	Uttlesford District Council **Level 2 Strategic Flood Risk Assessment** **Detailed Site Summary Table**
Site details	
Site Code	**Land behind Weston Homes Office Park**
Address	Land behind Weston Homes Office Park
Area	2.55ha
Current land use	Field, cark park and industrial estate
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 between the Pincey Brook and River Roding catchments but falls topographically in the northern end of the Pincey Brook catchment, to the north of Takeley. The site as a whole is bounded by a field to the north, Prior's Wood to the east, a residential area to the south and Weston Homes Office Park to the west. A small tributary of the Pincey Brook is located 180m south of the southern site boundary, which is in and out of culvert in Takeley, flowing in a north-westerly direction leading into the Pincey Brook around the airport carpark.
Topography	The site is relatively flat with a maximum elevation of 101.0m AOD in the east of the site and a minimum elevation of 99.2m AOD in the west of the site.
Existing drainage features	There appears to be the presence of one small Ordinary Watercourse along the site's northern boundary; this leads from Prior's Wood past the site, into culvert until Parsonage Road and then south parallel with the road into a tributary of the Pincey Brook.
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. 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 near the site, the ROFfSW mapping has been used as a proxy for the risk of fluvial flooding of this watercourse. The mapping indicates that flood risk is contained in the ditch along the northern boundary. Similarly, along the western boundary where there are short reaches of narrow open channel, containing flood risk locally. Whilst the risk is anticipated to be low given the confined topography, the risk posed by the Ordinary Watercourse should be investigated in a site-specific Flood Risk Assessment which may require detailed hydraulic modelling.
Surface Water	**Proportion of site at risk (RoFfSW):** **3.3% AEP** – 0.3% Max depth – 0.60-0.90m Max velocity – 0.25-0.50m/s **1% AEP** – 0.5% Max depth – 0.60-0.90m Max velocity – 0.25-0.50m/s **0.1% AEP** – 2.0% Max depth – 0.60-0.90m Max velocity – 0.50-1.00m/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:** ROFfSW mapping shows minor flow paths generated around the site boundary in the 3.3%, 1% and 0.1% AEP events, predominantly along the alignment of topographic depressions due to the Ordinary Watercourse. The majority of the site itself is not at risk. For the 3.3% and 1% AEP events, there is a small extent of surface water flooding in the southeastern corner of the site, although this appears to all be contained in a topographic depression. This flooding has a maximum depth and velocity of 0.90m and 0.50m/s respectively. The 1% AEP event also follows the site's northern boundary. In the 0.1% AEP event the surface water flooding in the southeast of the site increases in extent and is no longer entirely contained in the topographic depression. There is also a small extent of flooding along the northern

	boundary. This flooding has a maximum depth and velocity of 0.90m and 1.00m/s respectively.
Reservoir	This site is not shown to be at risk of reservoir flooding from either the 'dry day' or 'wet day' extents.
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 3 incidents of flooding in the CM22 6 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 2,254m southeast of the southeastern boundary. This relates to flooding from the River Roding in 1974, due to the channel capacity being exceeded. 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 Takeley 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 Ordinary Watercourse has several small structures along its course. The risk anticipated from the blockage of these structures would be low given the size of the drain and confined topography, but it could increase out of bank flooding in the developable area of the site to the north and west, so this should be considered in a Flood Risk Assessment, which may require detailed hydraulic modelling.
Emergency planning	
Flood warning	The site is not covered by modelled data in the Environment Agency's Flood Warning Service, nor the Flood Alert Service.
Access and egress	Vehicular access to the site is possible via an access road off Parsonage Road, on the western boundary (it may be that other access points are proposed in future master planning). Access and egress at the site are unaffected in all surface water events; however, in the wider vicinity along Parsonage Road, there are sections impacted in all AEP events in alignment with the topography of watercourses, with maximum depths and velocity of 0.90m and 2.00m/s to the north and south of the site. The 3.3% and 1% surface water plus climate change (SW+CC) model shows that Parsonage Road is flooded to a maximum depth and velocity of 0.66m and 1.70m/s respectively, which is not conducive with safe access

	and egress. Parsonage road floods to the north of the site when it is transected by the A120. Surface water flooding associated with the floodplain of an ordinary water course cuts across Parsonage Road to the south of the site, adjacent to Roseacres Road.
Dry Islands	The site is not located on a dry island.
Climate change	
Implications for the site	**Management Catchment:** Upper Lee **Fluvial:** There is no detailed model coverage to assess the impacts of climate change on fluvial risk. However, there is an Ordinary Watercourse present along the site's northern and western boundary, 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 a slight 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. 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, mainly in the southeastern corner of the site. The impacts of climate change on fluvial flood risk from the ordinary watercourse should be investigated as part of a site-specific FRA, which may require hydraulic modelling to confirm 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% SW+CC AEP model shows a similar extent, depth and velocity of flooding to the 1% surface water AEP event. The maximum depth and velocity of this flooding is 0.66m and 0.60m/s respectively, meaning it is a 'hazard for most'. The 1% SW+CC AEP model shows a similar extent, depth and velocity of flooding to the 0.1% surface water AEP event. The maximum depth and velocity of this flooding is 0.71m and 0.81m/s respectively, meaning it is a 'hazard for all'. Therefore, this 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 'London Clay Formation – clay, silt and sand'. ○ Relatively impermeable, improved slightly by the presence of sand and flint gravel.

- The superficial deposit is ‘Lowestoft Formation – Diamicton’ which 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)

- 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 London Clay Formation, overlain with superficial deposits of mainly Lowestoft Formation Diamicton 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 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 Watercourse which affects the site should be investigated, where suitable, to manage runoff and help mitigate flood events downstream in the wider Pincey Brook catchment. • Opportunities for using source control SuDS to manage runoff rates and volumes, contributing to the reduction of flood peaks on the Ordinary Watercourses surrounding the site and the Pincey Brook 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 on the site's 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 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 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.

- Blockage modelling may be required to assess the residual risk associated with potential blockage of the culverts on the unnamed Ordinary Watercourse.
- 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 the 0.1% AEP 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 from areas at fluvial and surface water flood risk along the northern boundary and south-eastern corner of the site.
- Fluvial flood risk impacts will need to be investigated and confirmed as part of a site-specific Flood Risk Assessment, which may require a detailed hydraulic model.
- 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.
- The flow paths and areas of surface water ponding should be incorporated and considered within the development design.
- 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.