	St Albans City and District Council **Level 2 Strategic Flood Risk Assessment** **Detailed Site Summary Table**
Site details	
Site Code	**UC43**
Address	Garage block to west of 32-46 Riverside Road, St Albans
Area	0.06ha
Current land use	Garages - 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 in the urban area of St Albans, south of the A1081. The site is bordered to the north by Riverside Road, to the east and west by residential house and to the south St Peter's School. To the south of St Peters School is the River Ver approximately 0.1km from the proposed site. The site is located within the Colne Management Catchment, which covers an area of 1,040km^2.
Topography	Environment Agency 1m resolution LiDAR across the site shows that topography varies. The site is in a densely developed urban area and LiDAR data is unlikely to be representative of the actual site topography, this may have an impact on some of the flood risk datasets used in the assessment. The site is on a gradual slope in a southern direction; with the highest elevation at 80.3mAOD on the northern border falling to 78.9mAOD along the southern border. With most of the site 79.2 to 79.8mAOD.
Existing drainage features	There are no existing drainage features within the site that are visible on topographic mapping or aerial imagery. The site is approximately 0.1km north of the River Ver. There are no major topographic depressions in the site that could act as drainage ditches. Given that the site is within the main St Albans urban area, it is likely to be drained by the surface water drainage network.
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, alongside the River Ver (2019) 1D-2D hydraulic modelling received for this Level 2 SFRA. **Flood characteristics:** The site is located within Flood Zone 1 and is therefore at negligible risk of fluvial flooding.
Surface Water	**Proportion of site at risk (RoFSW):** **3.3% AEP** – 0% Max depth – N/A Max velocity – N/A **1% AEP** – 52% Max depth – 0.30 – 0.60m Max velocity – 1.00 – 2.00m/s **0.1% AEP** – 89% Max depth – 0.60 – 0.90m Max velocity – >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:** During the 3.3% AEP event there is no flooding to the site. During the 1% AEP event there is a flow path running through the site, entering from Riverside Road then flowing south towards the River Ver. Flood depths across the site are predominantly 0.15 to 0.30 reaching a maximum 0.30 to 0.60m along the northern faces of both blocks of garages due to the surface water pooling slightly. Velocities across the site differ with the maximum velocities along the western boundary and southeastern corner; 1.00 to 2.00 m/s. The resulting hazard rating of the flooding is mainly 'very low' with the areas along the northern faces of the garages 'Danger to some' and 'Danger to most'. During the 0.1% AEP event, the surface water path through the site extends across the majority of the site. The flood depths differ across the site, the deepest depths along the northern face of the northern garage block: 0.60 to 0.90m. The northern face of the southern garage block reaches a maximum depth of between 0.30 to 0.60m. The velocities also vary across the site with the highest velocities in the southwestern corner >2.00m/s. The resulting hazard rating of the flooding is mainly categorized as 'Danger to some' and 'Danger to most'.

