

**PROPOSED MULTI-
FUNCTIONAL AMENITY
SPACE FOR THE LOCAL
COMMUNITY ACROSS LAND
OFF THE STREET,
HEVENINGHAM, SUFFOLK**

FLOOD RISK ASSESSMENT

JULY 2019

REPORT REF: 2329/RE/07-19/01

Evans Rivers and Coastal Ltd

T: 07896 328220

E: Enquiries@evansriversandcoastal.co.uk

W: www.evansriversandcoastal.co.uk

CONTRACT

Evans Rivers and Coastal Ltd has been commissioned by Heveningham Parish Council to carry out a flood risk assessment for a proposed multi-functional amenity space for the local community across land off The Street, Heveningham, Suffolk.

QUALITY ASSURANCE, ENVIRONMENT AND HEALTH AND SAFETY

Evans Rivers and Coastal Ltd operates a Quality Assurance, Environmental, and Health and Safety Policy.

This project comprises various stages including data collection; depth analysis; and reporting. Quality will be maintained throughout the project by producing specific methodologies for each work stage. Quality will also be maintained by providing specifications to third parties such as surveyors; initiating internal quality procedures including the validation of third party deliverables; creation of an audit trail to record any changes made; and document control using a database and correspondence log file system.

To adhere to the Environmental Policy, data will be obtained and issued in electronic format and alternatively by post. Paper use will also be minimised by communicating via email or telephone where possible. Documents and drawings will be transferred in electronic format where possible and all waste paper will be recycled. Meetings away from the office of Evans Rivers and Coastal Ltd will be minimised to prevent unnecessary travel, however for those meetings deemed essential, public transport will be used in preference to car journeys.

The project will follow the commitment and objectives outlined in the Health and Safety Policy operated by Evans Rivers and Coastal Ltd. All employees will be equipped with suitable personal protective equipment prior to any site visits and a risk assessment will be completed and checked before any site visit. Other factors which have been taken into consideration are the wider safety of the public whilst operating on site, and the importance of safety when working close to a water source and highway. Any designs resulting from this project and directly created by Evans Rivers and Coastal Ltd will also take into account safety measures within a "designers risk assessment".

Report carried out by:

Rupert Evans, BSc (Hons), MSc, CEnv, C.WEM, MCIWEM, PIEMA

DISCLAIMER

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1. INTRODUCTION

1.1 Project Scope

1.1.1 Evans Rivers and Coastal Ltd has been commissioned by Heveningham Parish Council to carry out a flood risk assessment for a proposed multi-functional amenity space for the local community across land off The Street, Heveningham, Suffolk.

1.1.2 It is understood that this Flood Risk Assessment will be submitted to the Planning Authority. Specifically, this assessment intends to:

- a) Consider the impacts of a range of fluvial flood events in accordance with NPPF;
- b) Review any literature and guidance specific to this area;
- c) Determine the extents of the aforementioned NPPF Flood Zones across the site, together with depths of floodwater and hazard;
- d) Assess the risks to people and property and propose mitigation measures accordingly;
- e) Review existing evacuation and warning procedures for the area;
- f) Carry out an appraisal of flood risk from any other sources such as groundwater as required by NPPF;
- g) Report findings and recommendations.

1.1.3 This assessment is carried out in accordance with the requirements of the National Planning Policy Framework (NPPF) dated 2019. Other documents which have been consulted include:

- DEFRA/EA document entitled *Framework and guidance for assessing and managing flood risk for new development Phase 2 (FD2320/TR2)*, 2005;
- Communities and Local Government 2007. *Improving the Flood Performance of New Buildings*. HMSO.
- DEFRA/EA document entitled *The flood risks to people methodology (FD2321/TR1)*, 2006;
- EA *Supplementary Note on Flood Hazard Ratings and Thresholds for Development Planning and Control Purpose*, 2008;
- National Planning Practice Guidance – Flood Risk and Coastal Change.
- UK Government's climate change allowances guidance dated February 2016.
- Environment Agency guidance entitled *Flood risk assessments: Climate change allowances – East Anglia; Essex, Norfolk, Suffolk, Cambridgeshire and Bedfordshire*.
- Suffolk Coastal and Waveney District Strategic Flood Risk Assessment (SFRA) Appendix B, dated 2008.
- Suffolk Local Flood Risk Management Plan dated 2012.

- Suffolk County Council Preliminary Flood Risk Assessment dated 2011.

