

Flood Risk Assessment AEG4186_ME9_Borden_01



UK Experts in Flood Modelling, Flood Risk Assessments, and Surface Water Drainage Strategies





Document Issue Record

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Prepared for: Wyndham Property Group

Reference: AEG4186_ME9_Borden_01

Site Location: Land Adjacent to Hawthorns, Maidstone Road, Borden, Swale, ME9 7QA

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Summary

Development Description	Existing	Proposed		
Development Type	A residential dwelling	Construction of residential dwellings		
EA Vulnerability Classification	More Vulnerable	More Vulnerable		
Ground Floor Level	The lowest topographic level at the northern corner is approximately 50.23m AOD, and the highest point of the site being on the south and southeastern side boundary at approximately 56.54m AOD (topographic survey)	No change		
Level of Sleeping Accommodation	N/A	First floor		
Surface Water Drainage	N/A ¹	Desktop geology indicates that the soils in the area are freely draining loamy soils. Therefore, it is recommended that dwelling is drained via individual house soakaways.		
Site Size	6,200m ²	No change		
Risk to Development	Summary	Comment		
EA Flood Zone	Flood Zones 1, 2, and 3			
Flood Source	Fluvial/Pluvial			
SFRA Available	Swale Borough Council Level 1 Strategic Flood Risk Assessment (Swa Borough Council, 2020)			
Management Measures	Summary	Comment		
Ground floor level above extreme flood levels	Yes	Dwellings located in Flood Zone 1 and in an area at 'very low' risk of pluvial flooding		



Safe Access/Egress Route	No	May not be possible in modelled 1 in 100 year event if flooding has already occurred. Safe refuge can be sought on site.			
Flood Resilient Design	Not required	Dwellings located in Flood Zone 1 and in an area at 'very low' risk of pluvial flooding			
Site Drainage Plan	Yes	Desktop geology indicates that the soils in the area are freely draining loamy soils. Therefore, it is recommended that dwelling are drained via individual house soakaways.			
Flood Warning and	N/Δ	Recommended that occupier monitor Met Office Weather Warnings for extreme weather events.			
Evacuation Plan		Warnings for extreme weather events.			
Evacuation Plan Offsite Impacts	Summary	Warnings for extreme weather events. Comment			
Evacuation Plan Offsite Impacts Displacement of floodwater	Summary No	Warnings for extreme weather events. Comment Dwellings located in Flood Zone 1 and in an area at 'very low' risk of pluvial flooding			
Evacuation Plan Offsite Impacts Displacement of floodwater Increase in surface run-off generation	Summary No	Warnings for extreme weather events. Comment Dwellings located in Flood Zone 1 and in an area at 'very low' risk of pluvial flooding Desktop geology indicates that the soils in the area are freely draining loamy soils. Therefore, it is recommended that dwelling are drained via individual house soakaways.			

¹ not required for this assessment

² data not available.



1. Introduction

- 1.1. Aegaea were commissioned by Wyndham Property Group to undertake a Flood Risk Assessment (FRA) to facilitate a planning application for the proposed development. This FRA has been prepared in accordance with the requirements set out in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance.
- 1.2. This FRA is intended to support a full planning application and as such the level of detail included is commensurate and subject to the nature of the proposals.

Site Overview

1.3. The site of the proposed development is Land Adjacent to Hawthorns, Maidstone Road, Borden, Swale, ME97QA (Figure 1).



Figure 1: Site Location (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors)



- 1.4. The existing site consists of a residential dwelling. It is understood that the proposed development is for the erection of several residential dwellings.
- 1.5. A topographic survey has been undertaken by IG Surveys Ltd. (drg no. J500-01) at the site which shows that the site generally slopes down towards the north with the lowest level being at approximately 50.23m Above Ordnance Datum (AOD), at the northern corner of the site and the highest point of the site being on the south and southeastern side boundary at approximately 56.54m AOD. Figure 2 provides a visual representation of topographic levels using Environment Agency Light Detection and Ranging (LiDAR) data Digital Terrain Model. The topographic survey is attached in Appendix A.



Figure 2: Site Topography (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

1.6. Swale Borough Council is the Local Planning Authority (LPA) for the site and Kent County Council is the designated Lead Local Flood Authority (LLFA). The site sits within the Environment Agency's Kent South London and East Sussex region.



