	St Albans City and District Council **Level 2 Strategic Flood Risk Assessment** **Detailed Site Summary Table**
Site details	
Site Code	**UC17**
Address	Garage Block off Cotlandswick, London Colney
Area	0.11ha
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 north of London Colney, a village in Hertfordshire. The site is south of the North Orbital Road; A414 and A1081. The site is situated in the middle of a residential housing estate with houses boarding the site boundary on all sides, with an access road, Cotlandswick, on the western side. The site lies 1.1km north of the River Colne. 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 in the lower part of the catchment, which is predominantly urban. The site is also within the Colne Management Catchment, which covers a much larger area of 1,040 km².
Topography	Environment Agency 1m resolution LIDAR shows that topography varies across the site. This small 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. LIDAR shows that the land is fairly flat ranging from 73.2mAOD to 72.6mAOD. The higher elevations located along the northern 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 main London Colney urban area, it is likely to be drained by the surface water drainage network. A small watercourse lies to the west of the site, the London Colney stream, that is largely culverted as it flows south through London Colney.
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 Upper Colne (2010) and London Colney (2018) 1D-2D hydraulic models received for this Level 2 SFRA. The site lies outside the 0.1% AEP flood extents from the Environment Agency's Upper Colne (2010) and London Colney (2018) models. **Flood characteristics:** The site is located within Flood Zone 1 and is therefore at negligible risk of fluvial flooding. The Environment Agency's Upper Colne model is undergoing a full revision. No results were available at the time of preparation of this report. It is possible that the predicted fluvial flood risk to the site may change as a result of this remodelling, however given the local topography it is considered that the site is unlikely to be impacted by this remodelling.
Surface Water	**Proportion of site at risk (RoFSW):** **3.3% AEP** – 0% Max depth – N/A Max velocity – N/A **1% AEP** – 10% Max depth – 0.15 – 0.30m Max velocity – <0.15m/s **0.1% AEP** – 58% Max depth – 0.30 – 0.60m Max velocity – 0.50 – 1.00m/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:** There is no surface water flooding within the site during the 3.33% AEP event. During the 1% AEP event, there is an area of pooling along the northern face of the southern block of garages. The flood depths range between 0.15 to 0.30m, with velocities od <0.25m/s. The resulting flood hazard is categorized as 'very low'.

	During the 0.1% AEP event, surface water enters the site from the north, causing flooding around the garages. Flood depths in front of the garage doors of both block of garages reaches between 0.30 to 0.60m. For the rest of the site depths range from 0.15 to 0.30m. Where the flow route enters site velocities are between 0.50 to 1.00m/s. Velocities around the garages primarily remain below 0.25m/s, peaking at a maximum velocity near the northwestern corner of the northern garage block, reaching between 0.50 to 1.00m/s.
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 23% of the site is shown to be at low risk of groundwater flooding, with the groundwater being 0.5-5m below ground level. This is to the eastern side of the site. Whereas the remaining 77% of the site is at moderate risk of groundwater flooding, as groundwater levels are between 0.25 to 0.5m. 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 historic incidences 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. There was a surface water flood incident that occurred in June 2016, on Cotlandswick 0.1km downstream of the site. This impacted a side road and the front and back garden of a property. The incident was reported to St Albans City and District Council.
Flood risk management infrastructure	
Defences	The Environment Agency AIMS dataset shows that the site is not protected by any formal flood defences.
Residual risk	Based on topography and modelled surface water flow paths around the site, it is not likely that a blockage of the London Colney Stream at the King's Road culvert would impact the site.
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 an access road off Cotlandswick. Vehicular access to Cotlandswick is via High Street.

