



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

Site details

Site Code	UC26
Address	Garage Block to Malvern Close, St Albans
Area	0.13ha
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	<p>The site is located within the residential suburb of Marshalswick in northern St Albans. The site shares its western and northern boundaries with Sandringham School, while to the east lies residential housing along Chiltern Road. The southern border is defined by another residential area running along to The Ridgeway.</p> <p>The site is located within the Colne Management Catchment, which covers an area of 1,040km².</p>
Topography	<p>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 comprised as several blocks of garages with tarmac access roads between. The site is on a slight gradient from west to east, the highest elevations are located along the western boundary, 106.4mAOD, which then slope down to the lowest in the southeastern corner, 105.1mAOD.</p>
Existing drainage features	<p>There are no existing drainage features within the site that are visible on topographic mapping or aerial imagery. Given that the site is within the St Albans urban area, it is likely that the site is drained by the surface water drainage network.</p>
Fluvial	<p>The proportion of site at risk FMFP: 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</p>

	<p>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%).</p> <p>Available data:</p> <p>The Environment Agency's Flood Zone mapping has been used in this assessment. No detailed hydraulic modelling was available for this site.</p> <p>Flood characteristics:</p> <p>The site is located within Flood Zone 1 and is therefore at negligible risk of fluvial flooding.</p>
<p>Surface Water</p>	<p>Proportion of site at risk (RoFSW):</p> <p>3.3% AEP – 0% Max depth – N/A Max velocity – N/A</p> <p>1% AEP – 0% Max depth – N/A Max velocity – N/A</p> <p>0.1% AEP – 0% Max depth – N/A Max velocity – N/A</p> <p>Available data:</p> <p>The Environment Agency's Risk of Flooding from Surface Water (RoFSW) map has been used within this assessment.</p> <p>Description of surface water flow paths:</p> <p>There is no surface water flooding within the site for either the 3.3%, 1% or 0.1% AEP events. Therefore, the site is a negligible risk of surface water flooding.</p>
<p>Reservoir</p>	<p>The Environment Agency's reservoir maps show the site is not at risk of flooding from reservoir.</p>
<p>Groundwater</p>	<p>JBA Groundwater mapping shows that the site is at moderate risk of groundwater flooding. The whole site is within category 3 which indicates that groundwater is less than 0.5m below ground level.</p> <p>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.</p>
<p>Sewers</p>	<p>The site is located within a postcode area with 30 historic incidences of sewer flooding, according to the Thames Water Hydraulic Sewer Flood Risk Register.</p>
<p>Flood history</p>	<p>There is no record of any flood incidences occurring at or close to the site.</p>

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 or Flood Alert Areas.
Access and egress	<p>Access and egress to the site is currently by Malvern Close. Vehicular access to Malvern Close is via Chiltern Road which is subsequently accessed to the north by Sandringham Crescent and to the south by The Ridgeway.</p> <p>There is safe access and egress to the site during the 3.33% AEP, 1% AEP and 0.1% AEP surface water events. There are two minor flow paths during the 0.1% AEP event, one to the north across Chiltern Road and the other to the south along The Ridgeway. However, both surface water flow paths have flood depths <0.15m and have a flood hazard of 'very low'. Therefore, pedestrian and vehicular access and egress is possible.</p>
Dry Islands	The site is not located on a dry island.
Climate change	
Implications for the site	<p>Management Catchment: Colne Management Catchment</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> <p>Fluvial:</p> <p>The site is within Flood Zone 1 and with the latest climate change allowances applied fluvial flood risk to the site remains negligible.</p> <p>Surface Water:</p> <p>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.</p> <p>In the 1% AEP plus 40% climate change event the flood extent is similar to that in the 0.1% AEP event. The site remains unaffected by surface water. The surface water flood along the access and egress routes; Chiltern Road and the Ridgeway are slightly smaller than the 0.1% AEP event, with the flood hazard being classified as 'very low'.</p> <p>Development proposals at the site must address the potential changes associated with climate change and be designed to be safe for the</p>

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 – The superficial geology of the site is Kesgrave Catchment Subgroup – Sand and gravel. This is a sedimentary superficial deposit.
- Soils at the site consist of:
 - Slightly acid loamy and clayey soils with impeded drainage.

