

# THE PEST HOUSE, CLAYGATE ROAD, YALDING

FLOOD RISK ASSESSMENT

LEVEL 2

## CONTROL SHEET

**CLIENT: LADDINGFORD DEVELOPMENTS LTD**

**PROJECT TITLE: THE PEST HOUSE, CLAYGATE ROAD, YALDING**

**REPORT TITLE: FLOOD RISK ASSESSMENT – LEVEL 2**

**PROJECT REFERENCE: LN35-PH**

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## 1 EXECUTIVE SUMMARY

This Flood Risk Assessment (FRA) has been prepared on behalf of Laddingford Developments Ltd, to accompany a planning application submitted to the Maidstone Borough Council for the refurbishment of The Pest House, Claygate Road, Yalding, ME18 6BB

The Pest House is a Grade II listed timber-framed dwelling dating from the 16<sup>th</sup> Century.

According to the Environment Agency's indicative flood maps, the site is located in Flood Zone 2, which has between 1% & 0.1% annual probability of fluvial flooding (Between 1 in 100 & 1 in 1000-year return period).

The overall site area is less than 1 hectare (ha).

The site location plan is shown in Appendix A.

This FRA will set out the existing limitations and proposed options relating to the discharge of surface water runoff generated by the proposed development. This report will outline various methods of providing appropriate sustainable solutions to enhance the local environment and improve current downstream conditions, whilst allowing for proposed usage and possible future climate change effects.

The Pest House has existing drainage connection to the adjacent Bentlett's Yard site. The former scrapyards is currently being redeveloped and the Pest House drainage connections are being retained and included in the overall drainage scheme. This allows the Pest House to benefit from the main attenuation and SuDS scheme.

## 2 INTRODUCTION

Dandara Ltd has been commissioned by Laddingford Developments Ltd to undertake a Level 2 Flood Risk Assessment (FRA) to accompany a planning application submitted to Maidstone Borough Council for the refurbishment of The Pest House, Claygate Road, Yalding, ME18 6BB.

Following a review of the SFRA report and current information from the Environment Agency flood data maps (Figure 1), the site is noted to be located in a Flood Zone 2 area which is categorised as having a medium-low risk of flooding.

