CC010-A

	Chelmsford City Council Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables
Site details	
Site Code	
Address	Andrews Place, Chelmsford
Area	1.91 ha
Current land use	Brownfield
Proposed land use	Residential
Flood Risk Vulnerability	More Vulnerable
Sources of flood risk	
Location of the site within the catchment	The site is located within the Chelmer Operational Catchment, which is 657.4km^2. Within the operational catchment, the site is located on the West of the River Can catchment, which drains 48.0km^2 of land. This catchment is not designated as artificial or heavily modified, although the site lies within the highly urbanised area of the City of Chelmsford. The site is bounded by allotments to the north-west, a residential area to the north-east, Rainsford Lane (A1016) to the south-east and Admirals Park to the south-west.
Topography	EA LiDAR indicates that the site slopes from a maximum elevation of 30.7mAOD (Above Ordnance Datum) on the north-eastern boundary to a minimum elevation of 25.5mAOD on the south-west boundary.
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 the River Can located approximately 62.5m south-west of the site. There are no Ordinary Watercourses or ditches within the site boundary.
Critical Drainage Area	The site is not in a critical drainage area.
Fluvial and tidal	**The proportion of site at risk FMFP:** **FZ3 – 23.9%** **FZ2 – 37.2%** **FZ1 – 62.8%** *The Flood Zone values quoted show the percentage of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone. This is because the values quoted are the area covered by each Flood Zone/extent within the site boundary. For example: Flood Zone 2 includes Flood Zone 3. Flood Zone 1 is the remaining area outside Flood Zone 2 (FZ2+ FZ1 = 100%).* **Defended outputs:** **3.3% AEP fluvial event – 0.0%** **1% AEP fluvial event – 25.0%** **0.1% AEP fluvial event – 38.4%**

	Modelled results show the percentage of site at risk from a given AEP flood event. **Available data:** Proportion of the sites at flood risk are determined from the Environment Agency's Flood Map for Planning Flood Zones. This represents the undefended scenario. The Environment Agency's 1D-2D ISIS-TUFLOW detailed hydraulic Chelmer (2010) model has been used within this assessment of fluvial flooding. The Environment Agency is currently preparing updated detailed modelling for the River Chelmer (including the Can at this location) which is expected to be available in Summer 2025 at time of writing. The latest available modelling should be used to inform any site-specific Flood Risk Assessment (FRA). **Flood characteristics:** The Environment Agency's Flood Map for Planning and the Chelmer (2010) hydraulic model show that the south-west of the site is at risk from fluvial flooding from the River Can. Overall, 23.9% of the site is within Flood Zone 3 concentrated in the south-western area of the site. Flood Zone 2 extends into those further with an additional 13.3% of the site at risk, expanding towards the north-eastern boundary. In a 3.3% AEP event, maximum depths of 0.3-0.6m occur along the south-western boundary, with maximum velocities reaching 0.5-1.0m/s near the north-western boundary. Inundation areas extend approximately 39m into the site from the south-western boundary. In a 1% AEP event, maximum depths of 0.9-1.2m occur along the south-western boundary, with maximum velocities reaching 0.5-1.0m/s near the western corner of the site. Inundation areas extend approximately 53m into the site from the south-western boundary. In a 0.1% AEP event, maximum depths of 1.2-1.5m occur along the south-western boundary, with maximum velocities reaching 0.5-1.0m/s in the southern corner of the site. Inundation areas extend approximately 64m into the site from the south-western boundary. The site is not at risk from tidal flooding.
Surface Water	**Proportion of site at risk (RoFfSW):** **3.3% AEP – 5.8%** Max depth – 0.3-0.6m Max velocity – 0.5-1.0 **1% AEP – 8.6%** Max depth – 0.6-0.9m Max velocity – 1.0-2.0m/s **0.1% AEP – 20.5%** Max depth – 0.6-0.9m Max velocity – 1.0-2.0m/s *The % Surface Water extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %).* The Environment Agency's Risk of Flooding from Surface Water mapping was used in this assessment.