2. DATA COLLECTION

2.1 To assist with this report, the data collected included:

- Ordnance Survey 1:10,000 street view map (Evans Rivers and Coastal Ltd OS licence number 100049458).
- Filtered LIDAR survey at 1m resolution.
- 1:250,000 *Soil Map of Eastern England* (Sheet 4) published by Cranfield University and Soil Survey of England and Wales 1983.
- 1:625,000 *Hydrogeological Map of England and Wales*, published in 1977 by the Institute of Geological Sciences (now the British Geological Survey).
- Flood Zone extents and JFLOW data as GIS files (from EA Geodata www.data.gov.uk).
- British Geological Survey, *Online Geology of Britain Viewer*.
- British Geological Survey, *Groundwater flooding susceptibility map*.
- Topographical Survey of the site carried out by SJ Geomatics (shown on Drawing Number SJG2680).

3. SITE CHARACTERISTICS

3.1 Existing Site Characteristics and Location

3.1.1 The site is located across land off The Street, Heveningham, Suffolk. The approximate Ordnance Survey (OS) grid reference for the site is 633415 272717 and the location of the site is shown on Figure 1.

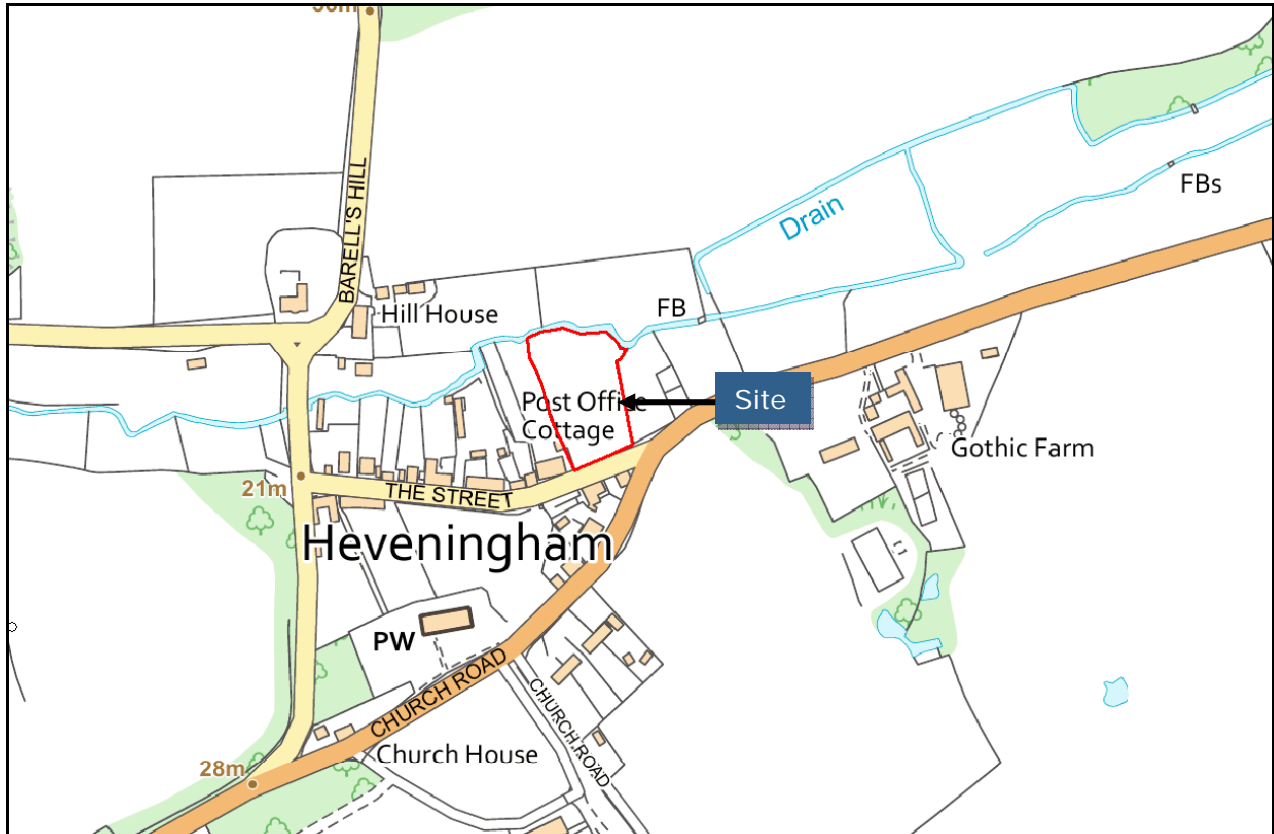


Figure 1: Site location plan (Source: Ordnance Survey)

3.1.2 The site comprises a heavily vegetated area currently used by some for dog walking. The River Blyth flows in an easterly direction adjacent to the northern frontage of the site. The site is accessed from The Street adjacent to the southern frontage of the site.

3.1.3 A topographical survey has been carried out by SJ Geomatics (shown on Drawing Number SJG2680). Ground levels are in metres above Ordnance Datum (m AOD). Filtered LIDAR at 1m resolution has also been obtained in order to determine and illustrate the topography across the site and wider area (Figure 2).

