



**Chelmsford City Council Level 2
Strategic Flood Risk Assessment
Detailed Site Summary Tables**

Site details

Site Code	SGS20
Address	Land to the East and North of Rettendon Place, Rettendon
Area	16.47ha
Current land use	Greenfield – Agricultural land
Proposed land use	Residential
Flood Risk Vulnerability	More Vulnerable

Sources of flood risk

Location of the site within the catchment	This site is located to the north and east of the village of Rettendon, approximately 10km south of Chelmsford. The site consists of two agricultural fields, the northern field which borders Main Road and the local school to the west and southern field which borders residential properties to the west and an agricultural field to the south. The site is located within the Rettendon Brook catchment, which has an area of 11.0 km² at the site and is within the Crouch and Roach Operational Catchment. The Rettendon Brook Catchment is described as being heavily modified.
Topography	Environment Agency 1m resolution LiDAR across the site shows that the topography differs across the two fields. The topography of the northern field remains relatively consistent, but slopes from 49.6mAOD along the eastern boundary to 42.9mAOD along the western boundary with Main Road. The LiDAR shows that the southern field slopes in the opposite direction, from south-west to north-east. The highest level of the field is with the south-west corner at 46.3mAOD and the lowest point of the field is at 30.0mAOD in the north-east corner.
Existing drainage features	Within the northern field there are not any existing drainage features. An unnamed ordinary watercourse begins in the centre of the southern field, it follows the topography of the field, flowing towards the north-east corner. The ordinary watercourse is a tributary of Fenn Creek, which itself is a tributary of the River Crouch. Mapping also shows that there is a pond approximately half way along the southern boundary of the site. To the east of the site there are a series of fishing lakes.
Critical Drainage Area	The site is not located within a Critical Drainage Area.
Fluvial and tidal	The proportion of site at risk FMFP: FZ3 – 0% FZ2 – 0% FZ1 – 100% Defended outputs: 3.3% AEP fluvial event – 0.0% 1% AEP fluvial event – 0.0%

	0.1% AEP fluvial event – 0.0% Available data: The proportion of the site at flood risk is determined from the Environment Agency's Flood Map for Planning Flood Zones. This represents the undefended scenario. Flood characteristics: This site is not at risk from fluvial flooding from Main Rivers or at risk from tidal flooding. There is no detailed modelling available for this site, however, it is likely that flood risk associated with the ordinary watercourse will be attributed to surface water flooding and discussed in the section below.
Surface Water	Proportion of site at risk (RoFSW): 3.3% AEP – 3% Max depth – 0.3m Max velocity – 0.5m/s 1% AEP – 4% Max depth – 0.6m Max velocity – 1.00m/s 0.1% AEP – 8% Max depth – 0.9m Max velocity – 1.00m/s <i>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 %).</i> The Environment Agency's Risk of Flooding from Surface Water mapping was used in this assessment. Description of surface water flow paths: The majority of the surface water flood risk for this site is associated with the unnamed ordinary watercourse which flows through the southern field. The extent of the flooding is contained to the channel. Depths range from 0.2m to 0.9m between the 3.3% and 0.1% AEP events. The risk of flooding from surface water mapping also shows that there is ponding in the area along the southern boundary which is associated with the identified pond. During the 3.3% AEP event, the velocity of the flooding associated with the watercourse is 0.5m/s and has a hazard rating of 'Moderate – dangerous for some', during the 1% AEP and 0.1% AEP events, the velocity increases to 1.00m/s, however the hazard rating remains the same at 'Moderate – dangerous for some'. In the northern field the north-west corner of the site is shown to be at risk from surface water during the 3.3% AEP event, with an anticipated depth of up to 0.3m, a velocity of 0.5m/s and a hazard rating of 'Low – caution'. The extent of this area of flooding extends across the boundary of the site with Main Road during the 1% and 0.1% AEP events, however the anticipated depth of the flooding during these AEP events remains up to 0.3m. During these events the velocity of the surface water flood risk increases to 1.00m/s and the hazard rating increases to 'Moderate – dangerous for some'.
Reservoir	The Environment Agency's (EA) risk of flooding from reservoirs dataset shows that the site is not at risk from reservoir flooding in the wet or dry day scenario.
Groundwater	JBA's Groundwater Emergence Map, is provided as 5m resolution grid squares. The site is shown to have negligible risk of groundwater emerging in this area, and any groundwater emergence incidence has a chance of less than