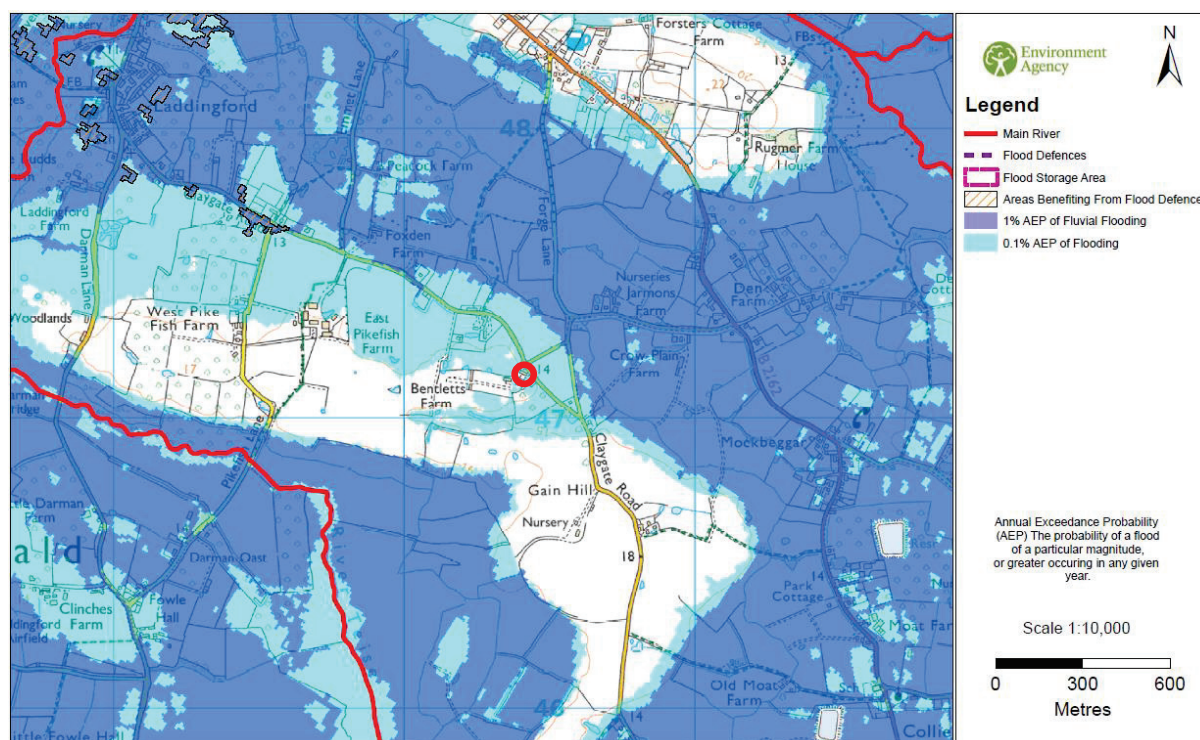


Figure 1: EA/NRW – Flood Data Map

This FRA has been compiled in accordance with the SFRA, KCC Drainage & Planning Policy and the National Planning Policy Framework (NPPF).

### 3 PLANNING POLICY

#### 3.1 National Planning Policy Framework & Planning Practice Guidance

- 3.1.1 The National Planning Policy Framework (NPPF) and the associated Technical Guidance, published/revised in 2012, 2014 and 2018 respectively, identify flood risk as a specific material consideration in the planning process and in the allocation and release of sites for development or re-development.
- 3.1.2 The NPPF & Technical Guidance replaced previous guidance and policy set out in PPS 25: Development and Flood Risk, however much of the technical criteria for Flood Risk Assessments remain largely unchanged. The NPPF seeks to strengthen the co-ordination between land-use planning and development planning and the operational delivery of flood and coastal defence strategy. Through the NPPF, Local Planning Authorities will continue to use their existing powers to guide, regulate and control development in relation to flooding and flood risk. The NPPF places a presumption in favour of sustainable development whilst meeting the challenge of climate change, flooding and coastal change. In accordance with the PPG, inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk through the application of the Exception and Sequential Tests.
- 3.1.3 The Water Resources Act 1991 [Section 105] requires the Environment Agency to exercise general supervision over all flood defence matters, including flood plains and washlands, which accommodate waters during periods of flood. In discharging their functions, the Environment Agency from time to time carries out surveys and flood studies, largely of 'main rivers' within its jurisdiction.
- 3.1.4 Environment Agency flood maps indicating the extents of the modelled floodplain are provided to Local Planning Authorities, to enable them to make more informed decisions when considering proposed development in flood-susceptible areas. If development is proposed in a flood-susceptible area, or in an area where there is a history of flooding, the Environment Agency, as a statutory consultee in the planning process, will generally recommend that the risk of flooding be formally assessed in accordance with the NPPF, and that a Flood Risk Assessment report is produced to support the Planning Application. The broader modelled flood extents are also

indicated on the Environment Agency's Flood Zone Maps, available through their website.

### **3.2 Strategic Flood Risk Assessment (SFRA)**

3.3 A SFRA has been prepared by Mott MacDonald and Maidstone Borough Council and is dated May 2008. This shows that the site lies with Flood Zone 1 and is at a low risk of flooding. However, recently updated flood mapping from the EA now shows the site in Flood Zone 2.

### **3.3 Sequential Test**

3.3.1 The Sequential Approach is detailed within the NPPF Technical Guidance and aims to ensure preference is given to land within Flood Zone 1 prior to Zones 2 and 3. It also ensures that flood vulnerability of the Proposed Development is taken into consideration when locating development in Flood Zones 2 and 3.