	Description of surface water flow paths: In the 3.3% AEP event, surface water flooding is predominantly in the south-west of the site, with additional ponding in the western corner of the site, along the western section of Andrews Place and in the southern corner, where Andrews Place intersects with the A1016. Ponding occurs along the south-western boundary where an embankment prevents flow paths from connecting to the River Can. A small surface water flow path emerges flowing in a south westerly direction along Andrews Place, where the maximum depth and velocity of approximately 0.3-0.6m and 0.5-1.0m/s respectively occurs. This flooding has a hazard score of 'Significant – danger for most'. In the 1.0% AEP event, surface water flooding is in the south-west of the site, with the same three isolated spots increasing in size. Pooling still occurs along the south-western boundary due to the embankment. The surface water flow path extends further towards the south-eastern boundary along Andrews Place, where the maximum depth and velocity increases to approximately 0.6-0.9m and 1.0-2.0m/s respectively. This flooding has a hazard score of 'Significant – Danger for most'. In the 0.1% AEP event, surface water flooding is predominantly in the south-west of the site linking the previously isolated spots, with other flow paths emerging along the north-western boundary along Andrews Place heading south-east in addition to an isolated flow path intersecting the north-east boundary heading southwards. In the western corner of the site, the embankment is overtopped and a flow path forms heading south-west towards the River Can. In the southern corner, another flow paths drains the site overtopping the embankment further downstream. Maximum velocities of approximately 1.0-2.0m/s occur along the north-western boundary and near the southern corner of the site, whilst maximum depths of approximately 0.6-0.9m occur along the western stretch of Andrews Place. This flooding has a hazard score of 'Significant – danger for most'
Reservoir	According to the Environment Agency's risk of flooding due to reservoirs dataset, there is risk of flooding in the 'Wet Day' scenario in south-western portion of the site, extending approximately 35m into the site parallel to the south-western boundary. There is no risk of flooding to the site during the 'Dry Day' scenario.
Groundwater	JBAs Groundwater Emergence Map is provided as 5m resolution grid squares. The whole site is shown to have negligible risk of groundwater emergence in this area, and any groundwater emergence incidence has a chance of less than 1% annual probability of occurrence. Groundwater levels are indicated to be at least 5m below ground level and groundwater flooding is not likely, however below ground development such as basements may still be susceptible to groundwater flooding.
Sewers	Sewer flooding records were not available for this assessment. The entirety of Chelmsford is identified as a Flood priority catchment in Anglian Water's Drainage and Wastewater Management Plan (DWMP). Developers should consult Anglian Water as part of any development proposal to ensure development

	does not exacerbate existing issues and maximise opportunities for development to deliver benefits in line with the long term strategic aims set out in the DWMP.
Flood history	The Environment Agency's Historic Flood Map show no records of flooding on the site.
Flood risk management infrastructure	
Defences	The Environment Agency AIMS dataset shows that the site is protected from flooding from the River Can by two types of flood defence. An embankment is situated along the south-western boundary and extends approximately 340m downstream. Engineered high ground is located along the northern bank of the River Can, approximately 54m south-west of the site.
Residual risk	As the site is located behind raised embankments, it may be at risk in the event of overtopping or breach of defences. There may also be residual risk to the site where the River Can is culverted under the A1016. If this were to block, water could back up and cause flooding in a similar pattern to the surface water risk mapping. This should be assessed as part of a site-specific flood risk assessment, considering the speed of onset and duration of flooding. Given the site's location behind defences, a flood warning and evacuation plan will be required should any development be located in an area at risk in the result of a breach or failure of defences.
Emergency planning	
Flood warning	The south-western portion of the site is in an Environment Agency Flood Alert Area from the Rivers Wid and Can. This south-western section also contains 2 Environment Agency Flood Warning Areas: Riverside properties on the River Chelmer and Can in Chelmsford; The Rivers Can and Chelmer, through Chelmsford.
Access and egress	Vehicular access and egress to the site is currently via two road junctions between Andrews Place and Rainsford Lane (A1016) along the south-eastern boundary. <u>Andrews Place South</u> During the 3.3% surface water AEP event the southern access road is inundated to a maximum depth and velocity of 0.6m and 0.5m/s respectively. This flooding has a hazard classification of 'Moderate – danger for some'. During the 3.3% fluvial event, this access road is clear from fluvial flooding. Therefore, safe access and egress via this route may still be possible. During the 1% AEP surface water event, the southern access road is inundated to a greater extent with maximum depths and velocities remaining at 0.6m and 0.5m/s respectively. Therefore, the hazard classification remains at 'Moderate – danger for some'. During the 1% fluvial event, the entire access road is inundated to a maximum depth and velocity of 0.6m and 0.5m/s. This fluvial flooding has a hazard classification of 'Significant – danger for most'. Therefore, safe access and egress via this route is not possible during a fluvial event, but may still be possible during a surface water event. During the 0.1% AEP event, the southern access road is inundated with surface water to a maximum depth of 0.6m and a maximum velocity of 0.5m/s. This flooding has a hazard classification of 'Significant – danger for most' and therefore, safe access and egress is not possible via this route. During the 0.1% fluvial event,