Reservoir	The Environment Agency's reservoir maps show the site is not at risk of flooding from reservoir.
Groundwater	The JBA Groundwater mapping shows the whole site is at low risk of groundwater flooding as groundwater levels are between 0.5 to 5m below ground level.
Sewers	The site is located within a postcode area with 11 historic incidences of sewer flooding, according to the Thames Water Hydraulic Sewer Flood Risk Register.
Flood history	There are no reported flood incidents 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 at residual risk of flooding.
Emergency planning	
Flood warning	The site is not located within any Environment Agency Flood Warning Areas.
Access and egress	Access and egress to the site is currently by Riverside Road. Vehicular access to Riverside Road is via Cottonmill Lane/Waterson's walk and Cromwell Road. During the 3.33% AEP event, Riverside Road is not flooded. Therefore, vehicular and pedestrian access and egress to the site is possible. During the 1% AEP event, there is a surface water flow route across Riverside Road where the site is located. Flood depths range mainly from 0.15 to 0.30m, with smaller areas to the east and south experiencing depths below 0.15m. Velocities along the flow path fluctuate between under 0.25m/s and 0.50 to 1.00m/s. Despite these conditions, the resulting flood hazard remains categorized as 'very low,' so vehicular and pedestrian access and egress to the site is still possible. During the 0.1% event, the flood extent across Riverside Road widens, encompassing a larger area. Additionally, a smaller flow path converges with the main flow from the southeast along Riverside Road. Flood depths, similar to the 1% AEP event, range from above 0.15m to between 0.30 to 0.60m, with the smaller flow path measuring below 0.15m. Velocities escalate along the surface water flow paths, peaking between 1.00 to 2.00m/s. The resulting hazard across Riverside Road into the site varies from 'very low' to 'Danger for some' and 'Danger for most'. Vehicular access and egress maybe impeded slightly. Developers will need to demonstrate that safe access and egress in the 0.1% AEP event, including 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 latest climate change allowances have been applied to the Ver (2019) model to indicate the impact of fluvial flood risk. As the site is within Flood Zone 1 and with the latest climate change allowances applied fluvial flood risk to the site remains negligible. **Surface Water:** The latest climate change allowances have 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 of the 0.1% AEP event, with a surface water flow path covering the majority of the site. The maximum flood depth, velocity and hazard within the site are 0.77m, 2.44m/s and 'Danger for Most'. Flood depths along the access and egress route, Riverside Road, remain <0.25m, with velocities between 0.9 to 2.00m/s the resulting flood hazard is 'Very low' to the east of the site, but directly to the north of the site '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 of the site is Lewes Nodular Chalk Formation and Seaford Chalk Formation – chalk. This is a sedimentary bedrock.
	  ○ Superficial deposits – The superficial deposits of the site is comprised of River Terrace Deposits – sands and gravels. A sedimentary superficial deposit.
	• Soils at the site consist of:
	  ○ Freely draining slightly acid bust base-rich soils.
	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 Chalk 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 entire site is located within Groundwater Source Protection Zone 1 (SPZ) and infiltration techniques may not appropriate for anything other than clean roof drainage. If infiltration is proposed for anything other than clean roof drainage a hydrogeological risk assessment should be undertaken, to ensure that the system does not pose an unacceptable risk to the source of supply. 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 available. • 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 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. • 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. 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 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.
NPPF and planning implications	
Exception Test requirements	The site is within Flood Zone 1 but at risk from 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, even though the site is classified as 'More Vulnerable'. 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: ○ At risk of surface water flooding. • 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); 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% and 0.1% surface water events with an appropriate allowance for climate change, using the depth, velocity, and hazard outputs.
	• Planning permission is required to surface more than 5 square metres of unpaved ground using a material that cannot absorb water.
	• 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.
	• 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.

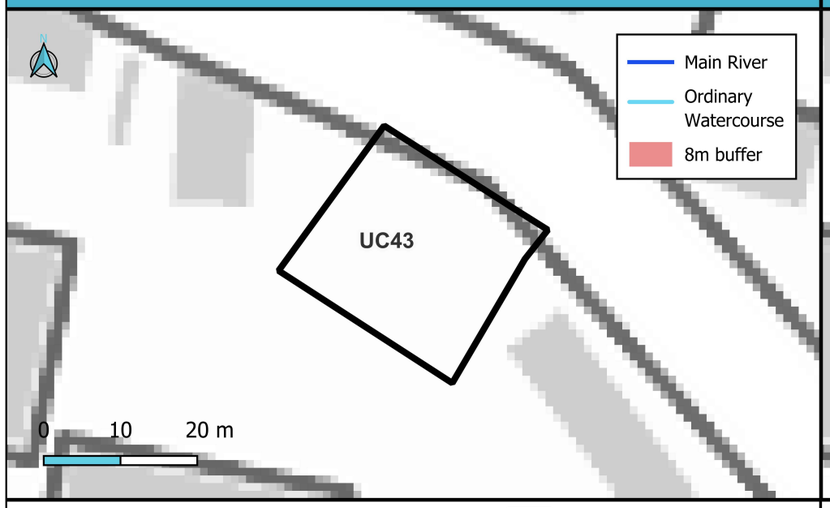
Key messages	
Development is likely to be able to proceed if: • A carefully considered and integrated flood resilient and sustainable drainage design is put forward, with development steered away from the areas identified to be at risk of surface water flooding across the site. • Arrangements for safe access and egress will need to be demonstrated for the 1% surface water events with an appropriate allowance for climate change, using the depth, velocity, and hazard outputs. This includes measures to reduce flood risk along these routes such as raising access, but not displacing floodwater elsewhere. • A site-specific FRA demonstrates that the site is not at an increased risk of flooding in the future and that development of the site does not increase the risk of surface water flooding on the site and to neighbouring areas. • If flood mitigation measures are implemented then they are tested to check that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another).	
Mapping Information	
Flood Zones	Flood Zones 2 and 3a have been taken from the Environment Agency's Flood Map for Planning mapping. Flood Zone 3b has been created from the Ver (2019) hydraulic model.

