normally be removed upstream, unless they are specifically designed to retain sediment in a separate part of the component, where it cannot easily migrate to the main body of water.
- 4 Where a wetland is not specifically designed to provide significantly enhanced treatment, it should be considered as having the same mitigation indices as a pond.
- 5 See Chapter 14 for approaches to demonstrate product performance. A British Water/Environment Agency assessment code of practice is currently under development that will allow manufacturers to complete an agreed test protocol for systems intended to treat contaminated surface water runoff. Full details can be found at: <http://tinyurl.com/q77yuj7>
- 6 SEPA only considers proprietary treatment systems as appropriate in exceptional circumstances where other types of SuDS component are not practicable. Proprietary treatment systems may also be considered appropriate for existing sites that are causing pollution where there is a requirement to retrofit treatment. SEPA (2014) also provides a flowchart with a summary of checks on suitability of a proprietary system.

13.4.8 To summarise, the Simple Index approach should be adopted to ensure that appropriate SuDS components are implemented within the proposed development to ensure that the water quality control is appropriately addressed.

13.4.9 Permeable surfacing, green/blue roofs, filter strips and basins provide treatment and should be incorporated wherever practicable.

13.4.10 The following commentary is offered in respect of water quality inclusions:

13.4.11 Roofs

No specific pollution mitigations are anticipated for these areas but is dependent upon material usage. The use of catchpits is recommended to limit the passage of 'fines' and detritus.

13.4.12 Permeable Hard Surfacing

Where access and parking are constructed as a permeable surfacing, it is anticipated that the permeable surfacing and sub-base will provide suitable pollution mitigation.

It is recommended that access/parking is constructed from permeable surfacing, even where infiltration is impracticable.

At the time of reporting, all significant areas of hard paving are proposed as being constructed with a permeable surfacing.

13.5 Operation and Maintenance

13.5.1 The long-term efficacy of any installed drainage system will be compromised by a lack of maintenance.

13.5.2 During the detailed design stage, consideration should be given to the maintenance of any proposed system. It is recommended that a drainage maintenance regime is developed and provided in an "Operation and Maintenance Manual" for the scheme which should conform to the requirements set out within CIRIA C753 The SuDS Manual.

13.5.3 Refer to Appendix 6 for typical considerations.

14 Further Actions

14.1 Infiltration Potential

14.1.1 The infiltration potential of the underlying soils should be investigated in order to formally confirm inferences made from generic, published information. This will have a significant influence upon the drainage strategy.

14.2 Groundwater Monitoring

- 14.2.1 The risk (both in the completed works and during construction) cannot be eliminated based upon the information currently held and it is recommended that the depth to groundwater is established and that it is monitored during the winter period for potential fluctuation.
- 14.2.2 The groundwater regime may be particularly influential when determining the viability of infiltration devices, including permeable paving Types A, B and C to BS 7533-13-2009.

14.3 Drainage Connectivity Survey

- 14.3.1 Additional evidence of the existing surface and foul water drainage regimes should be obtained.
- 14.3.2 Quantifiable evidence of existing discharges may be required by the Regulators when negotiating outfall rates, particularly where discharge in excess of the minimum is being sought.

14.4 Lead Local Flood Authority (LLFA) Discharge Constraints

- 14.4.1 Confirm with the LLFA the required allowance to be incorporated within the surface water drainage strategy for:
 - i. Urban Creep; and,
 - ii. Discharge rates/design storm including potential for a betterment over existing for a discharge into the adjacent watercourse to the west.
- 14.4.2 The LLFA should also be contacted in order to formally confirm the acceptability of access/egress flood risks and any associated mitigations, e.g. 'safe on site' practices, live communication of access difficulties and/or available routes to users.

15 Conclusions

- 15.1 The site is irregular in shape and occupies an area of approximately 1,027 m² and is located within a rural setting.
- 15.2 The development plans include converting the barn into a two-storey dwelling while maintaining the existing building footprint and demolishing the existing concrete areas.
- 15.3 It is anticipated that the proposed development will result in a hard-drained area of approximately 561 m².
- 15.4 The site exhibits a general slope from northeast to southwest, with ground levels varying from approximately 137.5 mAOD to 134.7 mAOD.

