JPC Environmental Services
(A Division of J P Chick & Partners Ltd)
Consulting Civil & Structural Engineers

Land adjacent Fairview, Ashbocking Road, Hemingstone, Suffolk

Level 1 Screening Study
Flood Risk Assessment

Report: IE23/084/FRA
09 October 2023
Rev. 00

Mr. & Mrs. Boardley

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1.0 EXECUTIVE SUMMARY

Site Name / Address:	Land adjacent Fairview, Ashbocking Road, Hemingstone, Suffolk, IP6 9RP Grid reference: OS X (Eastings) 616633, OS Y (Northings) 254124
Client:	Mr. & Mrs. Boardley
Planning Consultant / Architect:	Creative Building Designs
Local Planning Authority:	Mid Suffolk District Council
Application Type:	Outline Planning Application
Present Site Use:	Undeveloped grassland (greenfield)
Proposed Site Use:	Construction of 1no. residential dwelling including 3no. bay cart lodge and associated landscaping
Maintenance Responsibility	Homeowner

Objectives:

- Determine any extant risk of flooding from off-site sources;
- Research local incidents of flooding;
- Explore the potential impact of the planned development on surface water run-off;
- To make recommendations in respect of any flood mitigation measures or surface water management improvements that might be required to minimise the impact of the development, and
- To determine the scope of any additional investigations or hydraulic modelling that might be required to fully establish the degree of potential flood risk.

Findings:

General

- According to the GOV.UK indicative flood mapping, the application site is located entirely in Flood Zone 1 and therefore has a low probability of flooding (<0.1% annually) from fluvial and/or tidal sources;
- The risk of pluvial flooding occurring within the confines of the application site is Low to Medium, while the risk of pluvial flooding significantly impacting the on-site dwelling during the design flood event is considered to be Low; and
- The overall risk of groundwater flooding, sewer flooding and flooding from artificial sources is considered to be NEGLIGIBLE.

Planning

- In planning terms, the NPPF considers the sensitivity of the proposed site use to flood risk as 'More Vulnerable';
- This use is considered appropriate for its Flood Zone 1 designation, and therefore passes the Sequential Test; and
- The Exception Test does not need to be applied.

Recommendations:

Based on the findings of our desk-based research, a review of the development proposal and the drainage design, JPC Environmental Services would advise as follows:

- We consider this Flood Risk Assessment to be sufficient and proportionate to the nature and scale of the planned development.
- Whilst the risk of internal flooding is low, consideration should be given to the inclusion of wet proofing or flood-resilient measures into the development proposal in combination with setting the proposed finished ground flood levels (as a minimum) 150mm above external ground levels. Such measures might reasonably include (but not limited too):
  - Non-absorbent insultation within the floor construction and ground floor walls; and
  - Non-absorbent floor coverings such as ceramic tile, or polished concrete.
- Furthermore, it is recommended a route is maintained within the masterplan to continue to allow any overland flows to pass through the site between any new structures.
- A SuDS compliant drainage system should be incorporated into the development proposals. Such measures might reasonably include (subject to detailed design) the provision of permeable surfacing and/or other infiltration-based SuDS components. This will provide some on-site attenuation to reduce future risk of surface water flooding, as well as provide a means of treatment before the off-site discharge;
- Recent changes to the local guidance (Suffolk County Council Floods Team) require that 'surface' SuDS components are incorporated into the development to promote the four pillars of SuDS (i.e., Quality, Quantity, Biodiversity and Amenity); and
- Consideration should be given to the integration of water re-use and/or rainwater harvesting into the development for the use in non-potable systems/uses.

2.0 INTRODUCTION

2.01 Brief

2.01.1 JPC Environmental Services were appointed by the Mr. & Mrs. Boardley to prepare a Level 1 Flood Risk Assessment (FRA) to support an outline planning application associated with the development of a single residential dwelling including 3no. bay cart lodge on land adjacent to Fairview, Ashbocking Road, Hemingstone, Suffolk, IP6 9RP (hereafter to be referred to as 'the site').

2.01.2 This report shall be for private and confidential use of the Mr. & Mrs. Boardley. It should not be reproduced in whole or in part or relied upon by a third party for any use without the express written authority of JPC Environmental Services. If any unauthorised third party makes use of this report, they do so at their own risk and JPC Environmental Services owes them no duty of care or skill.

2.01.3 This report has been written in accordance with, and meeting the requirements of, planning policy currently guided by:

National Legislation/Codes

- *National Planning Policy Framework (NPPF) (Ministry of Housing Communities & Local Government, 2021)*
- *Ciria 753 – The SuDS Manual (Woods Ballard, B, Wilson, S, Udale-Clarke, H, Illman, S, Scott, T, Ashley, R, Kellagher, R, 2015)*
- *Defra's Non-statutory technical Standards (Department for Environment, Food and Rural Affairs, 2015)*
- *Building Regulations – Approved Document H (HM Government, 2015)*
- *BS8582:2013 – Code of Practice for Surface Water Management for Development Sites (British Standards Institution (BSI), 2013)*
- *National Design guide, Planning Practise Guidance for beautiful, enduring and successful Places (Ministry of Housing Communities & Local Government)*

Local Policy

- *Strategic Flood Risk Assessments JBA Consulting (2020). Babergh and Mid Suffolk Level 1 Strategic Flood Risk Assessment (August 2020) and Level 2 Strategic Flood Risk Assessment (October 2020)*

2.01.4 In producing this report, we have exercised all the reasonable skill, care and diligence to be expected of an appropriately qualified and competent consultant, experienced in carrying out equivalent services for developments of a similar size, scope and complexity, value and purpose.

2.02 Scope

2.02.1 This strategy has been produced in line with the NPPF. The purpose of this report is to:

- Determine any extant risk of flooding from off-site sources;
- Research local incidents of flooding;
- Explore the potential impact of the planned development on surface water run-off;
- To make recommendations in respect of any flood mitigation measures or surface water management improvements that might be required to minimise the impact of the development, and
- To determine the scope of any additional investigations or hydraulic modelling that might be required to fully establish the degree of potential flood risk.

2.03 Location

2.03.1 The site is located approximately 1.5km to the east of Hemingstone village, approximately centred at Ordnance Survey grid reference 616633, 254124.