Planning Policy and Guidance

- 1.7. UK government planning guidance states¹ that an FRA is required for developments which are:
 - in flood zone 2 or 3 including minor development and change of use
 - more than 1 hectare (ha) in flood zone 1
 - less than 1 ha in flood zone 1, including a change of use in development type to a more vulnerable class (for example from commercial to residential), where they could be affected by sources of flooding other than rivers and the sea (for example surface water drains, reservoirs)
 - in an area within flood zone 1 which has critical drainage problems as notified by the Environment Agency
- 1.8. The site is partially located within Flood Zone 2 and 3, therefore according to the NPPF, an FRA is required to be submitted accompanying the planning application.
- 1.9. The objective of this FRA is to demonstrate that the proposals are acceptable in terms of flood risk. This report summarises the findings of the study and specifically addresses the following issues in the context of the current legislative regime:
 - Fluvial/tidal flood risk
 - Surface water flood risk
 - Risk of flooding from other sources

¹ https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications#when-you-need-anassessment



2. Planning Policy

2.1. Inappropriate development in a flood risk area could pose significant risk in terms of personal safety and damage to property for the occupiers of the development or for people elsewhere. The approach taken in the assessment of flood risk at the planning stage is set out in national, regional, and local planning policy and associated guidance. This section summarises the key policies and guidance relevant to the proposed development.

National Planning Policy Framework (NPPF)

2.2. The National Planning Policy Framework² (NPPF) (DLUHC, 2023) which includes UK Government policy on development and flood risk states:

165. Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.

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

- a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;
- b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;
- c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;

²<u>https://www.gov.uk/guidance/national-planning-policy-framework</u>, last updated Dec 2023



- d) any residual risk can be safely managed; and
- e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

174. Applications for some minor development and changes of use should not be subject to the sequential or exception tests but should still meet the requirements for site-specific flood risk assessments set out in footnote 59.

2.3. Footnote 59 of the NPPF states:

A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

2.4. Flood Zones in England are defined as follows:



Table 1: Flood Zone Definitions

Flood Zone	Definition				
Zone 1 Low Probability	Land having less than 1 in 1,000 annual probability of river or sea flooding (all land outside Zones 2 and 3).				
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.				
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability or sea flooding.				
	This zone comprises land where water from rivers or the sea has t flow or be stored in times of flood. The identification of functiona floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise:				
Zone 3b The Functional	land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or				
Floodplain	land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding).				
	Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)				

- 2.5. An FRA should be appropriate to the scale, nature, and location of the development. It should identify and assess the risk from all sources of flooding to and from the development and demonstrate how any flood risks will be managed over the lifetime of the development.
- 2.6. An assessment of hydrological impacts should be undertaken, including to surface water runoff and impacts to drainage networks in order to demonstrate how flood risk to others will be managed following development and taking climate change into account.



Local Plan

2.7. The Local Plan prepared by the Local Planning Authority, Swale Borough Council, sets out the policies for development in the local area. The proposed site lies under the jurisdiction of this LPA and therefore will be required to adhere to the local plan policies. The Local Plan (2017) document provides the following policy on flood risk management and sustainable drainage;

Policy DM 21

Water, flooding and drainage

When considering the water-related, flooding and drainage implications of development, development proposals will:

1. Accord with national planning policy and planning practice guidance;

2. Avoid inappropriate development in areas at risk of flooding and where development would increase flood risk elsewhere;

3. Provide site specific flood risk assessments, as required, carried out to the satisfaction of the Environment Agency and, if relevant, the Internal Drainage Board. These will, where necessary, include details of new flood alleviation and flood defence measures to be installed and maintained by the developer;

4. Include, where possible, sustainable drainage systems to restrict runoff to an appropriate discharge rate, maintain or improve the quality of the receiving watercourse, to enhance biodiversity and amenity and increase the potential for grey water recycling. Drainage strategies (including surface water management schemes) for major developments should be carried out to the satisfaction of the Lead Local Flood Authority;

5. Integrate drainage measures within the planning and design of the project to ensure that the most sustainable option can be delivered, especially where, exceptionally, development is to be permitted in an area of flood risk;

6. Within areas at risk of flooding, submit a suitable flood warning and emergency plan that has been approved by the relevant emergency planning regime and, where appropriate, the emergency services;



7. Where necessary, demonstrate that adequate water supply and wastewater connection and treatment infrastructure is in place before construction commences and that these details have been approved by the appropriate water company and funded by the development where appropriate;

8. Ensure future unconstrained access to the existing and future sewerage and water supply infrastructure for maintenance and up-sizing purposes;

9. Make efficient use of water resources and protect the yield of local public water supplies. For new residential development, all homes to be designed to achieve a minimum water efficiency of 110 litres per person per day, in line with the Government's Housing Optional Technical Standard for water efficiency; and

10. Protect water quality, including safeguarding ground water source protection zones from pollution, to the satisfaction of the Environment Agency.