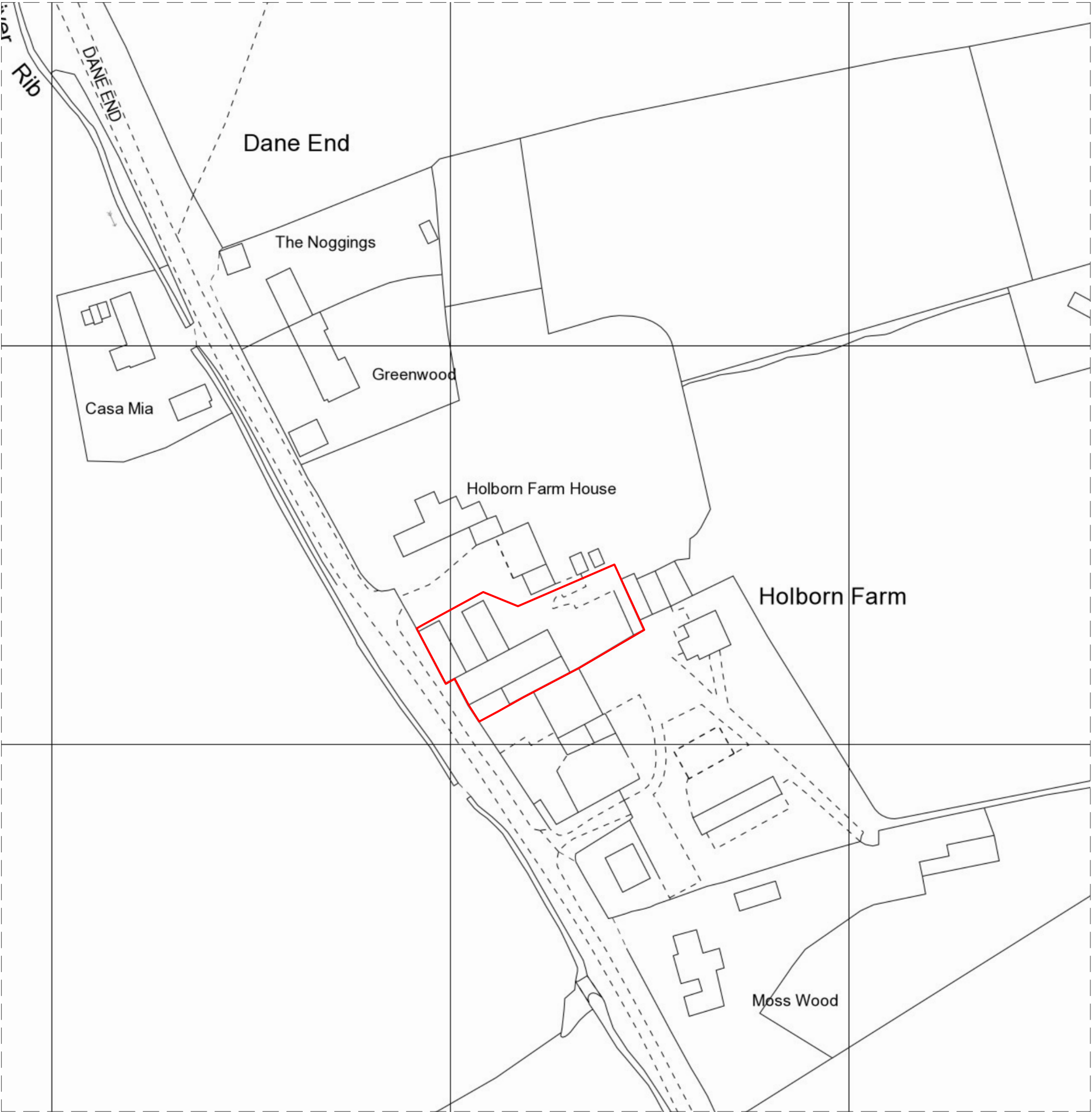
- 15.5 There nearest main river is a tributary to the River Rib, which is located approximately adjacent to the site, across Dane End. There are no other ordinary watercourses identified within close proximity to the site.
- 15.6 The EA 'Flood Map for Planning' service indicates that the site is located within Flood Zone 1; that is, land assessed as having between less than 0.1% annual probability of river or sea flooding.
- 15.7 Table 2 of PPG categorises the development proposals as "More Vulnerable".
- 15.8 Table 3 of PPG indicates that More Vulnerable end uses in Flood Zone 1 are appropriate.
- 15.9 Dame End is depicted as having 'high' risk of fluvial flooding. It is anticipated that access to the site will be afforded in all but extreme events and in all situations a safe refuge will be availed on site. It is recommended that occupants monitor sources of flood warning to further assist in mitigation.
- 15.10 The site is identified as being at "very low" risk of surface water flooding. That is, land assessed as having a less than 0.1% (1 in 1000) annual probability of flooding from surface water.
- 15.11 The EA's 'Long Term Flood Risk' service states that flooding from groundwater is unlikely in the area. However, a site-specific ground water investigation is recommended to assess the potential for groundwater to impact the site most notably where infiltration drainage solutions are proposed.
- 15.12 At the time of writing, there is a paucity of information regarding the site specific risk posed by sewer flooding. However, given that the site is located in a rural setting and positive fall towards the highway, no significant risk is inferred.
- 15.13 The existing surface water drainage regime is unknown and requires further investigation. Infiltration and/or outfall to nearby watercourse are consider the most likely outfalls. It is expected that the proposed development will maintain that regime.
- 15.14 At the time of writing, there in an absence of information on the infiltration capacity and groundwater regime of the underlying strata. The use of infiltration systems may be viable but required further investigation. However, given the inferred geology, including chalk and clay, it is considered unlikely that infiltration will be viable.
- 15.15 The LFRMS outlines the following salient policy:
- "Previously developed sites should aim to discharge at the original pre-development greenfield rate for the whole site where possible. If not, a significant reduction in the current rate of discharge should be achieved and evidence provided as to why greenfield rates are not viable."*

The volume of attenuation storage that would be required for the site should be based on the 1 in 100 year critical storm duration with an allowance for climate change and the allowable discharge rate.”

- 15.16 The design of surface water (and foul water) drainage is outside of the scope of this appraisal. Nevertheless, informative comment on discharge rate, attenuation volumes and management of discharge quality has been included herein. The drainage designer is to agree such details with the appropriate Regulator. Overall, with respect to flood risk, the site is considered:
- i. To be a Minor Development;
 - ii. To be at very low risk of fluvial flooding;
 - iii. To be at very low risk of surface water flood risk,
 - iv. To have restricted access during extreme events but providing safe refuge at all times, and,
 - v. To require surface water attenuation of both quantity and quality.

Appendix 1

- Site Location Plan
- Proposed Site Plan
- Proposed Catchment Plan



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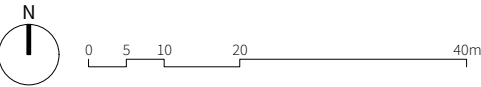
All dimensions are to be checked on site by the contractor. Do not scale this drawing. Any errors or omissions are to be reported to the Architect immediately.

