St Albans City and District Council
Level 2 Strategic Flood Risk Assessment
Detailed Site Summary Table

Site details	
Site Code	**B4**
Address	East St Albans, AL4 9JJ
Area	21.69ha
Current land use	Greenfield
Proposed land use	Mixed use - Primarily residential with a primary school
Flood Risk Vulnerability	More vulnerable
Sources of flood risk	
Location of the site within the catchment	The site is located in Oaklands, situated in eastern St Albans. Sandpit Lane runs along the northern boundary and a public bridleway runs along the eastern boundary. To the south of the site is Oaklands College and to the west Oaklands Grange housing development. The site is located within the Colne Management Catchment. The catchment is 1040km^2 with the site lying within an urbanised part of the catchment to the approximately 2.7km north of the River Colne.
Topography	Environment Agency 1m resolution LiDAR across the site shows that topography varies. The site area is comprised of agricultural land on a gradient. The highest elevations are found along the western boundary at around 94.9mAOD in the centre. The elevations then slope down to the northeast and east. The lowest elevations are located in the northeast corner at around 78.72mAOD.
Existing drainage features	From OS mapping, there appears to be a small watercourse which runs along the west and northern boundaries of the site. There are no other drainage features within the vicinity of the site.
Fluvial	**The proportion of site at risk FMFP:** FZ3b – 0% FZ3a – 0% FZ2 – 0% FZ1 – 100% 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%).

	Available data: The Environment Agency's Flood Zone mapping has been used in this assessment. No detailed hydraulic modelling was available for this site. **Flood characteristics:** The site is located within Flood Zone 1, however there appears to be a small unnamed ordinary watercourse along the north and west site boundaries, which could pose a risk in their immediate vicinities (although most of the site remains very low risk). Environment Agency Flood Zones are not available for small ordinary watercourses; however, the Environment Agency's Risk of Flooding from Surface Water (RoFSW) dataset can give an indication of the risk posed by small watercourses. This is discussed in the Surface Water section below.
Surface Water	**Proportion of site at risk (RoFSW):** **3.3% AEP** – 0.23% Max depth – 0.60 – 0.90m Max velocity – < 0.25m/s **1% AEP** – 2% Max depth – >1.2m Max velocity – 0.50 – 1.00m/s **0.1% AEP** – 9% Max depth – >1.20m Max velocity – 1.00 – 2.00m/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:** The site is affected by surface water flooding in the, 3.3% AEP 1% AEP and 0.1% AEP events. In the 3.3% AEP event there are three small areas of ponding around the northern and western boundaries. Flood depths of between 0.015 to 0.30m predicted in two of the areas of ponding, with the third in north-western corner of the site (adjoining a flow path along Sandpit Lane) predicted to reach 0.60 – 0.90m. The remainder of the site remains low risk. In the 1% AEP event there are a few small areas of ponding along the western boundary where the current hedge line is located, the deepest of which >1.2m. There is a small flow path in the south of the site flowing west to east, reaching a maximum depth of < 0.15m, and velocities of 0.50 – 1.00m/s. There is also a second flow path along the northern boundary of the site, an extension of the surface water flow path along Sandpit Lane again, flowing east to west. This flow path may be associated with the mapped ordinary watercourse. This flow path reaches a maximum depth of 0.25 – 0.50m with maximum velocities reaching between 0.50 – 1.00 m/s. The resulting flood hazard for the majority of site is 'very low' with a small