Sequential and Exception Tests

- 2.8. The Sequential and Exception Tests are applied in specific cases defined by UK Government policy. Their purpose is to drive development to areas of low flood risk and to support developments which improve flood risk for developments in areas at risk of flooding.
- 2.9. In pre-application response 24/502505/PAMEET (25/07/2024) Swale Council stated:

The NPPG states that development in flood risk areas is only exempt from the sequential test if it is (amongst others) on a site allocated in the development plan and the proposal is consistent with site's allocated use. The proposed development is not on an allocated site in the Local Plan and therefore is not exempt from the sequential test. I acknowledge that a pragmatic approach needs to be taken so we are trying to establish whether a sequential test would be required or not. Unfortunately, at the time of writing we do not have a definitive answer to this issue but will provide feedback on this point as soon as we can. Another option you might wish to consider is a scheme where the new access does not fall within Flood Zones 2 and 3, and as such the application site is entirely within Flood Zone 1.

2.10. The extent of the site boundary affected by Flood Zone 2 is less than 1% (circa 2.5m²). The resolution of the JFLOW modelling for the area is a 5m grid – meaning that the extent of Flood Zone 2 affecting the site is likely just the result of the 5m pixel sizes exported from the model



outputs. Furthermore, based on LiDAR information, the site boundary is circa 1m higher than the opposite side of the Flood Zone 2 pixel – flood water therefore would not be expected to flow into the site as indicated by the pixilation. The site should in reality be considered fully within Flood Zone 1.

2.11. In addition, Paragraph 023 of the NPPG states the following:

The sequential approach is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. This means avoiding, so far as possible, development in current and future medium and high flood risk areas considering all sources of flooding including areas at risk of surface water flooding. Avoiding flood risk through the sequential test is the most effective way of addressing flood risk because it places the least reliance on measures like flood defences, flood warnings and property level resilience features. Application of the sequential approach in the plan-making and decision-making process will help to ensure that development is steered to the lowest risk areas, where it is compatible with sustainable development objectives to do so.

2.12. In addition, the gov.uk guidance Flood risk assessment: flood zones 1, 2, 3 and 3b³ states:

You may not need a sequential test if development can be laid out so that only elements such as public open space, biodiversity and amenity areas are in areas at risk of any source of current or future flooding.

- 2.13. The proposals are for the construction of new residential dwellings. The location of the structures are to be on the topographically higher parts of the site, wholly located within Flood Zone 1. The area indicated as partly Flood Zone 2 is an area adjacent to the site access for landscaping and biodiversity improvement thus adheres to the above guidance in negating the need for a Sequential Test.
- 2.14. Therefore, the sequential approach has been adopted on site by locating the structures in a lowest risk area.

³ https://www.gov.uk/guidance/flood-risk-assessment-flood-zones-1-2-3-and-3b#check-if-yourdevelopment-needs-to-satisfy-the-sequential-and-exception-tests



2.15. In light of this, and with reference to the Flood Zone 2 extent being of 5m pixel size, the site should not be considered to be in Flood Zone 2, and should be considered as Flood Zone 1.

Exception Test

- 2.16. The Exception Test is applied to sites based on the Flood Zone and the nature of the development. As the proposed development consists of a residential use, it would be classed as "more vulnerable" in line with government development use classes.
- 2.17. The Flood Risk Vulnerability Classification table⁴, provided below in Table 2 shows which vulnerabilities are appropriate in each Flood Zone.
- 2.18. A small part of the northern corner of the site is located in Flood Zone 2 and 3, however the proposed new development sits wholly within Flood Zone 1. Table 2 shows Flood Zone 1 is an appropriate location for "more vulnerable" uses without the need for an Exception Test.
- 2.19. However, the wider site is located in an area at risk of flooding, the planning application submitted by the applicant is required to be accompanied by an FRA which shows that the development can be achieved in a sustainable manner, with an overall reduction of flood risk to the site and surrounding area as per Footnote 59 of the NPPF.