2.03.2 The site's location plan is provided at Appendix A, and within Figure 1 below.

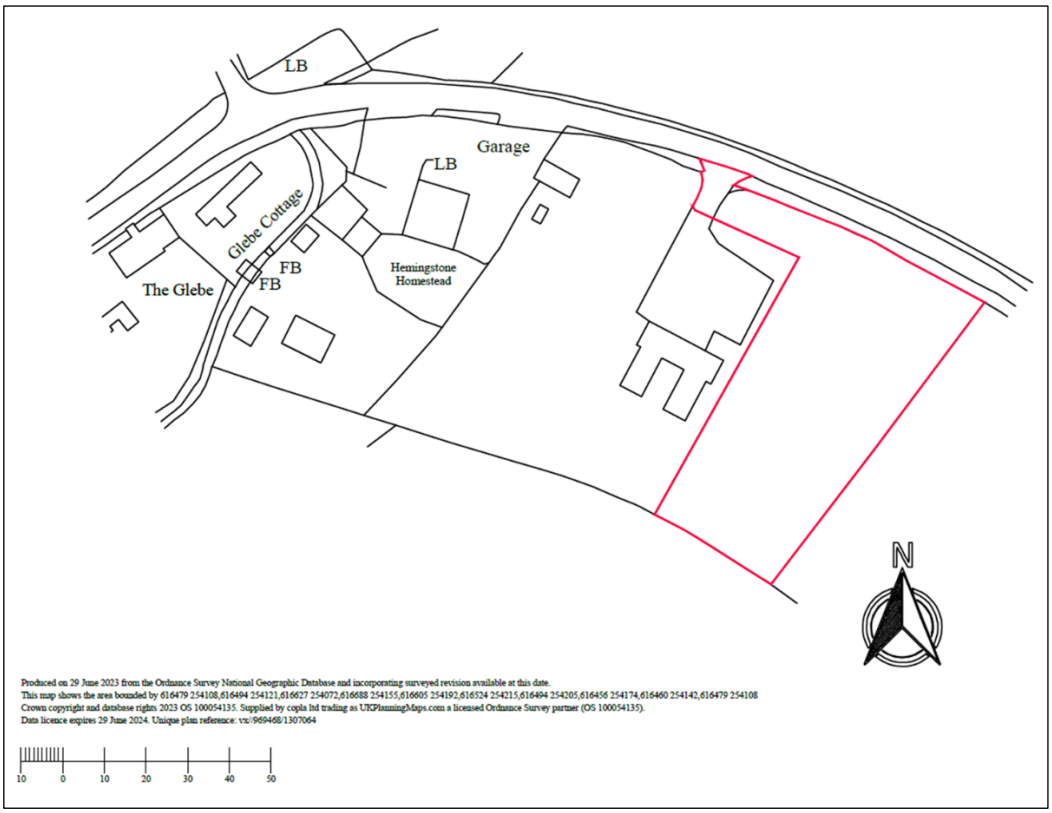

Figure 1- Application Site Orientation Plan

2.04 Site Description

2.04.1 The site extents to approximately 0.34ha and is currently undeveloped, grassland.

2.04.2 The site is located in a rural area and is bounded to the north-west by a single residential dwelling and a local garage beyond. Ashbocking Road (B1078) forms the site's north-eastern boundary. Agricultural fields/grazing land exist further to the north (beyond Ashbocking Road), as well as to the east and south.

2.05 Development Proposal

2.05.1 The development proposal relates to the erection of a single residential dwelling including 3-bay cart lodge.

2.05.2 A development layout is provided at Appendix A.

2.06 Flood Risk Vulnerability Classification

2.06.1 Developments are classified based on their sensitivity to flood risk. In this instance, in accordance with the NPPF Annex 3: Flood Risk Vulnerability Classification, the vulnerability of the proposed development is considered to be 'More Vulnerable'. Please refer to Figure 2.

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.

Figure 2 - Flood Risk Vulnerability Classification (NPPF Annex 3)

3.0 BACKGROUND TO FLOOD RISK AND REGULATORY CONTEXT

3.01 National Guidance

3.01.1 In relation to flood risk, planning policy in England is currently guided by the National Planning Policy Framework (NPPF) and the associated guidance relating to flood risk (25th August 2022). The purpose of this planning framework is to ensure that flood risk issues are taken into account at every stage of the planning process and that new development is steered towards less vulnerable locations in preference to higher risk areas.

3.01.2 At all levels this policy relies on a series of predicted flood zones, which are defined by the Environment Agency (EA). These zones are: -

- ***Flood Zone 1*** *– Low probability – less than 0.1% annual exceedance probability (AEP) of fluvial or tidal flooding.*
- ***Flood Zone 2*** *– Medium probability – between 1% to 0.1% AEP of fluvial flooding; or 0.5% to 0.1% AEP of tidal flooding.*
- ***Flood Zone 3a*** *– High probability – a 1% or greater AEP of fluvial flooding; or greater than 0.5% AEP of tidal flooding.*
- ***Flood Zone 3b*** *– Functional flood plain – land where water has to flow or be stored in times of flood (during events having greater than 3.3% or greater AEP).*

3.01.3 In addition to exploring the potential risk and impact of flooding on the development, site specific FRA's are required to assess the potential impact of the development itself on existing sites and the local hydrology. This is designed to ensure that new developments, which typically include extensive areas of impermeable surfacing, do not exacerbate flooding elsewhere.

4.0 DESK STUDY

4.01 Source of Information

4.01.1 As part of the desk-based research, JPC Environmental Services consulted the following sources of information:

- Indicative flood risk mapping (GOV.UK);
- Historic flood event information (EA/DEFRA); and
- Babergh and Mid Suffolk Councils Level 1 and 2 Strategic Flood Risk Assessment (August and October 2020 respectively).

4.02 Topography

4.02.1 On reviewing the England topographic map, it is noted that the topography of the area falls from the south-east to the north-west (i.e., towards an unnamed tributary of the River Gipping, refer to 4.04 for further details).

4.02.2 Ground levels within the confines of the site are in the order of 54.0 to 55.0m AOD and follow the topographical arrangement of the area. Refer to Figure 3.

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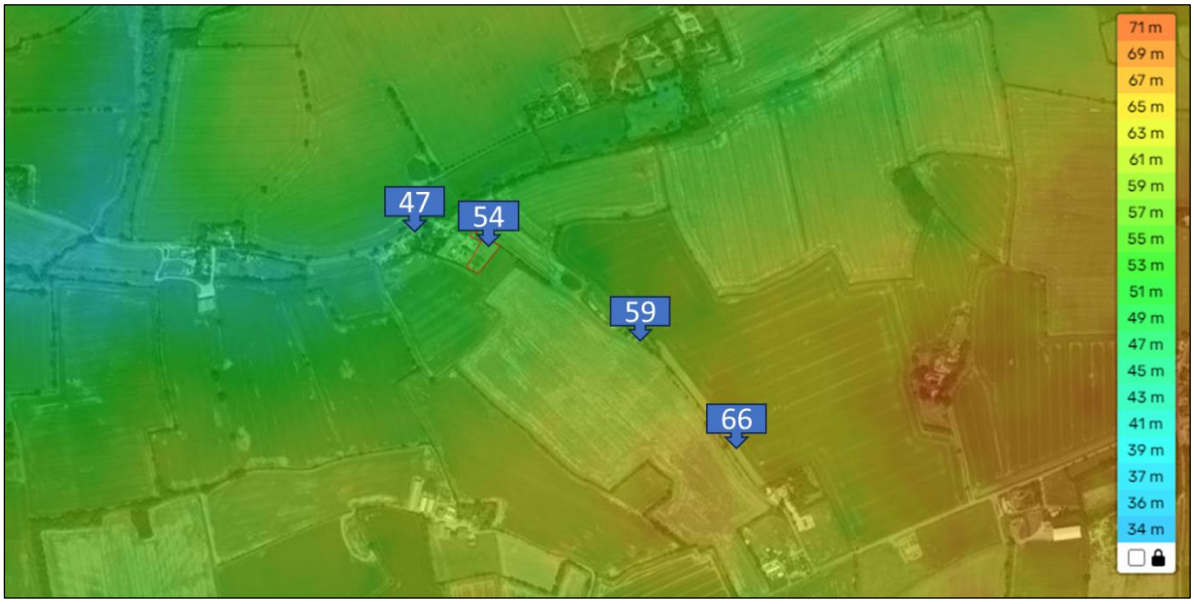


Figure 3- Extract from England Topographic Maps
(source: https://en-gb.topographic-map.com/maps/de54/)

4.03 Geology

4.03.1 With reference to the 1:50,000 British Geological Survey (BGS) Geological Mapping, the site is underlain by Lowestoft Formation – Diamicton (formerly known as Boulder Clay), over Newhaven Chalk Formation - Chalk.

4.03.2 In addition to the geological mapping, we have reviewed the BGS database for the closest available boreholes. There are records held by the BGS within approximately 1,500m of the site (located at Ashbocking House to the north, and the Suffolk Wildlife Trust to the east) which indicate findings of shallow deposits of topsoil with underlying Clay (bands of Yellow and Blue) and Chalk. The depth of the clay was approximately 30 – 40m below ground level.

4.03.3 The BGS borehole records also indicate no groundwater strikes. Copies of the borehole logs are provided at Appendix B.

4.04 Hydrological Features

4.04.1 The Flood Map for Planning shows the site lies in Flood Zone 1 (the low probability flood area) with no designated Main Rivers or Ordinary Watercourses on-site.

4.04.2 An unnamed tributary of the River Gipping is located approximately 150m to the north and approximately 170m to the west of the site. The watercourse flows from the north-east to the south-west and passes beneath the road in the vicinity of Hemingstone Garage. Refer to Appendix C attached.