Climate change	The most recent uplifts have been applied to the Ver (2019) hydraulic model to indicate the impacts on fluvial flood risk.
Fluvial depth, velocity and hazard mapping	Depth, velocity, and hazard data was derived from the Ver (2019) hydraulic model.
Surface Water	The Environment Agency's Risk of Flooding from Surface Water dataset has been used for this assessment. The latest climate change allowances have been applied to the RoFSW 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 Environment Agency's RoFSW.

Site Reference	UC43
Site Name	Garage block to west of 32-46 Riverside Road, St Albans

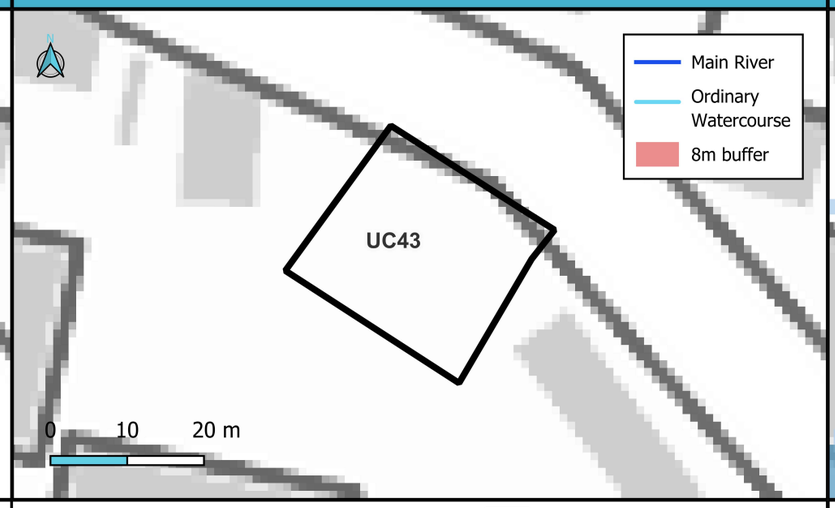
St Albans District Council
Strategic Flood Risk Assessment
Level 2 Detailed Site Summary

Flood Zone Map (present day)



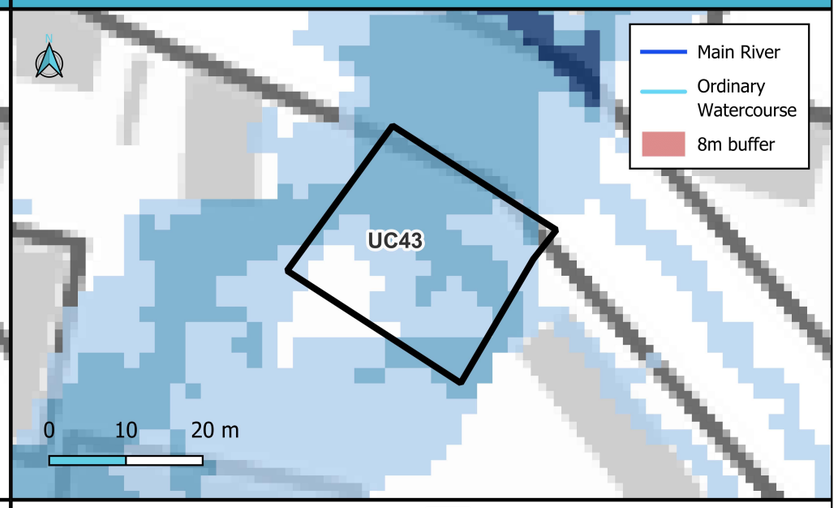
Flood Zone 2 (Between 1% and 0.1% AEP)
Flood Zone 3a (Between 3.33% and 1% AEP)
Flood Zone 3b (Less than 3.33% AEP)
Site boundary
Other site