This drawing is to be read in conjunction with all the relevant drawings and / or specialists' drawings / documents, any discrepancies or variations to be notified

The contractor shall submit setting out drawings to the Architect for approval, without which, manufacture shall not commence. All work must comply with relevant British Standards and current Building Regulations.

Key

Application site boundary



Revisions

P1 24/04/2025 Planning Issue

PLANNING

Client: Leon Cassidy & Hannah West

Project: Holborn Barn

Scale: 1:1000 @ ISO A3

Date: 22/04/2025

100-Site Location Plan



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The contractor shall submit setting out drawings to the Architect for approval, without which, manufacture shall not commence. All work must comply with relevant British Standards and current Building Regulations.

-  Site boundary
- Proposed - Turf
-  Proposed - Hardstanding (permeable)
-  Proposed - Gravel Driveway and parking (permeable)
- Demolition
- Section Location

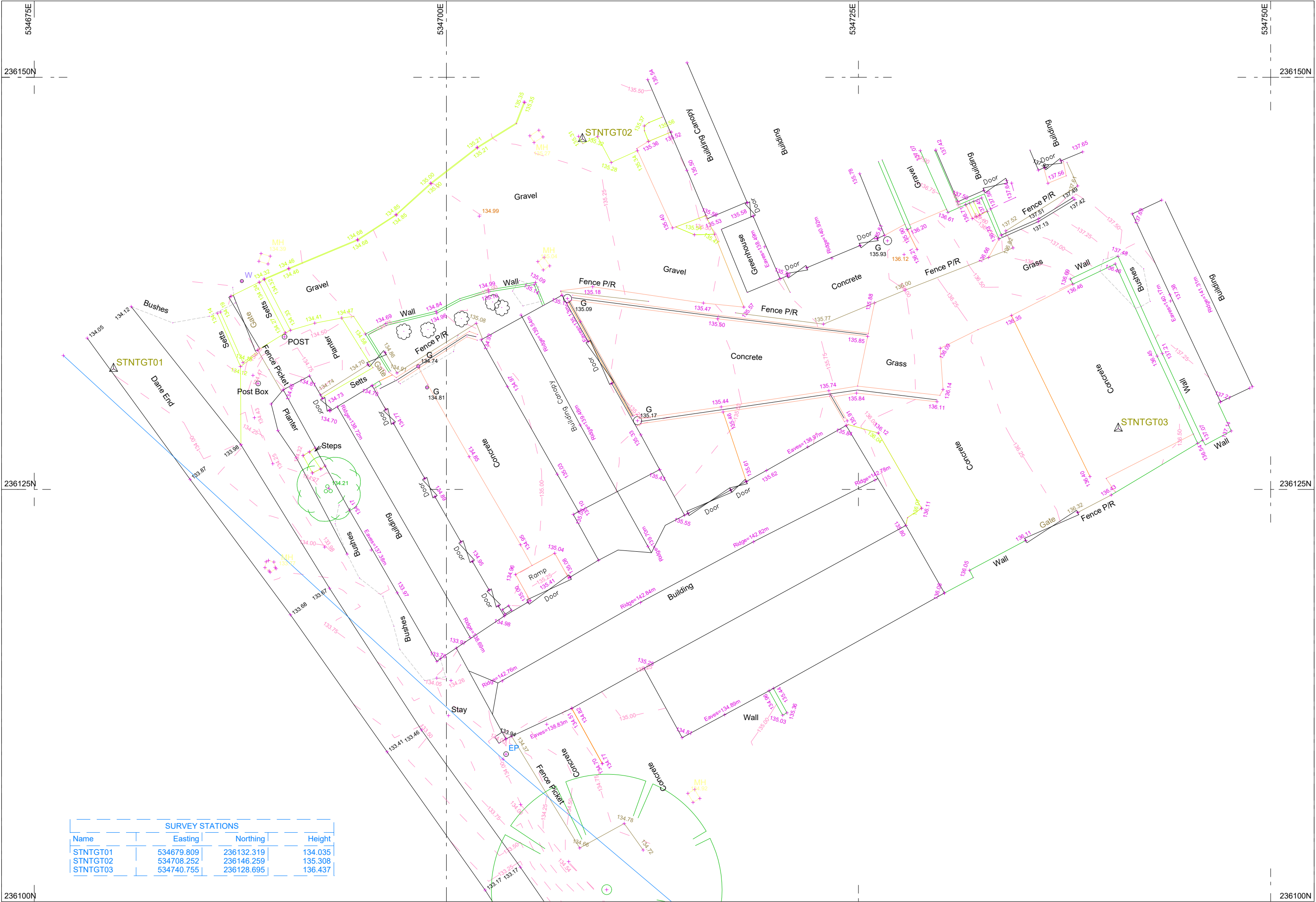
P1 24/04/2025 Planning Issue

Client:	Leon Cassidy & Hannah West
Project:	Holborn Barn
Scale:	1:200 @ ISO A2
Date:	22/04/2025

300-Pr Site Plan

Unit 2, Foundry Mews / Barnes / London / SW13 9AZ

Appendix 2 ▪ Topographical Survey



SURVEY STATIONS			
Name	Easting	Northing	Height
STNTGT01	534679.809	236132.319	134.035
STNTGT02	534708.252	236146.259	135.308
STNTGT03	534740.755	236128.695	136.437

Appendix 3

- EA Consultation Response
- LLFA Consultation Response (Awaited)

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for people and wildlife



George Innes

george.innes@hspconsulting.com

Our ref: EIR2025/01026

Your ref: 250311/EC03 C4547 -
FS1080

Date: 24 March 2025

Dear George Innes,

RE: Environmental Information Regulations: EIR2025/01026

Thank you for your request for information regarding 250311/EC03 C4547 - FS1080 Product 4 & Product 8 - Holborn Farmhouse Barn, which we received on 10 March 2025.