Sustainable Drainage Systems (SuDS)

- Groundwater levels 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 at this site.
- Although, groundwater mapping indicates that the site is at moderate risk of groundwater flooding, therefore infiltration techniques may not be suitable. 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. Proposed SuDS should be discussed with relevant stakeholders (with 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 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.
- 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

- Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality,

<p>benefits and integrated flood risk management</p>	<p>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 (with St Albans City and District Council, Hertfordshire County Council and the Environment Agency) at an early stage to understand possible constraints.</p> <ul style="list-style-type: none"> • 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.
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NPPF and planning implications

<p>Exception Test requirements</p>	<p>The site is within Flood Zone 1 but at risk from groundwater 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.</p>
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<p>Requirements and guidance for site-specific Flood Risk Assessment</p>	<p>Flood Risk Assessment:</p> <ul style="list-style-type: none"> • At the planning application stage, a site-specific FRA will be required as the site is: <ul style="list-style-type: none"> ○ At risk of 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.
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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).
- 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, basements are not suitable in this location.
- 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

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 applying the relevant flood mitigation techniques for groundwater flood risk.
- 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. There is no detailed hydraulic modelling available at this location.

Climate change

The latest climate change allowances have been applied to the 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.

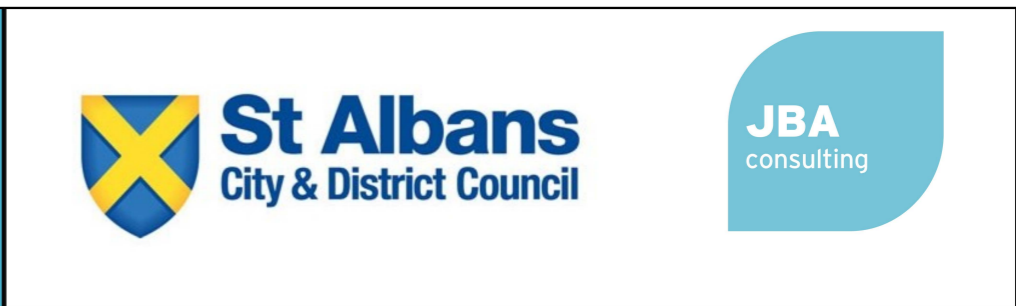
Fluvial depth, velocity and hazard mapping

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.