	the entire access road is inundated to a maximum depth and velocity of 1.2m and 1.5m/s. This fluvial flooding has a hazard classification of 'Extreme- danger to all'. Therefore, safe access and egress via this route is not possible during a fluvial event. <u>Andrews Place North</u> The northern access route is not inundated by fluvial flooding during any AEP event. During the 3.3% AEP event, the access road to the north is not inundated and therefore provides a route for safe access and egress. During the 1% AEP event, the access road to the north of the site remains clear from surface water flooding, however the A1060 is flooded to a maximum depth and velocity of 0.2m and 2.0m/s respectively. This flooding has a hazard classification of 'Low-Caution'. Therefore, access and egress via this route is likely to still be possible. During the 0.1% AEP event, Andrews Place remains relatively clear from surface water flooding. The depths and velocities of the surface water flooding on the A1016 remains at a maximum depth of 0.2m and the maximum velocity remains at 2.0m/s, meaning access and egress is likely still possible.
Dry Islands	The site is not located within a dry island during any modelled flood event.
Climate change	
Implications for the site	**Management Catchment: Essex Combined Management Catchment** Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard, and frequency of both fluvial and surface water flooding. **Fluvial:** The River Chelmer has available climate change outputs for the Central (25%) and Upper End (72%) allowances for the 2080s. During the 3.3% fluvial AEP + central climate change allowance, the southwest of the site is inundated with water from the River Can. The extent of this flooding is slightly less than that of the present day 1% AEP fluvial event. The maximum depth and velocity of this flooding is 0.3m and 0.8m/s respectively. The 3.3% fluvial AEP + upper climate change allowance is slightly larger in extent than the current day 1% fluvial AEP event. The maximum depth and velocity of this flooding is 0.8m and 1.0m/s respectively. Under the fluvial design event (1%AEP plus climate change), depths of 0.8m and velocities of 0.7m/s are possible. The extent of this flooding sits between present day 1% AEP and present day 0.1% AEP events. **Surface Water:** The latest climate change allowances have also been applied to the Risk of Flooding from Surface Water map to indicate the impact on surface water flood risk. The 1% AEP plus 40% climate change corresponds to the 1% AEP upper end allowance for peak rainfall

	intensity for the 2070s epoch and is therefore the 'design event' scenario. The 3.3% AEP plus climate change event impacts the site to a similar extent to the baseline 0.1% AEP event, covering the south-western portion of the site. The maximum depth and velocity are 0.6-0.9m and 1.0-2.0m/s respectively for both scenarios, with a maximum hazard classification on site of 'Significant – danger for most'. This similarity in extent and depth between the 3.3% AEP with climate change and 0.1% AEP events show that this site is sensitive to climate change in the surface water events. It is important to note a breach of the embankment along the south-western boundary occurs in the 1% AEP plus 25% climate change event. This occurs in the present 0.1% AEP event scenario and further highlights the sensitivity to the risk of surface water flooding. 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 drainage control and impact mitigation	

Broad-scale assessment of possible SuDS	**Geology & Soils**
	• Geology at the site consists of:
	  ○ Bedrock geology - London Clay Formation - clay, silt and sand
	  ○ Superficial deposits - Head - clay, silt, sand and gravel
	• Soils at the site consist of:
	  ○ Freely draining slightly acid loamy soils
	
