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

Site details	
Site Code	**UC8**
Address	Public Hall, 6 Southdown Road, Harpenden
Area	0.26ha
Current land use	Commercial - Public theatre
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 central Harpenden, a town to the north of St Albans. The site is currently a theatre venue. The site is bordered to the north by commercial units along Station Road B652, to the east by Arden Grove, to the south by Harpenden Hall, a commercial office building, and to the west by Southdown Road. The site is within the Upper Colne and Ellen Brook catchment, which covers an area of 95.5km², with the River Colne located approximately 1.1 km to the south of the site. The site is located within the upper part of the catchment, in the urban centre of Harpenden. The site is also situated within the Colne Management Catchment, which covers a much larger area of 1,040 km².
Topography	Environment Agency 1m resolution LIDAR shows that the topography varies across the site. 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 currently of a carpark to the northeast of the site with a building in the centre of the site, with an additional parking area in the southwest. The LIDAR shows that the site is on a slope, with the highest elevations along the northeastern boundary ranging between 105.1-105.3mAOD then decreasing to between 103.0-103.1mAOD along the southwestern boundary.
Existing drainage features	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 urban area of Harpenden, 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. The site is not covered by any detailed hydraulic modelling. **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** – 7% Max depth – 0.15 – 0.30m Max velocity – 1.00 – 2.00 m/s **1% AEP** – 16% Max depth – 0.30 – 0.6m Max velocity – 1.00 – 2.00m/s **0.1% AEP** – 39% 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 a surface water flow path flowing south along Southdown Road, which affects the southwestern boundary of the site. Flood depths range between 0.15m to 0.30 m where the current disabled car park and turning circle are located. Along Southdown Road on the site's boundary, velocities reach up to 1.00 to 2.00 m/s, while velocities to the north of the turning circle within the site range between 0.25 to 0.50 m/s. The flood hazard rating is 'very low' to 'Danger for some', with the higher hazard rating occurring between the current disabled parking and the turning circle. During the 1% AEP event, the entire western area including the turning circle, and parking in front of the hall's main entrance is affected by surface water flooding. Flood depths are the deepest in the northwestern corner of the site ranging from 0.30 to 0.60m. The remaining flood depths within the