We respond to requests for information that we hold under the Environmental Information Regulations 2004 (EIR).

Unfortunately we have not carried out any detailed flood modelling in the area you have requested. We are not able to confirm your flood levels without any modelling in place.

Our Flood Map in this area is formed of national generalised modelling which was used in 2004 to create fluvial floodplain maps on a national scale. This data was later improved using a more detailed terrain model for the area. This modelling is not a detailed local assessment; it is used to give an indication of areas at risk from flooding. In the future we may carry out detailed modelling in this area, but we do not currently have any plans to do so.

We do not hold records of historic flooding events from rivers and/or the sea affecting the area local to this site. However, please be aware that this does not necessarily mean that flooding has not occurred here in the past, as our records are not comprehensive.

Please see below some links where you can make your own flood map for planning map, the asset and defences map/data.

Following the Flood and Water Management Act 2010, Lead Local Flood Authorities are responsible for the management of groundwater and surface water flooding.

They also maintain a register of property flooding incidents. You may want to seek further advice from the Lead Local Flood Authority Hertfordshire County Council who may have further information.

You can look up further information about your risk from flooding using the following link [Check the long term flood risk for an area in England - GOV.UK](#).

This information is provided subject to the [Open Government Licence](#), which you should read.

Here is the link to the climate change allowances:

<https://www.gov.uk/government/publications/peak-river-flow-climate-change-allowances-by-management-catchment>

Further details about the Environment Agency information supplied can be found on the GOV.UK website: <https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather>

If you have requested this information to help inform a development proposal, then you should note the information on GOV.UK on the use of Environment Agency Information for Flood Risk Assessments

<https://www.gov.uk/planning-applications-assessing-flood-risk>

<https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion>

You can also view and print surface water flood maps online at:

<http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?topic=ufrmsw#x=357683&y=355134&scale=2>

Data Available Online

Many of our flood datasets are available online

- Flood Map For Planning ([Flood Zone 2](#), [Flood Zone 3](#), [Flood Storage Areas](#))
- Risk of flooding from rivers and sea and surface water - [Check the long term flood risk for an area in England - GOV.UK](#)
- Download the risk of flooding from surface water [Risk of Flooding from Surface Water](#)
- [Risk of Flooding from Rivers and Sea](#)
- [Historic Flood Map](#) and [Recorded Flood Outlines](#) - data.gov.uk

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for people and wildlife



- View details on [Assets and Defences](#)
- [Current Flood Warnings](#)
- [Sign up for flood warnings - GOV.UK](#)
- [Open data](#)

