	Uttlesford District Council **Level 2 Strategic Flood Risk Assessment** **Detailed Site Summary Table**
Site details	
Site Code	**Saffron Walden A**
Address	Land behind Knights Park
Area	2.95ha
Current land use	Field
Proposed land use	Employment
Flood Risk Vulnerability	Less Vulnerable
Sources of flood risk	
Location of the site within the catchment	The site is located in the upstream end of the Slade catchment, which flows into the River Cam, and is located southeast of Saffron Walden, east of Thaxted Road. It is bounded by agricultural fields on its northwestern, northeastern and southeastern boundaries and Knights Park retail park and industrial estate to the southwest.
Topography	EA LiDAR 1m DTM indicates that the site slopes north-westwards, from an elevation of approximately 94m AOD in the southeast of the site, to approximately 84m AOD in the northwest. The site is predominantly on high ground.
Existing drainage features	The Environment Agency's Statutory Main River Map indicates that there are no Main Rivers within the site boundary. The nearest Main River is a tributary of the Slade, located approximately 363m to the northwest of the northwestern boundary. An unnamed Ordinary Watercourse flows west, parallel (just slightly north) of the northeastern boundary of the site along Tiptofts Lane, to meet the small tributary of the Slade (and other small drains) around the Thaxted Road/ Cardamon Road junction. The tributary then flows north and meets the Slade at East Street, flowing then west towards the River Cam at Audley End.
Fluvial	**The proportion of site at risk FMFP:** FZ3 – 0% FZ2 – 0% FZ1 – 100% **Fluvial model outputs:** 3.3% AEP fluvial event – N/A 1% AEP fluvial event – N/A 0.1% AEP fluvial event – N/A

	Available data: The EA Flood Map for Planning Rivers and Sea Flood Zone shows available data for fluvial flood risk of Main Rivers. The Ordinary Watercourses on the site have a catchment area less than 3km2, and therefore are not covered by hydraulic modelling used to define the Flood Map for Planning. The detailed modelling available representing the Slade commences at the Thaxted Road/ Cardamon Road junction. In the absence of Flood Zone mapping, the Risk of Flooding from Surface Water (ROFfSW) mapping has been used as a proxy for the risk of fluvial flooding from the Ordinary Watercourses. **Flood characteristics:** The EA Flood Map for Planning indicates that the site is located in Flood Zone 1 and therefore has a very low risk of fluvial flooding from Main Rivers. However, as the Flood Zone maps only identify fluvial flood risk from Main Rivers, and therefore do not represent the risk of flooding form the Ordinary Watercourses on the site, the ROFfSW mapping has been used as a proxy for the risk of fluvial flooding of this watercourse. All three surface water AEP events along the channel are contained in the lower lying floodplain of the ordinary watercourse, approximately 35-40m away from the site's northern boundary. Close to the site's most northerly tip, the ordinary watercourse shifts across slightly (north then west again), from flowing along Tiptofts Lane. Here, there is a slightly wider extent of surface water risk as an overland surface water flow path along the site's eastern boundary also flows to meet the ordinary watercourse. The start of the Slade tributary modelling just downstream at Thaxted Road does show Flood Zone 3b and 3a as in-bank, with only FZ2 spreading out of bank. Due to the higher topography on site and the confined nature of an ordinary watercourse channel, it is deemed unlikely that this would have a significant effect on the site. Any potential effects would be confined to the site's most northerly boundary. It is recommended that the fluvial risk posed to the site from the ordinary watercourse is investigated in a site-specific FRA, which may require a detailed hydraulic model, or an extension to the existing model as part of a site-specific FRA.
Surface Water	**Proportion of site at risk (RoFfSW):** **3.3% AEP** – 0.0% Max depth – N/A Max velocity – N/A **1% AEP** – 0.0% Max depth – N/A Max velocity – N/A **0.1% AEP** – 6.62% Max depth – 0.13-0.30m Max velocity – 1.00-2.00m/s **Available data:** The Environment Agency's Risk of Flooding from Surface Water (ROFfSW) map has been used within this assessment. **Description of surface water flow paths:**