	During the 3.3% and 1% AEP event, Cotlandswick and the small access road is not flooded. Therefore, vehicular and pedestrian access and egress to the site is still possible. In the 0.1% AEP event, there is a small area of surface water ponding at the entrance to the site, where the access road meets the site boundary. There is also a flow path along Cotlandswick road from where it meets High Street. However nether the ponding or flow route will impede access.
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:** Both the Upper Colne (2010) and London Colney (2018) models were used to understand the impact of climate change on fluvial flood risk. The latest climate change allowances have been applied to the London Colney model. The 0.1% AEP extent from the Upper Colne model has also been used as a proxy for future flood risk. Mapping from both models shows that the site remains 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 flow route entering the site in the northwestern corner flowing south around the garage blocks, in addition to causing pooling between the two garage blocks. The maximum flood depth, velocity and hazard on the site during this event is, 0.39m, 0.86m/s and 'Danger for some'. Safe access and egress route along Cotlandswick remains, with a small area of pooling classified as 'Very low' hazard. 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:

	○ Bedrick – 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 are comprised of 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. • 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 Zones 2 and 3. 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 0.1% AEP event. 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	• 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

integrated flood risk management	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 • Where appropriate, 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 is at risk from surface water and 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. 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 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 the St Albans City and District Council, Hertfordshire County Council (Lead Local Folld Authority), 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.
- 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.
- Planning permission is required to surface more than 5 square metres of unpaved ground using a material that cannot absorb water.
- Due to the high groundwater flood risk, 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.
- Mitigation for seasonal high groundwater levels must be considered (for example by raising finished floor levels to an appropriate height above ground level).
- 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 and groundwater 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.

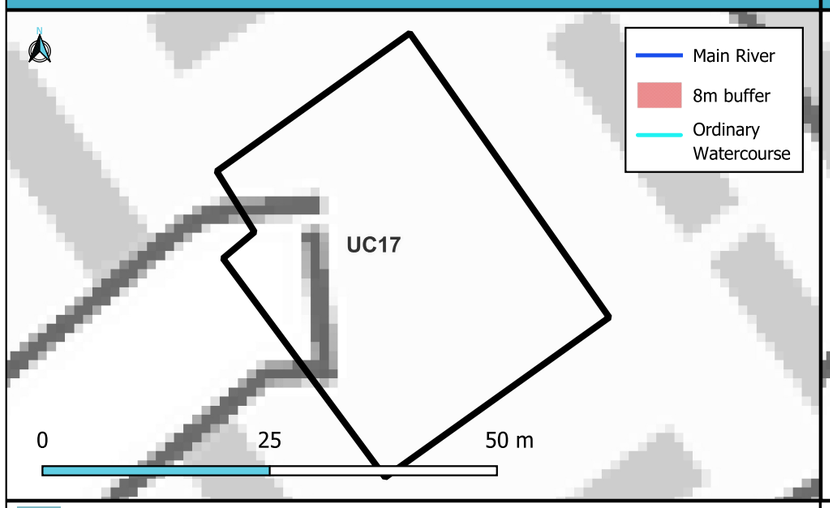
- A site-specific Flood Risk Assessment that demonstrates that site users will be safe in the 1% AEP surface water events, including an allowance for climate change. This will need to show that the site is not at an increased risk of flooding in the future and that development of the site does not increase the risk of surface water flooding on the site and to neighbouring properties.
- 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 Upper Colne (2010) and London Colney (2018) hydraulic models.
Climate change	The most recent uplifts have been applied to the London Colney (2018) hydraulic models to indicate the impacts on fluvial flood risk. The latest climate change allowances have been applied to the RoFSW map to indicate the impact on pluvial flood risk.
Fluvial depth, velocity and hazard mapping	Depth, velocity, and hazard data was derived from the London Colney (2018) hydraulic model.
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	UC17
Site Name	Garage Block off Cotlandswick, London Colney, AL2 1ED

