


Greater Norwich Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables	
Site details	
Site Code	GNLP0133E
Address/Grid Ref.	UEA, Grounds Depot. <i>Student accommodation</i> / 619832,307729
Area	1.61ha
Current land use	Greenfield
Proposed land use	University related (Student accommodation, in the region of 400 beds which may include a small element of ancillary university related uses)
Sources of flood risk	
Location of site within catchment	The River Yare rises near Garvestone to the east of Norwich and flows eastward, around the southern edge of Norwich, towards its confluence with the River Wensum just downstream of the city centre. The site is located east of Norwich on the north bank of the River Yare, approximately 7.7km upstream of its confluence with the River Wensum.
Existing drainage features	The site is located on the north bank of the river Yare. the southern edge of the is approximately 3150m from the river. The University of East Anglia Broad borders the southern edge of the site and an artificial channel passes the southern corner.
Fluvial	<p>Proportion of site at risk: FZ3b – 1% FZ3a – 3% FZ2 – 4% FZ1 – 96%</p> <p>Available data: Modelling has been completed for the River Yare using TUFLOW. Both defended and undefended scenarios have been modelled and the defended scenarios have been used to assess the risk of flooding to the site. Limitations of the modelling are summarised in the Mapping Information section at the end of this table. Further modelling was undertaken to apply recent climate change uplifts to the fluvial model of the Wensum.</p> <p>Flood characteristics: The majority of the site is not at risk of flooding during the 0.1% AEP event as it is significantly raised above the river level. The southern corner of the site is in Flood Zone 3b and floods to depths <0.2m during this 5% AEP event. Depths in this corner reach up to 0.4m during the 1% AEP event and up to 0.5m during the 0.1% AEP event. This area is small and at the bottom of the slope and it is recommended that the south east edge of the site is given to less vulnerable use.</p>
Coastal and Tidal	The site is not at risk from tidal or coastal flooding.
Surface Water	<p>Proportion of site at risk (RoFfSW): 3.3% AEP – 0% 1% AEP – 0% 0.1% AEP – 0%</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 higher risk zone (e.g. 1% AEP includes the 3.3% AEP %)</i></p> <p>Description of surface water flow paths:</p> <p>The site is not at risk of surface water flooding during the 0.1% AEP event. As this is currently a greenfield site, it is recommended that the developer demonstrate that the change in land use does not increase the risk of surface water flooding on site and to the surrounding area.</p>
Reservoir	The site is not shown to be at risk of flooding from reservoirs from available online maps.
Groundwater	<p>The Environment Agency Areas Susceptible to Groundwater Flooding dataset, 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"> The entire site is shown to have a >25% <50% susceptibility to groundwater flood emergence. <p>This 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>
Flood history	The Environment Agency's historic flooding and recorded flood outlines dataset has no record of flooding on the site.
Flood risk management infrastructure	
Defences	The site is not currently protected by any formal flood defences.
Residual risk	There is no residual risk to the site from flood risk management structures.
Emergency planning	
Flood warning	The majority of the site is not in a flood warning area, however the Environment Agency's 'River Yare from Barham Broom to the A11 at Cringleford' Flood Warning Area crosses the south eastern edge of the site.
Access and egress	Access to the site is via a single road, Bluebell Road, which passes along the eastern edge of the site. Access and egress via Bluebell Road and surrounding roads is unlikely to be impacted during the 0.1% AEP fluvial or surface water event. This remains the case even considering the Upper End (+65%) climate change scenario.
Dry islands	The site is not located on a dry island.
Climate change	
Implications for the site	<p>The site is not sensitive to climate change it is mostly sufficiently raised above the river level.</p> <p>Even in the most extreme 0.1% AEP plus Upper End 65% scenario, the flooded extent is limited to the south corner of the site, covering around 5% of the site. This does not represent a significant increase in flood extent from the present day 0.1% AEP event, where 4% of the site is flooded. Flood depths are significantly greater under this scenario however, reaching up to 1.2m. The modelled flood hazard indicates that this area is 'Dangerous for all' with deep fast flowing water.</p> <p>Proportions of the site in Future Flood Zones can be found in Table 6-2 of the Greater Norwich Level 2 SFRA Report</p>
Requirements for drainage control and impact mitigation	

