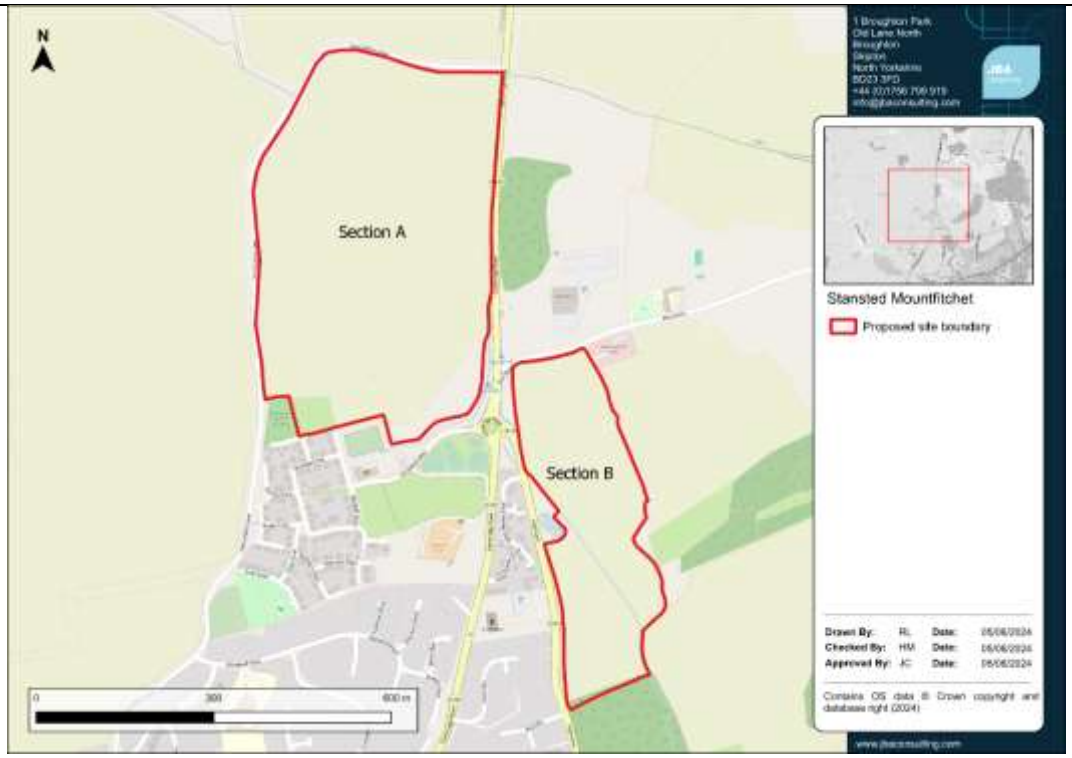
Uttlesford District Council
Level 2 Strategic Flood Risk Assessment
Detailed Site Summary Table

Site details	
Site Code	**Stansted Mountfitchet**
Address	Land east of High Lane, Stansted Mountfitchet
Area	32.0 ha
Current land use	Greenfield (Arable)
Proposed land use	Residential
Flood Risk Vulnerability	More Vulnerable
Sources of flood risk	
Location of the site within the catchment	The proposed development site is located in the centre of the small Ugley Brook catchment, on either side of the watercourse, which is a tributary of the Stansted Brook catchment, which drains an area of 25 km2. The site has two sections: Section A, located west of Cambridge Road and bounded by Pennington Lane to the west; and Section B, east of High Lane and south of Alsa Street.
Topography	Section A is lowest in east of the site (76m AOD) and highest in the west at 90.9m AOD. The site is located across a slight valley, with the Ugley Brook along the eastern perimeter of Section A, extending north to south, with a bend to the southeast through Section B. Section B is highest in the northeastern edge of the site at 87.8m AOD, and lowest in the centre of the site at 72.4m AOD, where the Ugley Brook flows through.

	
Existing drainage features	Ugley Brook runs parallel north to south along the eastern border of Section A, and from the northwest to southeast of Section B through the centre of this land parcel. There appears to be a small cut channel running west to east at the centre of Section A, and another in its southwestern corner. Ugley Brook flows into Stansted Brook approximately 970m south of the site; Stansted Brook flows north east to south west, joining the River Stort west of Stansted Mountfitchet, 1.5km downstream of the Ugley Brook – Stansted Brook confluence.
Fluvial	**The proportion of site as a whole at risk FMFP:** FZ3 – 6.9% FZ2 – 7.9% FZ1 – 92.1% **Fluvial model outputs:** 2% AEP fluvial event – 0.31%* 1.33% AEP fluvial event – 0.38%* 1% AEP fluvial event – 0.44%* 0.1% AEP fluvial event – 0.72%* *It is important to note that these reported %s of modelled risk are not a reflection of flood risk to the 'entire site'; the detailed model data only commences 150m from the site's Section B southern boundary, and so this information should be used more as an indication of differences between the respective flood events, rather than the relative %s themselves. See 'available data' below. **Available Data:** Flood Zones are determined from the Environment Agency's Flood Map for Planning (FMFP). This represents the undefended scenario. The Environment Agency's 1D-2D ISIS-TUFLOW Stansted Mountfitchet (2015) hydraulic model is a more accurate representation of the flood risk to this site. However, this model does not cover the entire reach of the Ugley Brook through the site; it commences 150m from the site's southern