	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.
	• British Geological Survey data indicates that the underlying geology is a mixture of clay silt and sand, 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.
	• Surface water discharge rates should not exceed pre-development discharge rates for the site and should be designed to be as close to greenfield runoff rates as reasonably practical in consultation with the Lead Local Flood Authority (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 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.
Opportunities for wider sustainability benefits and integrated flood risk management	• 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 (Local Planning Authority, 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 consider 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 the 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. • SuDS are to be designed so that they are easy to maintain, and it should be set out who will maintain the system, how the maintenance will be funded and they should be supported by an appropriately detailed maintenance and operation manual.
NPPF and planning implications	
Exception Test requirements	The site is classified as 'More Vulnerable' and is at significant risk from fluvial and surface water flooding. As the site is partly within Flood Zones 2 and 3, the Exception Test should be applied. Whilst the Exception Test is only explicitly required for sites at risk from fluvial sources, Chelmsford City Council should carefully weigh up the benefits of developing the site against the significant risk, and satisfy themselves that users of the site can be kept safe throughout its lifetime.
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: ○ At risk of other sources of flooding (surface water) • All sources of flooding should be considered as part of a site-specific FRA, including consideration of the ordinary watercourse and the residual risk from culvert blockages and breach of defences.

	• Consultation with Chelmsford City Council, Essex County Council, Anglian Water, 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); and the Council's Local Plan's SuDS Policy. • The development should be designed with mitigation measures in place where required. Particular consideration should be given to ongoing management and maintenance of the existing defences on site, including whether any land needs to be safeguarded for improvement of defences in future. **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 limited to pre-development greenfield rates. • Arrangements for safe access and egress will need to be provided for the 1% AEP fluvial and rainfall events with an appropriate allowance for climate change, considering depth, velocity, and hazard. Design and access arrangements will need to incorporate measures, so development and occupants are safe. Given the significant risk to the site and proximity to the watercourse, a flood warning and evacuation plan should be prepared for the site. See Section 8.6 of the Level 1 SFRA for details of the requirements for plans. • Provisions for safe access and egress should not impact on surface water flow routes or contribute to loss of floodplain storage. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Flood resilience and resistance measures should be implemented where appropriate during the construction phase, e.g. raising of floor levels and use of boundary walls. These measures should be assessed to make sure that flooding is not increased elsewhere.
Key messages	
The site is at significant risk from fluvial flooding, in particular the southwestern boundary, given the proximity to the River Can. Surface water flooding poses a significant risk both during the present-day less frequent events as well as the more frequent events under anthropogenic climate change, although access and egress routes will be affected with the more frequent events even without climate change. The southwestern boundary is also at significant risk from fluvial flooding in less frequent present-day events, as well as more frequent climate change events. Whilst the Exception Test is only explicitly required for sites at risk form fluvial/tidal sources, Chelmsford City Council should carefully weigh up the benefits of development against this risk and satisfy	

themselves that users of the site will be safe throughout its lifetime. With regards to managing the flood risk, development may be able to proceed if:

- Development is steered away from the southwestern border of the site which is at risk from deep fluvial and surface water flooding in the 3.3%, 1% and 0.1% AEP events.
- 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 1% AEP plus climate change events. This includes measures to reduce flood risk along these routes such as raising access, but not displacing floodwater elsewhere. Given the significant risk to the site at the 0.1% AEP events, a suitable flood warning and evacuation plan will be required.
- A site-specific FRA demonstrates that site users will be safe throughout the lifetime of the development 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 must be 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

The key datasets used to make planning recommendations for this site were the Environment Agency's Flood Map for Planning, the Environment Agency's Risk of Flooding from Surface Water map and the Environment Agency's Chelmer (2010) model. More details regarding data used for this assessment can be found below.

Flood Zones	Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Map for Planning mapping.
Climate change	The central and upper end allowances were available for the Chelmer (2010) hydraulic model to indicate the impacts on fluvial flood risk. 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.
Fluvial and tidal extents, depth, velocity and hazard mapping	Depth, velocity, and hazard data was derived from the Chelmer (2010) hydraulic model.
Surface Water	The Risk of Flooding from Surface Water map has been used to define areas at risk from surface water flooding.
Surface water depth, velocity and hazard mapping	The surface water depth, 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 Environment Agency's RoFSW.