3.3.2 Where the Sequential Approach shows that it is not possible to locate development in zones of lower flood risk due to other wider sustainability issues; it may be possible to justify, using the Exception test, that development is still feasible by the management of flood risk.

3.3.3 Table 3 of the NPPF Technical Guidance defines when the Exception Test is applicable.

The Technical Guidance states that sites at lower risk (i.e. Flood Zone 1) should be developed in preference to sites at higher risk (Flood Zone 2), and that *'only where there are no reasonably available sites in Flood Zones 1 and 2 should the suitability of sites in Flood Zone 3 be considered.'*

### **3.4 Kent County Council Drainage & Planning Policy**

3.4.1 Kent County Council (KCC) issued their current Drainage and Planning Policy in July 2017.

3.4.2 KCC provides a list of ten Sustainable Drainage Systems (SuDS) Policies (Figure 2) which are to be complied with for all developments:

Policy	Summary
SuDS Policy 1	Follow the drainage hierarchy
SuDS Policy 2	Manage Flood Risk Through Design
SuDS Policy 3	Mimic Natural Flows and Drainage Flow Paths
SuDS Policy 4	Seek to Reduce Existing Flood Risk
SuDS Policy 5	Maximise Resilience
SuDS Policy 6	Design to be Maintainable
SuDS Policy 7	Safeguard Water Quality
SuDS Policy 8	Design for Amenity and Multi-Functionality
SuDS Policy 9	Enhance Biodiversity
SuDS Policy 10	Link to Wider Landscape Objectives

**Figure 2: KCC SuDS Policy Summary**

3.4.3 These policies are reviewed later in this document.



## CIRIA Guidance

3.4.4 CIRIA publication ‘C624 Development and Flood Risk – Guidance for the Construction Industry’, defines three levels of Flood Risk Assessment which can be undertaken:

**Table 1: Levels / Scope of Flood Risk Assessment**

FRA Level	Description / Scope
<b>Level 1</b>	<p><b>Screening Study</b> to identify whether there are any flooding or surface water management issues related to a development site that may warrant further consideration. This should be based on readily available existing information, including the SFRA, Environment Agency Flood Map and Standing Advice.</p> <p>The Screening Study will ascertain whether a FRA is required.</p>
<b>Level 2</b>	<p><b>Scoping Study</b> to be undertaken if the Level 1 FRA indicates that the site may lie within an area that is at risk of flooding or that the site may increase flood risk due to increased run-off. This Study should confirm the sources of flooding which may affect the site and should include the following:</p> <ul style="list-style-type: none"> <li>an appraisal of the availability and adequacy of existing information;</li> <li>a qualitative appraisal of the flood risk posed to the site, and potential impact of the development on flood risk elsewhere;</li> <li>an appraisal of the scope of possible measures to reduce the flood risk to acceptable levels.</li> </ul> <p>The Scoping Study may identify that sufficient quantitative information is already available to complete a FRA appropriate to the scale and nature of the development.</p>
<b>Level 3</b>	<p><b>Detailed Study</b> to be undertaken if the Level 2 FRA concludes that further quantitative analysis is required to assess flood risk issues related to the development site. The Study should include:</p> <ul style="list-style-type: none"> <li>quantitative appraisal of the potential flood risk to the development;</li> <li>quantitative appraisal of the potential impact of development site on flood risk elsewhere;</li> <li>quantitative demonstration of the effectiveness of any proposed mitigation measures.</li> </ul>

3.4.5 This Flood Risk Assessment will follow the requirements of a Level 2 Scoping Study due to the site being in Flood Zone 2.

## 4 DEVELOPMENT DESCRIPTION AND LOCATION

### 4.1 Existing Surroundings Description

- 4.1.1 The site is located at The Pest House, Claygate Road, Yalding, Kent, adjacent to the former scrap yard at Bentlett's Yard.
- 4.1.2 The site lies approximately 1km from the nearest watercourse, River Teise, which is due southwest of the site. The subject site lies at approximately 14.10m AOD.
- 4.1.3 Claygate Road runs north to south past the eastern boundary of the site.
- 4.1.4 The site location plan is located in Appendix A.