<p>Broad scale assessment of possible SuDS</p>	<p>Geology & Soils</p> <ul style="list-style-type: none"> • Geology at the site consists of: <ul style="list-style-type: none"> ○ Bedrock – Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Formation, Portsdown Chalk Formation (undifferentiated) – Chalk. ○ Superficial – None recorded. <p>SuDS</p> <ul style="list-style-type: none"> • Most source control techniques are likely to be suitable. Mapping suggests that permeable paving may have to use non-infiltrating systems given the possible risk from groundwater. Mapping also suggests that slopes may be unsuitable for selective source control techniques. • Mapping suggests that there is a medium risk of groundwater flooding at this location, therefore it is likely infiltration techniques will not be suitable. This should be confirmed via site investigations to assess the potential for infiltration. Additionally, the site is located within a Source Protection Zone, therefore techniques should only be used where there are suitable levels of treatment 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 constraints. • Detention is unlikely to be feasible as mapping suggests mean site slopes are >5%. Feasibility of such options should be assessed as part of a site-specific assessment. If this feature is feasible a liner maybe required to prevent the egress of groundwater. • Filtration is unlikely to be feasible as mapping suggests mean site slopes are >5%. Feasibility of such options should be assessed as part of a site-specific assessment. If this feature is feasible it should be located where the depth to the water table is >1m, additionally a liner maybe required to prevent the egress of groundwater. • All forms of conveyance are likely to be suitable. Where the slopes are >5% features should follow contours or utilise check dams to slow flows. A liner maybe required to prevent the egress of groundwater. • Developers should investigate and consider in full all SuDS options and demonstrate that SuDS are not appropriate where they are not implemented. • The site is not designated by the Environment Agency as previously being a landfill site.
<p>Opportunities for wider sustainability benefits and integrated flood risk management</p>	<ul style="list-style-type: none"> • Due to the size and greenfield nature of the site, there are likely to be many opportunities to install green infrastructure and preserve existing natural features. This could include features such as rain gardens, wild verges and the preservation of existing mature trees.
<p>NPPF and planning implications</p>	
<p>Exception Test requirements</p>	<ul style="list-style-type: none"> • Given the low risk to most of the site, the site is likely to be suitable for development with some mitigation. • The site is however in close proximity to existing flood zones and it is recommended that a precautionary approach is taken. Any developer should undertake a site-specific flood risk assessment including surface water modelling to demonstrate that the change in land use does not increase the risk of surface water flooding on the site and to nearby properties.
<p>Requirements and guidance for site-specific Flood Risk Assessment</p>	<p>Flood Risk Assessment:</p> <ul style="list-style-type: none"> • As the site is not located in a Flood Zone, no site-specific Flood Risk Assessment is required at application stage. However, owing to the sites close proximity to existing flood zones it is recommended that a precautionary approach is taken and a site specific flood risk assessment undertaken. • 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. • Consultation with the Local Authority, Lead Local Flood Authority and the Environment Agency should be undertaken at an early stage. <p>Guidance for site design and making development safe:</p> <ul style="list-style-type: none"> • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to

	<p>show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG).</p> <ul style="list-style-type: none"> • 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. • 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. • It is recommended that the most at risk area of the site in the southern corner is given left undeveloped.
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Key messages

The development is likely to be able to proceed if:

- A carefully considered and integrated flood resilient and sustainable drainage design is put forward.
- A site-specific Flood Risk Assessment demonstrates that the site is not at an increased risk of flooding in the future, and that the development of the site does not increase the risk of surface water flooding on the site and to neighbouring properties.
- A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond current greenfield rates.

Mapping Information

The key datasets used to make planning recommendations regarding this site were the broadscale 2D modelling outputs from the Environment Agency's Flood Map for Planning, River Yare Flood Model and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.

Flood Zones	Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Map for Planning mapping.
Climate change	Climate change allowances were modelled as part of Level 2 SFRA.
Fluvial depth, velocity and hazard mapping	Fluvial depth and hazard mapping has been taken from the River Yare model for present day, which was a 1D model and a 2D domain was added as part of the modelling completed for the Level 2 SFR, alongside the climate change scenarios. This should be explored further at site-specific stage.
Surface Water	The Risk of Flooding from Surface Water map has been used to define areas at risk from surface water flooding.
Surface water depth, velocity and hazard mapping	The surface water depth and hazard mapping for the 1 in 1% AEP event is taken Environment Agency's Risk of Flooding from Surface Water mapping.