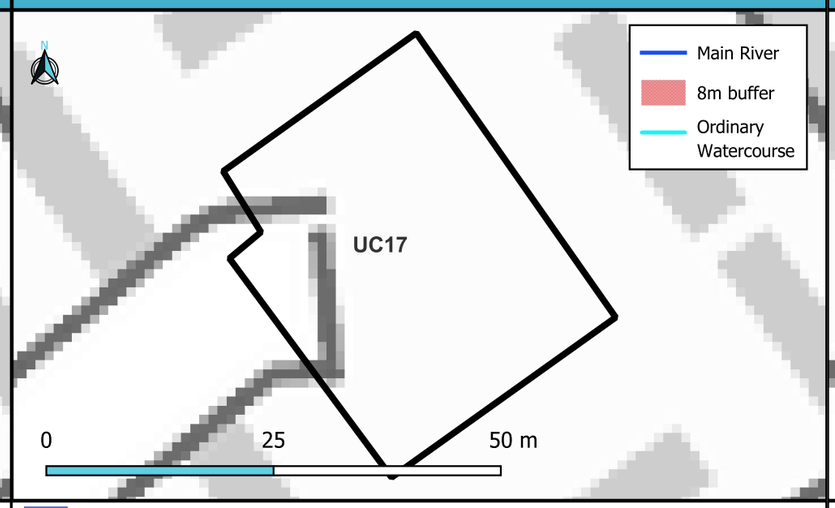
St Albans District Council
Strategic Flood Risk Assessment
Level 2 Detailed Site Summary

Flood Zone Map (present day)



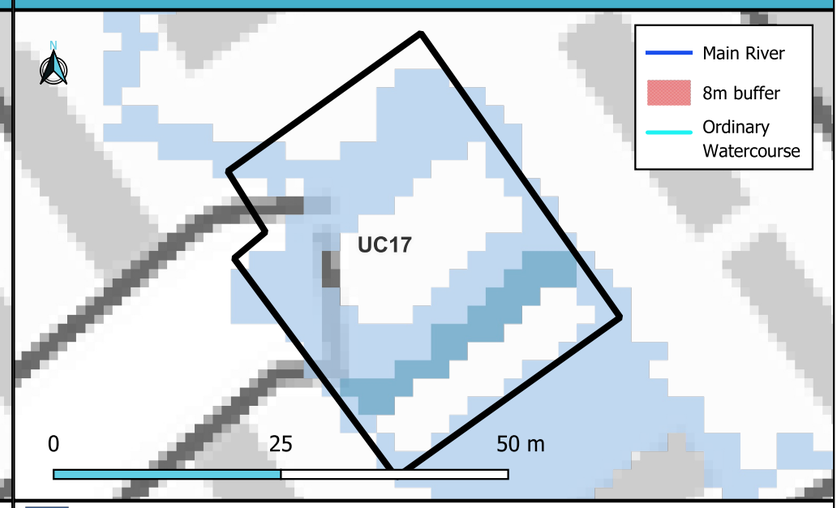
Flood Zone 2 (Between 1% and 0.1% AEP)
Flood Zone 3a (Between 3.33% and 1% AEP)
Flood Zone 3b (Less than 3.33% AEP)
Site boundary

Flood Zone 3b + Climate Change



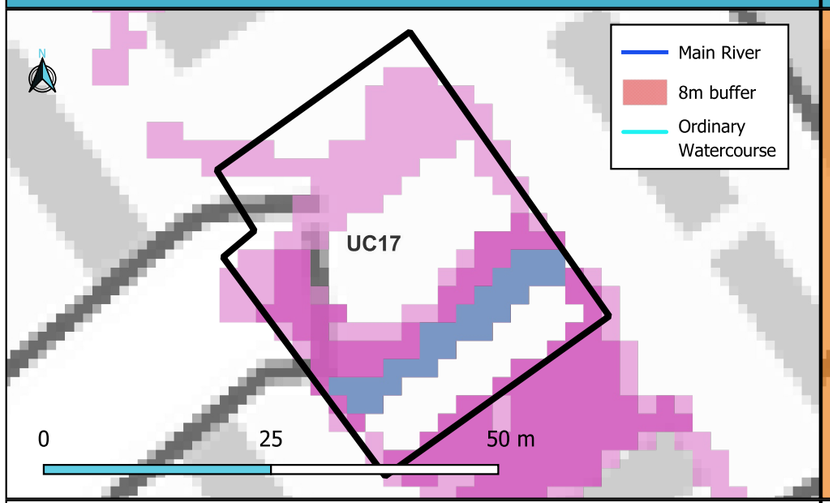
Flood Zone 3b + 21% (Central allowance)
Flood Zone 3b + 35% (Higher allowance)
Flood Zone 3b
Site boundary

