Greater Norwich Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables	
Site details	
Site Code	**DIS_3**
Address/Grid Ref.	Land north of Stanley Road/ 610808,279583
Area	1.66ha
Current land use	Greenfield
Proposed land use	Residential
Sources of flood risk	
Location of site within catchment	The site is in the catchment of the River Waveney. The River Waveney is an Environment Agency designated main river and flows in an easterly direction to the south of Diss. The river has not been artificially modified and flows in open channel.
Existing drainage features	Two unnamed drains are located 30m north-east and 30m north of the site. The drain flows north towards the Shelfanger watercourse which flows south from its source at Shelfanger around Diss before flowing into the River Waveney.
Fluvial	**Proportion of site at risk:** **5% AEP event –** 0% **1% AEP event –** 49% **0.1% AEP event –** 65% *As the model used is not externally reviewed, results do not align with designated flood zones and extents at risk during indicative events are instead quoted.* **Available data:** A strategic 2D model was built to inform the flood risk to this site. The model is strategic in nature and topography is informed by OS Mastermap. The model has not been externally reviewed and therefore has not informed the Environment Agency flood zones. Therefore, both SFRA flood mapping and the Environment Agency flood zones (whichever are greater) will need to be used for future development planning. The developer should look at the fluvial risk to the site in further detail for a site-specific FRA. **Flood characteristics:** The site is not at risk of flooding during the 5% AEP flood event. In the 1% AEP flood event, nearly half of the site is at risk of flooding. Flood water from the northern drain is the source of flooding on the site. Flood water flows south from the drain onto Bowden Way before overflowing onto the site and flowing south towards the A1066 road. Flood depths on the site are shallow and are a maximum of 0.2m with a flood hazard rating of 'Caution'. During the 0.1% AEP event, most of the site is at risk of flooding. As in the 1% AEP flood event, flood water flows from the northern drain onto the site and ponds along the A1066. Flood depths during this scenario are predominantly still shallow across the site with deeper areas of flood water along the A1066 (maximum flood depth of 0.4m). The flood hazard rating for most of the site is 'Caution', with a higher flood hazard rating for the area of deeper flood water along the A1066 (Dangerous for some').
Coastal and Tidal	The site is not at risk from coastal or tidal flooding.

Surface Water	**Proportion of site at risk (RoFfSW):** **3.3% AEP** – 1% Max depth 0.3-0.6m, Max velocity <0.25m/s **1% AEP** – 2% Max depth 0.3-0.6m Max velocity<0.25m/s **0.1% AEP** – 42% Max depth 0.6-0.9m Max velocity <0.25m *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 %)* **Description of surface water flow paths:** The site is impacted by surface water flooding in all modelled events. In the 3.3% AEP event, the extent of flooding on the site is minimal. A small area of surface water ponding, located to the west of the site, overlaps the site boundary. Flood depths range from 0m to 0.6m and a flood hazard rating of 'caution'. In the 1% AEP event, an additional area of ponding is present in the south of the site. Flood depths are shallow and are below 0.6m and have a flood hazard rating of 'caution'. In the 0.1% AEP event, surface water flooding is extensive and affects a significant part of the site. A large flow path flows south from Old High Road to Rowden Road before flowing onto the site. The flow path is wide in extent and results in ponding along the A1066 along the southern site boundary. Flood depths from the flow path are shallow and range between 0m-0.15m and has a flood hazard rating of 'caution'. Deeper flooding occurs where flood water ponding occurs in the southern part of the site. Flood depths in this area range between 0m and 0.3m and has a flood hazard rating of 'caution'. The area of ponding in the western part of the site merges into the flowpath. Flood depths are between 0m to 0.9m and have a flood hazard rating of 'caution' to 'dangerous for most'.
Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps.
Groundwater	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: • The entire site is shown to have a >=75% susceptibility to groundwater flood emergence. 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.
Flood history	The Environment Agency's historic flooding and recorded flood outlines datasets do not record of flooding on the site. The site is in a postcode area which has experienced 4 incidences of sewer flooding (as identified in the Level 1 SFRA).
Flood risk management infrastructure	
Defences	This site is not 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 site is not located in an Environment Agency Flood Warning or Flood Alert Area.
Access and egress	The site is currently accessed from Denmark Lane. In terms of fluvial flood risk, a significant part of the site is shown to be at risk of flooding during the 1% AEP and 0.1% AEP flood events. Flooding during all events is very shallow therefore access and egress to and from the site should not be affected. Impacts to access and egress remain low even considering the Upper End (+65%) climate change scenario as depths across the site remain very low. In terms of surface water flood risk, surface water flooding impacts the site and some of the surrounding road network in the 0.1% AEP modelled event. In the 0.1% AEP flood event, surface water flooding may impact access and egress from the site. A surface water flow path is present along Denmark Lane and Rowden Lane and may affect access to and from the site.