4.05 Hydrogeology

4.05.1 The EA divides significant groundwater catchments into three Source Protection Zones (SPZ). With reference to the source protection zones on DEFRA's MAGIC map the site is located within Zone III – Total Catchment. This is 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.

4.05.2 In terms of groundwater vulnerability, the site is classified as Medium on the EA's groundwater vulnerability mapping.

4.05.3 The site is located within a drinking water safeguard zone for surface waters and groundwater.

4.06 Potential Sources of Flooding

4.06.1 In line with the recommendations contained in the NPPF and the sources identified in the Flood and Water Management Act (FWMA) 2010, a review of the various potential sources of flooding has been explored, which could potentially impact the site both before and after the proposed development.

4.06.2 This assessment will evaluate the following sources of potential flood risk:

- Tidal/Fluvial flooding;
- Surface water (pluvial) flooding;
- Groundwater flooding;
- Sewer flooding; and
- Reservoir, Canal and other artificial sources of flooding

Tidal/Fluvial flood risk

4.06.3 With reference to the Indicative Flood Map for Planning, the site is located entirely within Flood Zone 1 (the low probability flood zone) and thus at less than 0.1% chance of flooding in any given year from either fluvial or tidal sources (refer to Figure 4). A larger scale version of the Flood Map for Planning is included within at Appendix C.

4.06.4 It is, therefore, considered that fluvial/tidal flooding represents a Negligible risk to the site.

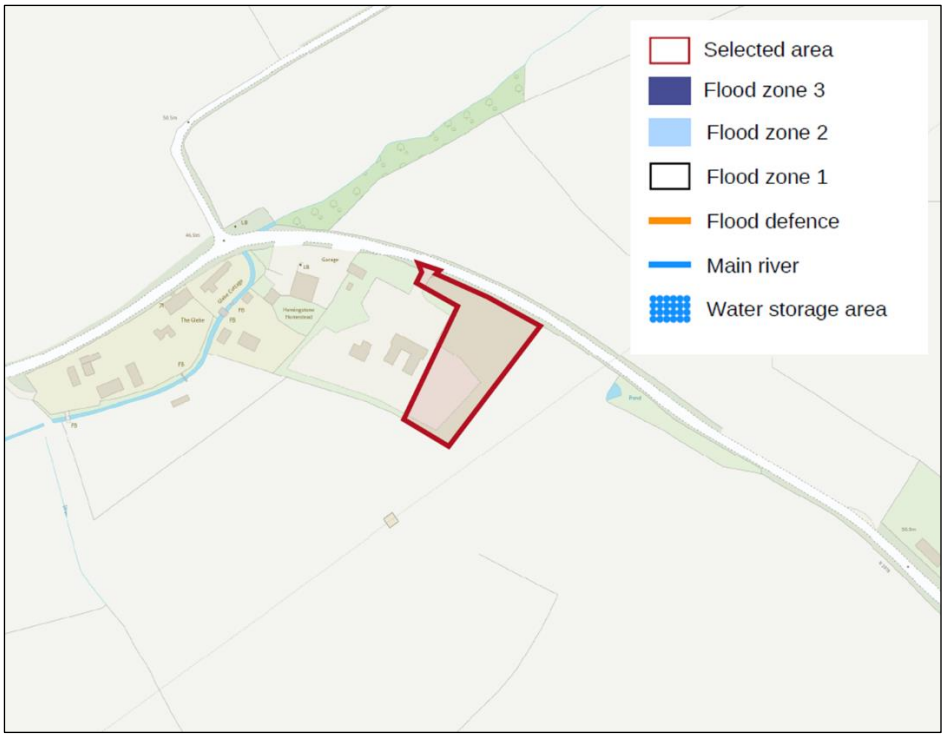


Figure 4- Extract of the Flood Map for Planning

Surface Water (Pluvial) Flooding

4.06.5 Pluvial (surface water) flooding typically occurs when intense rainfall occurs within a catchment to such an extent that it is unable to be absorbed at which point it makes its way to the nearest watercourse/surface water sewer. Due to the anticipated effects of climate change this is expected to be a more frequent and increasing source of flood risk, particularly in built up areas.

4.06.6 Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding. The GOV.UK Surface Water Flood Map highlights areas where runoff is likely to flow and/or gather based on LIDAR data and defines surface water flood risk as categories from 'Very Low' to 'High'. These zones are: -

- **Very Low** – area of less than 0.1% chance of flooding each year;
- **Low** – area between 0.1% and 1% chance of flooding each year (i.e., an extreme event);
- **Medium** – area of between 1% and 3.3% chance of flooding each year. This category is designated as the 'design event' for surface water flooding; and
- **High** – area of greater than 3.3% chance of flooding each year.

4.06.7 The pluvial flood risk mapping (GOV.UK) shows that the site is located as an area at risk of surface water flooding (refer to Figure 5, below).

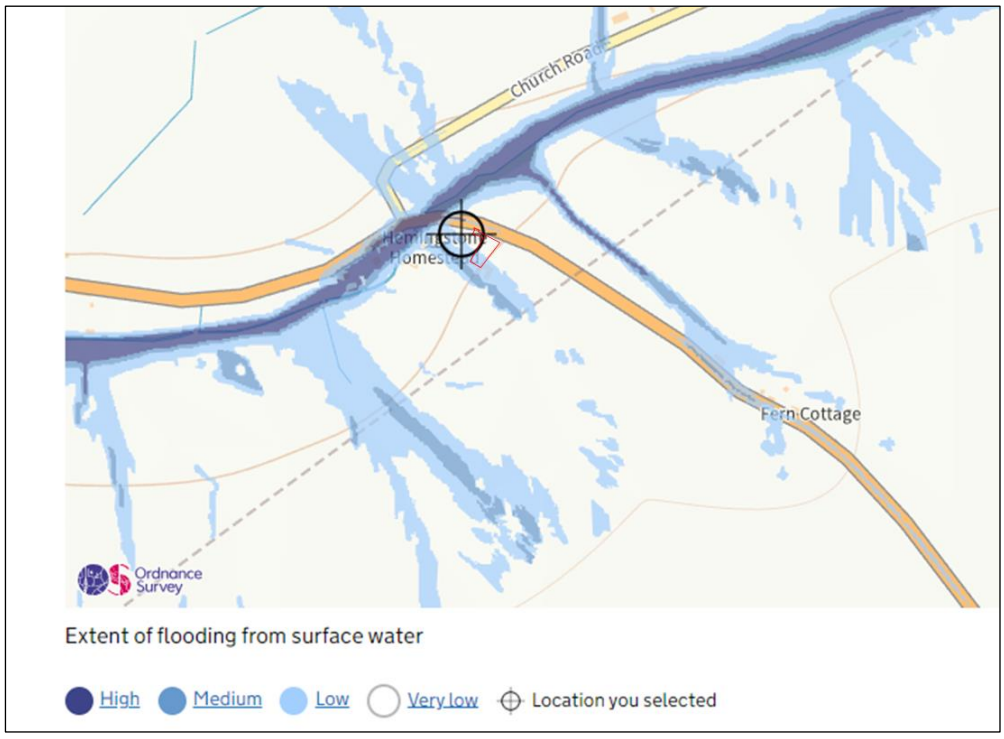


Figure 5- Extract of Environment Agency Surface Water Flooding

4.06.8 More detailed flood mapping hosted by Defra indicates that the site is not located in an area modelled for the >3.3% AEP pluvial flood event (i.e., the High-Risk area). Refer to Figure 6.

Figure 6- Detailed surface water mapping – High Risk Extent

4.06.9 During the 1% to 3.3% AEP pluvial flood event (i.e., the Medium Risk area; or 'Design Flood Event'), the extent of pluvial flooding is restricted to the rear of the application site (i.e., the south of the site). It is noted that the modelled flood extent occurs outside of the proposed built development footprint (refer to Figure 7, overleaf).

4.06.10 The corresponding maximum depth of flood water associated with this event, is in the order of 0.00 to 0.150m (i.e., up to maximum 150mm) deep. Please refer to Figure 8, overleaf.