3.1.4 It can be seen that ground levels across the site fall in a northerly direction towards the River Blyth.

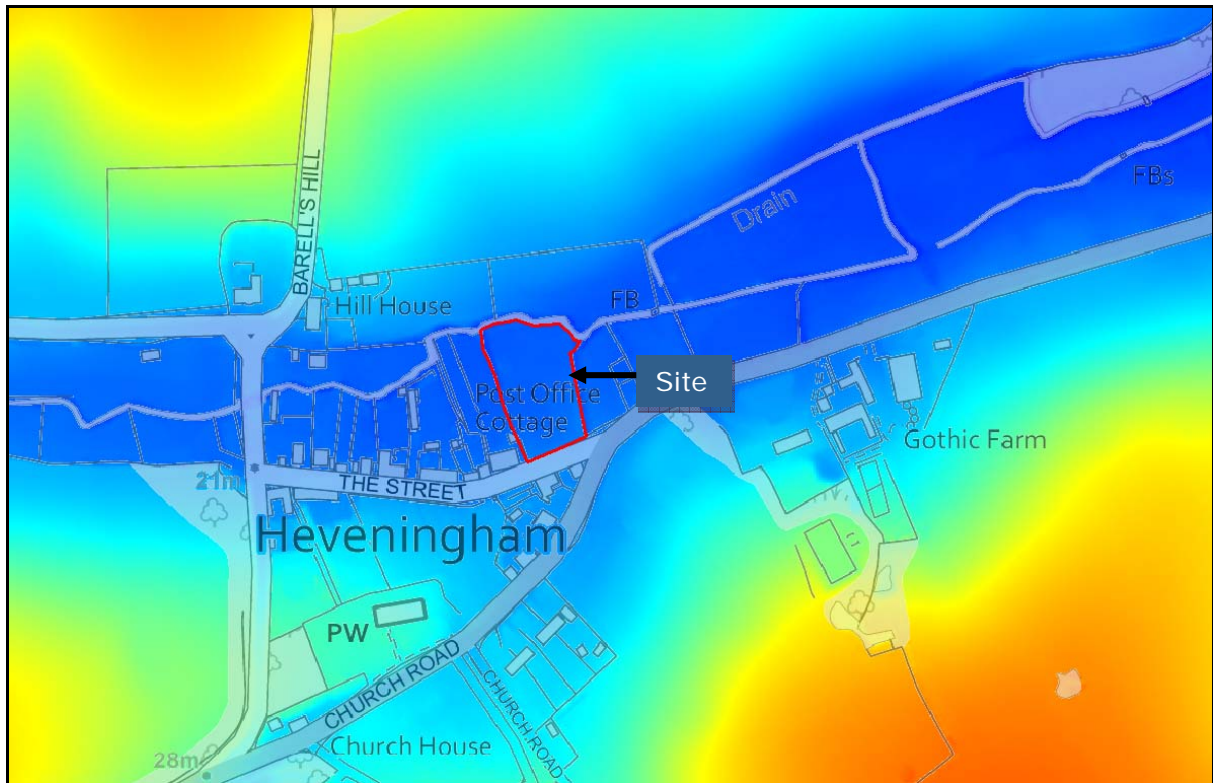


Figure 2: Filtered LIDAR data at 1m resolution

3.2 Site Proposals

- 3.2.1 It is the Client's intention to undertake vegetation clearance to create a multi-functional space for the local community with an area of long meadow grass and small fruiting trees and woodland area with trees. Additionally there will be a mown games pitch and a small play area and timber pergola.
- 3.2.2 The proposals are classified as a "water-compatible" use according to Table 2 of the NPPF Planning Practice Guidance.

4. BASELINE INFORMATION

4.1 Environment Agency Flood Zone Map

4.1.1 The Environment Agency's Flood Zone Map (Figure 3) shows that the site is located within the NPPF defined Flood Zones 3, 2 and 1.



Figure 3: Environment Agency Flood Zone Map (Source: Environment Agency, 2019)

4.2 Flood Data

4.2.1 There are no flood defences along the watercourse at this location.

4.2.2 JFLOW data and the flood zones have been downloaded as GIS files from EA Geodata www.data.gov.uk (tile TM37sw). By comparing the flood extent to the survey data it can be seen that the flood contour during the 1 in 100 year event is approximately set at 20.30m AOD. The flood contour during the 1 in 1000 year event is approximately set at 20.40m AOD. The flood contour during the climate change (20%) 1 in 100 year event is approximately set at 20.40m AOD.

4.2.3 It is understood that the 1 in 100 year flood data should be updated to reflect the UK Government's climate change allowances guidance dated February 2016 and the guidance document entitled *Flood risk assessments: Climate change allowances – East Anglia; Essex, Norfolk, Suffolk, Cambridgeshire and Bedfordshire*.

