



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

**Site details**

<b>Site Code</b>	<b>UC32</b>
<b>Address</b>	Garages off Creighton Avenue, St Albans
<b>Area</b>	0.14ha
<b>Current land use</b>	Garages – Brownfield
<b>Proposed land use</b>	Residential
<b>Flood Risk Vulnerability</b>	More Vulnerable

**Sources of flood risk**

<b>Location of the site within the catchment</b>	<p>The site is located in the residential area of Sopwell in south St Albans. The site is surrounded by residential housing to the North, East, South and West. The London Northwestern Railway lies 0.10km to the east of the site. To the southwest is the access road to the site off Creighton Avenue. The River Ver is approximately 0.48km to the east of the site.</p> <p>The site is located within the Colne Management Catchment, which covers an area of 1,040km<sup>2</sup>.</p>
<b>Topography</b>	<p>Environment Agency 1m resolution LiDAR across the site shows that topography varies. The site area is 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 comprised of several garage blocks on a reasonably flat area, the north and western borders are slightly higher than the southeastern area with elevations between 88.0 to 89.2mAOD.</p>
<b>Existing drainage features</b>	<p>There are no existing drainage features within the site that are visible on topographic mapping or aerial imagery</p>
<b>Fluvial</b>	<p><b>The proportion of site at risk FMFP:</b>            FZ3b – 0%            FZ3a – 0%            FZ2 – 0%            FZ1 – 100%</p> <p>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</p>

	<p>example: Flood Zone 2 includes Flood Zone 3. Flood Zone 1 is the remaining area outside Flood Zone 2 (FZ2+ FZ1 = 100%).</p> <p><b>Available data:</b></p> <p>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.</p> <p><b>Flood characteristics:</b></p> <p>The site is located within Flood Zone 1 and is at negligible risk of fluvial flooding.</p>
<p><b>Surface Water</b></p>	<p><b>Proportion of site at risk (RoFSW):</b></p> <p><b>3.3% AEP</b> – 0%  Max depth – N/A  Max velocity – N/A</p> <p><b>1% AEP</b> – 14%  Max depth – 0.15 – 0.30m  Max velocity – 0.25 – 0.50m/s</p> <p><b>0.1% AEP</b> – 37%  Max depth – 0.15 - 0.30m  Max velocity – N/A</p> <p><b>Available data:</b></p> <p>The Environment Agency’s Risk of Flooding from Surface Water (RoFSW) map has been used within this assessment.</p> <p><b>Description of surface water flow paths:</b></p> <p>There is no surface water flooding at the site during the 3.3% AEP event.</p> <p>During the 1% AEP event, there is surface water pooling on the site between the two large blocks of garages in the north of the site. The flood depths are predominantly &lt;0.15m with a small section to the south between 0.15 to 0.30m. Velocities are fairly slow with a maximum between 0.25 to 0.50m/s. The resulting flood hazard is ‘very low’.</p> <p>During the 0.1% AEP event, there is a surface water flow route through the site covering 37% of the site. The flow route enters the site from the north flowing south between the two main garage blocks and leaving through the southeastern corner. Flood depths range generally between 0.15 to 0.30m. Velocities through the site reach a maximum 1.00 – 2.00m/s where the flow route enters and leaves the site. The surface route through the site is mainly 0.50 to 1.00m/s. The resulting flood hazard is ‘very low’ with some small areas of ‘Danger to some’ where the surface flow route enters the site in the north and in front of the northwest garage.</p> <p>During the 0.1% AEP event, approximately 37% of the site is covered by a surface water flow route. This route begins at the northern boundary, coursing southward between the two main garage blocks before exiting at the southeastern corner. Flood depths typically range from 0.15 to 0.30m. At the points of entry and exit, velocities peak at 1.00 to 2.00m/s, while within the site, velocities remain between 0.50 and 1.00m/s. The flood</p>