	site are less than 0.30m. Flood velocities are highest along the southwestern boundary 1.00 to 2.00m/s, with the rest of the site experiencing velocities mainly between 0.50 to 1.00m/s. The resulting flood hazard is classed between 'Very low' to 'Danger for some'. With the area of flooding with the higher hazard rating to the north of the current turning circle, in the northwestern corner. During the 0.1% AEP even, there are two flow routes through the site. The main route is along Southdown Road affecting the western area of the site. The second flow route enters the site from the north via Arden Grove and flows along the northern side of the hall before joining with the surface flow route along Southdown Road. There is also a small area of ponding to the south of the hall. Flood depths reach a maximum depth of between 0.60 to 0.90m in several areas within the site, including the northwestern corner and area of ponding to the south of the hall. The remaining flood depths are primarily between 0.30 to 0.60m. Velocities through the site are primarily between 1.00 to 2.00m/s with the maximum velocity >2.00m/s, located in the southwestern corner. The flood hazard is classed as mainly as 'Danger for most' with a large area in front of the main hall entrance classed as 'Danger for all'.
Reservoir	The Environment Agency's reservoir maps show the site is not at risk of flooding from reservoir.
Groundwater	The JBA Groundwater mapping shows that the site is at low risk from groundwater flooding, as groundwater is located 0.5-5m below ground level.
Sewers	The site is located within two postcode areas, the northern and southern parts of the of site fall within a postcode area with 13 and 14 historic incidences of sewer flooding respectively. Records were obtained from 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. However, St Albans District Council has received reports of several historic flood incidents affecting various commercial units along Station Road, caused by surface water flooding. An event occurred in July 2017, during which a surface water flood event inundated several properties and one shop. Reports indicated that one property experienced internal flooding of 2-3 inches, while another property endured 18 inches of flooding both internally and externally. Furthermore, the records indicate there is a historical pattern of flooding around Bower's Parade/High Street attributed to surcharging sewers.
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 Alert Areas.
Access and egress	Access and egress to the site is currently by Southdown Road and Arden Grove. With a pedestrian access connecting through from the Station Road to Southdown Road. There is safe access and egress to the site via Arden Grove during the 3.3% and 1% AEP surface water flood events. However, during the 3.3% event, there is a large surface flow route originating north of the site and flowing down Southdown Lane. The flood depths range from 0.15 to 0.30 m by the turning circle in front of the hall to 0.30 to 0.60 m further south along the road. Flood velocities vary along Southdown Lane, primarily between 0.50 and 1.00 m/s, reaching a maximum of 1.00 to 2.00 m/s. The flood hazard is classed as 'Very low' to 'Danger for most', and access and egress may not be possible. During the 1% AEP event, this surface water route expands, affecting a wider area. The flood depths increase so that the majority of Southdown Road has between 0.30 and 0.60 m of water. There is also a larger area where velocities are between 1.00 and 2.00 m/s. The flood hazard along Southdown Road is mainly 'Danger for most', and vehicular access is limited. During the 0.1% AEP event, the surface water flow route along Southdown Road expands laterally, impacting not only Southdown Road but also the southern part of Arden Grove where it joins Southdown Road. Flood depths between Station Road and Southdown Lane range from 0.90 to 1.20 m. In front of the Hall on Southdown Lane, flood depths are 0.60 to 0.90 m, extending further down Southdown Lane. By the junction with Arden Grove, depths reach a maximum of 0.90 to 1.20 m on Southdown Lane. Velocities along this flow route are mainly between 1.00 and 2.00 m/s, with an area in the southwestern corner of the site exceeding 2.00 m/s. The flood hazard is categorized as ‘Danger for all’, making safe access and egress along Southdown Lane impossible. The flow route that extends from Station Road down the northern section of Arden Grove into the site's northern area has flood depths between 0.15 and 0.30 m, with velocities of 0.50 to 1.00 m/s. The associated flood hazard for this route is ‘Very low’, so safe access and egress is possible for pedestrians and vehicles. 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:** In this location, Flood Zone 2 has been used as a proxy to understand the impact of climate change on fluvial flood risk This mapping shows that the site is within Flood Zone 1, and that future 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 in the 0.1% AEP event, with the large surface water flow route through western side of the site, and a small route combining with this larger one along the northern boundary. The maximum flood depth, velocity and hazard within the site is 0.76m, 3.05m/s and 'Danger for all'. This shows that the site is somewhat sensitive to increases in pluvial flooding due to 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 surface water drainage and integrated flood risk management	

Broad-scale assessment of potential SuDS	**Geology & Soils**
	• Geology at the site consist of:
	  ○ Bedrock – The bedrock within the site of Lewes Nodular Calk Formation and Seaford Chalk Formation – Chalk. A type of sedimentary rock.
	  ○ Superficial – The superficial geology of the site is Lowestoft Formation – Diamicton. This is an extensive sheet of chalky till, with outwash sands, gravels, silts and clays. A form of sedimentary 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 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 mostly 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 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. • 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 3.3%, 1% and 0.1% AEP 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. Proposals to use SuDS techniques should be discussed with relevant stakeholders (St Albans City and District Council, Hertfordshire County Council 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 or rain gardens 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. 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 flooding from surface water • 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 St Albans City 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.

	• Arrangements for safe access and egress will need to be demonstrated for the 3.3%, 1% and 0.1% surface water events with an appropriate allowance for climate change, using the depth, velocity, and hazard outputs.
	• Should built development be proposed within the design 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

The site is in Flood Zone 1 however has some significant risk of surface water flooding. 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 3.3%, and 1% AEP 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