4.06.11 The detailed mapping also shows the velocity of the flow within the application site to be in the order of 0.50 to 1.00m/s (refer to Figure 9, overleaf).

4.06.12 The combination of flood depth and flood velocity allows a flood hazard score to be attributed. In this instance, the Medium Risk area, has a flood hazard rating score of 0.50 to 0.75 (refer to Figure 10, overleaf). This is categorised as a 'Very Low Risk'.

Figure 7- Detailed surface water mapping -
Medium Risk Extent including Flow Direction Maximum Velocity (FDMW)

Figure 8 - Detailed surface water mapping – Medium Risk Depth

Figure 9- Detailed surface water mapping – Medium Risk Velocity

Figure 10- Detailed surface water mapping – Medium Risk Flood Hazard Rating

4.06.13 During the Low-risk scenario (i.e., 0.1% - 1% AEP; or extreme event), the detailed mapping indicates that pluvial flooding would follow the general topography of the area and flow across the southern 'half' of the site (refer to Figure 11, below). The rear of the proposed dwelling (only) is shown to be located within the modelled flood extent.

Figure 11- Detailed surface water mapping – Low Risk Extent including FDMW

4.06.14 The corresponding depth of flood water in this event is shown to range from 0.00 to 0.15m (i.e., up to maximum 150mm) deep. Please refer to Figure 12, overleaf.

4.06.15 The velocity is shown to be in the order of 0.5m/s to 1.00 m/s for the majority of the site, albeit the velocity is shown to increase at the application site's north-western boundary to approximately 1.00m/s to 2.00m/s (refer to Figure 13, overleaf).

4.06.16 It is shown, however, that the combination of flood depth and flood velocity result in a flood hazard rating score of 0.50 to 0.75 (i.e., a 'Very Low Risk'). Refer to Figure 14, overleaf.

Figure 12- Detailed surface water mapping – Low Risk Depth

Figure 13- Detailed surface water mapping – Low Risk Velocity

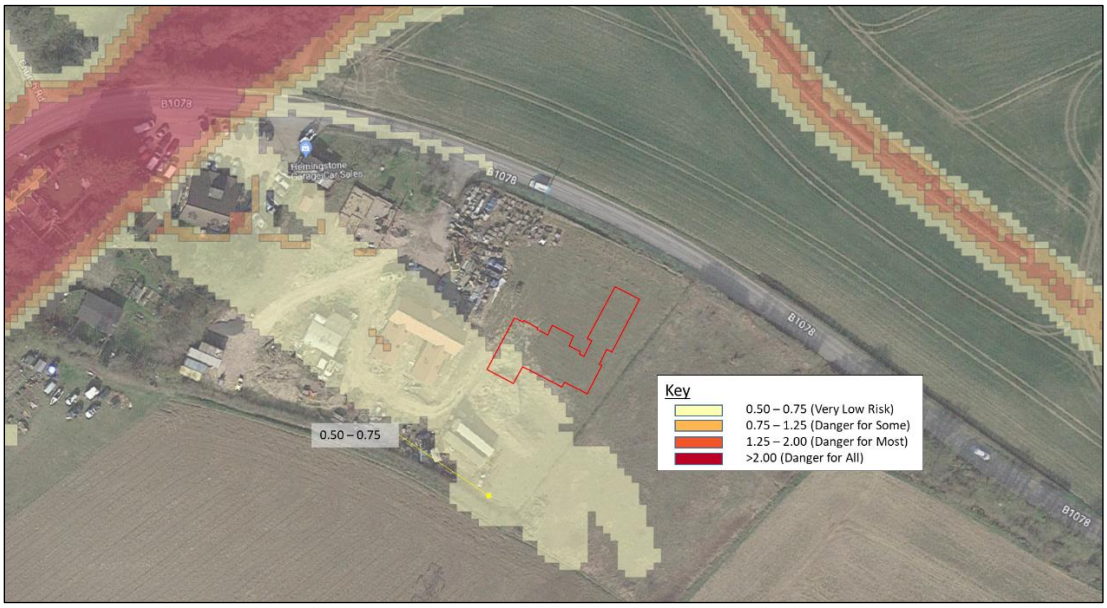


Figure 14- Detailed surface water mapping – Low Risk Flood Hazard Rating

4.06.17 Overall, we consider the risk of pluvial flooding occurring on-site to be Medium – Low, while the risk of pluvial flooding significantly impacting the on-site structures during the design flood event to be Low.

4.06.18 It is our professional opinion that the risk posed to the proposed development can be readily managed by setting the ground floor finished level (as a minimum) of 150mm above external ground levels.

4.06.19 Furthermore, it is recommended that consideration is given to the provision of flood resistant and resilient measures (where possible), and by maintaining a route within the masterplan to continue to allow any overland flows to pass through the site. The current redevelopment proposals accord with these recommendations.

4.06.20 The extent of impermeable surfacing will increase following completion of the proposed development. As a result, surface water must be carefully managed via the design and construction of a SuDS compliant drainage design strategy, to ensure that the risk of surface water flooding does not increase flooding of the development.

Groundwater flood risk

4.06.21 Groundwater flooding is closely associated with heavy rainfall events and pluvial flooding. Depending on the nature of the underlying geology and the seasonal depth of groundwater, periods of abnormally high rainfall can result in groundwater flooding of basements and the emergence of groundwater at the surface, causing damage to property and infrastructure.

4.06.22 BGS borehole logs (refer to Appendix B) for the closest available boreholes recorded no groundwater strikes to a depth of approximately 30 - 40m below ground level.

4.06.23 Furthermore, mapping provided in the SFRA (2020) shows that the site is located in a zone *'deemed as having a negligible risk from groundwater flooding due to the nature of the local geological deposits.'* Refer to Appendix D.

4.06.24 In the unlikely event that groundwater levels were to rise to a point where they meet/coincide with ground levels, then the resulting flows would tend to follow the topography and exit the site as overland flow (as opposed to pooling within the site boundaries).

4.06.25 Therefore, as the proposal comprises solely above ground construction and the underlying geology is cohesive, we consider the overall risk of groundwater flooding to be Negligible.

Sewer flood risk

4.06.26 Anglian Water (AW) asset mapping (available from DigDat, AW's records search portal) indicates that there are no publicly owned sewerage or water supply infrastructure located beneath and/or near the site. Refer to Figure 15.

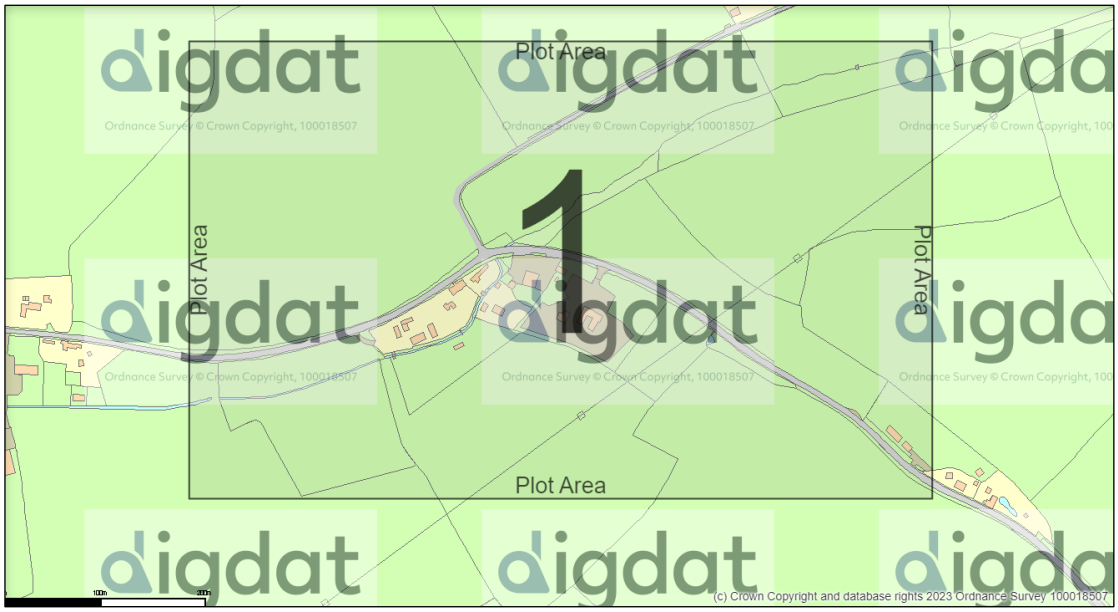


Figure 15- Extract of Anglian Water Asset Mapping

4.06.27 As there are no sewers recorded on-site or nearby, the risk of flooding from such sources is considered to be Negligible.