Flood Zone 3b + Climate Change



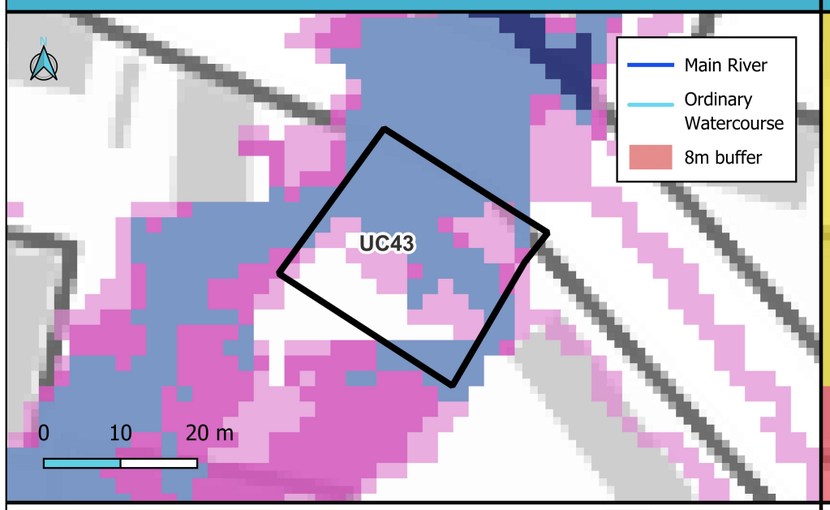
Flood Zone 3b + 21% (Central allowance)
Flood Zone 3b + 35% (Higher allowance)
Flood Zone 3b
Site boundary
Other site

Surface Water Map (RoFSW)



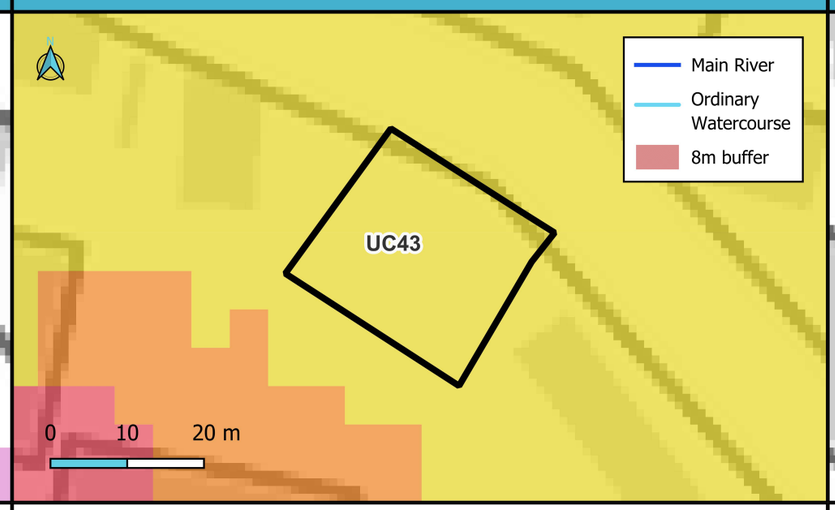
RoFSW 1 in 30-year (3.33% AEP)
RoFSW 1 in 100-year (1% AEP)
RoFSW 1 in 1000-year (0.1% AEP)
Site boundary
Other site

Surface Water Map + Climate Change



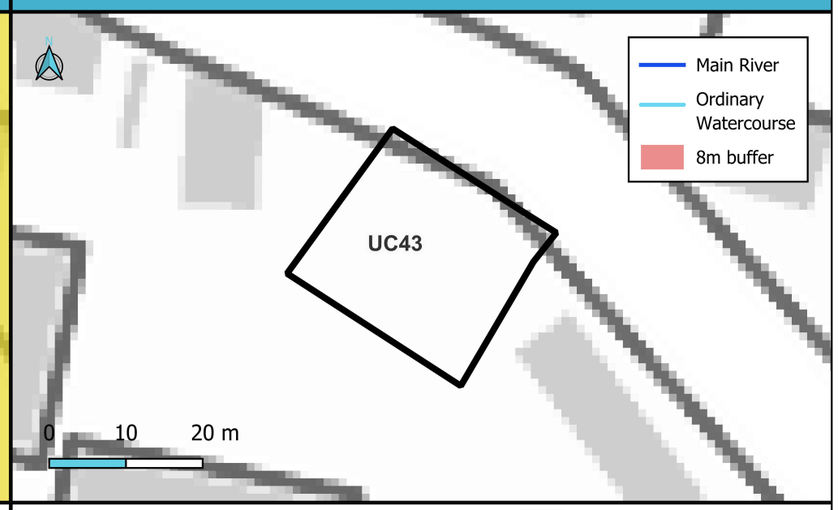
RoFSW 1 in 30-year (3.33% AEP)
RoFSW 1 in 30-year (3.33% AEP) plus 40%
RoFSW 1 in 100-year (1% AEP)
RoFSW 1 in 100-year 1% AEP plus 40%
Site boundary
Other site

