



## South Norfolk Council Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables

### Site details

<b>Site Code</b>	<b>VC DIT1 REV</b>
<b>Address</b>	Land between Thwaite Rd/Tunneys Lane, Ditchingham, South Norfolk, 634229 291610
<b>Area</b>	2.3ha
<b>Current land use</b>	Greenfield
<b>Proposed land use</b>	Residential

### Sources of flood risk

<b>Location of the site within the catchment</b>	The site is located in the Broome Beck Catchment, north of Ditchingham. The Broome Beck flows from its source in Bedingham, east, past Ditchingham, and joins the River Waveney at Broome.
<b>Existing drainage features</b>	Local topography shows that the site slopes gently downhill towards the northeast, which suggests existing drainage is towards Broome Beck which is approximately 350m to the northeast of the site.
<b>Fluvial</b>	<p><b>The proportion of site at risk (Environment Agency's Flood Map for Planning Flood Zones):</b>  <b>FZ3b</b> – 0%  <b>FZ3a</b> – 0%  <b>FZ2</b> – 1%  <b>FZ1</b> – 99%</p> <p><i>The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%).</i></p> <p><b>Available data:</b>  The Environment Agency's (EA) Flood Map for Planning has been used within this assessment.</p> <p><b>Flood characteristics:</b>  The EA's Flood Map for Planning shows a very small area of the site on the northern boundary is located within Flood Zone 2. The site is not located in Flood Zone 3a or 3b.</p>
<b>Coastal and Tidal</b>	The site is not at risk from tidal or coastal flooding.
<b>Surface Water</b>	<p><b>Proportion of site at risk (RoFSW):</b>  <b>3.3% AEP</b> – 1%  Max depth – 0.15 – 0.30m  Max velocity – 0.01 – 0.25m/s  <b>1% AEP</b> – 2%  Max depth – 0.30 – 0.60m  Max velocity – 0.25 – 0.50m/s  <b>0.1% AEP</b> – 10%  Max depth – 0.30 – 0.60m  Max velocity – 0.50 – 1.00m/s</p>

	<p><i>The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a greater Annual Exceedance Probability (AEP) (e.g. 1% AEP % includes the 3.3% AEP %).</i></p> <p><b>Description of surface water flow paths:</b> In the 0.1% AEP event, there are small areas of surface water ponding to a maximum depth of 0.6m, and hazard rating of 'danger for some', in a low topographic spot on the northern boundary of the site and on the eastern boundary where the site meets Waveney Road. During the 1% AEP, the extents of these areas decrease, and during the 3.3% AEP, only a marginal part of the site is impacted, with the maximum depth decreasing to 0.3m and the hazard rating decreasing to 'very low hazard'.</p>
<b>Reservoir</b>	The site is not shown to be at risk of reservoir flooding from the available <a href="#">online</a> maps.
<b>Groundwater</b>	<p>The Environment Agency Areas Susceptible to Groundwater Flooding, provided as 1km grid squares, shows the susceptibility of an area to groundwater flood emergence. The following comments can be made about groundwater flood risk:</p> <ul style="list-style-type: none"> <li>The entire site has a <math>\geq 75\%</math> susceptibility to groundwater flood emergence.</li> </ul> <p>The assessment does not negate the requirement that an appropriate assessment of the groundwater regime should be carried out at the site-specific FRA stage.</p> <p>The JBA Groundwater Emergence Map indicates predicted groundwater levels are within 0.5 m and 5 m of the ground surface at the site location. This means that there is a risk of flooding to subsurface assets but surface manifestation of groundwater is unlikely.</p> <p>Flow paths from the RoFSW mapping show that if groundwater to emerge, this would likely flow towards the topographic depression on the northern boundary of the site towards the eastern side, shown at the 1% AEP.</p>
<b>Sewers</b>	The site is located in a postcode area with no recorded historic sewer flooding, according to Anglian Water's DG5 Register for Greater Norwich.
<b>Flood history</b>	<p>The Environment Agency's historic flooding and recorded flood outlines datasets do not have a record of any flooding on or surrounding the site.</p> <p>Norfolk County Council's historic flooding records also do not show any flooding on or surrounding the site.</p>
<b>Flood risk management infrastructure</b>	
<b>Defences</b>	This site is not protected by any formal flood defences.
<b>Residual risk</b>	There is no residual risk to the site from flood risk management structures.
<b>Emergency planning</b>	
<b>Flood warning</b>	A very small area of the site on the northern boundary is within the River Waveney from Diss and the River Dove to Ellingham, including Bungay Flood Alert Area. The site is not located in a Flood Warning area.
<b>Access and egress</b>	<p>The site can currently be accessed by vehicles off Thwaite Road to the west.</p> <p>In all modelled fluvial events, the site and surrounding roads are unaffected by flooding.</p> <p>During the 3.3% and 1% AEP surface water events, flooding is not predicted to impact Thwaite Road. During the 0.1% AEP, an area of surface water ponding may extend from the field to the west of the site onto Thwaite Road. Depths could reach up to 0.6m on the road to a maximum velocity of 1.25m/s and maximum hazard rating of 'danger for some', meaning access and egress for emergency vehicles is unlikely to be affected.</p> <p>Safe access and egress will need to be demonstrated in the 1% AEP plus climate change surface water event. Site drainage proposals should address the requirements for access routes, avoid impeding surface water flows and preserve the storage of surface water to avoid exacerbation of flood risk in the wider catchment.</p>
<b>Dry Islands</b>	The site is not located on a dry island.
<b>Climate change</b>	