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Yours sincerely,

James Hammett
HNL Area Customers and Engagement Team

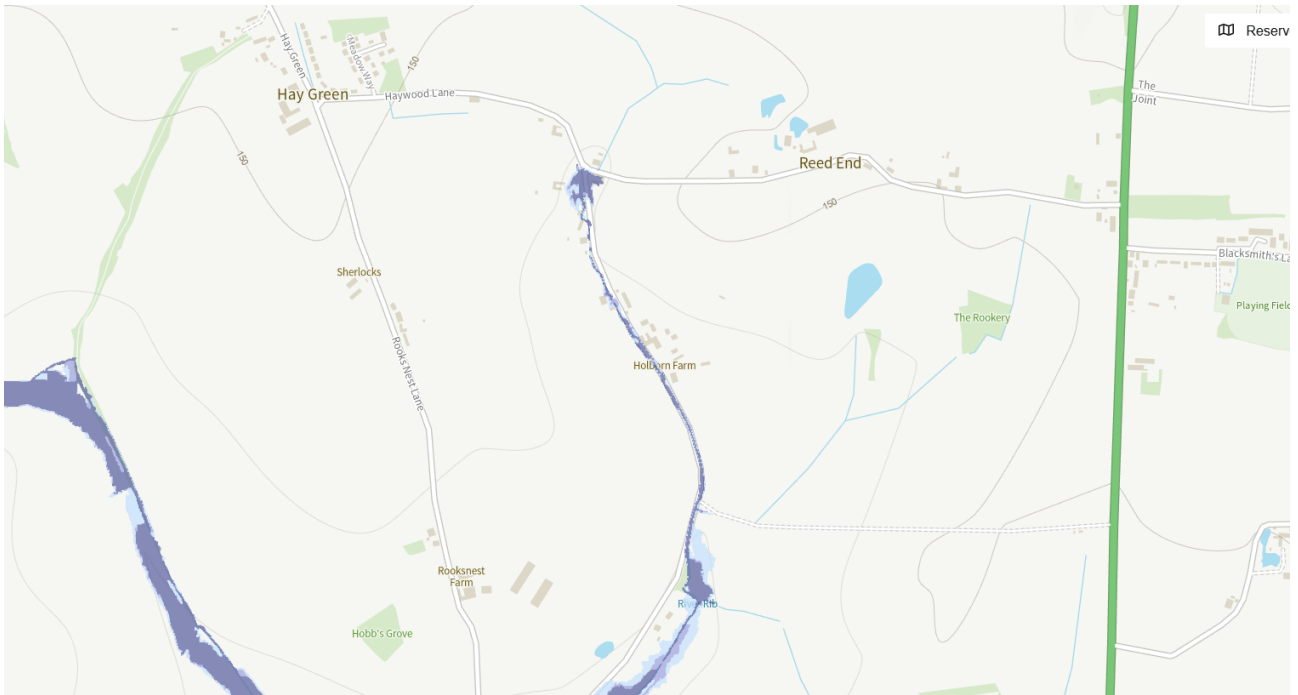
Appendix 4

- Flood Map For Planning
- Long Term Flood Risk Mappings

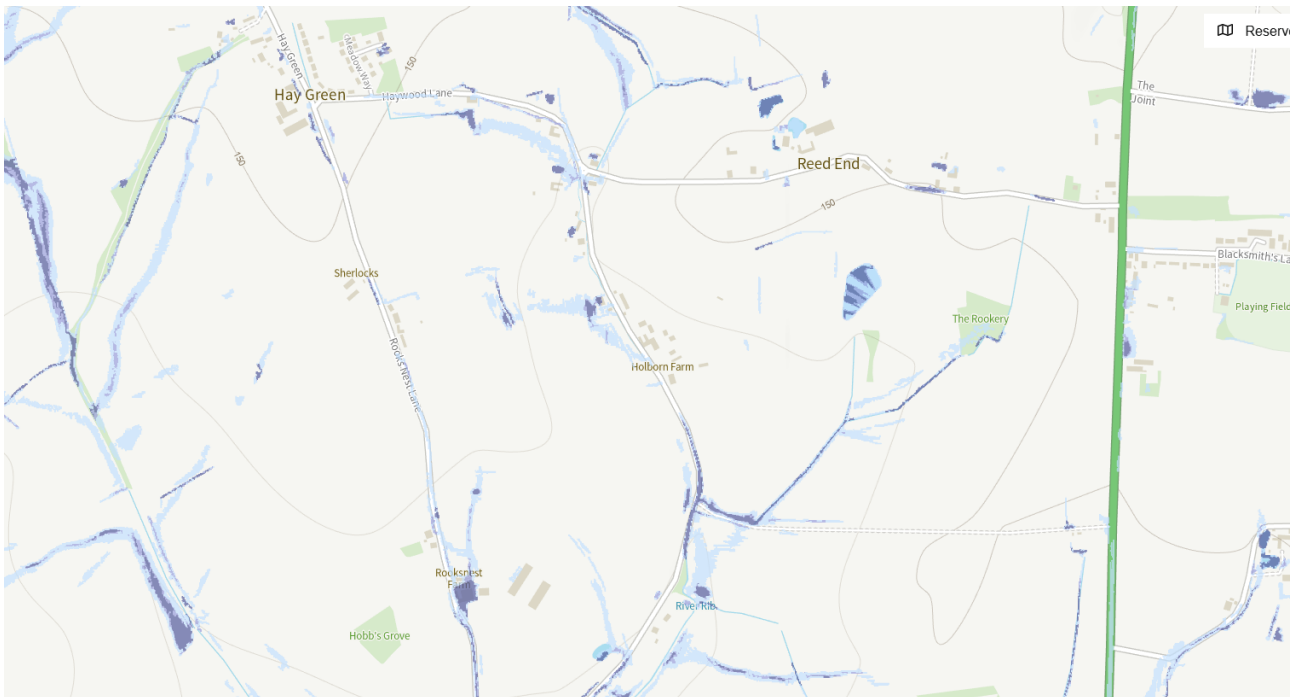
Extracts from Long Term Flood Risk Mapping

<https://check-long-term-flood-risk.service.gov.uk/>

Extent of flooding from rivers or the sea



Extent of flooding from surface water



Maximum extent of flooding from reservoirs



Surface Water Mapping Keys

Extent:

- High risk**
More than 3.3% chance each year
- Medium risk**
Between 1% and 3.3% chance each year
- Low risk**
Between 0.1% and 1% chance each year

Rivers and Sea Mapping Key

Extent:

- High risk**
More than 3.3% chance each year
- Medium risk**
Between 1% and 3.3% chance each year
- Low risk**
Between 0.1% and 1% chance each year
- Very low risk**
Less than 0.1% chance each year

Reservoirs Key

Extent:

- When river levels are normal**
- When there is also flooding from rivers**

Notes:

Site boundary is to be inferred from 'flood map for planning'.

All extracts taken April 2025.

Flood map for planning

Your reference
Holborn Barn

Location (easting/northing)
534719/236125

Created
11 April 2025 14:09

Your selected location is in flood zone 1, an area with a low probability of flooding.

You will need to do a flood risk assessment if your site is **any of the following**:

- bigger than 1 hectare (ha)
- in an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence which sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3>

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2025 AC0000807064. <https://flood-map-for-planning.service.gov.uk/os-terms>



Flood map for planning

Your reference
Holborn Barn

Location (easting/northing)
534719/236125

Scale
1:2,500

Created
11 Apr 2025 14:09

-  Selected area
-  Flood zone 3
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Water storage area



0 20 40 60m

Appendix 5

- Greenfield Rates
- Brownfield Runoff Rates
- Attenuation Estimates



Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (<https://www.uksuds.com/>)

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	29/04/2025
Calculated by	
Reference	
Model version	2.0.0

Location

Site name	Holborn Farm
Site location	Therfield



Site easting	534723
Site northing	236121

Site details

Total site area (ha)	0.1035	ha
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Greenfield runoff

Method

Method	FEH statistical	
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FEH statistical

	<u>My value</u>		<u>Map value</u>	
SAAR (mm)	620mm	☐	620	
BFIHOST	0.47			
QMed-QBar conversion	1.124	☐	1.124	
QMed (l/s)	0.235l/s			
QBar (FEH statistical) (l/s)	0.26l/s			