	There is no surface water flooding within the site boundary within the 3.3% or 1% AEP events. ROFfSW mapping shows flow paths generated on the site within the 0.1% AEP, along the southwestern boundary. This flows south-east to north-west towards the lower lying land. This has a maximum depth and velocity of 0.30m and 2.0m/s respectively. All three surface water AEP events along the channel are contained in the lower lying floodplain of the ordinary watercourse, approximately 35-40m away from the site's northern boundary. An overland surface water flow path is present in all AEP events parallel with the site's eastern boundary. The 0.1% AEP event reaches the site boundary with a maximum depth and velocity of 0.30m and 2.0m/s respectively. The flow path flows northwest to meet the ordinary watercourse in the location of where it shifts its course slightly north.
Reservoir	This site is not shown to be at risk of reservoir flooding in either the 'dry day' or 'wet day' scenarios.
Groundwater	Using JBA's Groundwater Emergence map, groundwater levels are either at or very near (0.025m of) the ground surface in the north of the site. In the southeast of the site groundwater levels are between 0.025 and 0.5m below the ground level. Therefore, this site is susceptible to groundwater flooding.
Sewers	According to the Thames Water Flood Data, there are no incidents of flooding in the CB10 2 postcode area. The site is located within the Thames sewer catchment. While Uttlesford is not identified as a flood priority catchment in Thames Water's Drainage and Wastewater Management Plan (DWMP), developers should consult Thames Water as part of any development proposal to ensure development does not exacerbate existing issues and maximise opportunities for development to deliver benefits to Thames Water's strategic aims.
Flood history	The EA Historic Flooding Map shows that the site has not previously been affected by fluvial flooding from Main Rivers. The nearest EA historic flood extent is located approximately 2.8km northwest of the site, and relates to flooding from the River Cam in 2001, but the cause of the flooding is unknown. Historic flooding data provided by Essex County Council also showed no historic flood incidents for this site. There are no published Section 19 Flood Investigations for Saffron Walden and no Parish Flood Risk Survey information.
Flood risk management infrastructure	
Defences	The site is not currently protected by any formal flood defences.
Residual risk	The unnamed Ordinary Watercourse appears to flow through several small structures as it flows west to meet Thaxted Road. However, given the site is largely raised out of the floodplain, and the likely confined nature of flood risk, it is deemed unlikely that any blockages would have an effect within the site boundary. This should be considered and confirmed in a Flood Risk Assessment.
Emergency planning	

Flood warning	The site is not covered by any EA Flood Warning Areas, or Flood Alert Areas.
Access and egress	Currently, the only vehicular access to the site is from the Knights Park industrial park, at the southwestern site boundary, from Thaxted Road (it may be that other access points are proposed in future master planning). Thaxted Road is at risk of surface water flooding in all AEP events in various locations. Access and egress should be steered south along Thaxted Road; it should be noted that there are still sections of the road that have surface water flow paths crossing (more prominent in the 0.1% AEP event), but to the north towards Saffron Walden, the road itself acts as a conduit for surface water flow paths. There is also risk to the road in the 0.1% AEP modelled event. Maximum depths and velocities are present on the road to the north of the site at >1.20m and >2.00m/s respectively. The 3.3% and 1% SW+CC model indicates that Thaxted road is flooded to the north and south of the site to a maximum depth and velocity of 1.50m and 3.20m/s respectively, limiting access and egress.
Dry Islands	The site is not located on a dry island.
Climate change	
Implications for the site	**Management Catchment:** Cam and Ely Ouse Management Catchment **Fluvial:** The site is located in Flood Zone 1 and there is no detailed model coverage to assess the impacts of climate change on fluvial risk. However, there are Ordinary Watercourses on the site, and the ROFfSW mapping can provide an indication on fluvial flooding with climate change. The 1% AEP ROFfSW extent has been used as a proxy for the 3.3% AEP + climate change fluvial event. The ROFfSW mapping shows very little difference in flood extent between the 3.3% and 1% AEP events, which suggests that climate change is not expected to have a significant impact on the extent of flooding from the Ordinary Watercourse during a 3.3% AEP event. This also does not affect the site. The 0.1% ROFfSW AEP extent has been used as a proxy for the 1% AEP + climate change fluvial event. The increase in flood extent in the ROFfSW mapping indicates that climate change may increase the extent of fluvial flooding at the northern tip of the site boundary. Climate change impacts of the ordinary watercourse should be investigated in a site-specific FRA; given the sloping topography and confined nature of the ordinary watercourse, it is unlikely that climate change will affect any part of the site other than around the site's northern boundary. This may need to be confirmed with modelling. **Surface Water:** The RoFfSW 3.3% AEP and 1% AEP models have been upscaled and run for climate change using the Upper End allowance. The 3.3% SW+CC AEP model shows a small extent of flooding along the southwestern boundary of the site. The maximum depth and velocity of this

	flooding is 0.22m and 0.94m/s respectively, meaning it is a 'hazard for some'. The 1% SW+CC AEP model shows surface water flooding along the whole length of the southwestern boundary. The extent, depth and velocity of this flooding is very similar to the 0.1% surface water AEP event, with a maximum depth and velocity of this flooding is 0.27m and 1.26m/s respectively, meaning it is a 'hazard for most'. There are no new surface water flow paths activated in the 3.3% or 1% SW+CC AEP events. This shows that the site is vulnerable to the impacts of climate change. Development proposals at the site must address the potential changes associated with climate change and be designed to be safe for the intended lifetime. The provisions for safe access and egress must also address the potential increase in severity and frequency of flooding.
Requirements for surface water drainage and integrated flood risk management	