Groundwater (Gw) Flood Risk 1% AEP



GW levels <0.025m below ground
GW levels 0.025m to 0.5m below ground
GW levels 0.5 to 5m below ground
GW levels atleast 5m below ground
Site boundary
Other site

Reservoir Flood Risk

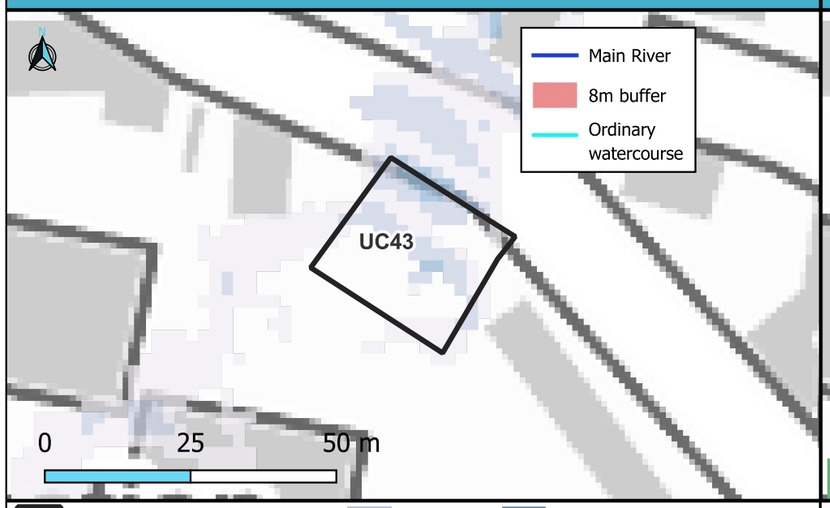


Reservoir 'Dry Day' flood extent
Reservoir 'Wet Day' flood extent
Reservoir - Fluvial contribution to flood extent
Site boundary
Other site

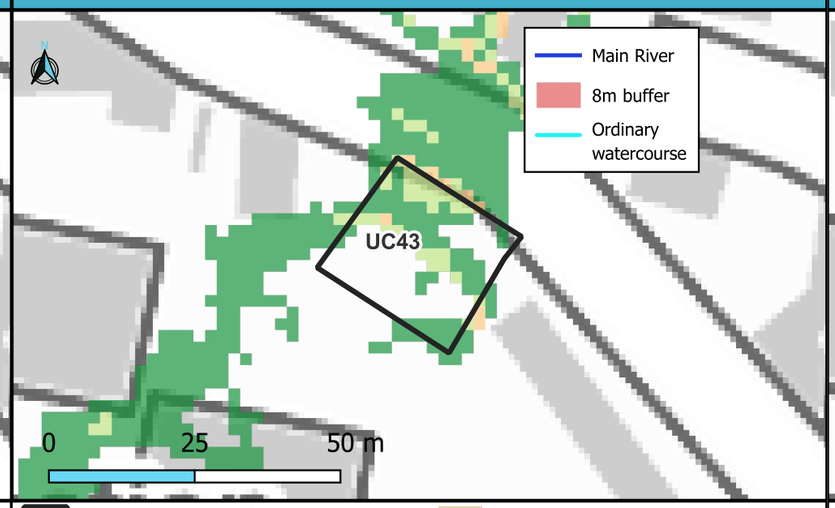
Site Reference	UC43
Site Name	Garage block to west of 32-46 Riverside Road, St Albans, AL1 1SD