Growth curve factors

	<u>My value</u>		<u>Map value</u>	
Hydrological region	5	☐	5	
1 year growth factor	0.87			
2 year growth factor	0.89			
10 year growth factor	1.65			
30 year growth factor	2.45			
100 year growth factor	3.56			
200 year growth factor	4.21			

Results

Method	FEH statistical	
Flow rate 1 year (l/s)	0.23l/s	
Flow rate 2 year (l/s)	0.24l/s	
Flow rate 10 years (l/s)	0.44l/s	
Flow rate 30 years (l/s)	0.65l/s	
Flow rate 100 years (l/s)	0.94l/s	
Flow rate 200 years (l/s)	1.1l/s	

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.0.0) developed by HR Wallingford and available at uksuds.com (<https://www.uksuds.com/>). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at [uksuds.com/terms-conditions](https://www.uksuds.com/terms-conditions) (<https://www.uksuds.com/terms-conditions>). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

Brownfield Discharge Rate

Estimated using Causeway Flow

Pre-development discharge

Site Makeup	Brownfield ▼
Brownfield Method	MRM ▼
Contributing Area (ha)	0.104
PIMP (%)	100
CV	1.000
Time of Concentration (mins)	2.00
Betterment (%)	0
Calc	

Return Period (years)	Q (l/s)
1	28.2
30	64.4
100	80.3

Surface Water Attenuation

Estimated using Causeway Flow

Storage Estimate

Return Period (years)	100
Climate Change (%)	40
Impermeable Area (ha)	0.059
Peak Discharge (l/s)	2.320
Infiltration Coefficient (m/hr) (leave blank if no infiltration)	
Required Storage (m³)	Calc
from	20
to	30

Notes

1. 2 l/s/ha assumed as practicable minimum outfall. Where discharge rate exceeds 2 l/s, it is to be based upon a pro-rata allowance of Qbar for the development area.
2. Simple, single rate control used.
3. It is inferred from proposals that the hard drained area will be reduced from 0.104 ha to 0.059 ha.

Appendix 6 Drainage Maintenance Schedule

Manholes and Inspection Chambers

Description

Manholes providing rodding and jetting access to pipe work.

Typically manholes, in distinction to inspection chambers, are designed to allow for operatives to access. Manholes should only be accessed following a risk assessment, and the specification of the safe system of work, paying regard to confined space risks.

Maintenance Issues

Manholes are unlikely to present maintenance issues in themselves. However, they provide access to the drainage infrastructure and allow visual inspection from the surface of any major maintenance issues.

Maintenance Regime

Schedule	Action Required	Frequency
Routine/regular maintenance (including inspections and monitoring)	Lift covers and ensure that there are no blockages. Inspect and identify any parts that are not operating correctly and remediate.	For 3 months following installation
	Ensure covers are in a good state of repair.	Monthly
	Inspect manholes, and inspection chambers, to ensure that the drainage is running freely.	Six Monthly and every autumn after leaf fall
Occasional maintenance	Suction sweeping and cleansing (to WRC Jetting Code of Practice) and CCTV where necessary.	Every 2 – 4 Years
Remedial maintenance	• Silt removal. • Inlet/outlet repair. • Erosion repairs. • System rehabilitation following a pollution event. • Manhole Cover Replacement. • Repairs to brickwork or concrete. • Chanel repair.	As required (tasks to repair problems due to wear, damage or vandalism).

Catchpits

Description

Catchpits are similar to manholes but include a sump to the base which is designed to capture silt and prevent it reaching other parts of the drainage network. Catchpits provide a convenient location to remove silt from drainage networks. Catchpits should only be accessed following a risk assessment, and the specification of the safe system of work, paying regard to confined space risks.

Maintenance Issues

If the silt captured in catchpits is not removed regularly it will cause silt to migrate downstream to other part of the drainage network, some of which may be less accessible, or inaccessible.

Maintenance Regime

Schedule	Action Required	Frequency
Routine/regular maintenance (including inspections and monitoring)	Lift manhole covers and ensure that there are no blockages.	For 3 months following installation
	Inspect and identify any parts that are not operating correctly and remediate.	
	Inspect silt storage in sump. Remove silt as required using subcontractor with vacuum extraction plant.	
	Ensure covers are in a good state of repair. Repair/replace as necessary.	Monthly
	Inspect catchpits to ensure that the drainage is running freely, and free of debris.	Six Monthly and every autumn after leaf fall
	Inspect silt storage in sump. Remove silt as required using subcontractor with vacuum extraction plant.	
Occasional maintenance	Suction sweeping and cleansing (to WRC Jetting Code of Practice) and CCTV where necessary.	Every 2 – 4 Years
	Remediate any chamber structural defects, or any defects that may reduce the free flow of water.	
Remedial maintenance	• Silt removal. • Inlet/outlet repair. • Erosion repairs. • System rehabilitation following a pollution event. • Manhole Cover Replacement. • Repairs to brickwork or concrete.	As required (tasks to repair problems due to wear, damage or vandalism).

Linear Drains

Description

Surface Water is drained over impermeable areas towards grated, or slot-type linear drains at low points and water is conveyed to below ground pipework.

Maintenance Issues

Linear drains can become blocked by silt or debris, causing flooding.

Linear drains often include silts traps at outlets which can cause siltation of downstream drainage infrastructure if not maintained adequately.