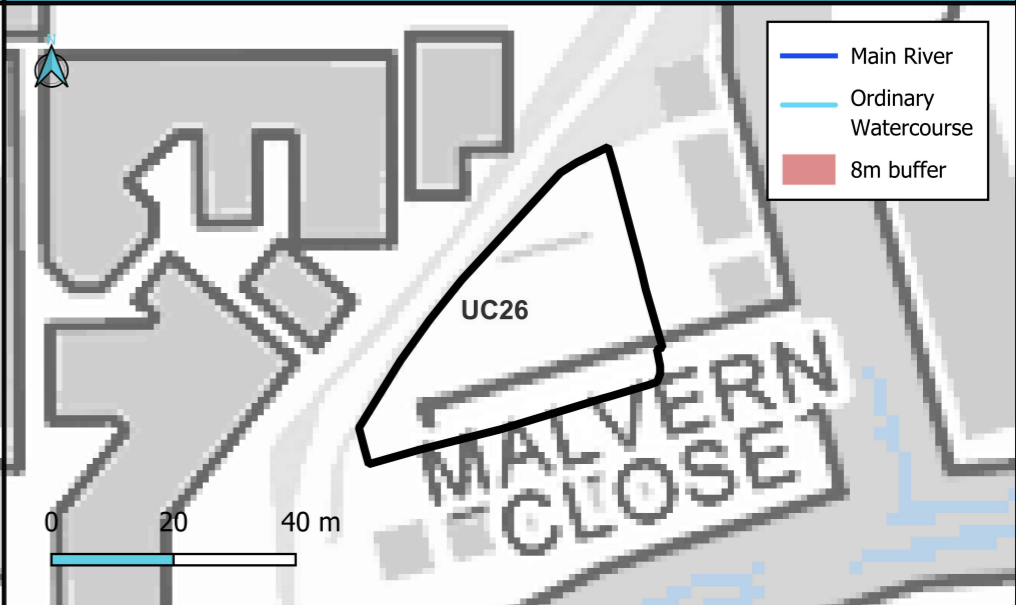
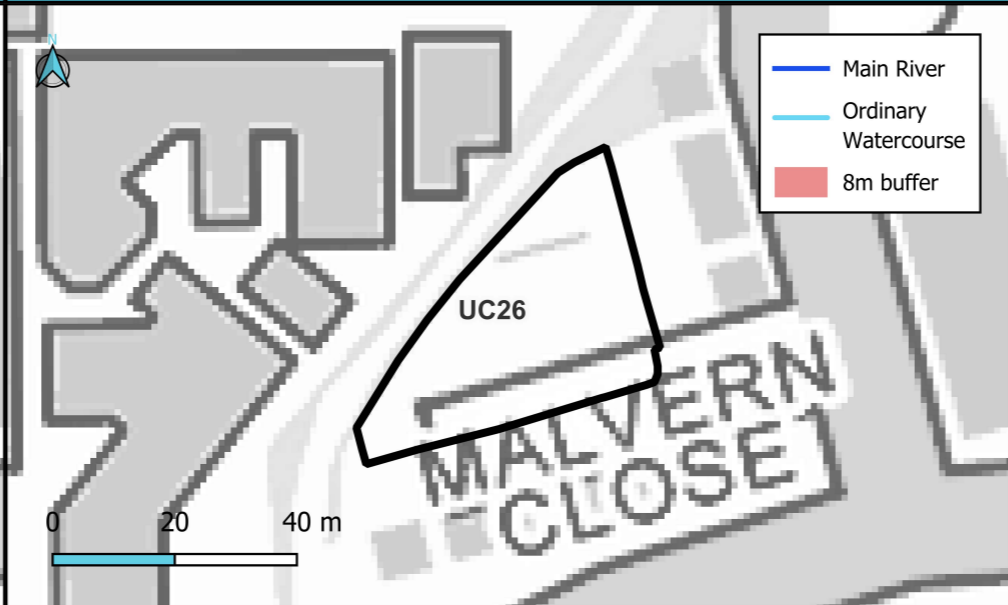
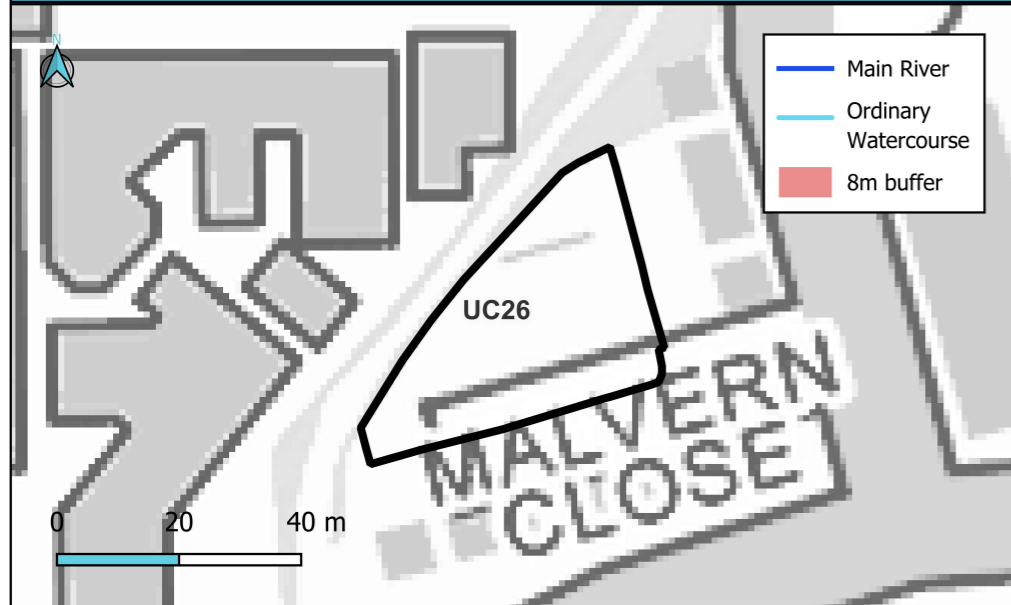
Site Reference	UC26
Site Name	Garage Block to Malvern Close, St Albans