Reservoir, Canal and other Artificial sources of flooding

4.06.28 The site is not shown to lie within an area denoted as being at risk of flooding from a breach (failure) of a raised reservoir embankment.

4.06.29 There are no other lakes/ponds or canals in the vicinity of the site deemed as posing a risk to the development.

4.06.30 It is therefore considered that the risk of flooding from such sources is Negligible.

4.07 Summary

4.07.1 The site is not considered to be liable to significant or unmanageable flooding from the sources identified in the Flood and Water Management Act (2010).

5.0 PLANNING POLICY

5.01 Flooding Sequential Test and Exception Test

5.01.1 The NPPF requires the (flood risk) Sequential Test to be applied at all stages of the planning process. It directs local authorities, developers, and consultants to follow a sequential, risk-based approach to identifying land suitable for development.

5.01.2 This approach is designed to steer new development away from high-risk areas and towards those areas at lower risk of flooding, taking all sources of flood risk and climate change into account. However, in some areas where development land is in short supply there can be an overriding need to build in areas that are at risk of flooding. In such circumstances, the application of the Sequential Test is used to ensure that lower risk sites are developed before the higher risk ones.

5.01.3 Whilst the responsibility for validating the Sequential Test falls to the Local Planning Authority[1], the nature of the proposals (i.e., classified as 'More Vulnerable') in Flood Zone 1 would suggest that the development proposal is 'appropriate' in this location and does not require the application of the Sequential Test to be passed (refer to Table 1, below). Furthermore, it is considered the Exception Test does not need to be applied.

Table 1 – Flood Risk Vulnerability and Flood Zone 'incompatibility'

Flood Zone	Risk Classification				
	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test Required	✓	✓	✓
Zone 3a	Exception Test Required	×	Exception Test Required	✓	✓
Zone 3b	Exception Test Required	×	×	×	✓

✓ - *Exception test is not required.*
× - *Development should not be permitted.*

Based on information contained in NPPF Table 2: Flood risk vulnerability and flood zone 'incompatibility' Paragraph: 079 Reference ID: 7-079-2022082, Revision date: 25 08 2022

[1] NPPF Table 2 (August 2022) no longer mentions that a 'development is appropriate' in Flood Zones 2 and/or 3, therefore, the table can no longer be used by the developer/developer team to demonstrate the Sequential Test is passed.

6.0 PROPOSED DEVELOPMENT DRAINAGE

6.01 Background and Policy

6.01.1 The FWMA 2010 and NPPF require all new development to ensure that peak discharge rates and volume of surface water runoff does not exceed that of the existing site, and where possible reduced rates of discharge are encouraged.

6.01.2 The guidance also requires that peak rainfall intensity should be increased with the application of a percentage uplift, to take into account the potential impact of climate change on future weather patterns during the design life of the development.

6.01.3 In the absence of a defined design life for the development, it is assumed a residential development to have a minimum lifetime of approximately 100 years.

6.01.4 For developments with a lifetime beyond 2100, it is recommended that the climate change allowance should follow the GOV.UK 'Upper End' allowance for the 2070s epoch (i.e., 2061 to 2125) and consider a 40 - 45% increase.

6.01.5 Any additional volume of rainwater arising from a 1 in 100-year (1 % AEP) storm event with a 6-hour duration should ideally be managed on-site, using techniques such as infiltration or recycled for non-potable application (i.e., such as flushing toilets or irrigation). Where this is not possible, post-development discharges should be restricted to greenfield rates.

6.02 Existing Surface Water Management

6.02.1 The site is currently undeveloped and there is no indication of any existing formal management regime for surface water run-off from the site.

6.02.2 Based upon the topographical survey and geological information, it is considered that the site drains diffusely across the undeveloped surfaces of the site.

6.03 Pre- and Post-development Runoff Rates

6.03.1 The rates of surface water run-off for the pre- and post-development scenarios have been calculated. A summary of the results is provided at Table 2 (overleaf).

6.03.2 The greenfield calculation assumes no development (i.e., the current, pre-development site) and a SOIL type 3 to match the existing (recorded) geological conditions. For the post-development scenario, the rate of runoff has been determined by the modified rational method (for an assumed 15-mins storm duration).

6.03.3 The calculation sheets can be found at Appendix E.

Table 2 – Surface Water Run-off Rates

	Site Greenfield (Developed area only) 0.19ha IH124		*Post-development (unmitigated) (Developed area only) -0.19ha Wallingford**	
	(l/s)	*(l/s/ha)*	*(l/s)*	*(l/s/ha)*
QBAR	0.44	2.33	-	-
Q 1 year	0.65	3.40	18.63	100.69
Q 30 year	1.82	9.59	45.70	247.04
Q 100 year	2.65	13.93	59.31	320.62
	**based on a 15-minute storm*			

6.04 Surface Water Management

6.04.1 The development proposals will result in a net increase in impermeable surfaces (in the order of approximately 0.19 ha). Refer to Appendix B.

6.04.2 Current best practice guidance document: the SuDS Manual (CIRIA Report C753), promotes sustainable water management through the use of Sustainable Drainage Systems (SuDS).

6.04.3 The detailed design process should there consider the principle of SuDS and Building Regulations, and follow the drainage hierarchy (i.e., the destination for surface water runoff, that is not collected for re-use within the development).

6.04.4 The discharge of surface water should be prioritised firstly to the ground via infiltration, and then via a connection to a sewer (in the absence of a suitable watercourse).

6.04.5 There are several potential measures that can be introduced into the development which will manage surface water in a sustainable way and will not result in an increase in discharge rates.

6.04.6 It is recommended that the inclusion of surface SuDS (i.e., components such as attenuation basins, ponds, swales, and bio-retention features) to reduce/improve runoff rates and improve the quality of water discharged from the site, while also promoting biodiversity and amenity benefits (i.e., the four pillars of SuDS, see 6.04.7) will be considered during the detailed design stages.

6.04.7 There are four main categories of benefits that can be achieved by SuDS, which are referred to as the 'four pillars of SuDS design'; water quantity, water quality, amenity and biodiversity, as depicted in Figure 16 (overleaf).

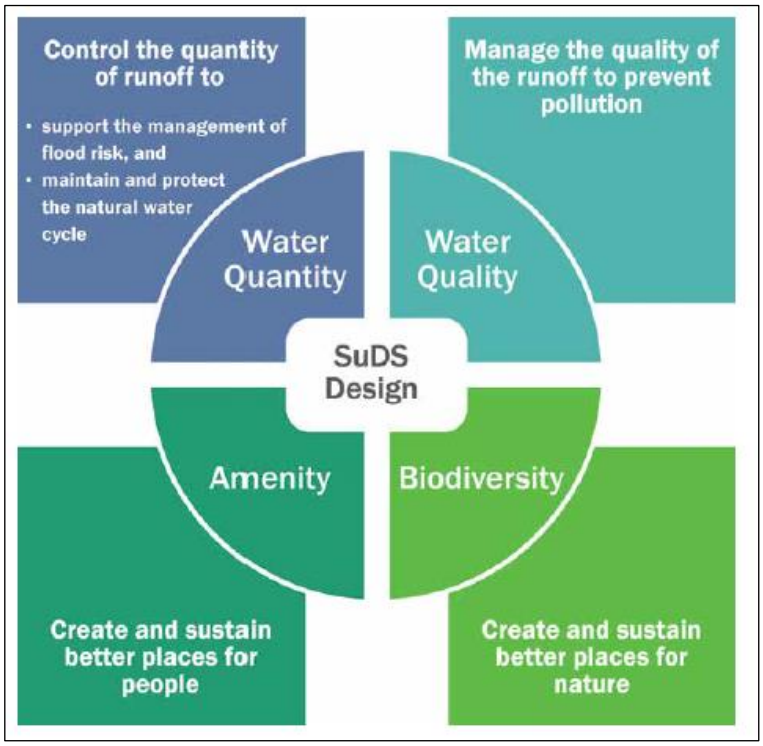


Figure 16- Four Pillars of SuDS (extract from CIRIA Report C753)