	area of ‘Danger to most’ located in the northwest corner where the flow route originates from Sandpit Lane before flowing into the site. In the 0.1% AEP surface water covers 9% of the site. In this event, the extent of flood water and depths in the 1% AEP event increases, with larger surface water flow paths located in the north and south of the site. A flow path crosses the south of the site from Eagle Way in the west to North Drive at the southeast corner The depths for the southern flow path reach+ a maximum of 0.15m and velocities of 0.50 to 1.00m/s. The northern flow path reaches a maximum depth of around 0.90 to 1.20m with velocities of around 1.00 to 2.00m/s. The resulting flood hazard is ‘very low’ along the southern surface water flow path but the northern is categorised as mainly ‘danger to some’ and ‘danger to most’.
Reservoir	The site is not a risk from reservoir flooding.
Groundwater	The JBA Groundwater mapping shows that the northern area of the site, consisting of 31% of the overall site, is classed as having moderate risk of ground water flooding with ground water being between 0.025 to 0.5m below ground level. The rest of the site is not at risk from groundwater flooding. The risk from groundwater will need to be investigated further as part of a site-specific flood risk assessment and is likely to require ground investigations to confirm the risk.
Sewers	The site is located within a postcode area with 24 incidents of sewer flooding, according to the Thames Water Hydraulic Sewer Flood Risk Register.
Flood history	There are no reported flood incidents reported by the Environment Agency, St Albans District Council or Hertfordshire County Council within the site.
Flood risk management infrastructure	
Defences	The Environment Agency AIMS dataset shows that the site is not protected by any formal flood defences.
Residual risk	The site is not residual risk.
Emergency planning	
Flood warning	The site is not located within either an Environment Agency Flood Warning or Flood Alert Area.
Access and egress	Access and egress to the site is currently via a series of gates off North Drive, a gravel track along the eastern boundary. There is no vehicular to the road at the northern end due to a series of bollards restricting access as its currently used as a public bridleway. The vehicular access to North Drive is currently through Oaklands Collage to the south. During the 3.33% AEP surface water event access and egress is possible along North Drive from the south. There is surface water ponding around

	the junction of North Drive and Sandpit Lane were the public Bridleway starts. Flood depths vary from <0.15 to up to 0.30m. Flood water is fairly slow moving at 0.25 to 0.50m/s. The resulting hazard is 'very low' to 'danger to some' around the entrance so pedestrian access and egress may be limited. During the 1% AEP flooding continues to affect the junction of Sandpit Lane and North Drive. Flood depths are predicted to be up to between 0.30 – 0.60m moving a velocity of 0.50 – 1.00m/s. The resulting hazard varying from 'very low' to 'danger to some'. The 0.1% AEP event the flood extent has increased with flood depths predicted to be up to 0.60 – 0.90m. The resulting hazard is higher, varying from 'Danger to some' to 'Danger to all'. Safe access from the south is still possible. If a new access and egress route is proposed from Sandpits Lane into the site from the north, consideration will need to be given to the surface water risk as the lane is affected by surface water flooding for 3.3%, 1% and 0.1% AEP events. The resulting hazard for the latter two events varies from 'danger to some' to 'danger to all'. Developers will need to demonstrate safe access and egress in the 1% AEP event including an allowance for climate change.
Dry Islands	The site is not located on a dry island.
Climate change	
Implications for the site	**Management Catchment: Colne 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 0.1% AEP extent from the Upper Colne (2010) model has also been used as a proxy for future flood risk. Mapping from the model shows that the site remains within Flood Zone 1 and that future fluvial flood risk to the site remains negligible. However, as discussed in the previous sections the ordinary watercourse which borders the site is not modelled as part of the Upper Colne model or included in national flood zone modelling. As a result, the impact of climate change on fluvial risk from this ordinary watercourse is unknown. **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 pluvial 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.

	In the 1% AEP plus 40% climate change event the flood extent is similar to that in the 0.1% AEP event. Flood water ponds in the topographic depressions across the site, in addition to two distinct flow paths in the northern and southern regions. Where it differs from the 0.1% AEP event is a small area of ponding in the southeastern corner of the site. The maximum flood depth, velocity and hazard is 0.86m and 1.8m/s 'Danger for most'. 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**
	• **Geology at the site consist of:**
	  ○ Bedrock – Bedrock geology consist of Lewes Nodular Chalk Formation and Seaford Chalk Formation.
	  ○ Superficial – The superficial geology of the site is Lowestoft Formation – diamicton (chalky till consisting of sands, gravels, silts and clays).
	• Soils at the site consist of:
	  ○ Slightly acid loamy and clayey soils with impeded drainage
	  ○ An area in the northeast of freely draining slightly acid but base-rich soils.
	