Dry islands	The site is not located on a dry island.
Climate change	
Implications for the site	• The site is highly sensitive to climate change causing increased in fluvial flows in the drains to the north and north-east of the site. • The site is in future Functional Flood Zone 3bwhich is the 20 year plus the Upper End (65%) climate change scenario. This results in flooding across the site. Water flows downhill from the north of the site to the south and flood depths on the site during this scenario are very shallow (<0.01m) across most of the site. Depths are deepest at the southern edge, up to 0.2m, and have a flood hazard rating of 'Caution'. This scenario presents a significant increase in risk to the site as during the present day 5% AEP flood event, the site is not at risk of flooding. • The site is in future Flood Zone 3a which is the 1% AEP plus the Upper End (+65%) climate change scenario. Flood depths during all the 1% AEP climate change scenarios do not significantly increase and remain below 0.03m across most of the site and have a modelled flood hazard rating of 'Cautiuon'. In the south-western corner of the site, where flooding is the greatest, flood depths range between 0.05m and 0.35m and have a flood hazard rating of 'Caution' for most of the area, and 'Danger to some' in a few small areas. • The site is in Future Flood Zone 2 which is the1,000 year plus the upper end (65%) climate change scenario. This results in flood depths remaining shallow (between 0.01m and 0.1m) across most of the site and a flood hazard rating of 'Caution' across most of the site. In the south of the site, flood depths are a maximum of 0.4m and have a maximum flood hazard rating of 'Dangerous for some'. **Proportions of the site in Future Flood Zones can be found in Table 6-2 of the Greater Norwich Level 2 SFRA Report**
Requirements for drainage control and impact mitigation	

Broad scale assessment of possible SuDS	**Geology & Soils**
	• Geology at the site consists of:
	  ○ Bedrock – Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Formation, Portsdown Chalk Formation (undifferentiated) – Chalk.
	  ○ Superficial – Croxton Sand and Gravel Member - Sand and Gravel.
	SuDS
	• 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 high 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.
	• 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 may be 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 may be 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 may be 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.
	• The site is not located within any Environment Agency designated Source Protection Zones.

Opportunities for wider sustainability benefits and integrated flood risk management	• Due to the size of the site, there is likely to be limited space for green infrastructure. It is recommended that areas of hard paving are designed to ensure that flood water can be stored during a flood event alongside the use of green features such as rain gardens and tree pits.
NPPF and planning implications	
Exception Test requirements	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. Residential development is classified as 'More Vulnerable'. Whilst the site is not currently within a designated Flood Zone, strategic modelling indicates that the site is at risk of fluvial flooding. Any proposed development should be accompanied by a site-specific Flood Risk Assessment which investigates the fluvial flood risk to the site in further detail.
Requirements and guidance for site-specific Flood Risk Assessment	**Flood Risk Assessment:** • At the planning application stage, a site-specific Flood Risk Assessment should be produced to assess the risk of flooding. • All sources of flooding, particularly the risk from fluvial and surface water sources should be considered as part of a site-specific flood risk assessment. • 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. • The development should be designed to ensure that mitigation measures are in place to ensure the development does not flood. **Guidance for site design and making development safe:** • 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 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). • Safe access and egress will need to be demonstrated in the 1 in 0.1% AEP plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Ideally, the access route should be situated 300mm above the designed flood level and waterproofing techniques should be used where necessary. 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. Alternatively, risk could be managed by inclusion of a higher refuge and a flood response plan that meets the requirements of the Local Council and their Emergency Planner. • Compensatory flood storage is required for any land raising and all proposed buildings whenever there is built development on land within the 1% +35% climate change flood extent. • 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. • Areas at risk from surface water flooding should ideally be integrated into green infrastructure, which presents wider opportunities to improve biodiversity and amenity as well as climate change adaptation. An integrated flood risk management and sustainable drainage scheme for the site is advised. It is essential that a detailed model of surface water flooding, using the existing drainage system, topographical and asset survey is constructed at the FRA stage. This will determine the risk from surface water flooding further and to ensure that overland flows do not overwhelm future sustainable drainage features. • Development on greenfield land should discharge at rates no greater than the existing greenfield rates for the 100% and the 1% rainfall events. • 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.

Key messages

The development is likely to be able to proceed if:

- 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)
- Space for surface water to be stored on the site is provided and rainwater harvesting should be considered.
- Development on greenfield land should discharge at rates no greater than the existing greenfield rates for the 100% and the 1% rainfall events.
- Safe access and egress routes must not be in the areas of high surface water risk or the 1% AEP fluvial design flood event (taking into account climate change).

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 Waveney Strategic 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	A strategic 2D model was built to inform the flood risk to this site. The model is strategic in nature and topography is informed by OS Mastermap. The model has not been externally reviewed and therefore has not informed the Environment Agency flood zones. Therefore, both SFRA flood mapping and the Environment Agency Flood Zones (whichever are greater) will need to be used for future development planning. The developer should look at the fluvial risk to the site in further detail for a site-specific FRA
Climate change	Climate change was modelled as part of the further modelling to apply recent climate change uplifts to the fluvial model of the River Waveney.
Fluvial depth, velocity and hazard mapping	Fluvial depth and hazard mapping has been taken from the strategic modelling. of the River Waveney. 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 0.1% AEP event is taken Environment Agency's Risk of Flooding from Surface Water mapping.