4.2.4 It is understood that the "Central" climate change allowance for the Anglian region of 15% as outlined in Table 1 of the Agency's guidance (assuming 50 year lifetime of development) should be applied to the peak flow rate for "water-compatible" development in Flood Zone 3a.

- 4.2.5 As the JFLOW data for the climate change 1 in 100 year event represents a 20% climate change allowance, it can therefore be used further in this assessment as the Central allowance.

4.3 Flood Warning and Emergency Planning

- 4.3.1 The site is not located within a Flood Alert or Flood Warning Area. However, it is understood that in the event of flooding, evacuation is managed by a multi-agency team in conjunction with the Police. The multi-agency team provides suitable premises for shelter, first aid, refreshments and possible transportation with consideration given to the elderly and vulnerable groups. It is essential that occupants produce robust Emergency Flood Plans to avoid putting themselves or emergency services at risk and that they do not rely solely on emergency services during the event.

5. FLUVIAL FLOOD RISK

- 5.1 It has been calculated in Section 4.2 above that the flood level during the present day 1 in 100 year event is 20.30m AOD. The present day 1 in 1000 year flood level is 20.40m AOD. The climate change 20% 1 in 100 year flood level is 20.40m AOD.
- 5.2 Based on a minimum ground level of 19.18m AOD the flood depth could therefore reach 1.22m during the climate change 1 in 100 year flood event. Parts of the site towards The Street are set above the flood level and would be unaffected during all events.
- 5.3 In order to determine the flood hazard at the site, the hazard categories outlined in Table 13.1 of *FD2320/TR2* (Figure 4 below), which is defined by the depth and velocity of the floodwater and the ability of people to evacuate once flooding occurs, has been used (assuming 0.5 m/s velocity). It should be noted that the white cells shown on Figure 4 denote a *Very low* hazard.
- 5.4 It can be seen that the hazard would be between *Very Low* and *Dangerous for Most*.

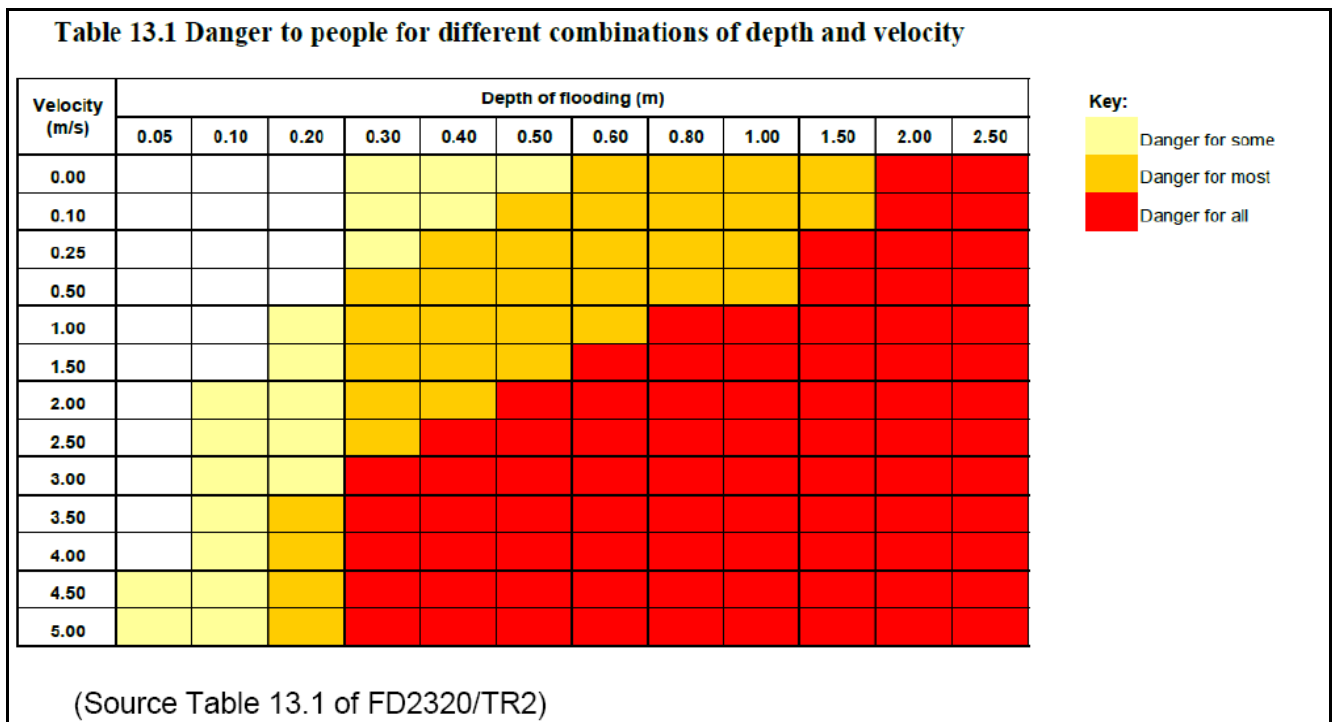


Figure 4: Hazard Classification

- 5.5 It is recommended that maintenance of the watercourse (involving vegetation clearance) is carried out by the Client periodically and this will reduce the risk of flooding.
- 5.6 Consideration should be given to the materials used for the play equipment and their resilience to being exposed to floodwater. For example, water-resistant paints could be applied to the timber play equipment. This will reduce the cost of repair and replacement as a result of flood damage.