	boundary in Section B. Therefore, the EA's FMfP has been used in the absence of detailed modelling through the rest of Section B and Section A. **Flood characteristics:** Flood Zone 2 and 3 of the EA's FMfP are present along the site's eastern boundary, encroaching into the site. Given the rising topography away from the Brook, it is likely the FMfP shows a slightly conservative picture of flood risk which may be refined through detailed modelling. The majority of this Section A is developable, if steered away from Cambridge Road and the ordinary watercourse. Until a detailed FZ3b is modelled, this is to be assumed as equivalent to FZ3a. The Flood Map is misaligned in the south-eastern corner of Section A , as structures are not modelled and the flood extents are shown to follow lower topography across the roundabout junction, whereas the watercourse continues its straight alignment to the west of the roundabout before entering culvert under Hornbeam Way, partially re-emerging as open channel between the B1383 and the B1351, before entering a culvert under the B1351 and re-appearing in Section B to flow south-east through the centre of the site, and out towards Gall End Lane. Section B is more at risk with the watercourse flowing through the centre and bisecting this land parcel. Where the detailed model commences, Flood Zone 3b (2% AEP in the absence of 3.3% AEP) is confined to the channel. FZ3a is slightly narrower than the FMfP but generally similar in width at approximately 25m, hence the FMfP is a good indication of flood extents in the absence of detailed modelling, but this will be refined at the FRA stage. In order for this site to progress, detailed hydraulic modelling will be required as part of a site-specific Flood Risk Assessment, to confirm Flood Zones and impacts of climate change.
Surface Water	**Proportion of site at risk (RoFfSW):** **3.3% AEP – 4.6%** Max depth – 0.9-1.2m Max velocity – >2m/s **1% AEP – 7.8%** Max depth – >1.2m Max velocity – >2m/s **0.1% AEP – 17.0%** Max depth – >1.2m Max velocity – >2m/s **Available data:** The Environment Agency's Risk of Flooding from Surface Water (RoFSW) map has been used within this assessment. **Description of surface water flow paths:** RoFSW mapping shows flow paths generated on the site within the 3.3%, 1% and 0.1% AEP events. For the 3.3% AEP event, the majority of surface water flooding occurs within the Ugley Brook channel and immediate floodplain through both site

	sections, with localised areas of ponding in the northwest of Section A. Flooding across both sections has a maximum depth and velocity of 1.2m and >2m/s respectively. This corresponds to a maximum hazard level of 'danger for all', in the southeast of Section B. In the 1% AEP event, the extent of flooding within the central channel expands laterally but is similar to the 3.3% AEP event. Channels running through the centre and southwest of Section A are expected to receive depths of up to 0.6m and 0.3m, respectively. The localised ponding in the northwest of Site A is expected to expand but remain relatively minor. The 1% AEP event is expected to generate a maximum depth and velocity of >1.2m and >2m/s respectively across the two sections, with the maximum hazard level of 'danger for all' also including the eastern perimeter of Section A. In the 0.1% AEP event, the previously isolated flow path to the north of Section A connects to Ugley Brook, flowing west to east. Two other parallel west to east flow paths are activated from the high ground west of Pennington Lane, flowing through the centre of Section A to the Ugley Brook and in the south-western corner to Bluebell Drive and Hornbeam Way to meet the Ugley brook between the two land parcels. Section A receives depths and velocities of up to 0.6m and >2m/s. The 0.1% AEP event is expected to generate a maximum depth and velocity across the sections in excess of 1.2m and 2m/s respectively. The maximum hazard level on site of 'danger for all' is expected along most of the Ugley Brook channel. Section B extents are largely confined to the floodplain, getting wider in each event. The 0.1% AEP extents are larger than the fluvial FZ2 extents.
Reservoir	The site is not expected to be at risk from reservoir flooding in the 'dry day' or 'wet day' scenario.
Groundwater	The JBA Groundwater Emergence map shows groundwater risk is variable across the site, ranging from negligible risk to the potential for groundwater to emerge at significant rates and flow overland or pond within any topographic low spots. Section A is expected to have more variable groundwater risk than Section B. While the east of Section A is deemed to have a negligible risk from groundwater flooding due to the nature of the local geological deposits, groundwater is expected to be shallower in the central northern section, where levels are between 0.025m and 0.5m below the ground surface. Within this zone, there is a risk of groundwater flooding to both surface and subsurface assets, and the possibility of groundwater emerging at the surface locally. Localised sections of this area are expected to have groundwater either at or very near (within 0.025m of) the ground surface. Within this zone there is a risk of groundwater flooding to both surface and subsurface assets. Groundwater may emerge at significant rates and has the capacity to flow overland and/or pond within any topographic low spots. Finally, the southern portion of the site is anticipated to have groundwater levels between 0.5m and 5m below the ground surface. Here, there is a risk of flooding to subsurface assets but surface manifestation of groundwater is unlikely. The majority of Section B is expected to have groundwater levels between 0.5m and 5m below the ground surface. Here, there is a risk of flooding to subsurface assets but surface manifestation of groundwater is unlikely.