 ⁴ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/57
 5184/Table_3_-_Flood_risk_vulnerability_and_flood_zone__compatibility_.pdf



Table 2: Flood Risk Vulnerability Classification Table

	Flood Risk Vulnerability Classification							
Flood Zones	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible			
Zone 1	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark			
Zone 2	\checkmark	Exception Test required	\checkmark	\checkmark	\checkmark			
Zone 3a	Exception Test required	х	Exception Test required	\checkmark	\checkmark			
Zone 3b	Exception Test required x		x	x	\checkmark			

Summary

2.20. This flood risk assessment has been prepared with due consideration to the above local and national policy.



3. Consultation and Review

Consultation

- 3.1. The site is within the remit of Kent County Council as Lead Local Flood Authority (LLFA).
- 3.2. At the time of writing no information has been provided by the EA. Given the rural nature of the site and that there are no nearby watercourses that are classified as an EA main river and therefore it is not expected the EA will hold any detailed flood modelling. The Flood Zones are assumed to be derived from national scale JFLOW modelling, which is not detailed enough to be utilised within site-specific FRA's.

Documents and Online Mapping

- 3.3. Local Governments and Lead Local Flood Authorities provide documents which contain data and policies on flood risk and new development in their areas. These documents are introduced and briefly summarised below. For the purposes of this FRA, these documents have been reviewed for relevant information and any relevant data is discussed within the appropriate sub heading of this report.
- 3.4. The following sources of information have been reviewed for this assessment:
 - Flood Map for Planning on the Environment Agency website <u>https://flood-map-for-planning.service.gov.uk/</u>
 - Long Term Flood Risk Information on the Environment Agency website <u>https://www.gov.uk/check-long-term-flood-risk</u>
 - National Planning Policy Framework (NPPF) (Department for Levelling Up, Housing and Communities, 2023)
 - Planning Practice Guidance Flood Risk and Coastal Change (Department for Levelling Up, Housing and Communities, 2022)
 - Geoindex Onshore (British Geological Survey, 2023)



- Bearing Fruits 2031: The Swale Borough Local Plan⁵ (Swale Borough Council, 2017)
- Preliminary Flood Risk Assessment⁶ (Kent County Council, 2011)
- Swale Borough Council Level 1 Strategic Flood Risk Assessment⁷ (Swale Borough Council, 2020)
- Kent Local Flood Risk Management Strategy 2017-2023⁸ (Kent County Council, 2017)

Preliminary Flood Risk Assessment (PFRA)

- 3.5. The PFRA, published in 2011, is a high-level appraisal of flood risk across Lead Local Flood Authority Kent County Council. The flood risk from all sources, including fluvial, surface water, groundwater, and surcharged sewers is evaluated. It is the basis upon which the Local Flood Risk Management Strategy is produced.
- 3.6. The PFRA summarises historical flood incidents in Kent County Council. The site is not recorded as having been affected by any flood event.

Strategic Flood Risk Assessment (SFRA)

- 3.7. The SFRA, published in 2020, provides the evidence base for the Local Planning Authority Swale Borough Council Local Plan and guidance for consideration when determining planning applications. The SFRA seeks to place new development into areas of lower flood risk taking into account current flood risk, future flood risk, and the effect a proposed development would have on the risk of flooding.
- 3.8. The SFRA mapping provided by Swale Borough Council has been used throughout production of this report as a source of information, particularly pertaining to historical flood incidents.

⁸ https://www.kent.gov.uk/__data/assets/pdf_file/0010/79453/Local-Flood-Risk-Management-Strategy-2017-2023.pdf



⁵ https://services.swale.gov.uk/media/files/localplan/adoptedlocalplanfinalwebversion.pdf

⁶ https://www.kent.gov.uk/__data/assets/pdf_file/0013/12091/Preliminary-flood-risk-assessment.pdf

⁷ https://swale.gov.uk/planning-and-regeneration/strategic-flood-risk-assessment-completed

Local Flood Risk Management Strategy (LFRMS)

- 3.9. The Local Flood Risk Management Strategy sets out roles and responsibilities for flood risk management, assesses the risk of flooding in the area, where funding can be found to manage flood risk, and the policies, objectives, and actions of the Lead Local Flood Authority.
- 3.10. The Kent County Council LFRMS is used within this report to identify any flood management infrastructure and historical incidences of flooding.