6. OTHER SOURCES OF FLOODING

6.1 Groundwater Flooding

- 6.1.1 In order to assess the potential for groundwater flooding during higher return period rainfall events, the Jacobs/DEFRA report entitled *Strategy for Flood and Coastal Erosion Risk Management: Groundwater Flooding Scoping Study*, published in May 2004, was consulted, together with the guidance offered within the document entitled *Groundwater flooding records collation, monitoring and risk assessment (ref HA5)*, commissioned by DEFRA and carried out by Jacobs in 2006.

□

Soil and Geology at the Site

- 6.1.2 The British Geological Survey's *Online Geology of Britain Viewer* indicates that the soils beneath the site comprise clay, silt, sand and gravel deposits.

Groundwater Flooding Potential at the Site

- 6.1.3 There have been no recorded groundwater flood events across the area between 2000 and 2003, as indicated by the Jacobs study. The BGS Groundwater Susceptibility Map indicates that there is "Potential for Groundwater Flooding to Occur at Surface".
- 6.1.4 As the site will be used for water-compatible purposes, a worst-case scenario would be that a high water table/groundwater flooding event will result in a potential loss/damage of equipment.

6.2 Surface Water Flooding and Sewer Flooding

- 6.2.1 Surface water and sewer flooding across urban areas is often a result of high intensity storm events which exceed the capacity of the sewer thus causing it to surcharge and flood. Poorly maintained sewer networks and blockages can also exacerbate the potential for sewer flooding. Surface water flooding can also occur as a result of overland flow across poorly drained rural areas.
- 6.2.2 The Environment Agency's Surface Water Flooding Map (Figure 5) indicates that across the site there is a very low to high surface water flooding risk (between a less than 1 in 1000 year chance to events greater than 1 in 30 years).
- 6.2.3 It is generally accepted that the low risk flood event (i.e. between 1 in 1000 years and 1 in 100 years) on the Agency's map is used as a substitute for the climate change 1 in 100 year event to provide a worst-case scenario.