### 4.2 Description of Existing Site

- 4.2.1 The site was, until recently, a private residence and is made up of 1 building with a single storey extension as well as a shed and hardstanding. There is a lawn area at the front of the property which extends to the Claygate Road.
- 4.2.2 The Pest House is a Grade II listed timber-framed dwelling dating from the 16th Century.
- 4.2.3 The existing property covers an area of approx. 0.043Ha (430m<sup>2</sup>) of which 0.014Ha (138m<sup>2</sup>) is classed as impermeable.
- 4.2.4 The property has a finished floor level (FFL) of 14.200m.
- 4.2.5 There is the redevelopment site at Bentlett's Yard adjacent to the Pest House. This site shares the access road.

### 4.3 Description of Existing Drainage

- 4.3.1 The Pest House discharges both Surface and Foul water to the drainage system which runs through/from the adjacent Bentlett's Yard site.
- 4.3.2 The existing surface water from the pre-development Bentlett's Yard is collected in trapped gullies and is conveyed by gravity, via a series of interceptors, to an outfall in a ditch which runs parallel to Claygate Road.

4.3.3 The existing foul water from the pre-development Bentlett's Yard is conveyed by gravity to a sewage treatment plant which discharges to an adjacent sampling chamber. This discharges by gravity to an outfall in the same ditch as the surface water.

#### **4.4 Existing Hydrology**

4.4.1 The site lies approximately 1km from the nearest watercourse, River Teise, which is due southwest of the site. The River Beult is located 1.5km north of the site.

4.4.2 There is an existing ditch which runs parallel to the access road and runs north along Claygate Road.

#### **4.5 Existing Geology**

4.5.1 Published geological information indicates that the site is likely to be on Weald Clay Formation - Mudstone.

#### **4.6 Existing Hydrogeology**

4.6.1 Groundwater in the area is anticipated to be Low.

#### **4.7 Existing Contamination**

4.7.1 The site is not expected to be contaminated due to its use as a residential property

#### **4.8 Sequential Test and Exception Test**

4.8.1 With reference to Table 2: '*Flood Risk Vulnerability Classification*' in NPPF Planning Practice Guidance, residential development is considered as 'more vulnerable' in terms of planning issues.

4.8.2 The Sequential Test should be applied to new developments located within a Flood Zone 2, 3 or functional floodplain, in order to steer them to areas with a lower risk of flooding. Whilst the proposed development site is located in a Flood Zone 2 (medium-low probability of flooding), it is an existing listed domestic property, so the Sequential Test should not be applied.

4.8.3 Table 3: '*Flood Risk Vulnerability and Flood Zone Compatibility*' in the NPPF Technical Guidance classifies 'More Vulnerable' classifications as appropriate for Flood Zone 2 without having to address the Exception Test.

## DEFINITIONS OF FLOOD HAZARD

### 4.9 Flooding from Rivers

- 4.9.1 River flooding that occurs when a watercourse cannot cope with the water draining into it from the surrounding land. This can happen, for example, when heavy rain falls on an already waterlogged catchment.
- 4.9.2 The Strategic Flood Risk Assessment (SFRA), prepared by Mott MacDonald in 2008, confirms that there have been no reported instances of flooding from watercourses within the vicinity of the site.
- 4.9.3 Environment Agency Flood Mapping and Data (Appendix C) identifies that The Pest House is in a Flood Zone 2 area with between a 1 in 100 and 1 in 1000 annual probability of flooding.
- 4.9.4 Flood data shows the maximum flood level, anywhere on the combined Bentlett's Yard and Pest House sites, during a 1 in 1000-year event is 14.11m

### 4.10 Flooding from Sewers

- 4.10.1 Sewer flooding that occurs when sewers are overwhelmed by heavy rainfall or when they become blocked. The likelihood of flooding depends on the capacity of the local sewerage system. Land and property can be flooded with water contaminated with raw sewage as a result. Rivers can also become polluted by sewer overflows.
- 4.10.2 There are no sewers in the vicinity of the site.