	Sustainable Drainage Systems (SuDS)
	• Groundwater levels in the north of the site are indicated to be less than 0.5m below ground level. Detention and attenuation features should be designed to prevent groundwater ingress from impacting hydraulic capacity and structural integrity. Additional site investigation work may be required to support the detailed design of the drainage system. This may include groundwater monitoring to demonstrate that a sufficient unsaturated zone has been provided above the highest occurring groundwater level. Below ground development such as basements are not appropriate in this area of the site. The rest of 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 chalk which is likely to be free draining. This should be confirmed through infiltration testing, and groundwater monitoring throughout a winter period.
	• The whole site is located within Groundwater Source Protection Zone 3. Proposed SuDS should be discussed with relevant stakeholders (St Albans City and District Council, Hertfordshire County Council (LLFA) and the Environment Agency) at an early stage to understand possible opportunities and constraints. The Groundwater Source Protection Zone guidance is currently undergoing a review.

	Therefore, developers should ensure they are using the latest guidance. • The site is not located within a historic landfill site but is within 250m of one. • 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 1% AEP and 0.1% 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 (St Albans City and District Council, Hertfordshire County Council (LLFA) and the Environment Agency) 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.

NPPF and planning implications	
Exception Test requirements	The site is within Flood Zone 1 but at risk from groundwater and surface water flooding. The Sequential Test must be passed, the criteria for which is highlighted within the Level 1 Assessment. The Exception Test is not required under the NPPF. However, it must be shown that the development will be safe for its lifetime and the risk 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 site is:
	  ○ Greater than one hectare
	  ○ At risk of surface water and groundwater flooding.
	• All sources of flooding should be considered as part of a site-specific FRA. Ground investigations are likely to be necessary to confirm the risk from groundwater flooding to the site.
	• Consultation with St Albans City and District Council, Hertfordshire County Council, Thames 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); St Albans City and District Council's Local Plan Policies and Hertfordshire County Council's Guidance for Developers.
	• The development should be designed with mitigation measures in place where required.
	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.
	• Arrangements for safe access and egress will need to be demonstrated for the 1% AEP surface water plus an allowance for climate change rainfall events with an appropriate allowance for climate change, using the depth, velocity, and hazard outputs.

- Should built development be proposed within the 1% AEP surface water flood extents, careful consideration will need to be given to flood resistance and resilience.
- Planning permission is required to surface more than 5 square metres of unpaved ground using a material that cannot absorb water.
- Mitigation for seasonal high groundwater levels must be considered (for example by raising finished floor levels to an appropriate height above ground level). Due to the high groundwater flood risk in the northern area of the site, basements are not advised.
- The design of SuDS schemes must consider the seasonally high groundwater table. Infiltration techniques may be ineffective and may pose a pollution risk. SuDS may need to be shallow and take up larger areas. Above ground conveyance and attenuation can be used but care must be taken that groundwater does not enter the SuDS feature and reduce the storage capacity and structural integrity of the design.
- 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

The site is within Flood Zone one, and the majority off the site is at low flood from all sources, however parts of the site have significant surface water and groundwater considerations. Development is likely to be able to proceed if:

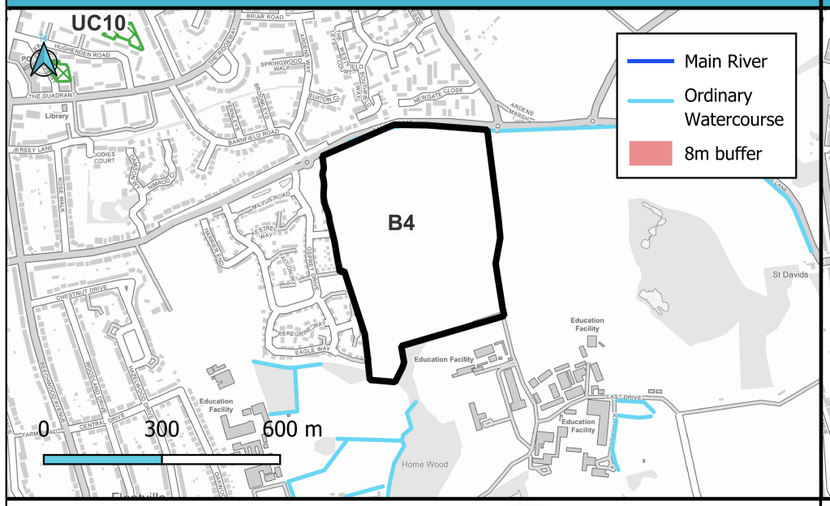
- A carefully considered and integrated flood resilient and sustainable drainage design is put forward, with development steered away from the areas identified to be at risk of surface water flooding across the site.
- The surface water flow paths which cross the site are incorporated into SuDS/blue-green infrastructure.
- A site-specific Surface Water Drainage Strategy, and SuDS maintenance and management plan is submitted along with the FRA.
- Safe access and egress can be demonstrated in the 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.

Mapping Information	
Flood Zones	Flood Zones 2 and 3a have been taken from the Environment Agency's Flood Map for Planning mapping. There is no detailed hydraulic modelling available at this location.
Climate change	The latest climate change allowances have been applied to the Environment Agency RoFSW map to indicate the impact on surface water flood risk. In the absence of detailed hydraulic modelling, Flood Zone 2 has been used as an indicative assessment of future fluvial risk at 1% AEP.
Fluvial depth, velocity and hazard mapping	There is no detailed hydraulic modelling available at this location.
Surface Water	The Environment Agency's Risk of Flooding from Surface Water dataset has been used for this assessment.
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.

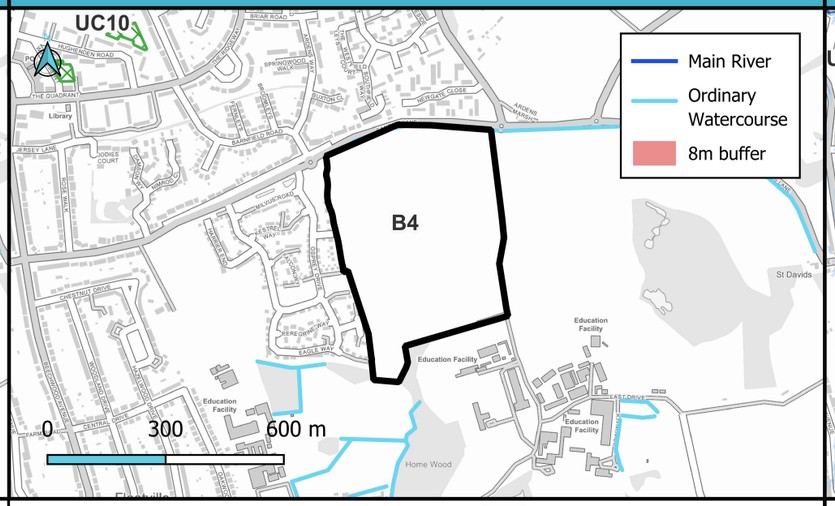
Site Reference	B4
Site Name	East St Albans

St Albans District Council
Strategic Flood Risk Assessment
Level 2 Detailed Site Summary

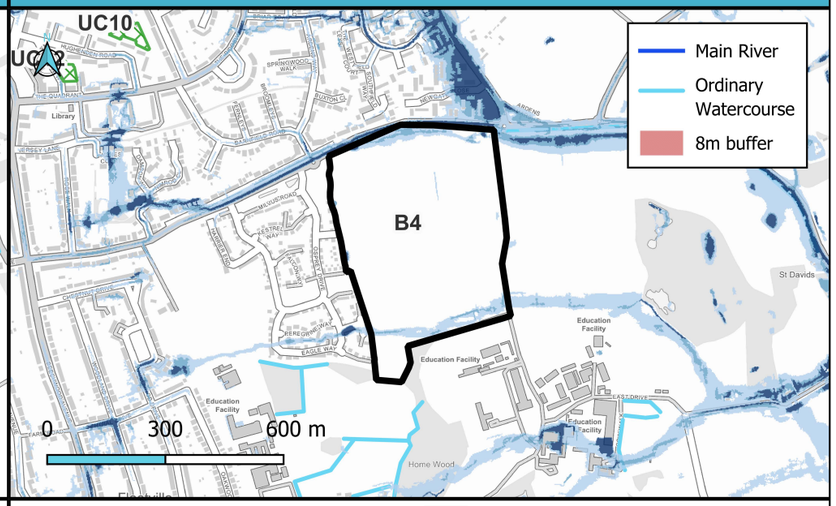
Flood Zone Map (present day)