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



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Flood Zone Map (present day)	Flood Zone 3b + Climate Change	Surface Water Map (RoFSW)
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- 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

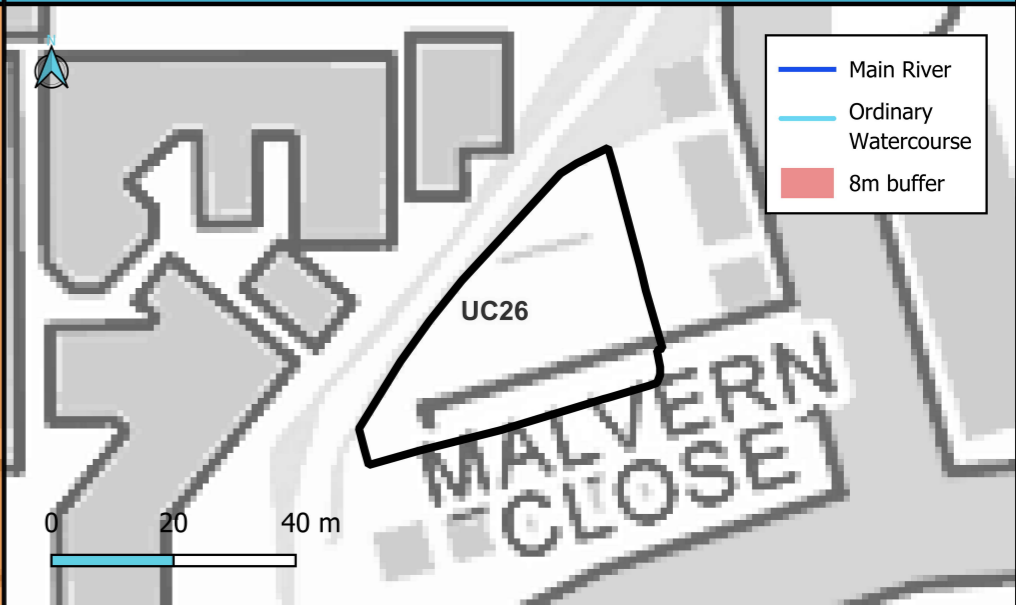
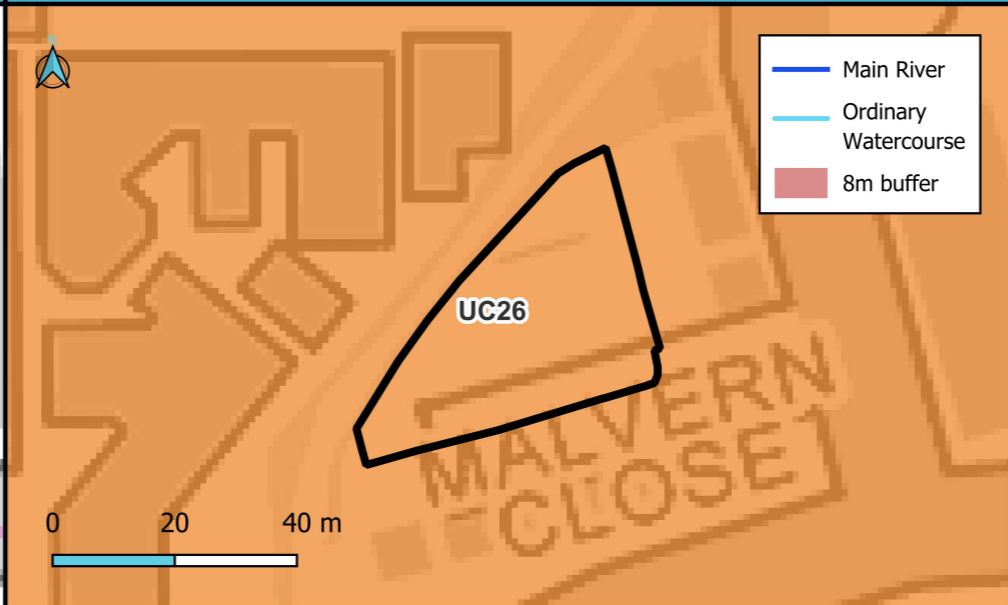
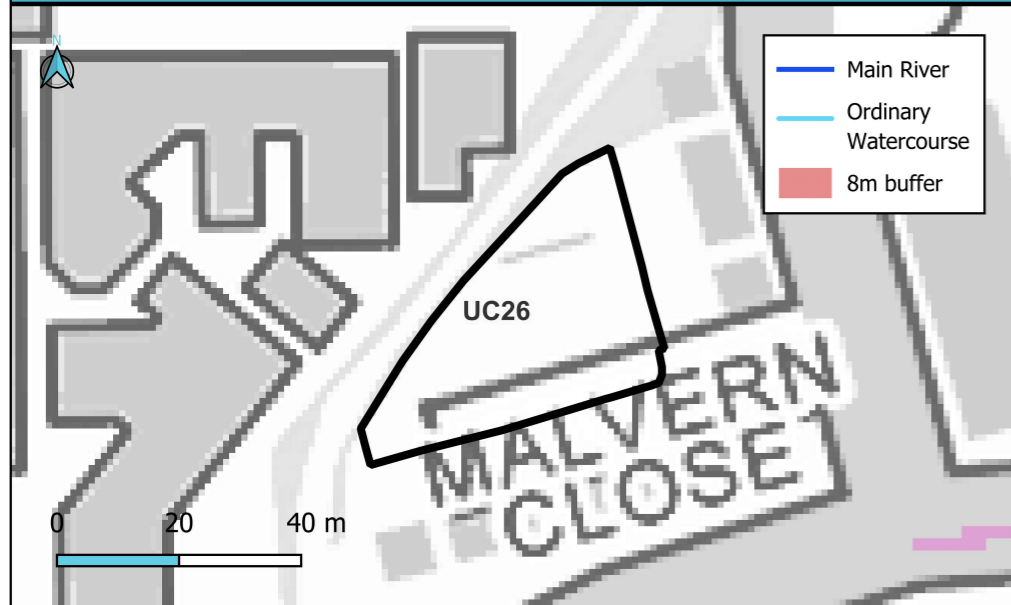
- Flood Zone 3b + 21% (Central allowance)
- Flood Zone 3b + 35% (Higher allowance)
- Flood Zone 3b
- Site boundary
- Other site