	hazard is categorized as 'very low,' with localized areas of 'Danger to some,' notably where the surface flow route enters the site from the north and in front of the northwest garage.
<b>Reservoir</b>	The Environment Agency's reservoir maps show the site is not at risk of flooding from reservoir.
<b>Groundwater</b>	The entire site is classed as having a negligible risk of groundwater flooding, as the JBA Groundwater mapping show that groundwater levels are at least 5m below ground level.
<b>Sewers</b>	The site is located within a postcode area with 15 historic incidences of sewer flooding, according to the Thames Water Hydraulic Sewer Flood Risk Register.
<b>Flood history</b>	There are no reported flood incidents within the site.
<b>Flood risk management infrastructure</b>	
<b>Defences</b>	The Environment Agency AIMS dataset shows that the site is not protected by any formal flood defences.
<b>Residual risk</b>	The site is not at residual risk of flooding.
<b>Emergency planning</b>	
<b>Flood warning</b>	The site is not located within any Environment Agency Flood Warning Areas.
<b>Access and egress</b>	<p>Access and egress to the site is currently by Creight Avenue. Vehicular access to Creight Avenue is via Holyrood Crescent.</p> <p>During the 3.33% and 1% AEP events, the southern part of Creighton Avenue has surface water ponding, where it meets Holyrood Crescent. Flood depths are &lt;0.15m and the associated flood hazard is 'very low', thus vehicular and pedestrian access is possible.</p> <p>During the 0.1% AEP event, the surface water flow route extends along both Creighton Avenue and Holyrood Crescent. The flood depths are low &lt;0.15m, the associated velocities are &lt;1.00m/s. The flood hazard ratings are still categorized as 'very low', therefore vehicular and pedestrian access is still possible.</p>
<b>Dry Islands</b>	The site is not located on a dry island.
<b>Climate change</b>	
<b>Implications for the site</b>	<p><b>Management Catchment: Colne Management Catchment</b></p> <p>Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard, and frequency of both fluvial and surface water flooding</p>

**Fluvial:**

The latest climate change allowances have been applied to the River 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:**

In the 1% AEP plus 40% climate change event the flood extent is similar to that in the 0.1% AEP event, with a surface water flow path running through the centre of the site. The maximum flood depth, velocity and hazard within the site is, 0.22m, 1.10m/s and 'Danger for Some'. The access and egress routes along Creighton Avenue and Holyrood Crescent remain classified as 'Very low' hazard, therefore vehicular and pedestrian access and egress is still possible

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.
- Soils at the site consist of:
  - Freely draining slightly acid loamy soils

**Sustainable Drainage Systems (SuDS)**

- 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.
- 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 whole site is located within Groundwater Source Protection Zone 3. Infiltration techniques may not be suitable and should only be used following the granting of any required environmental permits from the Environment Agency for Zone 3 although it is possible that infiltration may not be permitted. 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

	<p>currently undergoing a review; therefore, developers should also ensure they are using the latest guidance available.</p> <ul style="list-style-type: none"> <li>• The site is not located within a historic landfill site.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> </ul>
<p><b>Opportunities for wider sustainability benefits and integrated flood risk management</b></p>	<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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</li> <li>• 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.</li> <li>• Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting must be considered in the design of the site.</li> </ul>
<p><b>NPPF and planning implications</b></p>	
<p><b>Exception Test requirements</b></p>	<p>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. 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.</p>

**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 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.
- 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 extent, careful consideration will need to be given to flood resistance and resilience measures.
- 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.
- 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.
- 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

<b>Flood Zones</b>	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 River Ver (2018) hydraulic model.
<b>Climate change</b>	The most recent uplifts have been applied to the River Ver (2018) hydraulic model to indicate the impacts on fluvial flood risk.
<b>Fluvial depth, velocity and hazard mapping</b>	Depth, velocity, and hazard data was derived from the River Ver (2018) hydraulic model.
<b>Surface Water</b>	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.
<b>Surface water depth, velocity and hazard mapping</b>	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	UC32
Site Name	Garages off Creighton Avenue, St Albans