Broad-scale assessment of potential SuDS	**Geology & Soils**
	• The bedrock geology is 'Lewes Nodular Chalk Formation and Seaford Chalk Formation'.
	  ○ Chalk has a high permeability.
	• The superficial deposit is not stated for this site but is likely to be the same as the surrounding area, which is 'Lowestoft Formation – Diamicton'; this is composed of sheets of chalky till, with outwash sands and gravels, silts and clays.
	  ○ This mixture of characteristics means that the drainage of the area will vary. Sands, gravel and chalk facilitate water permeation; however, silts and clays make the ground impermeable.
	  ○ The composition of these soils will influence the drainage of the site.
	
	Sustainable Drainage Systems (SuDS)
	• Groundwater levels are indicated to be at or very near (within 0.025m) ground level and there is a risk of groundwater flooding at the surface during a 1% AEP event, which may flow to and pool within topographic low spots. 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 Lewes Nodular Chalk Formation and Seaford Chalk Formation which is likely to be free draining. 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 not located within a Groundwater Source Protection Zone and there are no restrictions over the use of infiltration techniques with regard to groundwater quality.
	• The site is not located within a historic landfill site.
	• Use of infiltration SuDS not appropriate if the site is located on contaminated ground.

	• 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. It may be possible to reduce site runoff by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques. • The Risk of Flooding from Surface Water (ROFfSW) mapping indicates the presence of surface water flow paths during the 0.1% AEP event. Existing flow paths should be retained and integrated with blue-green infrastructure and public open space. • 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. • 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. • 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. • Opportunities to incorporate filtration 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 and improve water quality of surface water runoff discharged from the site and reduce the impact on receiving water bodies. • Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting must be considered in the design of the site. • 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 >5%, features should follow contours or utilise check dams to slow flows.
Opportunities for wider sustainability benefits and integrated flood risk management	• The use of Natural Flood Resilience (NFM) measures on the Ordinary Watercourses which affect the site should be investigated, where suitable, to manage runoff and help mitigate flood events downstream in Saffron Walden and the wider Slade catchment. • Opportunities for using source control SuDS to manage runoff rates and volumes, contributing to the reduction of flood peaks on the Ordinary Watercourses on the site and the Slade River downstream, as well as existing surface water flow paths leaving the site. • Waterside areas, or areas along known flow routes, can act as blue green infrastructure, being used for recreation, amenity, and

	environmental purposes, allowing the preservation of flow routes and flood storage, and at the same time providing valuable social and environmental benefits contributing to other sustainability objectives.
NPPF and planning implications	
Exception Test requirements	The Local Authority will need to confirm that the Sequential Test has been carried out in line with national guidelines. The Sequential Test will need to be passed before the Exception Test is applied. The Exception Test is not required for this development as the site is classified as 'Less Vulnerable' (Employment and not present in the Flood Zones). However, there is still fluvial flood risk from the Ordinary Watercourse close to the site's northern boundary which needs to be investigated in more detail and confirmed in a FRA, with development steered away from areas of flood risk.

Requirements and guidance for site-specific Flood Risk Assessment	**Flood Risk Assessment:**
	• At the planning application stage, a site-specific FRA will be required as the proposed development site is:
	  ○ Greater than one hectare
	  ○ At risk from Ordinary Watercourses through/ near the site
	  ○ At risk of other sources of flooding (surface water)
	• All sources of flooding should be considered as part of a site-specific FRA.
	• Consultation with the Local Authority, Lead Local Flood Authority, Water Company, and the Environment Agency should be undertaken at an early stage.
	• Any FRA should be carried out in line with the National Planning Policy Framework (NPPF); Flood Risk and Coastal Change Planning Practice Guidance (PPG); Uttlesford District Council's Local Plan Policies and Essex County Council's SuDS Guidance.
	• The development should be designed with mitigation measures in place where required.
	• Detailed modelling may be required to confirm Flood Zone and climate change extents for the Ordinary Watercourse close to the site's northern boundary as part of a site-specific FRA. The Environment Agency and LLFA should be consulted at the time of the flood risk assessment to advise on requirements.
	• Climate change should be assessed using recommended climate change allowances at the time of the assessment (Flood risk assessments: climate change allowances - GOV.UK (www.gov.uk)) for the type of development and level of risk. The current allowances were published in May 2022 but may be subject to change in the future.
	• Trash screens on culverts downstream of sites can build up with debris and increase flood risk. Additionally, Parish Councils can seek access improvements for trash screens and the ownership of the screen may be unknown.
	• If any culverts or flood risk infrastructure are found to be under the required conditions, then the new development must not compromise assets downstream, and if there is scope, then improvements should be sought to bring the assets up to condition.
	• Compensatory flood storage should be provided where development is proposed within the 1 in 100-year (1% AEP) flood extent, including

an appropriate allowance for climate change. Ideally, proposed developments should have a net gain of floodplain storage to reduce the risk of flooding, on site and elsewhere.