Surface Water Map (RoFSW)



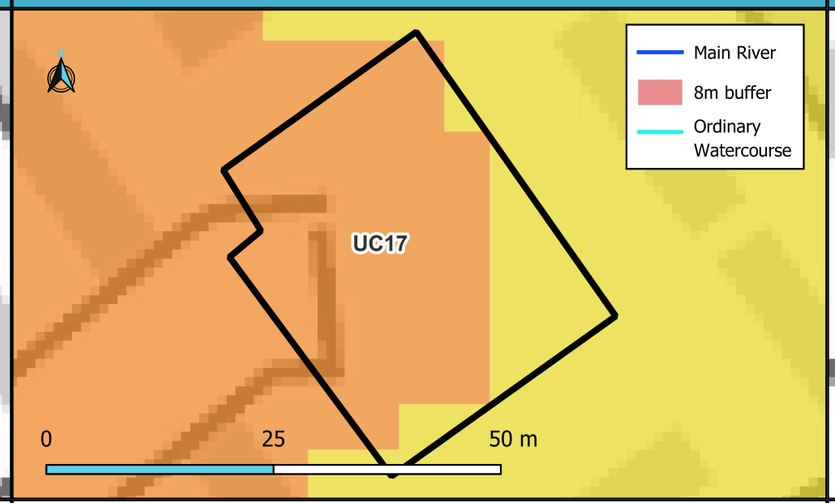
RoFSW 1 in 30-year (3.33% AEP)
RoFSW 1 in 100-year (1% AEP)
RoFSW 1 in 1000-year (0.1% AEP)
Site boundary

Surface Water Map + Climate Change



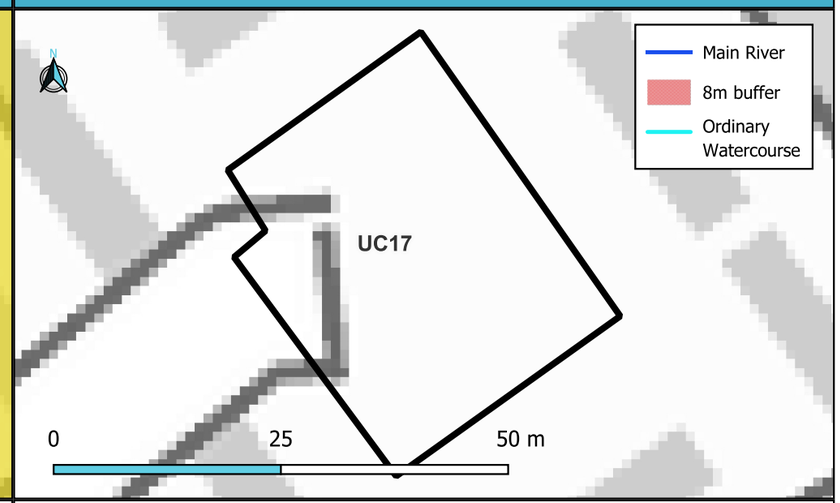
RoFSW 1 in 30-year (3.33% AEP)
RoFSW 1 in 30-year (3.33% AEP) plus 40%
RoFSW 1 in 100-year (1% AEP)
RoFSW 1 in 100-year 1% AEP plus 40%
Site boundary