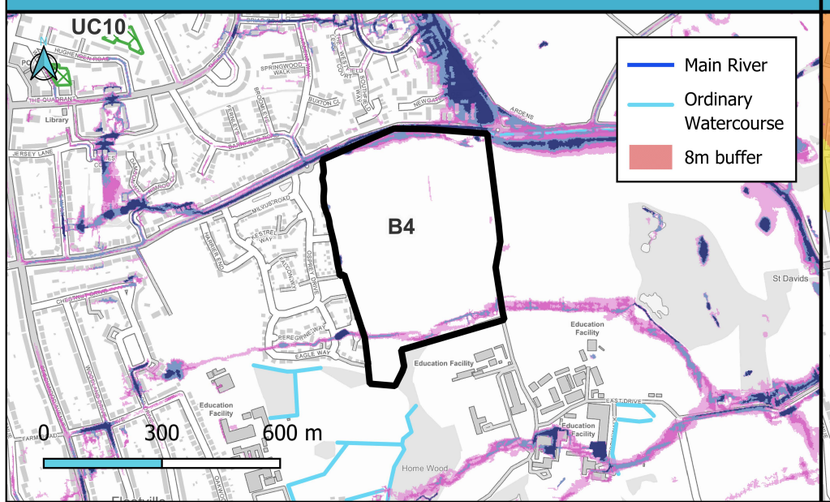
Flood Zone 3b + Climate Change



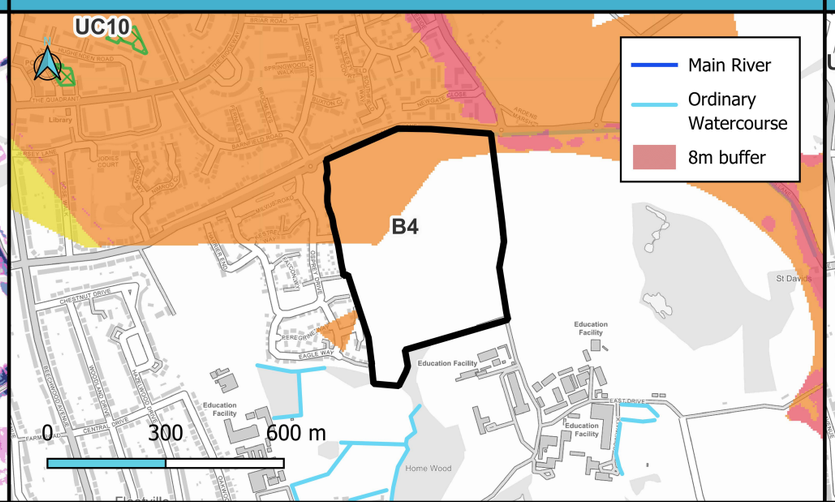
Surface Water Map (RoFSW)