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



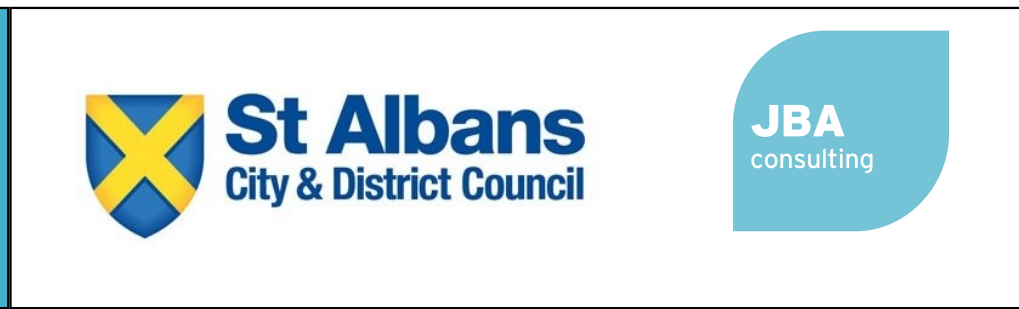
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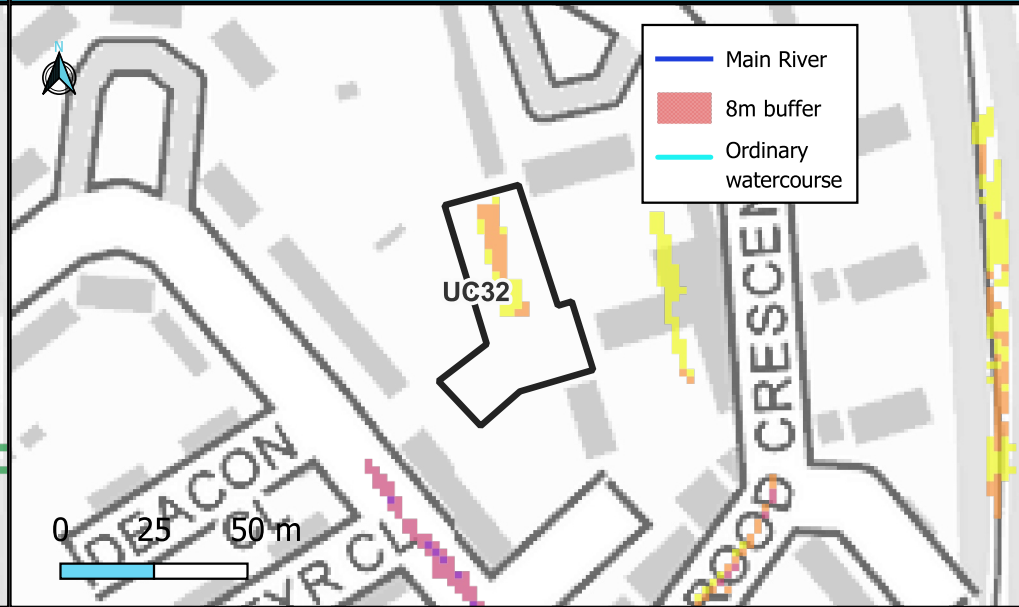
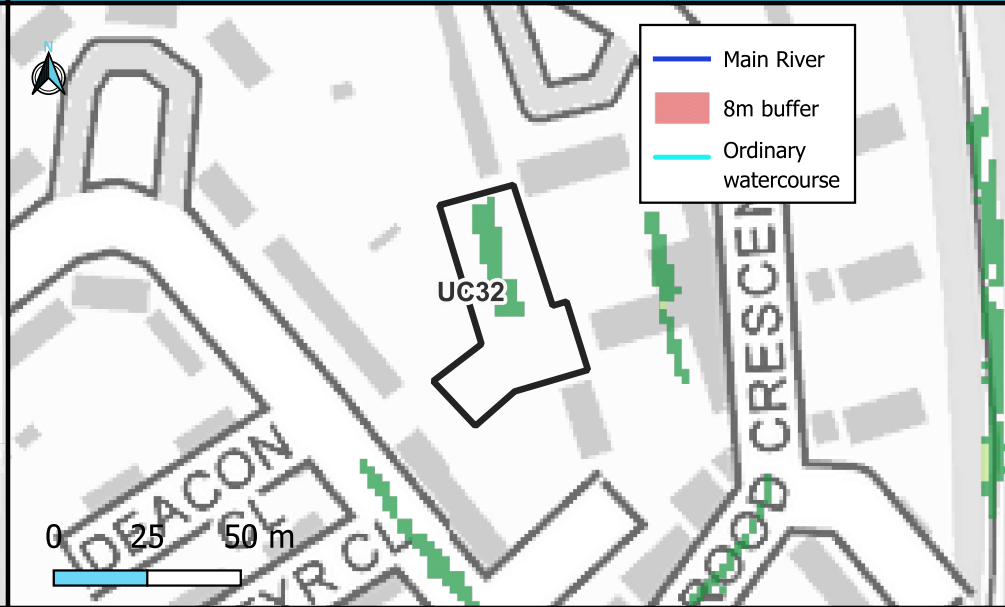
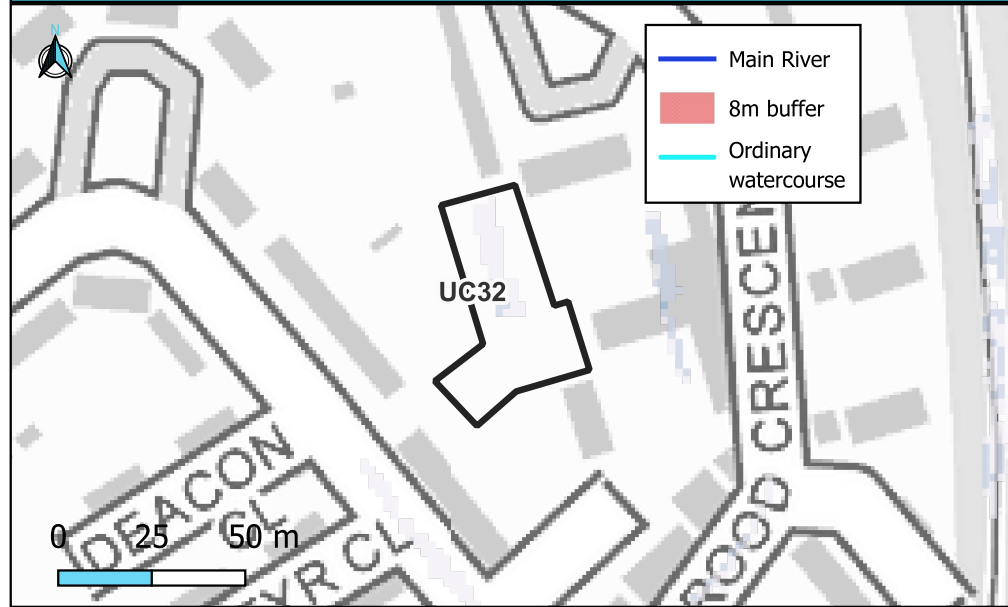
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RoFSW Max Depth - 1% AEP	RoFSW Max Hazard - 1% AEP	RoFSW Max Velocity - 1% AEP
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Site boundary	Depth (m)	0.30 - 0.60	> 1.20
Other site	0.00 - 0.15	0.60 - 0.90	0.90 - 1.20
	0.15 - 0.30		