Maintenance Regime

Schedule	Action Required	Frequency
Routine/regular maintenance (including inspections and monitoring)	Inspect linear drains to ensure that there are no blockages at surface level.	For 3 months following installation
	Lift covers to outflow boxes and check for blockages or siltation.	
	Inspect and identify any parts that are not operating correctly and remediate.	
	Inspect linear drains to ensure that there are no blockages at surface level.	Monthly
	Lift covers to outflow boxes and check for blockages or siltation.	Six Monthly and every autumn after leaf fall
Occasional maintenance	Jetting of linear drains and suction vacuuming of outlet boxes (to WRC Jetting Code of Practice). CCTV where necessary.	Every 1 – 2 Years
Remedial maintenance	• Silt removal. • Inlet/outlet repair. • Erosion repairs. • System rehabilitation following a pollution event. • Linear drain cover replacement. • Chancel repair. • Ensure that impermeable surfaces surrounding linear drains have not settled below top of linear drain level, causing ponding.	As required (tasks to repair problems due to wear, damage or vandalism).

Gullies

Description

Surface Water is drained over impermeable areas towards grated gullies at low points, from where water is conveyed to below ground pipework.

Maintenance Issues

Gullies can become blocked by silt or debris, causing flooding.

Gullies include integral silt traps which can cause siltation of downstream drainage infrastructure if not adequality maintained.

Gullies often include a trapped outlet which prevents liquids lighter than water (ie oil and fuel) leaving the gully. If silt and light liquids are not removed regularly silt and oil will migrate downstream to other part of the drainage network, some of which may be less accessible, or inaccessible.

Maintenance Regime

Schedule	Action Required	Frequency
Routine/regular maintenance (including inspections and monitoring)	Inspect to ensure that there are no blockages at surface level, and that the outfall is operating effectively.	For 3 months following installation
	Inspect and identify any parts that are not operating correctly and remediate.	
	Ensure that there are no blockages at surface level.	Monthly
	Lift covers to check for blockages or siltation.	Six Monthly and every autumn after leaf fall
Occasional maintenance	Remove oil and silt using specialist vacuum extraction plant.	Every 1 – 2 Years
Remedial maintenance	• Silt removal. • Inlet/outlet repair. • Erosion repairs. • System rehabilitation following a pollution event. • Cover replacement. • Structural failure of gully pot. • Ensure that impermeable surfaces surrounding linear drains have not settled below top of gully cover level, causing ponding.	As required (tasks to repair problems due to wear, damage or vandalism).

Pipework

Description

Below ground drainage pipework connects drainage inlets (gullies, linear drains etc) to manholes and also provides connections between manholes.

Maintenance Issues

Pipes can become blocked by silt, debris fat, grease, or suffer structural collapse. It is also possible for pipe joints to become displaced or for roots to grow from the surrounding ground into pipes.

These factors cause a reduction in, or loss of, the hydraulic capacity of the pipes which can in turn cause flooding to land and buildings.

Defects in pipes can also cause a reduction in stability to ground underlying foundations, which can cause settlement and damage to buildings and external surfaces.

The material of pipes and associated couplings can be degraded if aggressive liquids are passed through the pipes.

It is recommended that trees are not planted within 3m of pipes to minimise the risk of root ingress.

Maintenance Regime

Schedule	Action Required	Frequency
Routine/regular maintenance (including inspections and monitoring)	Inspect and identify any parts that are not operating correctly and remediate.	For 3 months following installation
	Monitor working of drainage at ground level. Evidence of damage to pipework may include localised flooding or emission of smells.	Monthly
	Lift manholes covers to check for blockages.	Six Monthly
Occasional maintenance	CCTV pipework, clean to WRC Sewer Jetting Code of Practice. Remediate as necessary.	Every 1 – 2 Years
Remedial maintenance	• Silt removal. • Fat and Grease removal. • Erosion repairs. • Joint displacement. • Structural failure, cracking or collapse. • System rehabilitation following a pollution event.	As required (tasks to repair problems due to wear, damage or vandalism).

Vortex Controls

Description

Vortex controls, often called Hydrobrakes, are installed in some manholes to restrict the rate of flow. Vortex controls are usually constructed in steel and are installed in a manhole with a sump.

Maintenance Issues

Vortex controls can become blocked by debris, plastic bags or other sheet material. If silt is allowed build up in the sump the operation of the device can be hampered causing flooding upstream.

Maintenance Regime

Schedule	Action Required	Frequency
Routine/regular maintenance (including inspections and monitoring)	Refer to manufacturer's specification.	For 3 months following installation
	Inspect and identify any parts that are not operating correctly, consult supplier and remediate as required.	
	Monitor working of drainage at ground level.	Monthly
	If there is localised flooding check the condition of all system elements.	
	Lift manholes covers to check for blockages.	Six Monthly and every autumn after leaf fall etc.
	Remove sediment from pre-treatment structures, gullies, catchpits etc.	
Occasional maintenance	Clean to WRC Sewer Jetting Code of Practice. Remediate as necessary.	Every 1 – 2 Years
Remedial maintenance	Inspect, and carry out remediation works to ensure that the features are in fully working order.	As required (tasks to repair problems due to wear, damage or vandalism).

Geocellular Attenuation Storage

Description

Geocellular storage systems are modular plastic units with a high porosity that can be used to efficiently create a below-ground structure for the temporary storage of surface water before being released.

Maintenance Issues

The main maintenance issue with geocellular attenuation storage is the prospective build up of silt within the units. It is imperative that the upstream and downstream catchpits are inspected and emptied regularly to prevent the ingress of silt into the system.