	There is considered to be a negligible risk from groundwater flooding in the northwest of Section B due to the nature of the local geological deposits.
Sewers	Sewer flooding records for Uttlesford district provided by Thames Water showed 13 instances of sewer flooding events in the CM24 8 postcode. 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 Environment Agency's Historic Flood Map shows no records of flooding on the site. However, the Environment Agency have reported fluvial and surface water flooding in the vicinity of the site.
Flood risk management infrastructure	
Defences	The Environment Agency (EA) AIMS dataset shows that the site is not protected by formal flood defences.
Residual risk	There are a number of structures where the Ugley Brook flows beneath in the vicinity of the site: Pennington Lane at its junction with Cambridge Road into Section A, Hornbeam Way leaving Section A, and the B1351 into Section B. In the event of a blockage of these structures during a flood event, flood risk could be exacerbated in the localised areas near the structures, by backing up, ponding or increasing overland flow routes. The potential impacts of blockage should be confirmed using detailed hydraulic modelling in a FRA at site-specific assessment stage.
Emergency planning	
Flood warning	None of the site is covered by a Flood Alert. A Flood Warning covers 9.9% of the site, along the banks of the Ugley Brook – to the east of Section A and diagonally northwest to southeast across Section B.
Access and egress	Vehicular access to Section A is currently possible via Hornbeam Way and Bluebell Drive to the south, Cambridge Road to the east, and Pennington Lane to the north and west. For all modelled surface water flooding scenarios, all current access routes to Section A are expected to become inundated, and thus the site may not be accessible by vehicle. Hornbeam Way and Bluebell Drive to the south form a conduit for a surface water flow path. Pennington Lane just has isolated crossings mainly in the 0.1% AEP event where the surface water overland flow routes cross from the hills west to east, at depths of up to 0.9m flowing at >2m/s. Cambridge Road is parallel with the Ugley Brook and hence due to topography, is shown to be inundated in both fluvial and surface water events. Vehicular access to Section B is possible from the north via Alsa Street which remains free of flood risk (except for a small stretch in the 0.1% AEP where it meets Snakes Lane), and Cambridge Road/High Lane to the west. Again, for all modelled scenarios, all current access routes to the west are expected to become inundated, and so may not be accessible by vehicle in certain conditions. High Lane (B1351) has clear stretches then parts where flow paths cross (>1.2 m deep and velocities exceeding 2m/s in the 0.1% AEP event), but further south at the Lower Street, Chapel Hill/ Water Lane