### 4.11 Flooding from Groundwater

- 4.11.1 Groundwater flooding that occurs when water levels in the ground rise above surface levels. It is most likely to occur in areas underlain by permeable rocks, called aquifers. These can be extensive, regional aquifers, such as chalk or sandstone, or may be more local sand or river gravels in valley bottoms underlain by less permeable rocks.
- 4.11.2 The risk of flooding from ground water is considered to be low as the underlying strata is impermeable Weald clay.

#### **4.12 Surface Water Flooding**

4.12.1 Surface water flooding occurs when heavy rainfall overwhelms the drainage capacity of the local area. It is difficult to predict and pinpoint; much more so than river or coastal flooding.

4.12.2 The site lies on a ridge of high ground bounded by ditches and slopes towards Claygate Road. It is therefore considered that the risk of flooding from the land is low.

#### **4.13 Flooding from Artificial Sources**

4.13.1 Flooding from artificial sources can be defined as a failure of man-made infrastructure or human intervention that causes flooding. Consideration should be given to features such as reservoirs, canals and lakes where water is retained above natural ground level.

4.13.2 Environment Agency mapping shows a risk of flooding from the Bewl Water and Weirwood reservoirs. Being 14km and 36km respectively from the site, the risk of flooding is unlikely to lead to the loss of life but may cause damage to property due to rising water levels. Reservoirs are registered, regularly inspected and maintained as required by law so the risk of flooding can be considered low.

#### **4.14 Existing Drainage Arrangement**

4.14.1 Surface water currently discharges to ditches on the opposite side of the access road via pipework carrying treated foul water discharge from the adjacent Bentlett's Yard treatment tank.

4.14.2 The existing hard standing areas have been measured at 0.014Ha (138m<sup>2</sup>).

4.14.3 The current property is subject to Environment Agency General Binding Rules to discharge treated water foul water to the local watercourse.

### **5 PROBABILITY OF FLOODING**

#### **5.1 Probability of Flooding from the River**

5.1.1 In accordance with the Environment Agency's indicative flood map, the property is located in Flood Zone 2, which has between 1% than 0.1% annual probability of fluvial flooding (equivalent of between 1 in 100 & 1 in 1000-year return period).

## 5.2 Probability of Flooding from Groundwater

5.2.1 Mapping indicates that the site is at 'Negligible Risk' of groundwater flooding.

## 5.3 Probability of Flooding from Artificial sources

5.3.1 There is a low probability of flooding occurring from artificial sources.

## 5.4 Probability of Flooding from Surface Water

5.4.1 Mapping indicates that the property is unlikely to flood up to a 1 in 1000-year return period, but the off-site highways may be susceptible to some flooding as the river levels rise, preventing the upstream watercourses from flowing freely.

## 6 KCC SUSTAINABLE DRAINAGE SYSTEMS POLICY

This section refers to the SuDS scheme for the combined Bentlett's Yard and Pest House developments.

### 6.1 SuDS Policy 1: Follow the Drainage Hierarchy

*Surface runoff not collected for use must be discharged according to the following discharge hierarchy:*

- *to ground,*
- *to a surface water body,*
- *a surface water sewer, highway drain, or another drainage system, or*
- *to a combined sewer where there are absolutely no other options, and only where agreed in advance with the relevant sewage undertaker.*

*The selection of a discharge point should be clearly demonstrated and evidenced.*

6.1.1 All surface water collected within the boundary of The Pest House shall be discharged to the Surface Water SuDS system that has been constructed as part of the adjacent Bentlett's Yard scheme. The ultimate discharge point being the surface water ditch to the north of the access road.