4. Sources of Flood Risk

Fluvial

- 4.1. Flooding from watercourses arises when flows exceed the capacity of the channel, or where a restrictive structure is encountered, resulting in water overtopping the banks into the floodplain.
- 4.2. The northern corner of the site is located partially within Flood Zone 2 and 3. Flood Zone 3 denotes a risk of flooding from fluvial sources greater than 1 in 100 (1% AEP). Flood Zone 2 denotes a risk of flooding from fluvial sources between 1 in 100 (1% AEP) and 1 in 1000 (0.1% AEP).
- 4.3. The extent of the site boundary affected by Flood Zone 2 is less than 1% (circa 2.5m²). The resolution of the JFLOW modelling for the area is a 5m grid meaning that the extent of Flood Zone 2 affecting the site is likely just the result of the 5m pixel sizes exported from the model outputs. Furthermore, based on LiDAR information, the site boundary is circa 1m higher than the opposite side of the Flood Zone 2 pixel flood water therefore would not be expected to flow into the site as indicated by the pixilation. The site should in reality be considered fully within Flood Zone 1.
- 4.4. The proposed development is to be wholly located within Flood Zone 1. Flood Zone 1 denotes a risk of flooding from fluvial sources less than 1 in 1000 (0.1% AEP).





Figure 3: EA Flood Map for Planning (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

- 4.5. The closest EA main river to the site is the Milton Creek, located approximately 5km to the east in Sittingbourne. There are no other mapped watercourses in the vicinity of the site.
- 4.6. Based on the EA Historic and Recorded Historic Flood Extents map (Figure 4), there is no record of historical flooding on the site.





Figure 4: EA Historic Flood Mapping (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

- 4.7. At the time of writing no information has been provided by the EA. Given the rural nature of the site and that there are no nearby watercourses that are classified as an EA main river and therefore it is not expected the EA will hold any detailed flood modelling. The Flood Zones are assumed to be derived from national scale JFLOW modelling, which is not detailed enough to be utilised within site-specific FRA's.
- 4.8. Given that there are no nearby watercourses classified as an EA main river, combined with the fact that the site is located high up in a rural catchment, it is likely that the risk of flooding is primarily controlled by pluvial sources. i.e., during periods of prolonged rainfall or intense rainfall events.
- 4.9. Overall, the risk of fluvial flooding to the site is considered to be low. It should also be noted that all new dwellings will be located on the topographically higher parts of the site, wholly located in Flood Zone 1.



Tidal

- 4.10. Tidal flooding occurs when a high tide and high winds combine to elevate sea levels. An area behind coastal flood defences can still flood if waves overtop the defences or break through them. Tidal flooding can also occur a long way from the coast by raising river levels. Water may overtop the river bank or river defences when tide levels are high.
- 4.11. The site is a significant distance from any tidal source and above the anticipated extreme tidal levels, even when considering the impacts of climate change.
- 4.12. There is no record of historical tidal or sea flooding on-site.
- 4.13. The risk of flooding from tidal sources is considered low.

Canals

- 4.14. The Canal and River Trust (CRT) generally maintains canal levels using reservoirs, feeders, and boreholes and manages water levels by transferring it within the canal system.
- 4.15. Flooding can also occur where a canal is impounded above surrounding ground levels and the retaining structure fails.
- 4.16. There are no nearby canals to the site. Furthermore, the SFRA states that there are no records of historical canal flooding within the Borough.
- 4.17. The risk of flooding from this source is considered to be low.

Pluvial

- 4.18. Pluvial flooding can occur during prolonged or intense storm events when the infiltration potential of soils, or the capacity of drainage infrastructure is overwhelmed leading to the accumulation of surface water and the generation of overland flow routes.
- 4.19. Annual surface water flood risk is labelled by the EA as:
 - 'High Risk'; >3.3% AEP (annual probability greater than 1 in 30).
 - 'Medium Risk'; 1.1% to 3.3% AEP (annual probability between 1 in 100 and 1 in 30).
 - 'Low Risk'; 0.1% to 1% AEP (annual probability between 1 in 1000 and 1 in 100).
 - 'Very Low Risk'; <0.1% AEP (annual probability less than 1 in 1000).