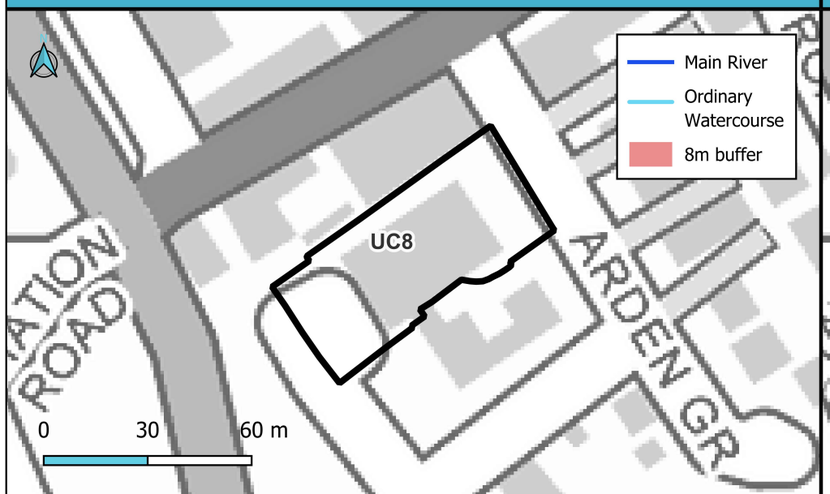
Flood Zones	Flood Zones 2 and 3a have been taken from the Environment Agency's Flood Map for Planning mapping. There is no detailed hydraulic modelling available at this location.
Climate change	The latest climate change allowances have been applied to the Environment Agency's RoFSW map to indicate the 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 0.1% 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	UC8
Site Name	Public Hall, 6 Southdown Road, Harpenden

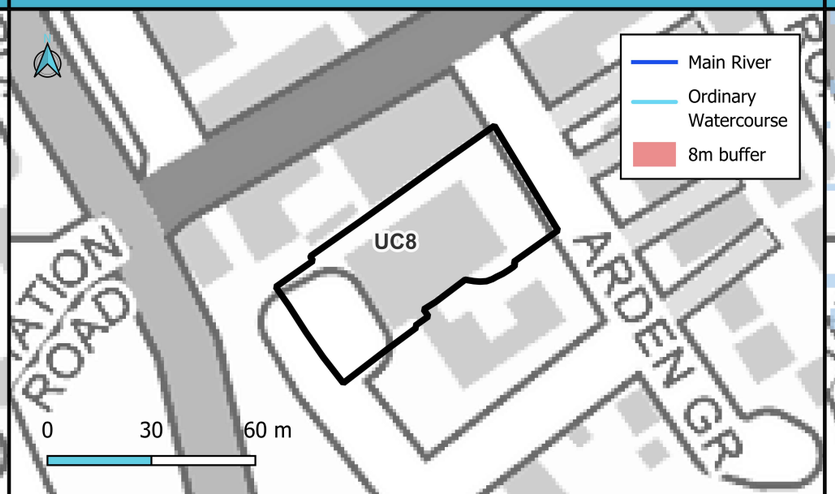
St Albans District Council
Strategic Flood Risk Assessment
Level 2 Detailed Site Summary

Flood Zone Map (present day)



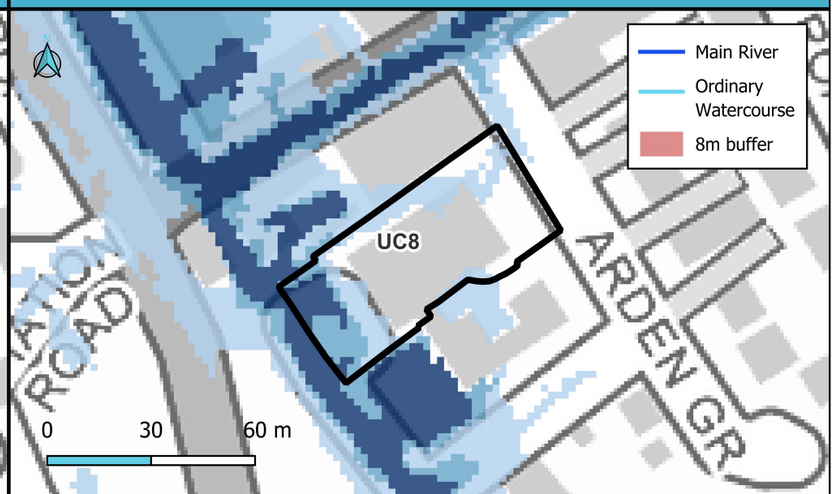
Flood Zone 2 (Between 1% and 0.1% AEP)
Flood Zone 3a (Between 3.33% and 1% AEP)
Flood Zone 3b (Less than 3.33% AEP)
Site boundary
Other site