- 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

Groundwater (Gw) Flood Risk 1% AEP

Reservoir Flood Risk



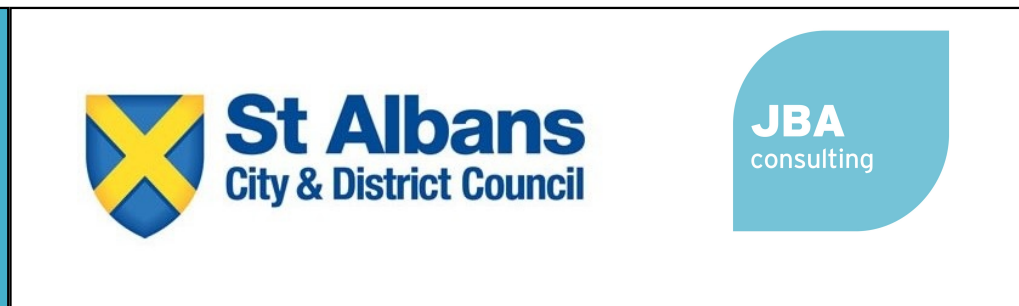
- RoFSW 1 in 30-year (3.33% AEP)
- RoFSW 1 in 30-year (3.33% AEP) plus 40%
- RoFSW 1 in 100-year (1% AEP)
- RoFSW 1 in 100-year (1% AEP) plus 40%
- Site boundary
- Other site

- GW levels <0.025m below ground
- GW levels 0.025m to 0.5m below ground
- GW levels 0.5 to 5m below ground
- Site boundary
- Other site
- GW levels at least 5m below ground