**Implications for the site**

- Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding.
- In the absence of detailed modelling, Flood Map for Planning Flood Zone 2 can be used as an indicative 1% + climate change flood extent. This suggests the site may be at greater fluvial flood risk in the future as Flood Zone 2 extends approximately 100m more towards the site than Flood Zone 3.
- Climate change should also be considered for surface water events; at the site-specific stage, the 1% AEP +40% event is considered as part of surface water drainage strategies, or surface water modelling in the Broadland Rivers Management Catchment for the 2070s. The 1% AEP +40% event mapping suggests that the site is not likely to be at significantly increased risk of surface water flooding in future.
- Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.

**Requirements for drainage control and impact mitigation**

**Broad-scale assessment of possible SuDS**

**Geology & Soils**

- Geology at the site consists of:
  - Bedrock- Gravel, sand, silt and clay
  - Superficial- Sand and gravel, river terrace deposits
- Soils at the site consist of:
  - Freely draining slightly acid sandy soils

**SuDS**

- The site is considered to be highly susceptible to groundwater flooding. Groundwater flooding could occur at the surface which may flow to and pool within topographic low spots during very wet winters. Detention and attenuation features should be designed to prevent groundwater ingress from impacting hydraulic capacity and structural integrity. Additional site investigation work may be required to support the detailed design of the drainage system. This may include groundwater monitoring to demonstrate that a sufficient unsaturated zone has been provided above the highest occurring groundwater level. Below ground development such as basements are not appropriate at this site.
- BGS data indicates that the underlying geology is sands, gravels, silts and clays which is likely to be free draining. However, the groundwater flood risk classification is >75% according to the EA's Areas Susceptible to Groundwater Flooding (AStGWF) map. The JBA Groundwater Map also shows that there is a risk of flooding to subsurface assets. Therefore, this should be confirmed through infiltration testing, with the use of infiltration maximised as much as possible in accordance with the SuDS hierarchy.
- The site is located within a Groundwater Source Protection Zone. Infiltration techniques may not be suitable and should only be used following the granting of any required environmental permits from the Environment Agency for Source Protection Zones 2, 3 and 4 although it is possible that infiltration may not be permitted. Proposed SuDS should be discussed with relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible opportunities and constraints.
- The site is not located within a historic landfill site.
- Surface water discharge rates should not exceed the existing greenfield runoff rates for the site. Opportunities to further reduce discharge rates should be considered and agreed with the LLFA.
- If it is proposed to discharge runoff to a watercourse or sewer system, the condition and capacity of the receiving watercourse or asset should be confirmed through surveys and the discharge rate agreed with the asset owner.

**Opportunities for wider sustainability benefits and integrated flood risk management**

- Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could provide wider sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible constraints.