Flood Zone 3b + Climate Change



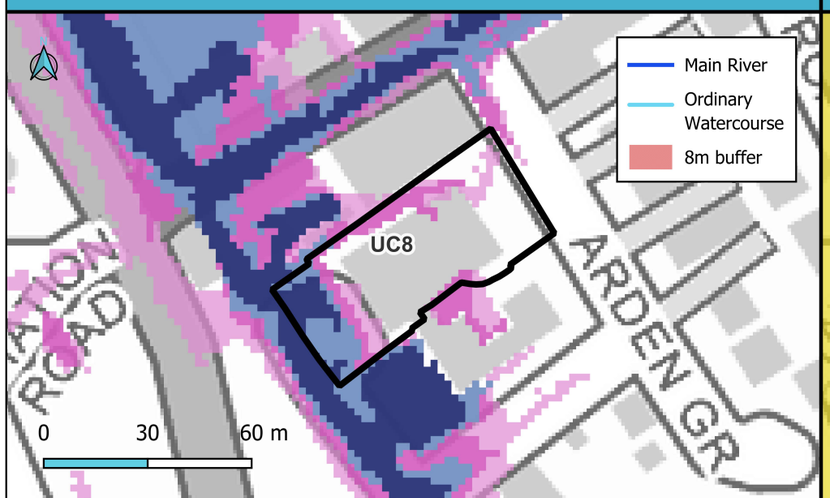
Flood Zone 3b + 21% (Central allowance)
Flood Zone 3b + 35% (Higher allowance)
Flood Zone 3b
Site boundary
Other site

Surface Water Map (RoFSW)



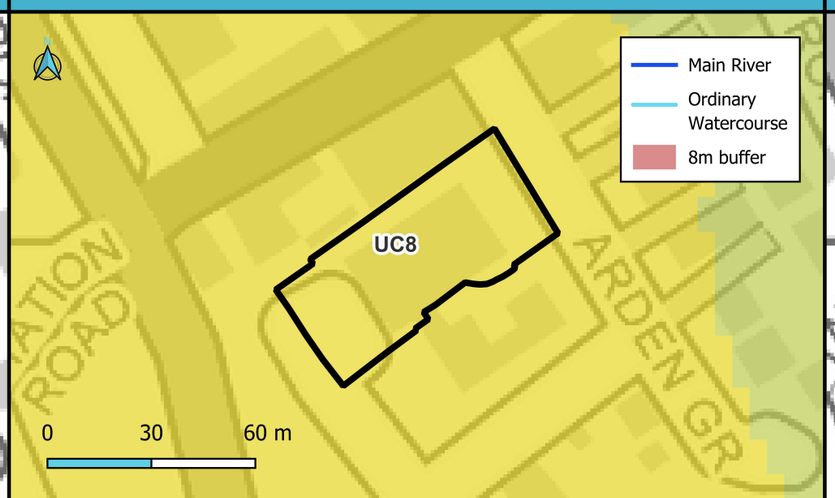
RoFSW 1 in 30-year (3.33% AEP)
RoFSW 1 in 100-year (1% AEP)
RoFSW 1 in 1000-year (0.1% AEP)
Site boundary
Other site

Surface Water Map + Climate Change



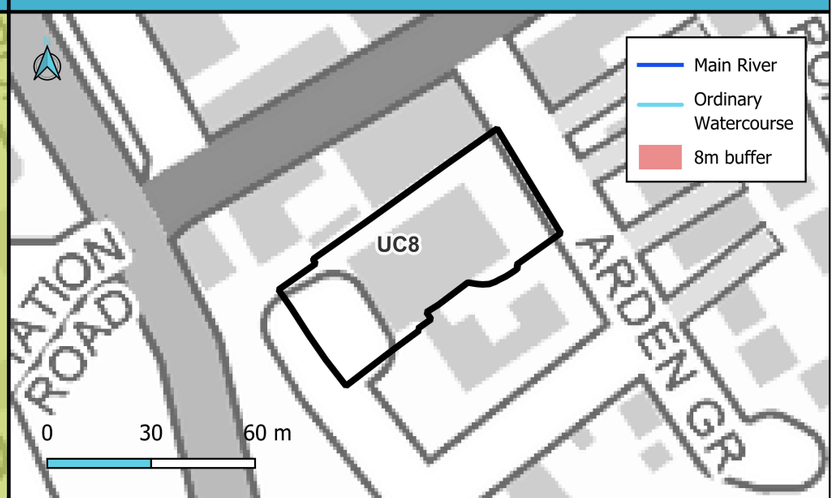
RoFSW 1 in 30-year (3.33% AEP)
RoFSW 1 in 30-year (3.33% AEP) plus 40%
RoFSW 1 in 100-year (1% AEP)
RoFSW 1 in 100-year 1% AEP plus 40%
Site boundary
Other site