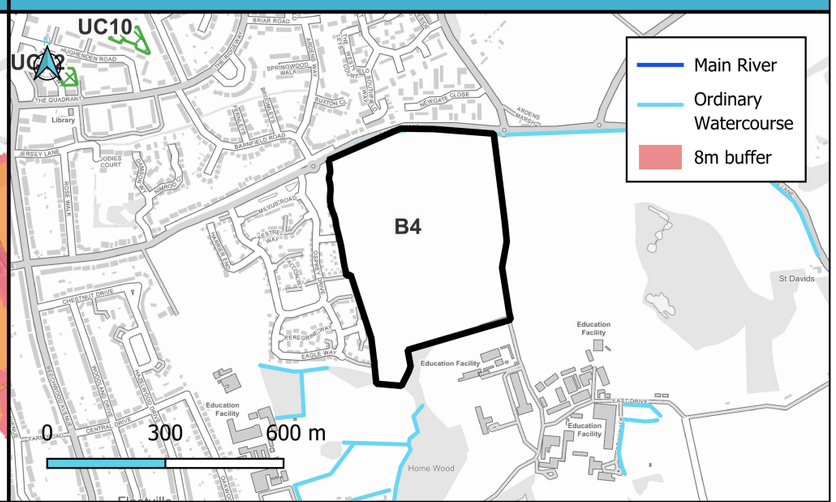
Surface Water Map + Climate Change



Groundwater (Gw) Flood Risk 1% AEP



Reservoir Flood Risk



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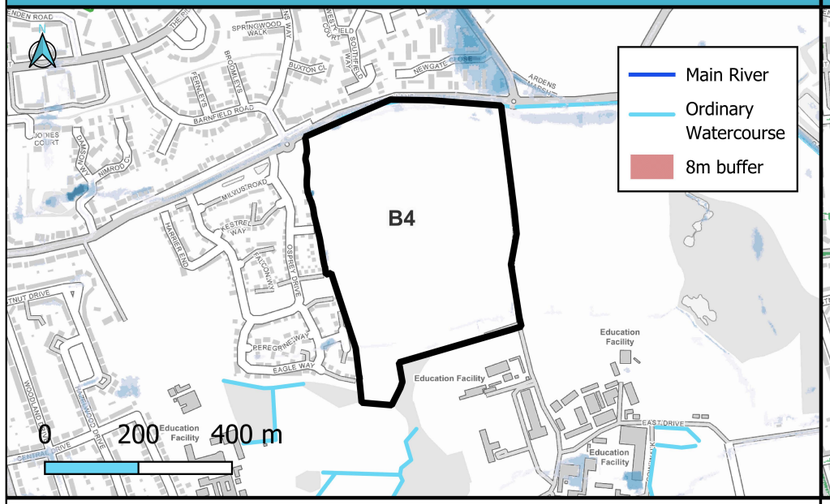
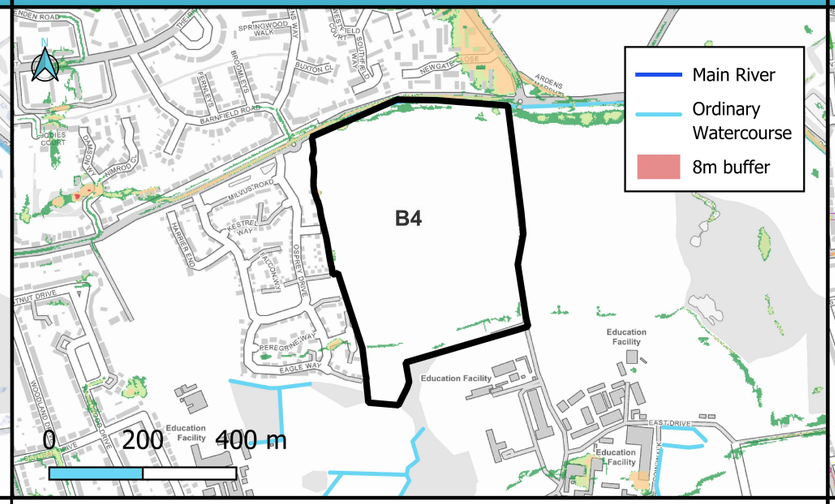
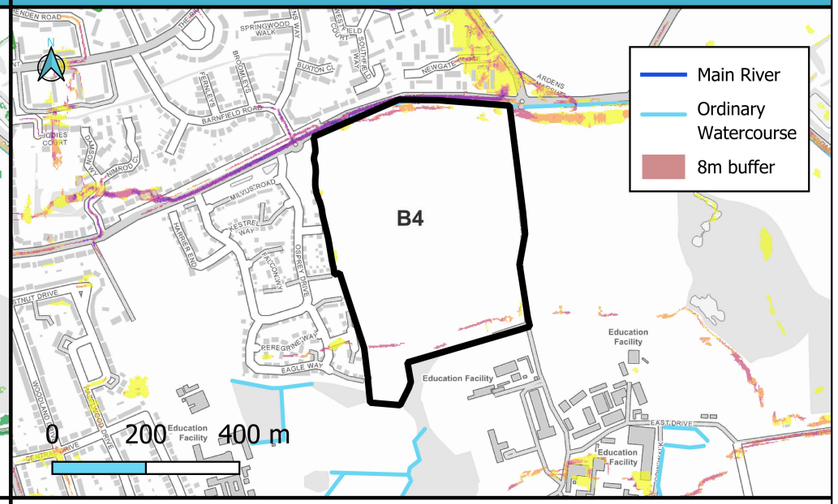
RoFSW Max Depth - 1% AEP