4.20. The EA Online 'Flood Risk from Surface Water' map indicates that the site is located within a 'very low' risk of flooding area, however the surrounding roads, specifically Maidstone Road and the areas to the northwestern side of Maidstone Road, are within an area at 'low', 'medium' and 'high' risk of flooding (Figure 5).



Figure 5: EA Surface Water Flood Risk Mapping (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

- 4.21. Given the site is not located within an area of 'high', 'medium' or 'low' surface water flood risk, no flood depths have been recorded on site during the modelled 1 in 30 year (3.3% AEP) scenario, the 1 in 100 year (1% AEP) or the 1 in 1000 (0.1% AEP) scenarios.
- 4.22. Analysis of the flood depths during the 'high' risk event (Figure 6) shows that the majority of the surrounding area would remain unaffected by flooding. The areas identified to be at risk along Maidstone Road generally wouldn't experience flood depths greater than 300mm, however there are smaller isolated areas on the northwestern side of Maidstone Road that may experience 300mm to 600mm of flood depths.





Figure 6: RoFSW Surface Water Depths for a High Risk (1 in 30 year) Scenario (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

4.23. Analysis of the flood depths during the 'medium' risk event (Figure 7) shows the areas identified to be at risk along Maidstone Road generally wouldn't experience flood depths greater than 300mm.The northwestern side of Maidstone Road that may experience 300mm to 600mm of flood depths.





Figure 7: RoFSW Surface Water Depths for a Medium Risk (1 in 100 year) Scenario (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

4.24. Analysis of the flood depths during the 'low' risk event (Figure 8) shows the areas identified to be at risk along Maidstone Road could experience flood depths between than 300mm and 600mm. The northwestern side of Maidstone Road that may experience 600mm to 900mm of flood depths.





Figure 8: RoFSW Surface Water Depths for a Low Risk (1 in 1000 year) Scenario (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

- 4.25. The SFRA provides mapping of historical surface water flood incident records kept by the local authority. No historical surface water incidents have been recorded in the vicinity of the site.
- 4.26. Overall, the risk of pluvial flooding to the site is considered to be low, however, the risk of flooding to the adjacent Maidstone Road is considered moderate to high.

Reservoirs

- 4.27. Large waterbodies or reservoirs that have walls built above the surrounding ground level pose a risk of flooding. Walls could fail due to old age, accident, or because excess flood water has been added to the reservoir. Although a breach is unlikely, the consequences would be significant, leading to rapid inundation of the downstream floodplain.
- 4.28. According to the EA's Flood Risk from Reservoirs mapping the site is outside modelled flood extents in the event of reservoir flooding (Figure 9).





Figure 9: EA Reservoir Flood Risk Mapping (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). ©https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

4.29. The site has not been flagged as being at risk of flooding following a reservoir failure, therefore the risk of flooding is low.

Groundwater

- 4.30. Groundwater flooding occurs in areas where underlying geology is permeable and water can rise within the strata sufficiently to breach the surface.
- 4.31. The British Geological Survey's (BGS) mapping shows superficial deposits underlying the site classified as Head consisting of gravel, sand, silt and clay. The bedrock underlying the site is Seaford Chalk Formation comprised of chalk.
- 4.32. The SFRA includes the JBA Groundwater Flood Map Depths for the borough. The site is shown to be located within an area where groundwater levels are between 0.5m and 5.0m below the ground surface (Figure 10).





Figure 10: JBA Groundwater Flood Map Depths (Swale SFRA, 2020) (Site located within the red circle)

4.33. Based on the information above and considering that the proposed development does not include any subterranean features, the groundwater flood risk is considered to be low.

Sewers

- 4.34. Foul or surface water sewers can be a cause of flooding if the drainage network becomes overwhelmed, either by blockage or due to local development beyond the designed capabilities of the drainage system.
- 4.35. The SFRA includes details from Southern Waters SIRF database which details the number of sewer flooding incidents within the borough. The data is provided at four-digit postcode level for confidentiality reasons. For the postcode area 'ME9 7' in which the site lies, there were 12 recorded incidents of sewer flooding.
- 4.36. Based on the information above, the site is considered to be at a low risk of sewer flooding. It is recommended that all new drainage associated with the scheme be fitted with non-return valves and appropriate connection consents are obtained from Southern Water.