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

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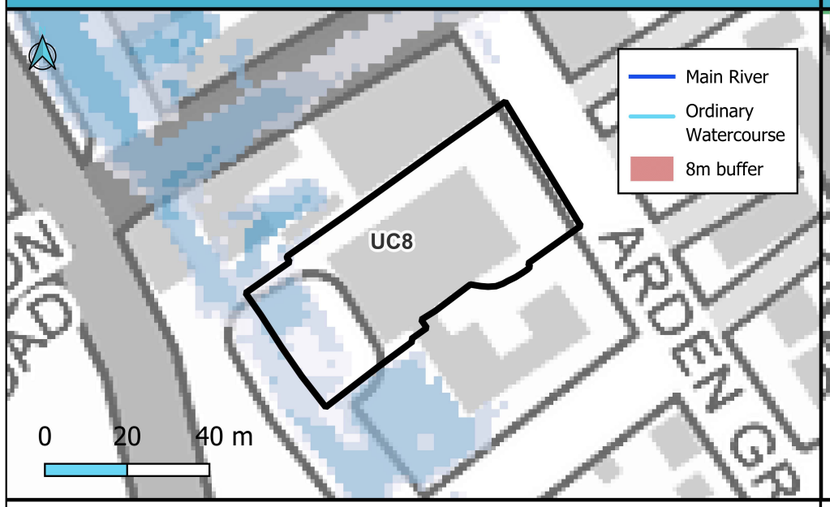
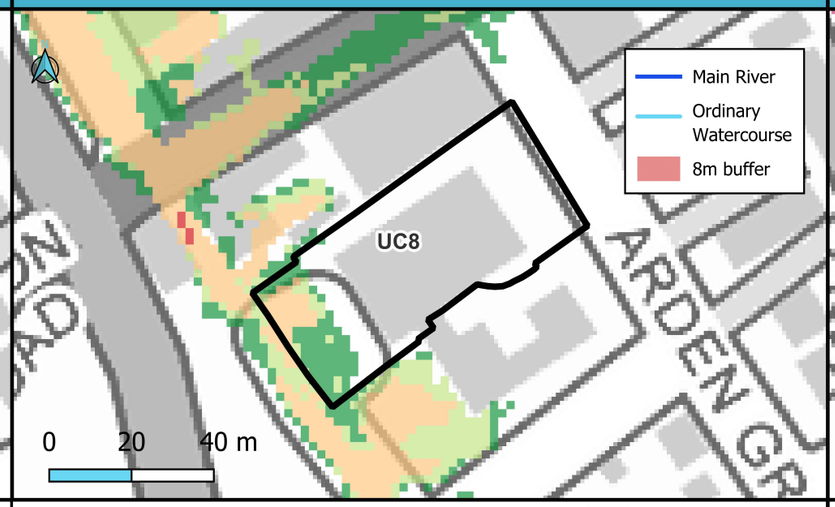
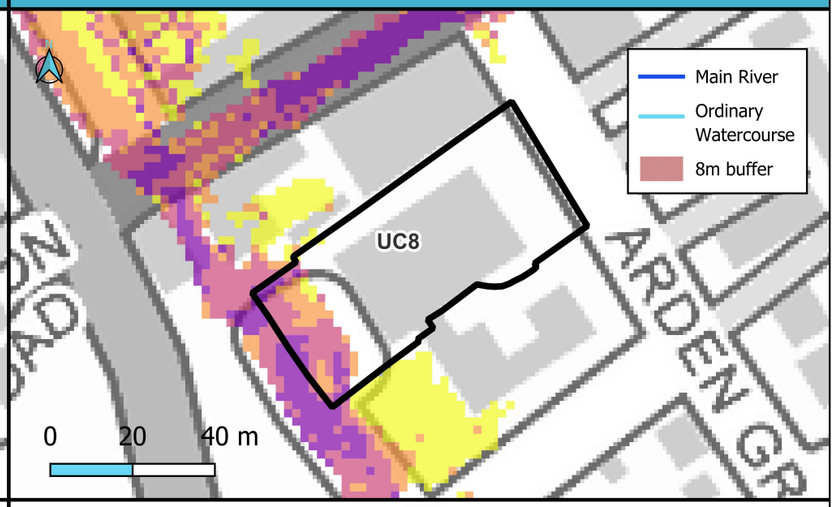
RoFSW Max Depth - 1% AEP