6.1.2 Ground conditions do not allow for infiltration techniques.

### 6.2 SuDS Policy 2: Manage Flood Risk Through Design

*It is essential that the drainage scheme proposed:*

- *protects people and property on the development site from flooding;*  
*and,*

- *does not create any additional flood risk outside of the development in any part of the catchment, either upstream or downstream.*

*Any drainage scheme must manage all sources of surface water, including exceedance flows and surface flows from offsite, provide for emergency ingress and egress and ensure adequate connectivity.*

6.2.1 As the property is listed, the floor levels cannot be changed. However, the existing floor level is currently 100mm above the 1 in 1000-year fluvial flood level.

6.2.2 The impermeable area of the property is not being increased and, in coordination with the adjacent site's SuDS scheme the overall reduction in outflow from the two developments will decrease the flows to the local ditch system by up to 422 l/sec during a 1 in 100-year (+40% CC) storm.

### **6.3 SuDS Policy 3: Mimic Natural Flow and Drainage Flow Paths**

*Drainage schemes should be designed to match greenfield discharge rates, volumes and follow natural drainage routes as far as possible.*

6.3.1 The Bentlett's Yard SuDS scheme is comprised of multiple sections of permeable paving. The system discharges to the local ditch system and the existing surface water outfall.

6.3.2 Due to the levels constraints of the site and the outfall ditch, the flow rates are slightly higher than greenfield runoff but still provide over 100 l/sec reduction on flow during a 1 in 1-year storm and 422 l/sec during a 1 in 100-year (+CC) rainfall event.

### **6.4 SuDS Policy 4: Seek to Reduce Existing Flood Risk**

*New development should be designed to take full account of any existing flood risk, irrespective of the source of flooding.*

*Where a site or its immediate surroundings have been identified to be at flood risk, all opportunities to reduce the identified risk should be investigated at the masterplanning stage of design and subsequently incorporated at the detailed design stage.*

*For brownfield sites, and unless demonstrated to be reasonably impracticable, we would expect a 50% reduction in the peak runoff rate.*

6.4.1 The Finished Floor Levels of the listed building are 100mm above the 1 in 1000-year flood level.

6.4.2 The flow rate from adjacent brownfield site has been reduced to a maximum of 30 l/sec for all storm events up to and including the 100 year + 40% CC return period. The Pest House runoff is included in these calculations.

### **6.5 SuDS Policy 5: Drainage Sustainability and Resilience**

*The proposed drainage system must consider life-time sustainability of the drainage measures and components.*

*The design of the drainage system must account for the likely impacts of climate change and changes in impermeable area over the design life of the development. Appropriate allowances should be applied in each case. A sustainable drainage approach which considers control of surface runoff at the surface and at source is preferred and should be considered prior to other design solutions.*

6.5.1 A 10% urbanisation allowance has been added to the drainage calculations.

6.5.2 The driveways and carriageway surface water runoff discharges into the permeable paving. The roof water will be conveyed into the sub base of the permeable paving via a traditional piped system.

### **6.6 SuDS Policy 6: Design to be Maintainable**

*A drainage scheme maintenance plan should be prepared which demonstrates a schedule of activities, access points, outfalls and any biodiversity considerations.*

*The maintenance plan should also include an indication of the adopting or maintaining authority or organisation and may require inclusion within a register of drainage features.*

6.6.1 A maintenance plan will be produced once a final scheme is approved and constructed.

6.6.2 The drainage and highway will remain un-adopted, but a maintenance company shall be appointed to ensure the upkeep of all SuDS elements, once works are completed.

### **6.7 SuDS Policy 7: Safeguard Water Quality**

*When designing a surface water management scheme, full consideration should be given to the system's capacity to remove pollutants and to the cleanliness of the water being discharged from the site, irrespective of the receiving system.*

*Interception of small rainfall events should be incorporated into the design of the drainage system.*



6.7.1 The driveways and carriageways discharge to the permeable paving. Contaminates will be removed through the top layers of the paving.