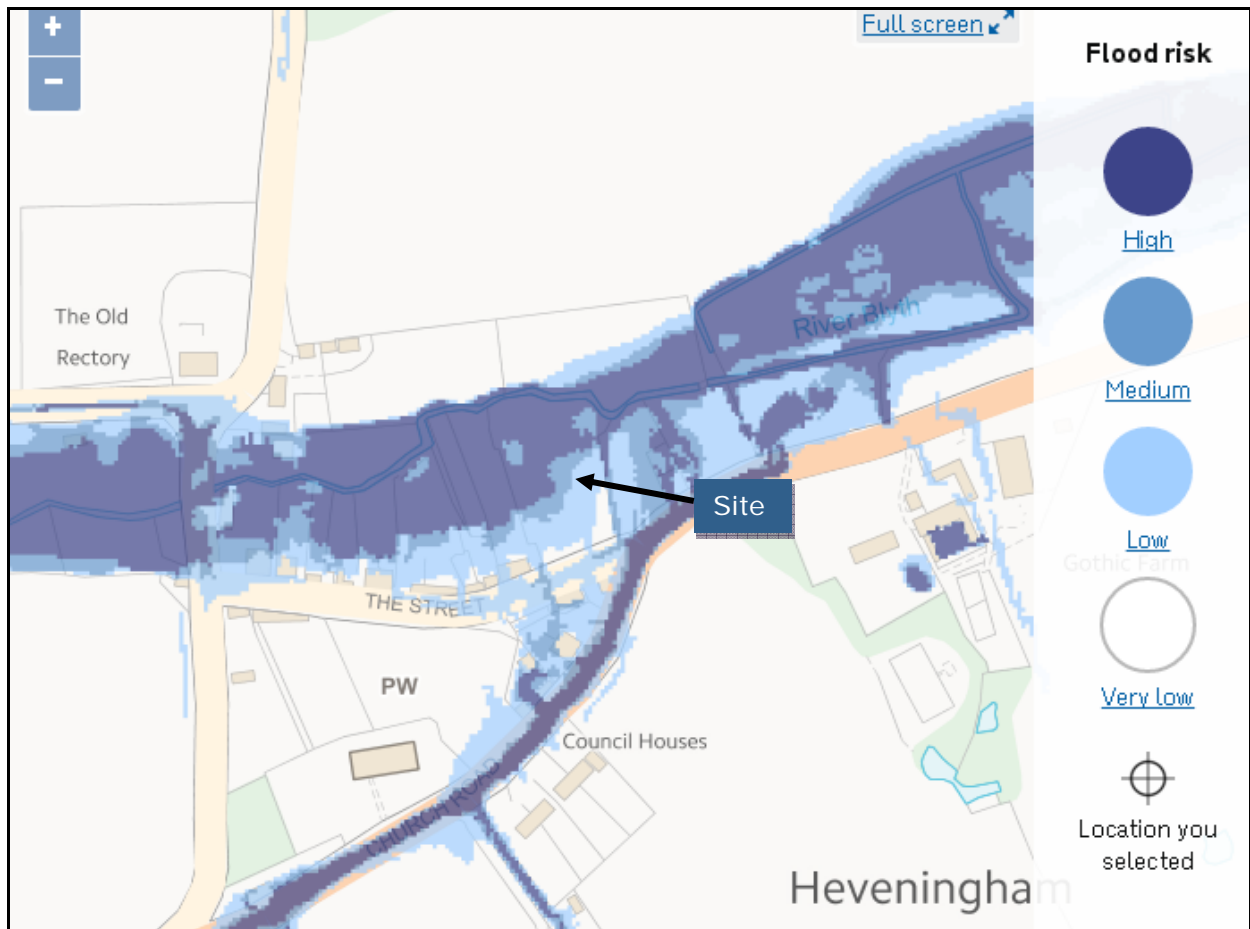


Figure 5: Environment Agency Surface Water Flooding Map (Source: Environment Agency, 2019)

- 6.2.4 The Agency's map generally shows lower areas of ground where water may pond during storm events and identify areas which receive subsequent runoff from surrounding land during heavy rainfall events.
- 6.2.5 It can be seen that there is a strong relationship between the flood extent and route of the adjacent watercourse and that the site is located within a surface water flood flow path running in an easterly direction.
- 6.2.6 The data associated with the EA map indicates that the depth of water across the site during worst-case low risk events would be between <math><0.3\text{m}</math> and $>0.9\text{m}$.
- 6.2.7 The flood hazard is calculated based on different combinations of floodwater depth and velocity, and subsequently by using the hazard equation as cited in the DEFRA/EA R&D Document *Framework and guidance for assessing and managing flood risk for new development Phase 2 (FD2320/TR2)*. The numerical hazard rating is then categorised into four degrees of flood hazard in accordance with *FD2320/TR2*, shown on Table 1 overleaf.
- 6.2.8 The hazard rating has been extracted from the surface water hazard map which was downloaded from Data.gov.uk and is identified as being between 0 and >2.00 during worst-case low risk events across the site.

6.2.9 Therefore, according to Table 1 below the hazard to people across the site would be between *Very Low* and *Dangerous for All*.

Table 1: Hazard to people categories (based on FD2320/TR2)

Hazard Rating	Degree of Flood Hazard	Description
< 0.75	Very low hazard	Caution "Flood zone with shallow flowing water or deep standing water"
0.75 – 1.25	Danger for Some	Dangerous for some (i.e. children) "Danger: Flood zone with deep or fast flowing water"
1.25 – 2.0	Danger for Most	Dangerous for most people (i.e. general public) "Danger: Flood zone with deep fast flowing water"
> 2.0	Danger for All	Dangerous for all "Extreme danger: flood zone with deep fast flowing water"

6.3 Reservoirs, Canals And Other Artificial Sources

6.3.1 The failure of man-made infrastructure such as flood defences and other structures can result in unexpected flooding. Flooding from artificial sources such as reservoirs, canals and lakes can also occur suddenly and without warning, leading to high depths and velocities of flood water which pose a safety risk to people and property.

6.3.2 The Environment Agency's "Risk of flooding from reservoirs" map shows that the site is not at risk from reservoir flooding.

7. FLOOD RISK MITIGATION AND EVACUATION

Reducing Vulnerability to the Hazard

- 7.1 Wherever possible flood protection measures should be incorporated at the site in order to prevent the loss of equipment. It may be prudent for site management to move some equipment away from the site if possible and to other lesser risk areas within the Client's ownership if there is considered to be a flood risk at the site.
- 7.2 Although people are likely to be only occupying the site during daytime hours, people at the site are unlikely to have detailed knowledge of the dynamics of the flood event and the storminess of the event could result in people panicking or becoming anxious, particularly if they observe flooding across site.
- 7.3 Signs and information plaques should be located regularly across the site to inform people of the flood risk. Site operators should regularly review weather warnings and other media and should close the site if there is considered to be a flood risk. People at the site will also need to make a judgment themselves with regards to the flood hazard.
- 7.4 It is recommended that a *Business Flood Plan* is developed and would include information on what to do during an event, together with evacuation procedures and routes.