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

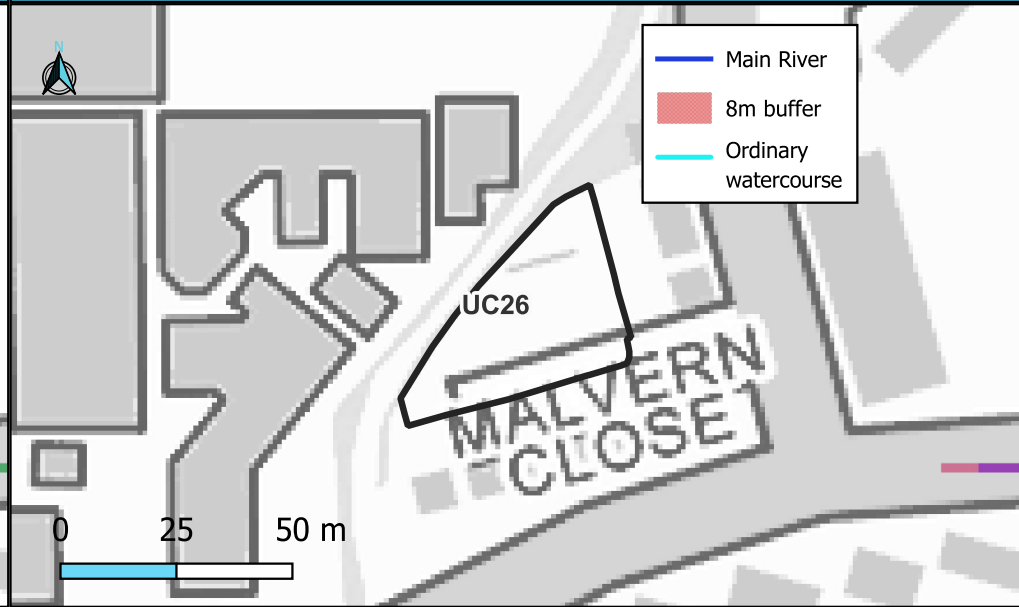
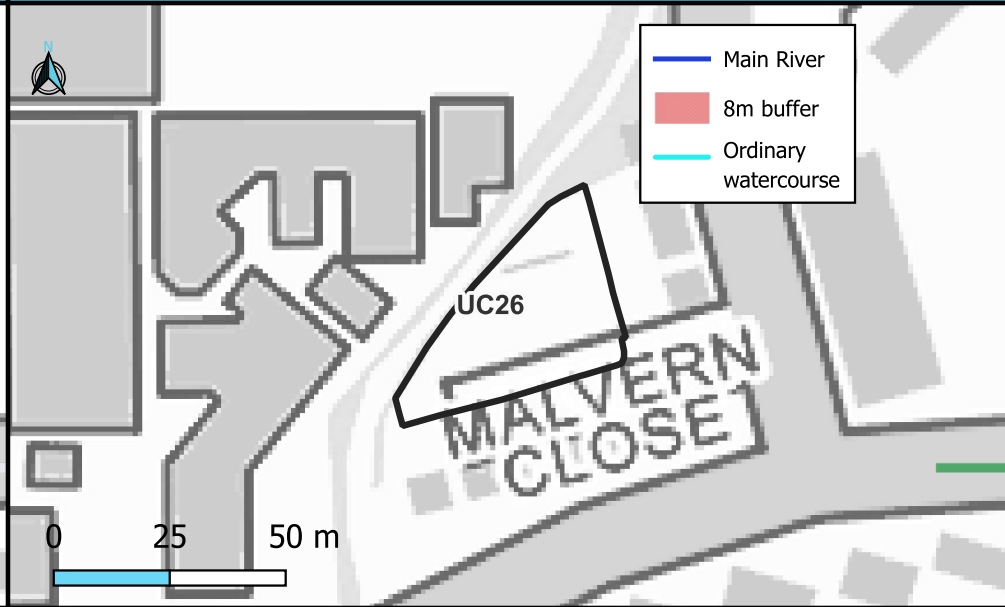
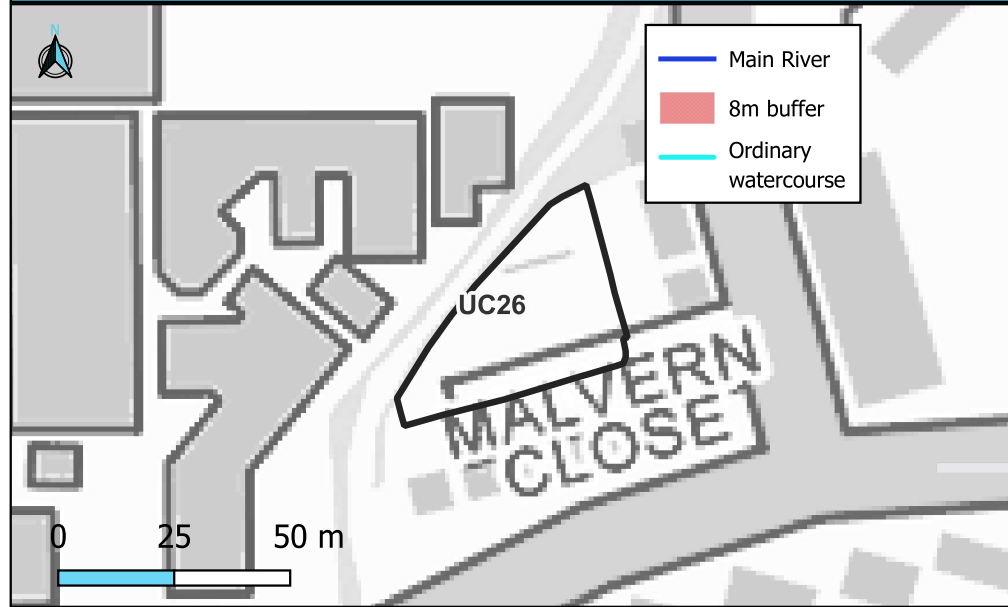
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RoFSW Max Depth - 1% AEP	RoFSW Max Hazard - 1% AEP	RoFSW Max Velocity - 1% AEP
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Site boundary	Depth (m)	0.30 - 0.60	> 1.20
Other site	0.00 - 0.15	0.60 - 0.90	
	0.15 - 0.30	0.90 - 1.20	