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).
- The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, so runoff magnitudes from the development are not increased by development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure runoff rates are as close as possible to greenfield rates.
- Planning permission is required to surface more than 5 square metres of unpaved ground using a material that cannot absorb water.
- Arrangements for safe access and egress will need to be demonstrated for the 1% AEP surface water event with an appropriate allowance for climate change, using the depth, velocity, and hazard outputs. As safe access and egress may not be possible to the southwest of the site during a 1% surface water event, if this is the preferred access route for the site, a Flood Warning and Evacuation Plan will be required.
- Flood resilience and resistance measures should be implemented where appropriate during the construction phase, e.g. raising of floor levels. These measures should be assessed to make sure that flooding is not increased elsewhere.
    - set finished floor levels to 300mm above the 1% AEP flood level, including an appropriate allowance for climate change.
    - include property flood resistance and resilience measures.
- Other examples of flood resistance and resilience measures include:
    - using flood resistant materials that have low permeability to at least 300mm above the estimated flood level.
    - making sure any doors, windows or other openings are flood resistant to at least 300mm above the estimated flood level.
    - raising all sensitive electrical equipment, wiring and sockets to at least 300mm above the estimated flood level.
    - The EA advises that minimum flood floor level for 'More Vulnerable' development such as residential properties should be set 600mm above the 1% AEP fluvial plus climate change peak flood level, where the appropriate new climate change allowances have been used. Therefore, if the vulnerability of the site increases then the minimum flood floor level would have to increase.

Key messages

Development is likely to be able to proceed if:

- Development is steered away from the area of surface water along the western boundary and the northern and eastern site boundaries where surface water risk abuts the site. Any flow paths should be incorporated and considered within the development design.
- Fluvial flood risk impacts from the ordinary watercourse parallel with the site's northern boundary will need to be investigated and confirmed as part of a site-specific Flood Risk Assessment, which may require a detailed hydraulic model. It is unlikely looking at the topography, RoFfSW extents and that the site is largely raised out of the floodplain, that the site would be affected by fluvial risk; though potentially at the most northerly tip when looking at the 0.1% AEP surface water mapping as an indication of climate change.
- A carefully considered and integrated flood resilient and sustainable drainage design is put forward, with development steered away from the areas identified to be at risk of surface water flooding across the site.
- Safe access and egress can be demonstrated in the fluvial and surface water plus climate change events. This includes measures to reduce flood risk along these routes such as raising access, but not displacing floodwater elsewhere.
- A site-specific FRA demonstrates that the site is not at an increased risk of flooding in the future and that development of the site does not increase the risk of surface water flooding on the site and to neighbouring areas.
- If flood mitigation measures are implemented then they are tested to check 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	
Flood Zones	Flood Zones 2 and 3 have been taken from the EA Flood Map for Planning mapping. As the risk of fluvial flooding from Ordinary Watercourses on the site is not represented in the Flood Map for Planning, the ROFfSW mapping has been used as a proxy dataset and identifies fluvial flood risk at the southeastern and southern boundaries of the site.
Climate change	A detailed fluvial hydraulic model is not available for this site, and therefore the impacts of climate change cannot be assessed in detail. Instead, the ROFfSW mapping has been used as a proxy for fluvial and surface water flooding in the 3.3% AEP + climate change and the 1% AEP + climate change events.
Fluvial depth, velocity and hazard mapping	Depth, velocity, and hazard data was derived from the EA ROFfSW mapping, in the absence of a detailed fluvial hydraulic model.
Surface Water	The EA ROFfSW dataset has been used for this assessment. The latest climate change allowances (updated May 2022) have also been applied to the Risk of Flooding from Surface Water map to indicate the impact on pluvial flood risk.
Surface water depth, velocity and hazard mapping	The surface water depth, velocity, and hazard mapping for the 3.3%, 1% and 0.1% AEP events (considered to be high, medium, and low risk) have been taken from EA ROFfSW mapping.
Groundwater	Groundwater data was derived from JBA's Groundwater Emergence maps.
Sewer	Uttlesford's sewers are managed by both Thames Water (for catchments flowing south) and Anglian Water (for catchments flowing north). Data for sewer flooding was provided by Thames Water. Sewer flooding data was requested from Anglian Water but not received within the study timeframe.

Reservoir	The EA ‘Dry Day’ and ‘Wet Day’ Reservoir flood maps have been used in this assessment.