5. Flood Risk Mitigation

Fluvial and Pluvial

- 5.1. The northern corner of the site is located partially within Flood Zone 2 and 3, however, the majority of the site is located within Flood Zone 1. The site is also considered to be at 'very low' risk of flooding from pluvial sources. The location of the dwellings will be located on the topographically higher parts of the site and therefore located wholly within Flood Zone 1 and outside of all modelled surface water flood extents.
- 5.2. Given that there are no nearby watercourses classified as an EA main river, combined with the fact that the site is located high up in a rural catchment, it is likely that the risk of flooding is primarily controlled by pluvial sources. i.e., during periods of prolonged rainfall or intense rainfall events.
- 5.3. Given that the overall flood risk to the proposed dwellings would be considered to be low, there are minimal flood resilience measures that are required incorporated into the development itself. The location of the development should remain on the elevated areas of the site.
- 5.4. Flood warning procedures have been detailed in this report and should be formalised prior to the site being occupied.

Reservoirs, Canals, Groundwater and Sewers

5.5. Flood risk from these sources is considered to be low, therefore mitigation is not required.

Increase to Flood Risk Elsewhere

5.6. The proposed structures are to be located in Flood Zone 1 and within low-risk areas from surface water flooding. Therefore, the development will not increase flood risk elsewhere.

Access/Egress

5.7. The site is not in an area where the EA provide specific flood alerts and warnings. The occupants of the dwellings should monitor Met Office Weather Warnings to be prepared for extreme weather events.



- 5.8. Analysis of the RoFSW 'medium' risk hazard ratings along Maidstone Road show that the road immediately adjacent to the site may be unaffected by flooding and therefore dry. However, areas immediately north and south along Maidstone Road are shown to have hazard ratings of between 0.75 and 1.25, which is also defined as 'danger for some'. Therefore, safe access egress away from the site may not be possible if flooding has already occurred.
- 5.9. However, it is important to note that residents can stay in their homes as safe refuge can be sought on site.



Figure 11: RoFSW Surface Water Hazard for a Medium Risk (1 in 100 year) Scenario (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

Flood Warning Procedures

5.10. Flood Alerts are issued more frequently than Flood Warnings. The Met Office website states that Flood Alerts could be issued between 2 hours and 2 days in advance of flooding, while Flood Warnings are issued between half an hour to one day in advance of flooding. As such, it



is proposed to evacuate the site upon receipt of a Flood Warning as this should provide sufficient warning to enable evacuation before flood waters reach the evacuation route.

- 5.11. The residents of each dwellings should sign up to the Met Office weather warning service to receive flood warnings. Residents are responsible for monitoring the situation and ensuring relevant information is disseminated to all residents on site as well as ensuring visitors follow the procedures if the situation worsens.
- 5.12. If flooding has already occurred prior to evacuation, then residents should remain within their homes, which are located in Flood Zone 1 and at low risk of flooding from surface water.



6. Conclusions

- 6.1. This FRA has been undertaken with reference to the requirements of NPPF and Planning Practice Guidance with respect to the development at Land Adjacent to Hawthorns, Maidstone Road, Borden, Swale, ME9 7QA. It has been written to support a planning application and prepared with due consideration to the nature of the proposed development to provide the appropriate level of detail.
- 6.2. An assessment of the risk of flooding from all sources has been undertaken and is summarised in the table below:

Source of Flooding	Flood Risk Summary
	The northern corner of the site is located partially within Flood Zone 2 and 3, however, the majority of the site is located within Flood Zone 1. The location of the dwellings will be located on the topographically higher parts of the site and therefore located wholly within Flood Zone 1.
	Based on the EA Historic and Recorded Historic Flood Extents map, there is no record of historical flooding on the site.
Fluvial	At the time of writing no information has been provided by the EA. Given the rural nature of the site and that there are no nearby watercourses that are classified as an EA main river and therefore it is not expected the EA will hold any detailed flood modelling. The Flood Zones are assumed to be derived from national scale JFLOW modelling, which is not detailed enough to be utilised within site-specific FRA's.
	Given that there are no nearby watercourses classified as an EA main river, combined with the fact that the site is located high up in a rural catchment, it is likely that the risk of flooding is primarily controlled by pluvial sources. i.e., during periods of prolonged rainfall or intense rainfall events.
	Overall, the risk of flooding to the site is considered to be low.
Pluvial	The EA Online 'Flood Risk from Surface Water' map indicates that the site is located within a 'very low' risk of flooding area, however the surrounding roads, specifically Maidstone Road and the areas to the northwestern side of Maidstone Road, are within an area at 'low', 'medium' and 'high' risk of flooding.
	Analysis of the flood depths during the 'medium' risk event (Figure 7) shows the areas identified to be at risk along Maidstone Road generally wouldn't experience