6.7.2 The clean roof water will be conveyed into the sub base of the permeable paving via a traditional piped system. Leaf guards and silt traps will be provided upstream of the permeable paving.

#### **6.8 SuDS Policy 8: Design for Amenity and Multifunction**

*Drainage design should in the first instance consider opportunities for inclusion of amenity and biodiversity objectives and thus provide multi-functional use of open space with appropriate design for drainage measures within the public realm.*

6.8.1 Permeable paving is located in the main square area as well as the majority of the shared surface road.

6.8.2 Existing ditches and ponds along the northern boundaries are being cleaned and retained.

#### **6.9 SuDS Policy 9: Enhance Biodiversity**

*Drainage design should in the first instance consider opportunities for biodiversity enhancement, through provision of appropriately designed surface systems, consideration of connectivity to adjacent water bodies or natural habitats, and appropriate planting specification.*

6.9.1 The existing ditches and ponds along the northern boundary of the Bentlett's Yard site will be cleared and desilted providing natural habitats as well as additional storage during peak storms.

#### **6.10 SuDS Policy 10: Link to Wider Landscape Objectives**

*Drainage design should consider in the first instance opportunities to contribute to the wider landscape and ensure proposals are coherent with the surrounding landscape character area.*

6.10.1 Significant reduction on runoff rates as well as the use of the existing ditches and discharge points and the reduction in overall hardstanding should benefit the local area as well as reduce the risk of local flooding.

## 7 DEVELOPMENT PROPOSAL

### 7.1 Surface Water

- 7.1.1 The proposed 0.043 ha (430m<sup>2</sup>) building plans are included in Appendix D.
- 7.1.2 The proposed refurbishment of The Pest House, whilst a separate application, is integrally linked to the adjacent Bentlett's Yard development site. The Pest House currently utilises the drainage system from Bentlett's Yard and this will be continue in the proposed design.
- 7.1.3 The proposed development will include the refurbishment of the main existing building, demolition and erection of the existing single storey rear extension, garage and associated hardstanding. The existing impermeable area is 0.014 ha (138m<sup>2</sup>).

#### **The following Development Proposal details are for the combined Bentlett's Yard and Pest House development**

- 7.1.4 The proposed Bentlett's Yard development comprises 28 houses (not including The Pest House) with connecting carriageway, drives and gardens. The impermeable area is 0.752ha (7520m<sup>2</sup>) and is significantly less than the existing hardstanding area.
- 7.1.5 The main carriageway and access roads will be constructed using a combination of permeable block and asphalt porous paving, which will collect and attenuate the surface water runoff before discharging via the existing outfall in the watercourse along Claygate Road.
- 7.1.6 The driveways will be constructed of standard block paving
- 7.1.7 Current guidance 'Non-Statutory Technical Standards for Sustainable Drainage' produced by the Local Authority SuDS Officer Organisation (LASOO) states that *'For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.'*

7.1.8 The Greenfield Runoff rate has been calculated as shown in the table below:

Qbar (l/s)	5.27
1 in 1 Year (l/s)	4.48
1 in 30 Year (l/s)	12.12
1 in 100 Year (l/s)	16.81

*The Greenfield Runoff rate is based on an overall site area of 1.986Ha. The full HR Wallingford calculation sheet is located in Appendix B.*

7.1.9 The Brownfield Runoff rate has been calculated as shown in the table below:

1 in 1 Year (l/s)	131.2
1 in 30 Year (l/s)	327.5
1 in 100 Year (l/s)	452.5

*The Brownfield Runoff rate is based on the hardstanding (only) area of 1.340Ha. The Micro Drainage calculation sheet is located in Appendix C.*

7.1.10 Whilst every effort was made to discharge the proposed runoff at greenfield runoff rates for the 1, 30 & 100 year events, the existing ditch outfall level dictates the volume of storage available within the porous paving. The listed building (Pest House) floor level also limits the carriageway elevation adjacent to the outfall. It has therefore not possible to achieve the above greenfield runoff rates so a reduction in the brownfield runoff rate has been sought to get as close to the greenfield runoff rates as reasonably practicable.