Safe Access/Egress

- 7.5 Safe access/egress will be available at all times during fluvial events via The Street.
- 7.6 During surface water flood events The Street will be affected by floodwater, however, inspection of the GIS hazard data indicates that safe access/egress will be available from the site. It is recommended that people leave the site in a westerly direction along The Street in order to remain across *Very Low* hazard areas.
- 7.7 A flood response plan will be compiled to ensure that the occupants are aware of the flood risk and procedures to take before, during and after a flood.

8. CONCLUSIONS

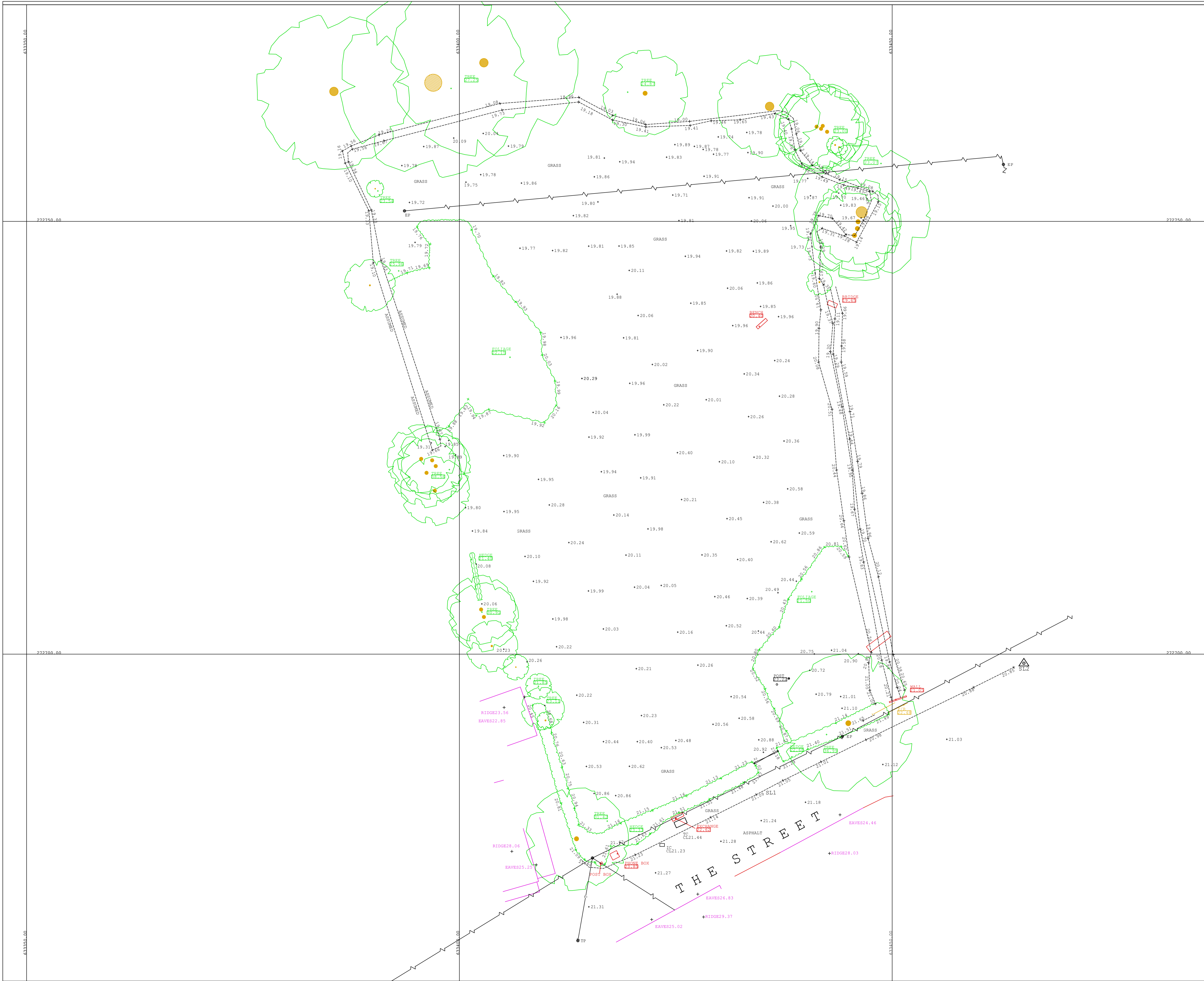
- The site is located within Flood Zones 3, 2 and 1 and the proposals comprise a water-compatible use.
- The flood level during the present day 1 in 100 year event has been estimated to be 20.30m AOD. The present day 1 in 1000 year flood level has been estimated to be 20.40m AOD. The climate change 20% 1 in 100 year flood level has been estimated to be 20.40m AOD.
- It is recommended that maintenance of the watercourse (involving vegetation clearance) is carried out by the Client periodically and this will reduce the risk of flooding.
- Consideration should be given to the materials used for the play equipment and their resilience to being exposed to floodwater.
- It is considered that there is a moderate risk of groundwater flooding at the site from underlying deposits and a very low to high risk of surface water flooding.
- A warning and evacuation strategy has been developed within this assessment. It is proposed that the site operators prepare a *Business Flood Plan*.
- Safe access/egress can be achieved during fluvial events and surface water flood risk events.