	flood depths greater than 300mm. The northwestern side of Maidstone Road that					
	may experience 300mm to 600mm of flood depths.					
	Overall, the risk of pluvial flooding to the site is considered to be low, however, the risk of flooding to the adjacent Maidstone Road is considered moderate to high.					
Tidal						
Reservoirs						
Groundwater	The site is considered to be at low risk from other sources.					
Sewers						
Canals						

- 6.3. The FRA supports the planning application and demonstrates that there is an acceptable level of flood risk to the site if the mitigation strategies recommended are implemented in the scheme. The development does not increase flood risk off site or to the wider area.
- 6.4. This Flood Risk Assessment should be submitted as part of the planning application to satisfy the requirements under NPPF.



Appendix A - Development Proposals







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	OS Note: Some services may have been omitted due to parked vehicles. The Ordnance Survey tile is to be used as a guide only.	Comments This plan should only be used for its original purpose. iG Surveys accepts no responsibility for this plan if supplied to any party other than the original client.	Buildings Overhead Cable 0 H IC Inspection Wall Concrete edge Pinv Pipe inversion Kerb line Tarmac edge Gy Gully Line marking Grass verge Bg Back gull Drop kerb Canopy/Overhang Dp Down pic	in chamber Boll Bollard int IB Illuminated bollard Bin Rubbish bin Iy Vp Vent pipe pe Gri Ground light	d Intervoven	Wm Water meter Gas Gas valve Av Air valve ICU Undentified inspection	BP Brick paved CPS CVR Cover IC Inspection chamber Related Residue and	ent Wyndha	am Property Group	iG	
N	This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36(15) via Global Navigational Satellite Systems (GNSS) and the O.S. Active Network (OS Net). A true OSGB36 coordinate has been established near to the site centre via a transformation using the OSTN1GB5 & OSCM15CB transformation models	All dimensions should be checked on site prior to design and construction. Drainage information (where applicable) has been visually inspected from the surface and therefore should be treated as approximate only.	Centre line Verge Pipe Pipe abov ▲ 1 Station and Name MH Manhole ▲ 100.000 Station Level WL Water leve ● ● ● ● File Filod ligh ● ● ● ● ★ Tree / Bush / Sapling Lp Lamp pop ▲ Area of Undergrowth Tp Telegraph	ve ground Lbox Letter box Ldr Ladder vel Sty Stile ht IFL Internal floor level st THL Threshold level h post Sp Sign post	Post & Rall PW Post & Rall OL Chain Link WP Wooden Panels CP Concrete Panels SIP Steel Palisade	No Wash but Re Rodding eye BB Belisha beacon CTV Cable tv Mirr Marker post Gmix Gas marker post So Soffit	Critical Vegating wait UTL Unable to lift TCL Tree canopy level G: Gifth MG Multi gifth Simp Tree Stump CL: Cover level U: Invant Ineal	dress	Hawthorns Danaway ME9 7QA	SURVEY	'S LTC eomatics
	The survey has been correlated to this point and a further one or more OSGB36(15) points established to create a true O.S. bearing for angle orientation. No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates which have a scale factor applied.	Notes	EP Electricity TI Traffic ligh R: Ridge Level Bus Bus stop E: Eaves Level Sv Stop valv F: Flat Roof Level St Stop tap Gate Er Earth rod	y usex in intantoie pht BH Borehole ELC Electric re BT British Telecom C'box Control box d TT Tactile	Station Co-ordinates Station Easting IG1 585994.62 IG2 586033 91	g Northing 6 162755.240 3 162820.114	Level Dra 48.670 48.301	ale 1:200 Iwn By LG	Paper Size A1 Drawing Title Topographical	iG Surveys Unit 1 Garden Gee Road, Co	Ltd i Court palville
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Please refer to Survey Station Table to enable establishment of the on-site grid.

Drawing Number

J500-01

Rev.

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OS GPS

Level datum

Grid orientation OS GPS

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Date

14-05-2024