	junction, there are surface water flow paths in all AEP events. Access on foot may remain possible, even for the 0.1% AEP event, via Alsa Street's connection with May Walk. Development must be able to demonstrate safe access and egress in the fluvial and surface water plus climate change events. This likely includes measures to reduce flood risk along these routes such as raising access, but floodwater should not be displaced elsewhere. In particular, access needs to be considered with respect to Section B of the site being bisected, and how both sides of this land parcel can gain safe access/egress in the event of a flood.
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, except in the most southerly 150m of the Section B site. In the absence of detailed modelling, FZ2 can be used as a proxy for fluvial flooding with climate change. However, it is recommended that a detailed hydraulic model of the Ugley Brook (or extension to the existing model) on the site is developed, as part of a site-specific FRA to confirm the impacts of climate change. The FZ3a extent has been used as a proxy for the 3.33% AEP (FZ3b) + climate change fluvial event. FZ3a shows only a minor expansion may be expected in flood extent between the 3.3% and 3.3%+CC AEP events, which suggests that climate change is not expected to have a significant impact on the extent of flooding. The FZ2 extent has been used as a proxy for the 1% AEP and 0.1% AEP + climate change fluvial events. Again, there is only a minimal increase in extent, suggesting the site is relatively insensitive to the effects of climate change on fluvial flooding. **Surface Water:** The 3.3% AEP + climate change event shows a similar extent to the baseline 1% AEP event, including the presence of the flow paths in Section A and an expansion to the left bank of the Ordinary Watercourse in Section B. While this shows that climate change is expected to increase the risk of surface water to the site at the 3.3% level, flood depths remain largely shallow (<0.3 m) outside of the main channel, which continues to contain most of the water. The 1% AEP + climate change event exhibits a similar extent to the baseline 0.1% AEP event. This mapping indicates that the surface water flooding is no longer contained within channels, and there is an expansion to the flow paths flowing from the farmland east of Section A. 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 site sits on a bedrock of London Clay Formation, consisting of clay, silt and sand. This is overlain by a superficial layer of sedimentary head (clay, silt, sand and gravel) in the channel, and glaciofluvial (sand and gravel) and diamicton of the Lowestoft Formation on the surrounding banks. **Sustainable Drainage Systems (SuDS)** • Groundwater levels are indicated to be between 0.5 and 5m below ground level and there is a risk of flooding to subsurface assets and below ground development such as basements. Groundwater monitoring is recommended to determine the seasonal variability of groundwater levels, as this may affect the design of the surface water drainage system. • BGS data indicates that the underlying geology is London Clay Formation, overlain with superficial deposits of various sedimentary layers, 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 located within a Groundwater Source Protection Zone. Infiltration techniques may not be suitable and should only be used following the granting of any required environmental permits from the Environment Agency for Zones 2, 3 and 4 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 opportunities and constraints. • The site is designated in one Nitrate Vulnerable Zones (NVZs) ○ Surface Water - “Surface Water S443 – LEE NVZ” • 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 (RoFSW) 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 Stansted Mountfitchet and the wider Stansted Brook/ River Stort catchment. • There has been previous exploration into NFM in the upper reaches of the Ugley Brook catchment but it did not progress. There is an opportunity for this to be included and explored in the site allocation. • 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 NPPF classifies residential development as ‘More Vulnerable’.

	The Exception Test is required for this site because there is significant fluvial and surface water flood risk within all Flood Zones along the Ugley Brook running within the eastern boundary of Section A and through the centre of Section B. 'More Vulnerable' development is not permitted within Flood Zone 3b.

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:
	  ○ Within fluvial flood zones 2, 3a, and 3b
	  ○ Greater than one hectare
	  ○ At risk of other sources of flooding (surface water, groundwater and fluvial)
	• 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 scenario modelling should be conducted to assess the residual risk associated with potential blockage of the culverts on the Ugley Brook in the vicinity of the site.
	• 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 events with an appropriate allowance for climate change, using the depth, velocity, and hazard outputs. As access and egress to some sections of the site will not be possible during the 0.1% AEP event, a Flood Warning and evacuation Plan will be required.
- An environmental permit for flood risk activities may be required for work in, under, over or within 8m from a fluvial main river and from any flood defence structure or culvert.
- 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.
    - raise them as much as possible.
    - include extra 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 600mm above the estimated flood level.
    - making sure any doors, windows or other openings are flood resistant to at least 600mm above the estimated flood level.
    - by raising all sensitive electrical equipment, wiring and sockets to at least 600mm above the estimated flood level.

Key messages

Development is likely to be able to proceed if:

- Detailed modelling must be undertaken for the site to progress at detailed site-specific FRA stage, to confirm Flood Zone and climate change extents for the Ugley Brook through the sites.
- The area close to the Ugley Brook channel and floodplain is left undeveloped. Development should be steered away from the area of fluvial flood risk in the eastern side

of Section A and along the central watercourse floodplain in Section B, as well as the flow paths/areas of surface water ponding in Section A are 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. Access needs to be considered with respect to Section B of the site being bisected, and how both sides of this land parcel can gain safe access/egress in the event of a flood.
- 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. Where the detailed Stansted Brook 1D-2D hydraulic model is present, in the lower 150m of the Section B site, this has been used in preference.
Climate change	Where the detailed Stansted Brook hydraulic model is present, in the lower 150m of the Section B site, this has been used in preference. Otherwise, Flood Zone 2 has been used as a proxy for fluvial climate change. The RoFSW mapping has been upscaled for surface water flooding in the 3.3% AEP + climate change and the 1% AEP + climate change events, upper end scenarios.
Fluvial depth, velocity and hazard mapping	The Environment Agency's Stansted Mountfitchet (2015) hydraulic model begins in the lower 150m of Section B and contains scenarios for 2%, 1.3%, 1% and 0.1% AEP events. These data were used to indicate fluvial depth, velocity, and hazard for the area they covered. For the remainder of the site not covered by a hydraulic model, the EA's FMfP FZ2 and 3a were used to indicate flood extent.
Surface Water	The EA RoFSW 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 RoFSW mapping.