6.04.8 Appropriately designed, constructed, and maintained SuDS support sustainable development through combining water management with green space with benefits for amenity, recreation and wildlife. SuDS are more sustainable than conventional surface water drainage methods as they can mitigate many of the adverse effects that stormwater run-off has on the environment. This can be achieved by:

- Reducing run-off rates, thereby lessening the risk of flooding downstream;
- Minimising additional run-off emanating from urban development, which could exacerbate the risk of flooding and impair water quality;
- Encouraging natural groundwater recharge (as appropriate) and so reduce the impact on aquifers and rivers;
- Reducing pollution risks associated with development;
- Contributing to, and enhancing, the amenity and landscape of an area and to promoting community involvement and enjoyment; and
- Providing habitats for wildlife and opportunities for biodiversity enrichment.

6.04.9 All proposals and rates are subject to detailed design and the approval of relevant parties.

6.05 Foul Water Management

6.05.1 The National Planning Practice Guidance and Building Regulations Approved Document H (2015) provide a hierarchy of drainage options that must be considered (and discounted) in the following order: a connection to the public sewer, a private sewer communication with a public sewer, a package treatment plant, a septic tank and finally a cesspool (if the other options are not available).

6.05.2 A search of the AW asset records, hosted by Digdat.co.uk, and liaison with their Developer Services Team reveals that there are no public foul water sewers in close proximity to the site. Therefore, in accordance with the above hierarchy, foul water from the redevelopment will be directed to a package treatment plant from which treated effluent will be discharged to the nearest ditch network/watercourse or ground.

6.05.3 The size and type of package treatment plant is subject to detailed design by the specialist supplier/manufacturer.

6.05.4 Unless the proposal satisfies the EA's Binding Rules, the outfall to the ground and/or ditch may need an Environmental Permit and should be carried out in consultation with the EA. If the Binding Rules are met, the installer should just register the new package treatment plan with the EA.

6.05.5 All private drainage works will conform to Part H of the current Building Regulations and BS EN 752.

7.0 CONCLUSIONS & RECOMMENDATIONS

7.01 Summary of Flood Risk

7.01.1 GOV.UK mapping indicates that the site in located in Flood Zone 1 (the low probability flood area).

7.01.2 The site is not considered to be liable to significant or unmanageable flooding from the other sources identified in the Flood and Water Management Act 2010 (FWMA).

7.01.3 It is considered that the risk posed to the proposed development can be readily managed by setting the ground floor finished level (as a minimum) of 150mm above external ground levels.

7.01.4 It is noted that the proposals will result in a net increase in the impermeable cover at the site. Therefore, the rate of surface water runoff shed from/by the site would increase over the lifetime of the development with the inclusion of an allowance for climate change (without mitigation). It is, therefore, recommended that the use of a SuDS based drainage system, incorporating surface SuDS, is incorporated into the detailed design stage.

7.01.5 The technical assessment of flood risk presented within this FRA demonstrates that flood risks and residual flood risks are manageable over the lifetime of the development without increasing flood risk elsewhere.

7.01.6 We consider this Flood Risk Assessment to be sufficient and proportionate to the nature and scale of the planned development.

7.02 Recommendations

7.02.1 Based on the information gathered as part of the assessment JPC Environmental Services recommends the following:

- Whilst the risk of internal flooding is low, consideration should be given to the inclusion of wet proofing or flood-resilient measures into the development proposal in combination with setting the proposed finished ground flood levels (as a minimum) 150mm above external ground levels. Such measures might reasonably include (but not limited too):
  - Non-absorbent insultation within the floor construction and ground floor walls; and
  - Non-absorbent floor coverings such as ceramic tile, or polished concrete.
- Furthermore, it is recommended a route is maintained within the masterplan to continue to allow any overland flows to pass through the site between any new structures.
- A SuDS compliant drainage system should be incorporated into the development proposals. Such measures might reasonably include (subject to detailed design) the

provision of permeable surfacing and/or other infiltration-based SuDS components. This will provide some on-site attenuation to reduce future risk of surface water flooding, as well as provide a means of treatment before the off-site discharge;

- Recent changes to the local guidance (Suffolk County Council Floods Team) require that 'surface' SuDS components are incorporated into the development to promote the four pillars of SuDS (i.e., Quality, Quantity, Biodiversity and Amenity); and
- Consideration should be given to the integration of water re-use and/or rainwater harvesting into the development for the use in non-potable systems/uses.

7.02.2 The opinions and recommendations expressed within this report are based on the results of desk-based research and information provided by third party agencies. No additional hydraulic modelling has been undertaken.

8.0 APPENDICES

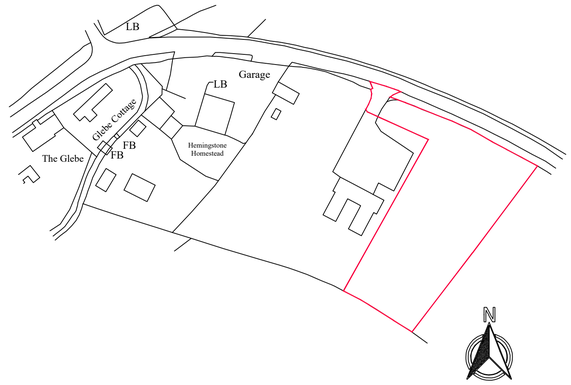
Appendix A – Site Location Map/Architectural Layout

1:200 Site Layout

1:100 Indicative Front Elevation (North East)

UK Planning Maps

01856 898 022
www.UKPlanningMaps.com



10 0 10 20 30 40 50

1:1250 Site Location Plan

NOTES :
DO NOT SCALE from this drawing.
Contractors must verify all dimensions on site before setting out,
Commencing work, ordering materials or making any shop drawings.

The information contained in this drawing is representational and has been compiled, from a dimensional survey only and does not warrant nor certify the structure of the buildings or neighbouring structures at the time of contraction.
The contractor is to visit the site to make himself acquainted with the building's and surroundings and undertake any investigation work or make all allowances to ensure that a full and final quotation for the works will be submitted, taking into account all eventualities.
Failure to do so will be at the contractors own risk and no additional payments shall be countenanced for any amendments to the work.
The contractor is to carry out all works in full compliance with the Health and Safety Commission's Approved Code of Practice "Managing Construction for Health and Safety" and Construction (Design and Management) Regulations 1994.
All work and working practices on the site shall be carried out in accordance with the above and to ensure that there is no risk to the site operatives, visitors or public.
The contractor is to include all preliminary allowances to cover the prevention of accidents and injury.
All works are to be carried out to comply with manufacturers, suppliers and industry guidelines, local authority regulations, good standards, fire safety recommendations, specialist subcontract recommendations and services supply and installation regulations. All manufacturers literature is to be kept on site. Provide all relevant guarantees in duplicate for presentation to the client.
Allow all necessary attendance and liaison with CA's (and CA personnel) specialist subcontractor trades. Ensure all notifications are submitted to the Local Authority Building Control and submit materials as required to the local Authority Planning Department.
Carefully examine the drawings and notify any discrepancies to the CA for instruction prior to proceeding.
Check all dimensions on site prior to ordering materials and notify any discrepancies to the CA for instruction prior to proceeding.