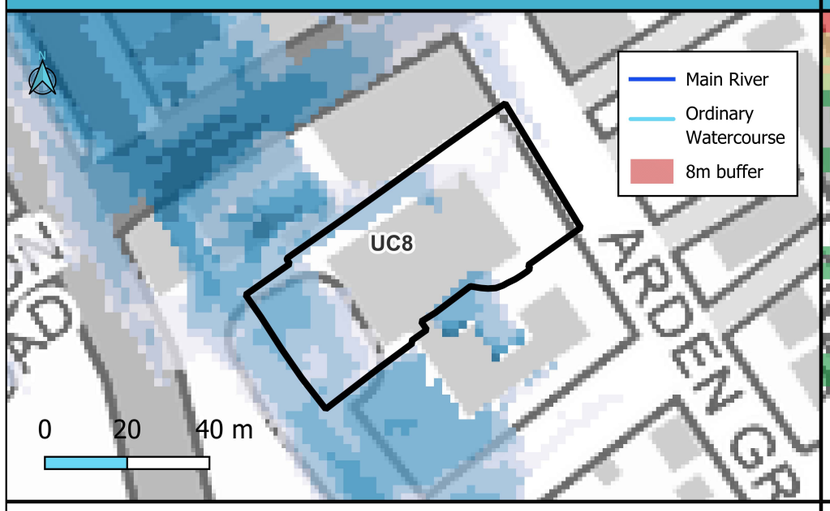
RoFSW Max Hazard - 1% AEP



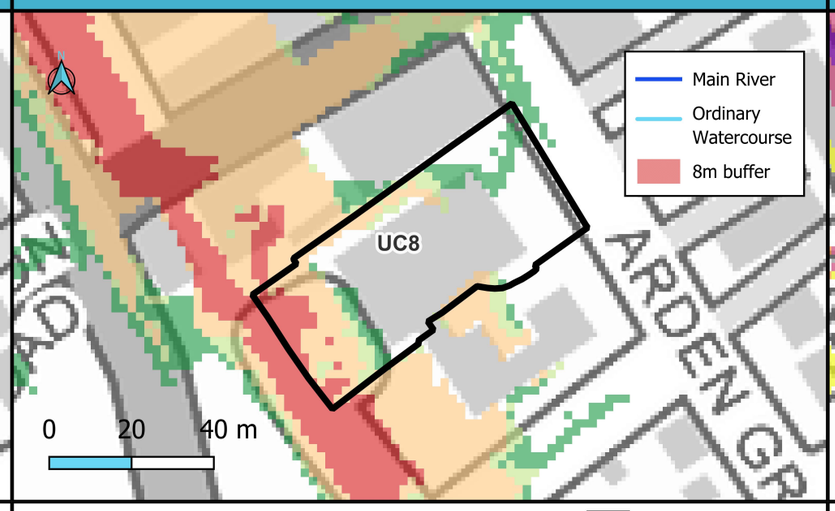
RoFSW Max Velocity - 1% AEP



RoFSW Max Depth - 1% AEP + 40% CC



RoFSW Max Hazard - 1% AEP + 40% CC



RoFSW Max Velocity - 1% AEP + 40% CC