	1% annual probability of occurrence. There will be a remote possibility that incidence of groundwater flooding could lead to damage to property or harm to other sensitive receptors at, or near, this location. The risk from groundwater should be confirmed and quantified as part of a site-specific flood risk assessment (FRA), which is likely to require ground investigations. Development should be steered away from areas that are identified as at risk from groundwater flooding (either from groundwater emerging, or due to overland flows where groundwater emerges uphill). In particular subsurface development (e.g. basement dwellings and buildings with deep foundations) should be avoided in areas where groundwater is found to be close to the surface.
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 does not show any records of flooding on the site. Essex County Council as Lead Local Flood Authority (LLFA) has no records of flooding within the site boundary. The closest incident is approximately 240m to the north east, where in 2009 an incident was recorded to pose risk to life.
Flood risk management infrastructure	
Defences	The Environment Agency AIMS dataset shows there are no formal flood defences in the vicinity of the site.
Residual risk	The site is not at residual risk from breach or failure of defences.
Emergency planning	
Flood warning	The site is not located in an Environment Agency Flood Alert or Flood Warning Area.
Access and egress	The access and egress to the site will be via Main Road, the flow path described in the 'surface water' section above flows across this access and egress point during all AEP events. The hazard ratings for each AEP are as follows: 3.3% AEP: Low – caution 1% AEP: Moderate – dangerous for some 0.1% AEP: Moderate – dangerous for some The site is currently undeveloped and surface water flows are likely to be affected by the form of any built development and associated drainage features. A site-specific FRA should consider the risk from surface water considering land levels and drainage features associated with the post development scenario, rather than just the currently available results. Arrangements for safe access and egress will need to be demonstrated for 1% AEP plus an appropriate allowance for climate change, using the depth, velocity, and hazard outputs. Any raising of access routes should not impede the existing watercourse/surface water flow route.
Dry Islands	The flood risk mapping suggests that the site will not become a dry island during a flood event.

Climate change	
Implications for the site	Management Catchment: Combined Essex 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 Crouch has available climate change outputs for the Central (25%) and Upper End (72%) allowances for the 2080s. The fluvial flood extents associated with the Fenn Creek and River Crouch do not extend into the site boundary. Surface Water: Climate change allowances, up to 2060, have been applied to the NaFRA2 dataset for surface water flooding using the UK Climate Projections (UKCP18). Across the site, the extent of the 3.3% AEP event plus climate change corresponds to the 1% AEP present day scenario. During the 1% AEP plus climate change scenario, the extent of the surface water flooding associated with the unnamed ordinary watercourse extends further into the site but does not reach the same extent as the 0.1% AEP present day scenario. During the 0.1% AEP event plus climate change, the extent of the surface water flooding across the site is greater than the 0.1% AEP present day event, with the most noticeable increase to the north of the ordinary watercourse. During this scenario additional flow routes and areas of ponding are also present. Based on the information presented, it can be inferred that this site is sensitive to surface water 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 drainage control and impact mitigation	
Broad-scale assessment of possible SuDS	Geology & Soils - Geology at the site consists of: - Bedrock Geology – Claygate Member consisting of clay, silt and sand. - Superficial Geology – none. - Soils at the site consist of: - Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey 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 with highly variable permeability. This should be confirmed through infiltration testing. Off-site discharge in accordance with the SuDS hierarchy may be required to discharge surface water runoff from the site. - The site is not located within a Groundwater Source Protection Zone. - The site is not located within a Nitrate Vulnerable Zone - The site is not located within a Drinking Water Safeguard Zone. - The site is not located within a historic landfill site. - 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 all events. Existing flow paths/watercourses 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 take into account the impacts of future climate change over the projected lifetime of the development. • Opportunities to incorporate source control techniques such as green roofs, permeable surfaces, and rainwater harvesting must be considered in the design of the site. • 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. • 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. • 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.
NPPF and planning implications	
Exception Test requirements	The site is classified as 'More Vulnerable' and is at risk from surface water flooding associated with an unnamed ordinary watercourse. The Exception Test is not required under the NPPF; however the Sequential Test must be passed, unless a site-specific FRA shows the site can be safely developed without increasing the risk of surface water elsewhere. It must be shown that the development will be safe for its lifetime and the risk of flooding from all sources can be managed through a sequential approach to design.
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, groundwater) • All sources of flooding should be considered as part of a site-specific FRA, including consideration of the residual risk from a failure, or overtopping of defences.

- Ground investigations are likely to be required to suitably assess the risk posed by groundwater to the site.
- 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 SuDS Policy.
- Assessment of surface water risk to the site should be supported by detailed modelling, and consideration of the post-development site-layout and drainage features as well as the present undeveloped risk.

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 if safe access and egress cannot be provided during an extreme event. See Section 8.6 of the Level 1 Strategic Flood Risk Assessment (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 in Flood Zone 1 but is at risk of surface water flooding. With regards to managing the flood risk, development may be able to proceed if:

- Existing drainage features on the site are incorporated into a sustainable drainage design for the site and considered within the wider 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 and groundwater flooding across the site.
- Safe access and egress can be demonstrated in the 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 risks to the site, a suitable flood warning and evacuation plan will be required if development is located within areas of risk and/or safe access and egress cannot be provided in an extreme event.

- 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/fluviat flooding on the site and downstream.

Mapping Information

The key datasets used to make planning recommendations for this site were the Environment Agency's Flood Map for Planning and the Environment Agency's Risk of Flooding from Surface Water map. 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	Climate change allowances have been incorporated into the Environment Agency's Flood Map for Planning. Climate change allowances have been incorporated into the Environment Agency's Risk of Flooding from Surface Water mapping.
Fluvial and tidal extents, depth, velocity and hazard mapping	N/A – not required for this assessment.
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	Environment Agency's Risk of Flooding from Surface Water dataset.