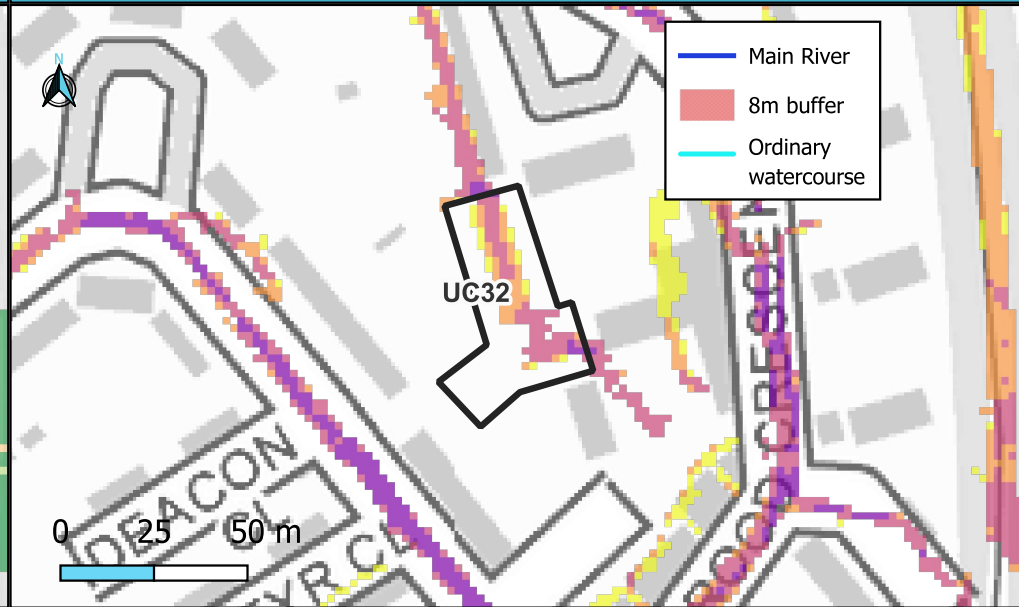
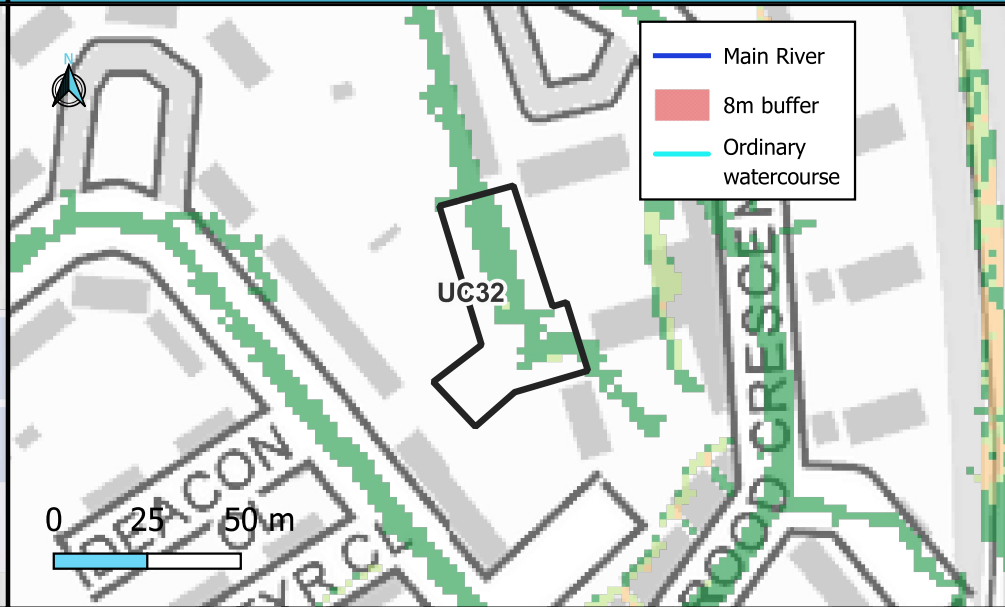
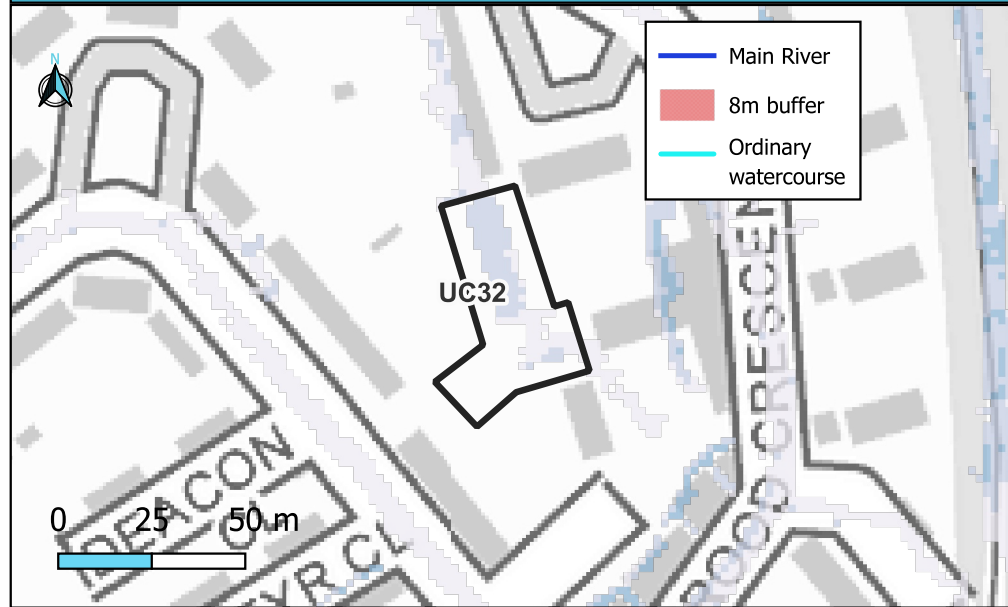
Site boundary	Hazard	1.25 - 2.00: Significant
Other site	< 0.75: Low	> 2.00: Extreme
	0.75 - 1.25: Moderate	

Site boundary	Velocity (m/s)	0.25 - 0.50	> 2.00
	0.00 - 0.25	0.50 - 1.00	1.00 - 2.00

RoFSW Max Depth - 1% AEP + 40% CC

RoFSW Max Hazard - 1% AEP + 40% CC

RoFSW Max Velocity - 1% AEP + 40% CC



Site boundary	Depth (m)	0.15 - 0.30	0.90 - 1.20
	<= 0.15	0.30 - 0.60	> 1.20
		0.60 - 0.90	

Site boundary	Hazard	0.75 - 1.25: Moderate
	< 0.75: Low	1.25 - 2.00: Significant
	> 2.00: Extreme	

Site boundary	Velocity (m/s)	0.25 - 0.50	> 2.00
	0.00 - 0.25	0.50 - 1.00	1.00 - 2.00