	<ul style="list-style-type: none"> <li>• Development at this site should not increase flood risk either on or off site. The design of the surface water management proposals should take into account the impacts of future climate change over the projected lifetime of the development</li> <li>• Opportunities to incorporate infiltration techniques such as filter strips, filter drains and bioretention areas must be considered. Consideration should be made to the existing condition of receiving waterbodies and their Water Framework Directive objectives for water quality. The use of multistage SuDS treatment will clean improve water quality of surface water runoff discharged from the site and reduce the impact on receiving water bodies.</li> <li>• Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting must be considered in the design of the site.</li> <li>• The potential to utilise conveyance features such as swales to intercept and convey surface water runoff should be considered. Conveyance features should be located on common land or public open space to facilitate ease of access. Where slopes are &gt;5%, features should follow contours or utilise check dams to slow flows.</li> </ul>
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## NPPF and planning implications

<b>Exception Test requirements</b>	<ul style="list-style-type: none"> <li>• The Local Authority will need to confirm that the Sequential Test has been carried out. The Sequential Test will need to be passed before the Exception Test is applied. The NPPF classifies residential development as 'More Vulnerable'.</li> <li>• As the site is at risk of groundwater flooding and surface water flooding, as well as fluvial flooding in the future, the Exception Test needs to be applied. The Exception Test will be passed if the area at risk of surface water flooding in the northern part of the site is left undeveloped and instead incorporated as amenity greenspace.</li> </ul>
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<b>Requirements and guidance for site-specific Flood Risk Assessment</b>	<p><b>Flood Risk Assessment:</b></p> <ul style="list-style-type: none"> <li>• At the planning application stage, a site-specific Flood Risk Assessment will be required as the proposed development site contains a small area at fluvial and surface water flood risk, is indicated to be at significant groundwater flood risk and is more than 1 hectare in area.</li> <li>• All sources of flooding should be considered as part of a site-specific flood risk assessment.</li> <li>• The site-specific FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance, Norwich City Council's Local Plan policies, and the Norfolk County Council Lead Local Flood Authority's Statutory Consultee for Planning Guidance Document.</li> <li>• Consultation with the Local Authority, Lead Local Flood Authority, Water Company, and the Environment Agency should be undertaken at an early stage.</li> <li>• The development should be designed to ensure that mitigation measures are in place to ensure the development does not flood.</li> </ul> <p><b>Guidance for site design and making development safe:</b></p> <ul style="list-style-type: none"> <li>• Safe access and egress will need to be demonstrated in the 1 % AEP plus climate change rainfall event, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes or contribute to loss of floodplain storage. Consideration should be given to the siting of access points with respect to areas of surface water flood risk</li> <li>• The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond current greenfield rates.</li> <li>• The proposed site should discharge surface water at the original pre-development (greenfield) runoff rate. If this is not possible, a significant reduction in the current rate of discharge should be achieved and agreed with the relevant drainage body (LLFA, IDB or Anglian Water).</li> </ul>
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	<ul style="list-style-type: none"> <li>Developers should refer to Norfolk County Council's 'Norfolk County Council Lead Local Flood Authority Statutory Consultee for Planning Guidance Document' and the Level 1 SFRA for information on SuDS for guidance on the information required by the LLFA from applicants to enable it to provide responses to planning applications.</li> </ul>
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## Key messages

The development is likely to be able to proceed if:

- Safe access and egress can be demonstrated in the 1% AEP surface water event. The current access point on Thwaite Road is likely to be unaffected by surface water flooding in the 1% AEP event.
- A site-specific FRA demonstrates that the site is not at an increased risk of flooding in the future, that the development of the site does not increase the risk of surface water flooding on the site and to neighbouring properties, and how the natural flood storage provided by the pre-developed site is preserved.
- If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another).

## Mapping Information

The key datasets used to make planning recommendations regarding this site were the Environment Agency's Flood Map for Planning and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.

<b>Flood Zones</b>	Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Map for Planning mapping.
<b>Climate change</b>	In the absence of detailed modelling, the Environment Agency's Flood Map for Planning Flood Zone 2 has been used as an indication of flood extent during a 1% + climate change scenario. For surface water risk, a 1% AEP +40% scenario has been considered, which represents the Broadland Rivers Management Catchment for the 2070s.
<b>Fluvial depth, velocity and hazard mapping</b>	This site is not shown to be at significant risk of flooding from fluvial sources.
<b>Surface Water</b>	The Risk of Flooding from Surface Water dataset has been used to define areas at risk from surface water flooding.