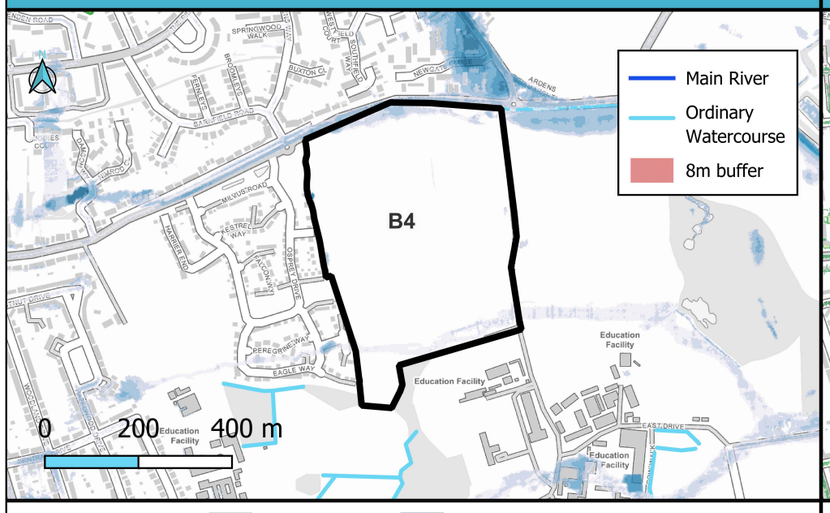
RoFSW Max Hazard - 1% AEP



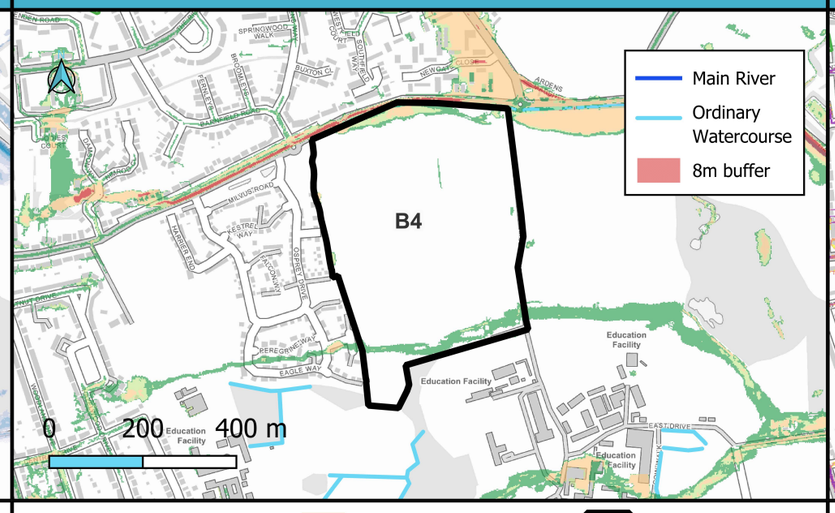
RoFSW Max Velocity - 1% AEP



RoFSW Max Depth - 1% AEP + 40% CC



RoFSW Max Hazard - 1% AEP + 40% CC



RoFSW Max Velocity - 1% AEP + 40% CC