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

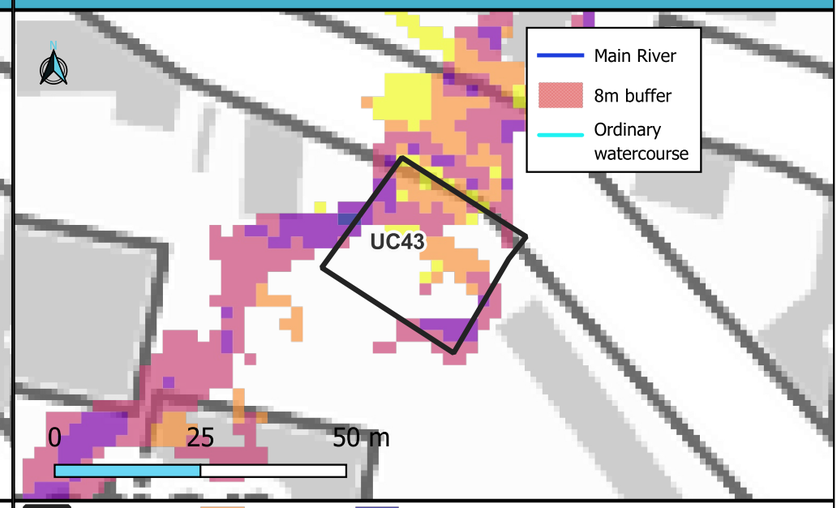
RoFSW Max Depth - 1% AEP



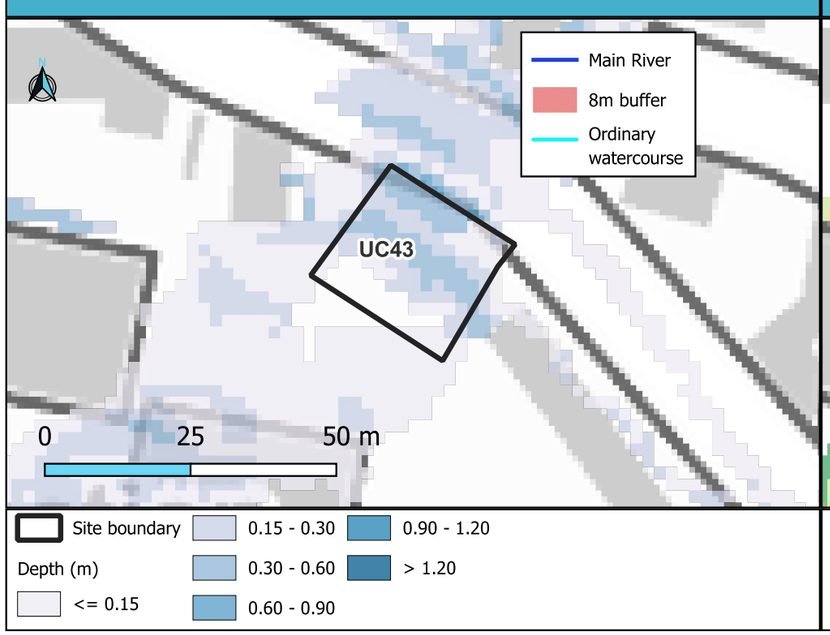
RoFSW Max Hazard - 1% AEP



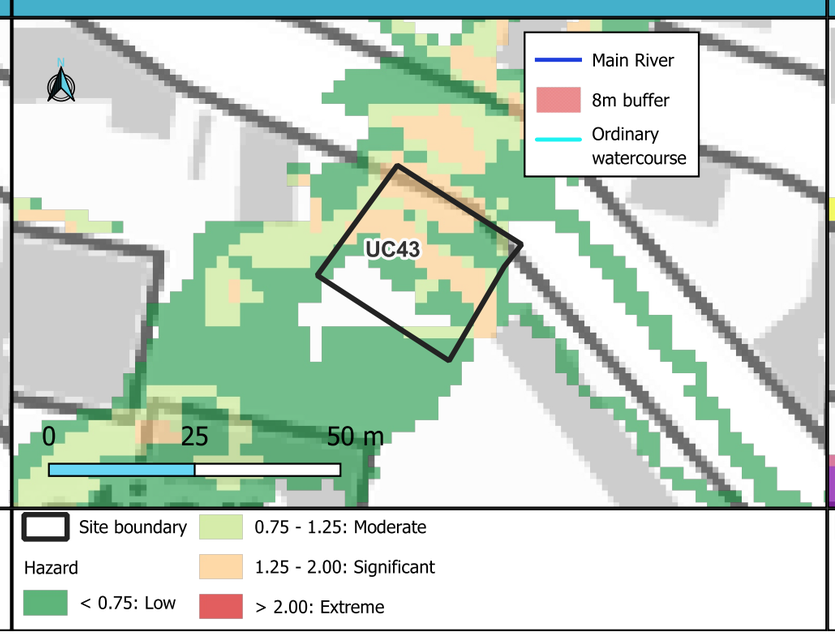
RoFSW Max Velocity - 1% AEP



RoFSW Max Depth - 1% AEP + 40% CC



RoFSW Max Hazard - 1% AEP + 40% CC



RoFSW Max Velocity - 1% AEP + 40% CC