This drawing and design is for use solely in connection with the project described below.
No Responsibility for any error or omission in this specification will be recognized unless brought to the attention of the client or his agent prior to signing the contracts.

scale 1:100
0 1 2 3 4 5m

scale 1:200
0 1 2 3 4 5 6 7 8 9 10m

revision	date	amendment

Client :
MR & MRS BOARDLEY

Drawing Title :
SITE LAYOUT
AS PROPOSED

Project :
PROPOSED NEW DWELLING
& ASSOCIATED WORKS
LAND ADJACENT TO
FAIRVIEW
ASHBOCKING ROAD
HEMINGSTONE
SUFFOLK
IP6 9RP

33 Hood Drive, Great Blakenham, Ipswich, Suffolk, IP6 0NP
Telephone: 07775863177
email : ricky@cbdesignuk.com

Project ref / Drawing number :
2333.02

Scale :
1:200/1:100@A1

Date :
JUNE 23

All dimensions are approximate and in millimeters.

All dimensions to be checked on site.

Appendix B - BGS Borehole Records

Ac. 48346

TM15 165-167

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

INFORMATION MANAGEMENT PROGRAMME

A SITE DETAILS

TM15SE

Borehole drilled for: ECONIC LTD. / Suffolk Wildlife Trust.
Location: S.W.T. ASHBOCKING SUFFOLK
NGR (8 figures): #1 TM 18200 BVG54258 #2 TM 18220 BVG54254 #3 TM 18215 BVG54265.
Ground Level (if known): Please attach site plan
Drilling Company: STOCKS HILL DRILLING.
Date of Drilling: Commenced 26/01/09 Completed 31/02/09.

B CONSTRUCTION DETAILS

Borehole Datum (if not ground level) G.L. above / m below GL
(point from which all measurements of depth are taken e.g. flange, edge of chamber, etc.) G.L.

Borehole drilled diameter	6¼"	mm from GL	to 47	m/depth
		mm from	to	m/depth
		mm from	to	m/depth
Casing material NONE and type (e.g. if plain steel, plastic slotted)	diameter	mm from	to	m/depth
Casing material	diameter	mm from	to	m/depth
Casing material	diameter	mm from	to	m/depth
Casing material	diameter	mm from	to	m/depth
Grouting details	Geotherm grout to Surface.			
Water struck at N/A		m (depth below datum - mbd)		
		m (depth below datum - mbd)		
Rest water level on completion	N/A.	mbd		

C TEST PUMPING SUMMARY (Please supply full details on Forms WR-39)

Test Pumping Datum (if different from borehole datum) ____ m above / below borehole datum (mbd)
Pump Suction depth ____ mbd
Water Level (Start of Test) ____ mbd
Water Level (End of Test) ____ mbd
Pumping rate ____ m³/d:l/s
for ____ days/hours
Recovery to ____ mbd in ____ mins: hrs: days
(from end of pumping)
Date(s) of measurements ____
Please supply chemical Analysis if available

Ground Surface Level
Head Bore Hole

TM15/165-167

D STRATA LOG

Geological Classification (BGS only)	Description of strata	Thickness m	Depth m
	yellow clay + flint & chalk.	3.00	3.00
	Blue clay (soft) + flint & chalk	9.00	12.00
	Blue clay (hard) + flint & chalk	29.00	41.00
	Hard chalk then soft chalk. + some flint.	6.00	47.00
	(continue on separate page if necessary)		
	Other comments (e.g. gas encountered, saline water intercepted, etc.)		

FOR OFFICIAL USE ONLY

FILE	CONSENT NO	NGS REF NO:
LIC NO:	PURPOSE:	EA REF NO:
DATE REC:	COPY TO:	ENTERED BY:

TM 15 SE/14

207/210 **Ashbocking House, Ashbocking (formerly The Rectory)** 1702·5490

Surface +204. Bore 186. Lining tubes: 114 x 5 in from surface. R.W.L. +126. Ferruginous. *Smith, F., Aug. 1930.*
Deepened. Windpump. *Before 1941.* **Ferruginous.** *1960.*

Boulder Clay	...	...	97½	97½
UCk	...	...	118½	216

Boulder clay 97½	Soil	2.0	2.0
	Yellow clay & stones	6.0	8.0
	Blue clay & stones	83.0	91.0
	Chalk	2.0	93.0
	Dark brown silt	4.0	97.0
	Flint	-.6	97.6
UCk 83½	Chalk	88.6	186.0

RA.

(This has been deepened to 216)?

1. **207/210 Ashbocking House, Ashbocking** (formerly The Rectory) TM 1700 5489 TM15/55

Surface +204. **Bore** 186. **Lining tubes:** 114 x 5 in from surface. **R.W.L.** +126.
Ferruginous. *Smith, F., Aug. 1930.*
Deepened. Windpump. *Before 1941.* **Ferruginous.** *1960.*

Boulder Clay	...	...	97½	97½
UCk	...	...	118½	216

Boulder clay 97½	Soil	2.0	2.0
	Yellow clay & stones	6.0	8.0
	Blue clay & stones	83.0	91.0
	Chalk	2.0	93.0
	Dark brown silt	4.0	97.0
	Flint	-.6	97.6
UCk 82½	Chalk	88.6	186.0

RA.

(This has been deepened to 216)?

TM15/55

RECORD OF WELL (SHAFT OR BORE) 207

1" O.S.
Grid Ref.

219

At The Rectory

Town or Village Ashbocking County Suffolk Six-inch quarter sheet 66 NE E

Exact site ______ in parish of ______ (A rough sketch-map or tracing from a map is very desirable)

Level of ground surface above sea-level (O.D.) +204 ft. If well starts below ground surface, state how far ______ ft.

Shaft ______ ft., diameter ______ ft. Bore ______ ft. Diameter of bore: at top ______ ins.; at bottom ______ ins.

Details of permanent lining tubes (internal diameters preferred) 114 ft. x 5 in.

Water struck at depths of (feet) ______

Rest-level of water below ~~above~~ top of well 78 feet. Suction at ______ feet. Yield on ______ hours' / days' test

______ gallons per ______ (with pump of capacity ______ g.p.h.); depressing water level to ______ feet below top. Time of recovery ______ hrs. Amount normally pumped daily ______ g.p.h. for ______ hours.

Quality (attach copy of analysis if available) ______

Sunk by F. Smith & Son for Mr. A Warner & Son Date of well Aug 1930

Information from Do

(For Survey use only). GEOLOGICAL CLASSIFICATION.	NATURE OF STRATA (and any additional remarks).	THICKNESS Feet.	THICKNESS Inches.	DEPTH Feet.	DEPTH Inches.
Boulder Clay 97½	Soil	2		2	
	Yellow clay & stones	6		8	
	Blue clay & stones	83		91	
	Chalk	2		93	
	Dark brown silt	4		97	
	Flint		6	97	6
UCk 88½	Chalk	88	6	186	
RA					

Mr. E. T. Cazalet, Ashbocking House (formerly the Rectory). O.D. 204'. ✓
Deepened about 30' after 1930 on account of redness of water: some improvement resulted.
Sited by visiting on Suffolk 66 NE/E.
Windpump.

A.J.B. 11.XI.41.

In use: Windpump only. Domestic use.
Inaccessible for measurements.
Water is very ferruginous.

Visited. RCD 20.6.60.

~~DATA~~ Bank

For Survey use only

Date received	G.S.M. Office File No.	Site marked on 1" map (use symbol)

Geological Survey and Museum, South Kensington, London, S.W.7.

(7993) Wt.36064/0349 5,000 12/38 A.&E.W.Ltd. Gp.686

Appendix C – Environment Agency Indicative Flood Map

Flood map for planning

Your reference	Location (easting/northing)	Created
IP6 9RP	**616634/254128**	**25 Sep 2023 16:44**

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 that 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.