Maintenance Regime

Schedule	Action Required	Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	For 3 months following installation, then annually.
	Remove debris from the catchment surface (where it may cause a risk to performance)	Monthly
	For systems where rainfall infiltrate into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary	Annually
	Remove Sediment from pre-treatment structures and/or internal forebays.	Annual, or as required
Remedial Actions	Repair/rehabilitate inlets, outlets, overflows and vents.	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of tank for sediment build-up and remove if necessary.	Every five years or as required

Petrol Interceptors/Oil Separators

Description

Petrol interceptors, also called oil separators, separate out light liquids, such as oil or fuel, and silt and grit. The purpose of the separation is to prevent oil and silt (which may contain heavy metals) polluting watercourses downstream.

Maintenance Issues

For a separator to operate effectively, and prevent pollutants leaving a site, it is necessary to remove the contained oil and silt on a regular basis. It is recommended that maintenance is proactive, rather than waiting for any installed alarm to highlight the need for emptying. The party responsible for maintenance, usually the owner or occupier, should consult the manufacturer to determine a suitable maintenance regime. Oil and silt should only be removed by a licenced contractor.

Maintenance Regime

Activity	Action Required	Frequency
Routine/regular maintenance (including inspections and monitoring)	Refer to manufacturer's specification.	For 3 months following installation
	Inspect and identify any parts that are not operating correctly and remediate.	
	Monitor working of drainage at ground level. If there is localised flooding check the condition of all system elements.	Monthly
Routine/regular maintenance (including inspections and monitoring)	• Check volume of sludge/silt. • Check thickness of light liquid. • Check function of automatic closure device. • Empty the separator, if required. • Check the coalescing material and clean or change if necessary (Class 1 only). • Check the function of the warning device (if fitted).	Six Monthly and every autumn after leaf fall
Occasional maintenance	• Consult manufacturer to obtain details of an approved separator maintenance contractor. • Check watertightness of system. • Check structural condition. • Check internal coatings. • Check built-in parts • Check electrical devices and installations. • Adjust automatic closure devices.	5 Yearly Maximum
Remedial maintenance	Inspect, and carry out remediation works to ensure that the features are in fully working order.	As required

Soakaways, Infiltration Trenches and Blankets

Description

There are many different types of drainage components that can be used to facilitate infiltration. These include soakaways, trenches, and blankets.

Maintenance Issues

Soakaways, Trenches and Blankets should include monitoring points where the water level in the system can be observed and monitored. The useful life and effective operation of an infiltration component is related to the frequency of the of maintenance and the risk of sediment being introduced into the system.

Maintenance Regime

Activity	Action Required	Frequency
Regular Maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Half yearly: spring (before nesting season) and autumn
Occasional maintenance	Remove sediment and debris from pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings.	As required, based on inspections
Remedial actions	Reconstruct soakaway and/or replace or clean void fill, if performance deteriorates or failure occurs.	As required
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year then annually
	Check soakaway to ensure emptying is occurring	Annually

Filter Drains

Description

Filter drains are shallow trenches filled with stone/gravel that create temporary subsurface storage for the attenuation, conveyance and filtration of surface water. The stone may be contained in a simple trench lined with a geotextile, geomembrane or impermeable liner. Often filter drains have a 50mm-100mm depth of permeable material that is separated from the main gravel/stone trench by a permeable geotextile. This top layer is intended to be sacrificial, collecting silt over time and requiring replacement every 5 – 10 years, or as required if ponding is evident.

Maintenance Issues

Over time the top permeable material layer will trap silt and other materials. On a highway the trapped material may include heavy metals. The top layer, and associated geotextile, will become less permeable with time and should be replaced as set out below.

If the filter drain includes pipework it may become blocked over time. The pipe should be kept clear of silt and debris.

If the main filter material becomes silted up there may be a requirement to excavate and replace the entire filter drain.

Any material removed should be tested and may require disposal at landfill.

Maintenance Regime

Activity	Action Required	Frequency
Regular maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly (or as required)
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six monthly
	Remove sediment from pre-treatment devices	Six monthly, or as required
Occasional maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (eg NJUG, 2007 or BS 3998:2010)	As required
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium. This may also be necessary where there are high silt loads.	Five yearly, or as required
	Clear perforated pipework of blockages	As required

Trees

Description

Trees can benefit surface water management through transpiration, interception, increased filtration and phytoremediation (the process of a tree taking up harmful chemicals). Trees are typically an addition to a SuDS component.

Maintenance Issues

Maintenance requirements of trees will be greatest during the first few years, when the tree is becoming established. Early maintenance should involve regular inspection, removal of invasive vegetation and irrigation, if required during long dry spells. Maintenance responsibility for a tree pit or planter should be placed with an appropriate organisation.

Maintenance Regime

Activity	Action Required	Frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets and outlets	Inspect monthly
Occasional maintenance	Check tree health and manage tree appropriately	Annually
	Remove silt build-up from inlets and surface and replace mulch as necessary	Annually, or as required
	Water	As required (in periods of drought)
Monitoring	Inspect silt accumulation rates and establish appropriate removal frequencies	Half yearly

Pervious Pavements

Description

Pervious pavements, together with their associated substructures, are an efficient means of managing surface water runoff close to its source – intercepting runoff, reducing the volume and frequency of runoff and providing a treatment medium.

Maintenance Issues

Pervious pavements need to be regularly cleaned of silt and other sediments to preserve their infiltration capacity. Typically sweeping once a year should be sufficient to maintain an acceptable infiltration rate on most sites. However, the frequency should be adjusted to suit site specific circumstances and should be informed by inspection reports.

Maintenance Regime

Activity	Action Required	Frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48hrs after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Holborn Barn, Therfield, Royston

Flood Risk Assessment



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