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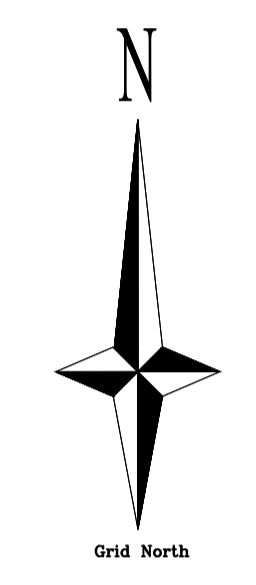
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[accessed 12/09/2016]

DRAWINGS



Co-ordinate Table				
Station	Type	Easting (mE)	Northing (mN)	Level (m2)
SL1	PK Nail	633435.977	272684.649	21.066
SL2	PK Nail	633465.216	272698.947	20.806

SURVEY RELATED TO OSG83(15) ORDNANCE SURVEY GRID CO-ORDINATES TRANSFORMED FROM ETRS89 (WGS84) USING GEIOD MODELS OSGM15/OSTN15



- NOTES**
- GRID AND LEVELS RELATED TO ORDNANCE SURVEY GPS NETWORK
 - ALL LEVELS ON KERB LINES ARE CHANNEL LEVELS UNLESS NOTED OTHERWISE.
 - SERVICE ROUTES HAVE BEEN IDENTIFIED BY LIFTING OF INSPECTION COVERS & VISUAL INSPECTION FROM THE SURFACES.
 - FOR SAFETY REASONS, DRAINAGE PIPE SIZES HAVE BEEN DETERMINED FROM THE SURFACE AND SHOULD BE TREATED AS APPROXIMATE ONLY.
 - DRAINAGE PIPE SIZES ARE DIAMETERS AND ARE SHOWN IN MILLIMETERS.
 - TREE SPECIES SHOULD BE CHECKED BY AN ARBORIST IF CRITICAL.

Revisions	
A	
B	
C	

Drawing No: **SJG2680** Revision Sheet 1/1
 Surveyed By: [] Drawn By: [] Checked By: [] Sheet Size: [] Date: 14/03/2018
 Client: **Isobel Bilgen Garden Design** Scale: 1:200

Project: **Bell Meadow, The Street, Heveningham**

SYMBOLS		LEGEND	
	Banking	AV	Air Valve
	Hedge	BD	Bollard
	Tree	CB	Cable Box
	Bush	CHY	Chimney
	Gate	CL	Cover Level
	O/H Electric	CONC	Concrete
	O/H Telecom	CTV	Cable TV
	Control Station	DK	Drop Kerb
		DP	Down Pipe
		DR	Drain
		ELC	Electricity
		EP	Elec Pole
		ER	Earth Rod
		FB	Flower Bed
		FR	Fire Hydrant
		GP	Gate Post
		GV	Gas Valve
		IC	Inspect. Cover
		IL	Insect Lament
		JB	Junction Box
		KD	Kerb Outlet
		LB	Letter Box
		LP	Lamp Post
		MS	Manhole
		MK	Marker
		NP	Name Plate
		O/H	Overhead
		OSBM	Ordinance Bench Mark
		P	Post Or Pillar
		PM	Parking Meter
		RE	Rodding Eye
		RS	Road Sign
		SAP	Sapling
		SC	Stop Cock
		SL	Sump Level
		ST	Stop Tap
		SV	Sluice Valve
		TAR	Tarmac
		TC	Telecom Cover
		TCB	Telephone Call Box
		TL	Traffic Lights
		TF	Telegraph Pole
		TV	Television Box
		UTL	Unable to lift
		VF	Vent Pipe
		WL	Water Level
		WM	Water Meter
		WO	Wash Out

FENCE TYPES
 B/W Barbed Wire C/P Chestnut Paling P/S Palisade
 C/B Close Boarded I/R Iron Railing P/W Post & Wire
 C/I Corrugated Iron I/W Interwoven
 C/L Chainlink P/R Post & Rail

BOX AROUND LEVEL INDICATES LEVEL AT TOP OF FEATURE -

SURVEYED BY:-

48c Thoroughfare
Halesworth
Suffolk
IP19 8AR
 Tel. 01986 872716 Fax. 01986 875175
 email. mail@sjgeomatics.co.uk
 web. www.sjgeomatics.co.uk
Company Registration Number 0981329