7.1.11 KCC SuDS Policy 5 requires an additional 10% urbanisation allowance be added to calculations to allow for potential future increase in hardstanding areas.

7.1.12 KCC guidance requires that the design be undertaken utilising FEH rainfall data or use FSR data with a M5-60 value of 26.25mm. We have used the FSR method.

7.1.13 The proposed outfall rates have been designed as shown in the table below:

1 in 1 Year (l/s)	18.5
1 in 30 Year (l/s)	30.0
1 in 100 Year (+20% Climate Change) (l/s)	30.0

*The Micro Drainage calculation sheet is located in Appendix E.*

7.1.14 KCC guidance requires the design to be undertaken to include a 20% climate change allowance but also requires a check be undertaken using 40% to ensure that any exceedance routes/volumes do not affect the residential units or offsite property.

7.1.15 The calculations using the 40% climate change allowance show exceedance from the system, however it is less than 2m<sup>3</sup> and will be easily held within the carriageway and will not affect any local properties. Calculations are located in Appendix E.

## 7.2 Foul Water

7.2.1 Foul flows will be conveyed by gravity along designated services routes adjacent to the main carriageway to a Sewage Treatment Plant.

7.2.2 The Sewage Treatment Plant will discharge treated effluent into the existing ditch adjacent to Claygate Road using the existing outfall.

7.2.3 A Permit to Discharge has been obtained from the Environment Agency.

## 8 FLOOD RISK MITIGATION MEASURES

8.1.1 There is medium to low risk of flooding from offsite except for fluvial water flows between a 1 in 100 and 1 in 1000-year (1% - 0.1% annual probability) event. These flows are likely to be contained within the road extents, so mitigation measures are not deemed necessary.

8.1.2 The Pest House floor level is already above the 1 in 1000-year flood level.

## 9 CONCLUSIONS

- 9.1.1 The proposed development is located within Flood Zone 2 but the current floor level is higher than the 1 in 1000 year flood level provided by the Environment Agency.
- 9.1.2 Property usage classed as 'More Vulnerable' but does not require Sequential as it is an existing building and does not require an Exemption Tests as it is in Zone 2
- 9.1.3 Being a listed building the finished floor levels cannot be changed.
- 9.1.4 The proposed surface water peak flow rate will be restricted to the maximum runoff rate of 30 l/sec for all storm events up to the 100-year return period (+40% Climate Change Allowance). This is between 101 - 422 l/sec betterment of the brownfield runoff rates for a 1 and 100-year event, respectively.
- 9.1.5 The proposed foul water will be treated prior to discharging to the local watercourse.
- 9.1.6 The site is at 'Negligible Risk' of groundwater flooding.
- 9.1.7 The local ditches and ponds have been cleaned, under ecological supervision, to allow for the reestablishment of local flora and fauna as well as re-establishing the storage volumes lost to the local ditch network.

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## 10 REFERENCES

1. CIRIA 2004. Development and Flood Risk Guidance for the Construction Industry-C624. CIRIA, London.
2. Department for Communities and Local Government - National Planning Policy Framework
3. Strategic Flood Risk Assessment 2008 – Maidstone Borough Council
4. Environment Agency - Flood and Coastal Management in England
5. Non-Statutory Technical Standards for Sustainable Drainage - Local Authority SuDS Officer Organisation (LASOO)
6. Drainage and Planning Policy Statement 2017 – Kent County Council

## **APPENDIX A – SITE LOCATION PLAN**

## **APPENDIX B – GREENFIELD RUNOFF CALCULATIONS**



## **APPENDIX C – BROWNFIELD RUNOFF CALCULATIONS**

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**APPENDIX F – ENVIRONMENT AGENCY PRODUCT 4**

**(DETAILED FLOOD RISK)**