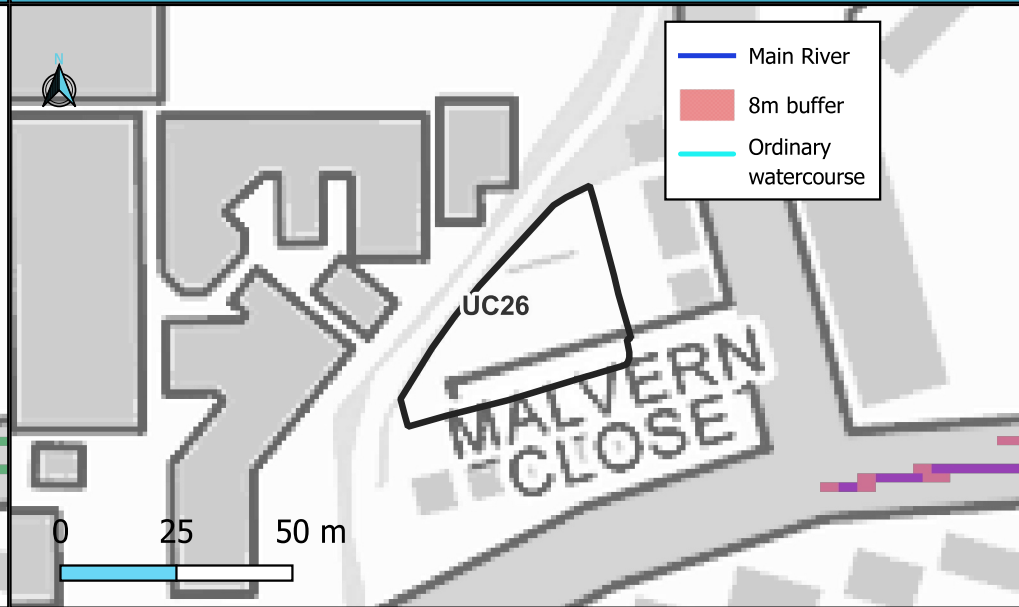
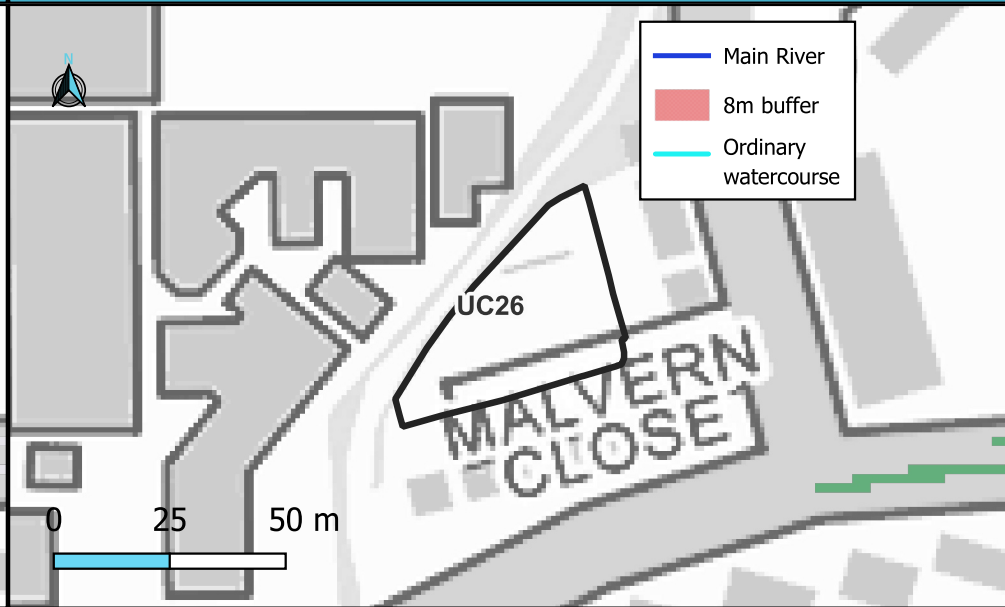
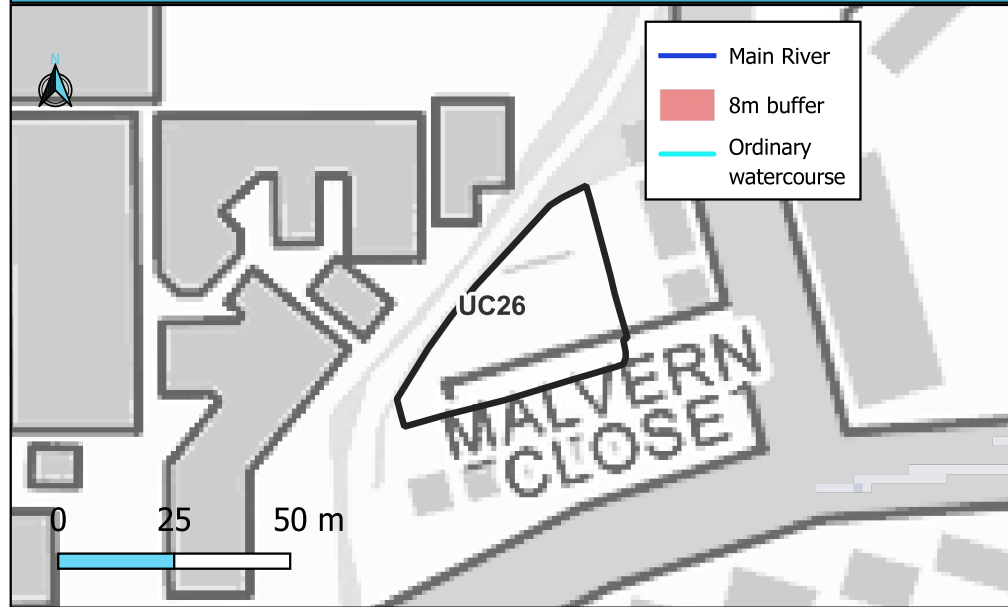
Site boundary	Hazard	1.25 - 2.00: Significant
Other site	< 0.75: Low	> 2.00: Extreme
	0.75 - 1.25: Moderate	

Site boundary	0.25 - 0.50	> 2.00
Velocity (m/s)	0.50 - 1.00	
0.00 - 0.25	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	0.15 - 0.30	0.90 - 1.20
Depth (m)	0.30 - 0.60	> 1.20
<= 0.15	0.60 - 0.90	

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

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