Uttlesford District Council
Level 2 Strategic Flood Risk Assessment
Detailed Site Summary Table

Site details	
Site Code	**Chesterford**
Address	Chesterford Research Park
Area	11.57ha
Current land use	Fields and car park
Proposed land use	Employment
Flood Risk Vulnerability	Less Vulnerable
Sources of flood risk	
Location of the site within the catchment	The majority of the site is located to the east of the Cam catchment, with the eastern most part of the site in the west of the Slade River catchment. The site is located to the east of Little Chesterford. It is bounded agricultural land to the east, south and west. The Chesterford Research Park is located to the north of the site.
Topography	The ground has a maximum elevation of 103m AOD to the east of the site and a minimum elevation of 96m AOD to the west of the site. The site is located on high ground between two river catchments.
Existing drainage features	There are no Ordinary Watercourses on the site. There are several small isolated ponds around the Research Park and the source of an Ordinary Watercourse just west of the most south-westerly site boundary, which flows south-west into the Cam.
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. Any sources of Ordinary Watercourses near to the site have a catchment area less than 3km^2, and therefore are not covered by hydraulic modelling used to define the Flood Map for Planning. 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. The source of an Ordinary Watercourse commences just west of the most southern point of the site boundary, which flows south-west into the Cam. There is no anticipated risk to the site given the topography slopes north-east to south-west away from the site.
Surface Water	**Proportion of site at risk (RoFfSW):** **3.3% AEP** – 0.13% Max depth – 0.00-0.15m Max velocity – 1.00-2.00m/s **1% AEP** – 0.14% Max depth – 0.00-0.15m Max velocity – 1.00-2.00m/s **0.1% AEP** – 6.80% Max depth – 0.00-0.15m 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:** During the 3.3% and 1% surface water AEP events is a very small extent of flooding in the northeast of the site. The maximum depth and velocity of this flooding is 0.15m and 2.00m/s respectively. During the 0.1% surface water AEP event the flooding in the northeast of the site increases in extent. Flow paths emerge in the centre of the site flowing from northeast to southwest towards the woods and the Ordinary Watercourse which commences south of the site. The maximum depth and velocity of this flooding is 0.15m and 2.00m/s respectively. These patches of 0.1% AEP risk do bisect the site in several locations here, so development should be steered away from these areas so that floodwater is not displaced elsewhere in the site.
Reservoir	This site is not shown to be at risk of reservoir flooding in both the 'dry day' and 'wet day' scenarios.
Groundwater	Using JBA's Groundwater Emergence map, this site is not considered to be susceptible to groundwater flooding, due to the nature of the local geological conditions.
Sewers	According to the Thames Water Flood Data, there are no incidents of flooding in the CM10 1 postcode area. The site is located within the Thames sewer catchment.
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 1,653m east of the site, and relates to flooding from the River Granta 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	There is no residual risk to the site.
Emergency planning	
Flood warning	The site is not covered by any EA Flood Warning Areas, or Flood Alert Areas.
Access and egress	Currently, the site can be accessed via the unnamed road leading to Chesterford Research Park both along the northwestern boundary and the northern boundary to the east of the Research Park (it may be that other access points are proposed in future master planning). The access road to the research park branches off Walden Road. Access is also possible from the east from Little Walden. Although safe access and egress can occur on the access road to the Research Park, Walden Road floods in places to depths and velocities not conducive with safe access and egress, to the north and south of the access road during the 3.3%, 1% and 0.1% AEP events, associated with ordinary watercourses. This means that safe access and egress to the site cannot be guaranteed as flood depths and velocities on this road range from a maximum of 0.60m and 2.00m/s respectively in the 3.3% AEP event to 0.90m and >2.00m/s respectively in the 0.1% AEP event. Petts Lane to the east leading to Little Walden is heavily impacted by surface water flood risk as the Slade flows parallel to this road, in a southerly direction. Little Walden itself is also at significant risk of flooding in all AEP events, therefore access and egress should be steered away from this direction. Safe access and egress are not possible in the 3.3% surface water plus climate change (SW+CC) model and greater. Depths and velocities to the north and south of Walden Road are too great for safe access and egress to occur. The maximum depths and velocities are 0.44m and 3.5m/s to the south of Walden Road where the ordinary Watercourse crosses the road.
Dry Islands	The site is not located on a dry island.
Climate change	
Implications for the site	**Management Catchment:** Cam and Ely Ouse **Fluvial:** The site is located in Flood Zone 1 and is not at fluvial flood risk. **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% and 1% SW+CC AEP models show a greater extent of flooding compared to the 3.3% and 1% AEP events. The maximum depth and velocity of this flooding is 0.13m and 2.19m/s respectively, meaning it is a ‘hazard for some’. 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 'Lewis Nodular Chalk Formation and Seaford Chalk Formation (Undifferentiated)- Chalk'.
	  o Relatively permeable.
	• The superficial deposit is 'Lowestoft Formation- Diamicton'
	  o Characterised by chalk and flint content as well as silts and clays, meaning it has varying permeability.
	
	Sustainable Drainage Systems (SuDS)
	• The site is not considered to be susceptible to groundwater flooding, due to the nature of the local geological conditions. This should be confirmed through additional site investigation work.
	• BGS data indicates that the underlying geology is 'Lewis Nodular Chalk Formation and Seaford Chalk Formation (Undifferentiated)', overlain with the superficial deposit of 'Lowestoft Formation' and is likely to have varying drainage. Any proposed use of infiltration should be supported by infiltration testing. Off-site discharge in accordance with the SuDS hierarchy is required to discharge surface water runoff.
	• 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 ROFfSW mapping indicates the presence of surface water flow paths on the site during the 3.3%, 1% and 0.1% AEP events. 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 upstream of the Ordinary Watercourse south of the site should be investigated, where suitable, to manage runoff and help mitigate flood events downstream in Chesterford and the wider Slade River 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 River Chelmer 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/ no ordinary watercourses). Flood risk from surface water should still be considered and development steered away from this 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 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.

- Detailed modelling will be required to confirm Flood Zone and climate change extents for the Ordinary Watercourses at the site as part of a site-specific FRA, to determine the flood extents, climate change and flood 1 in 1000-year flood level (0.1% AEP) The Environment Agency and LLFA should be consulted at the time of the flood risk assessment. They will advise as to whether existing detailed models are available, and if so, whether they need to be updated.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 during a 3.3%, 1% or 0.1% surface water event, 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 the flow paths/areas of surface water ponding in the centre and northeast of the site. These should be incorporated and considered within the development design. These patches of 0.1% AEP risk do bisect the site in several locations here, so development should be steered away from these areas so that floodwater is not displaced elsewhere in the site.
- 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. Access should be directed west as Little Walden to the east is significantly impacted by flood risk along the Slade watercourse which runs in parallel to the road and village.
- 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.
Climate change	The ROFfSW mapping has been used for 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.
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.