Environment Agency

Flood map for planning

Your reference
IP6 9RP

Location (easting/northing)
616634/254128

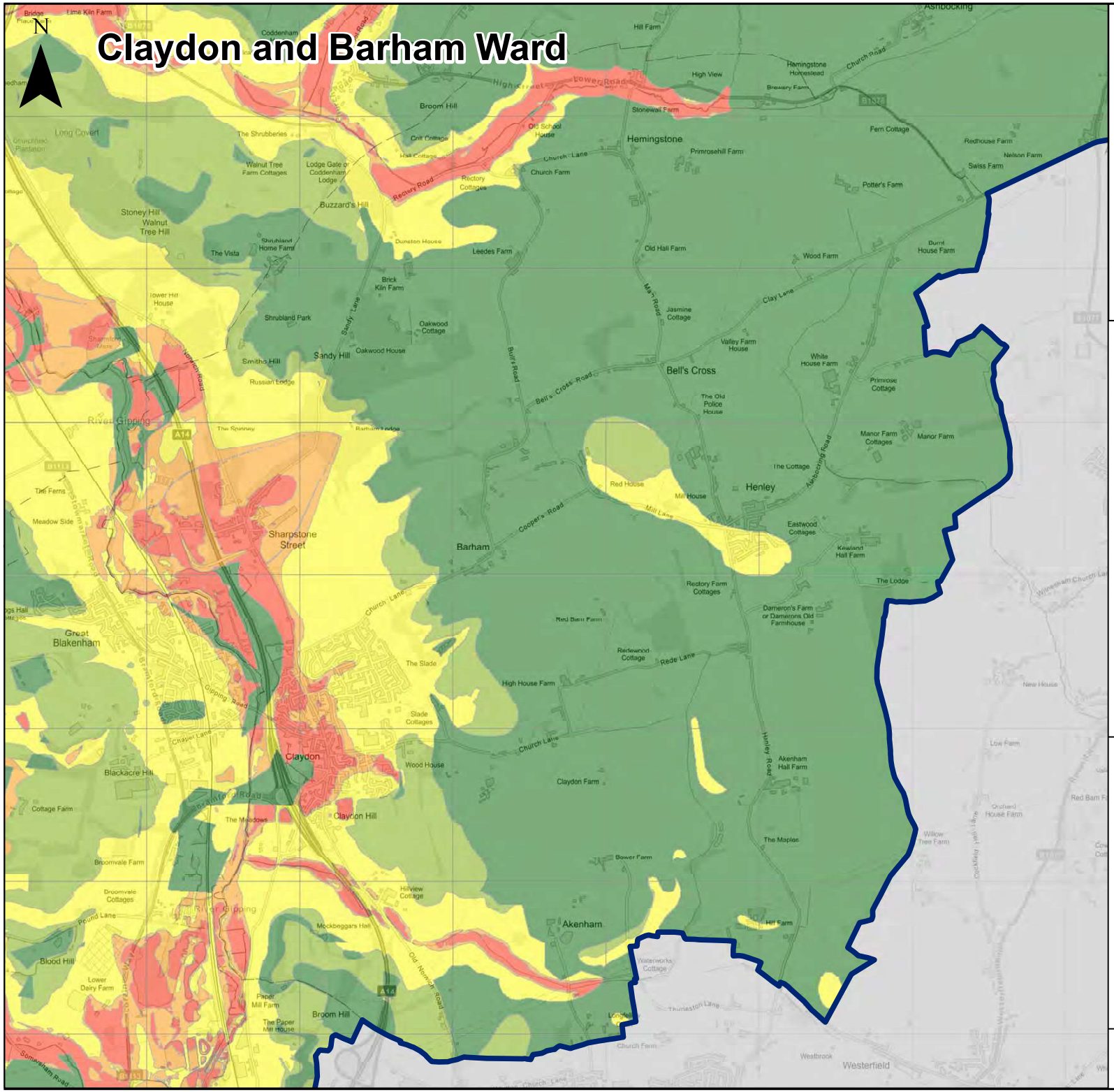
Scale
1:2500

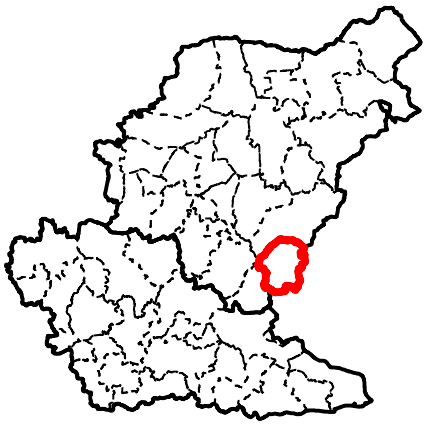
Created
25 Sep 2023 16:44

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

0 20 40 60m

Appendix D – Babergh and Mid Suffolk SFRA Mapping Extracts





Legend

- Babergh District
- Mid Suffolk District
- Ward Boundary
- This zone is deemed as having a negligible risk from groundwater flooding due to the nature of the local geological deposits
- Flooding from groundwater is not likely
- There is a risk of flooding to subsurface assets but surface manifestation of groundwater is unlikely
- Within this zone there is a risk of groundwater flooding to surface and subsurface assets. There is the possibility of groundwater emerging at the surface locally
- Within this zone there is a risk of groundwater flooding to both surface and subusrface assets. Groundwater may emerge at significant rates and has the capacity to flow overland and/or pond within nay topographic low spots

0 0.275 0.55 1.1
Kilometers

Appendix G - JBA Groundwater Map

DATE DRAWN:
20/08/2020

Appendix E - Pre- and Post-development Surface Water Runoff Calculations

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Robert Ward
Site name:	Ashbocking Rd
Site location:	Hemingstone

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.

Site Details

Latitude:	52.14291° N
Longitude:	1.16503° E
Reference:	345955787
Date:	Oct 03 2023 15:35

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 1

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	3	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.37	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	585	585
Hydrological region:	5	5
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	2.45	2.45
Growth curve factor 100 years:	3.56	3.56
Growth curve factor 200 years:	4.21	4.21

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	2.33	3.91
1 in 1 year (l/s):	2.03	3.4
1 in 30 years (l/s):	5.71	9.59
1 in 100 year (l/s):	8.29	13.93
1 in 200 years (l/s):	9.8	16.48

Run-off from Hard Standing Areas - Post Development

Peak Discharge Q = 3.61 Cv i A Cv = 0.9

i = Rainfall Intensity From Micro Drainage

A = Area = 0.19 ha

1 Year Event

15 minute storm	=	3.61	x	0.9	x	30.99	x	0.2	=	19.131 l/s
30 minute storm	=	3.61	x	0.9	x	20.22	x	0.2	=	12.479 l/s
120 minute storm	=	3.61	x	0.9	x	7.94	x	0.2	=	4.903 l/s
6 hour storm	=	3.61	x	0.9	x	3.65	x	0.2	=	2.251 l/s

30 Year Event

15 minute storm	=	3.61	x	0.9	x	76.04	x	0.2	=	46.937 l/s
30 minute storm	=	3.61	x	0.9	x	49.50	x	0.2	=	30.556 l/s
120 minute storm	=	3.61	x	0.9	x	18.62	x	0.2	=	11.491 l/s
6 hour storm	=	3.61	x	0.9	x	8.03	x	0.2	=	4.959 l/s

100 Year Event

15 minute storm	=	3.61	x	0.9	x	98.68	x	0.2	=	60.92 l/s
30 minute storm	=	3.61	x	0.9	x	64.79	x	0.2	=	39.995 l/s
120 minute storm	=	3.61	x	0.9	x	24.46	x	0.2	=	15.100 l/s
6 hour storm	=	3.61	x	0.9	x	10.42	x	0.2	=	6.431 l/s

Volume of Run-off from Hard Standing 6 Hour Storm

1 Year Storm	=	2.25	x	60	x	60	x	6	=	48615 litres or	49 m^3
30 Year Storm	=	4.96	x	60	x	60	x	6	=	107125 litres or	107 m^3
100 Year Storm	=	6.4	x	60	x	60	x	6	=	138913 litres or	139 m^3

Project:

JP Chick & Partners Ltd
Consulting Civil & Structural Engineers
7 Museum Street
Ipswich
Suffolk
IP1 1HQ
Tel: (01473) 280699
Fax: (01473) 280701
www.chick.co.uk
ipswich@chick.co.uk

Designed	Checked	Date	Job No.
		Oct-23	IE23/084

Calculation Sheet

Sheet No. 1 of 1