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

Reservoir Flood Risk



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

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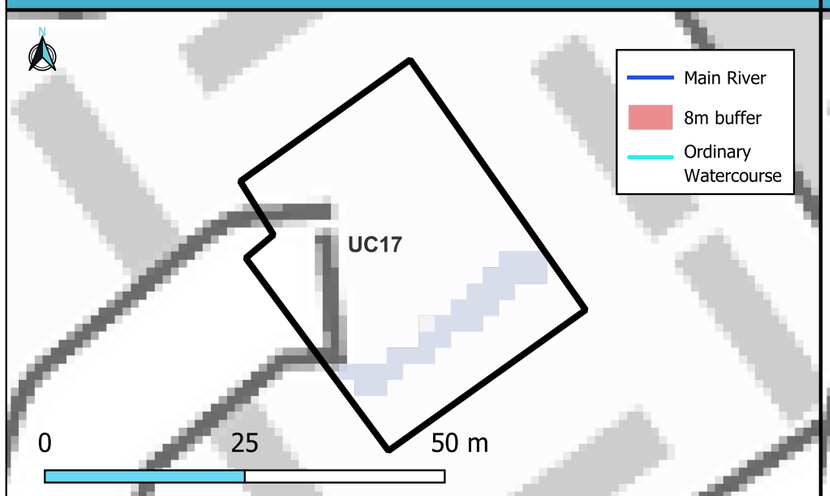
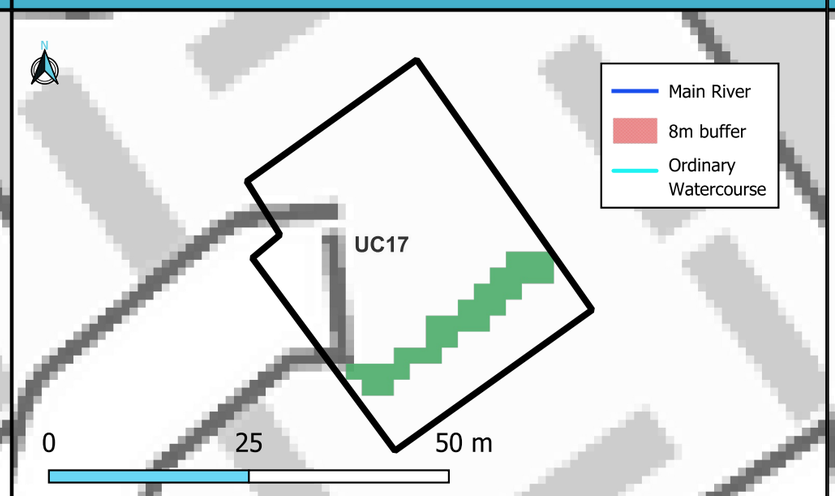
Strategic Flood Risk Assessment
Level 2 Detailed Site Summary

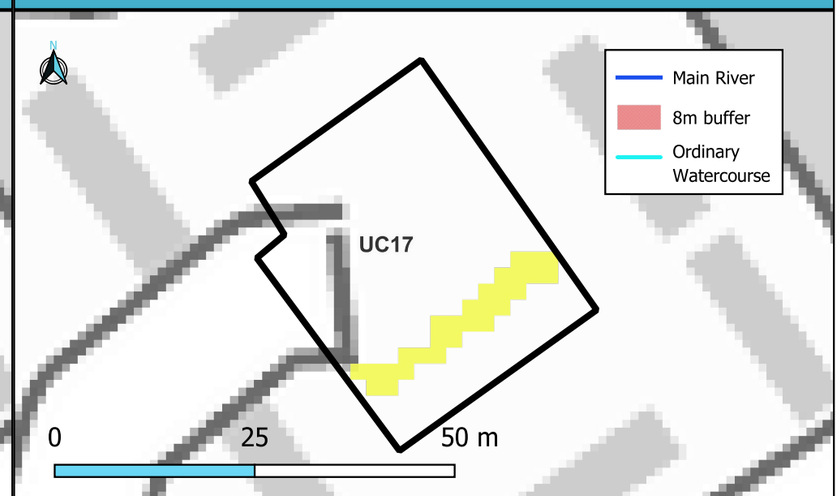
RoFSW Max Depth - 1% AEP



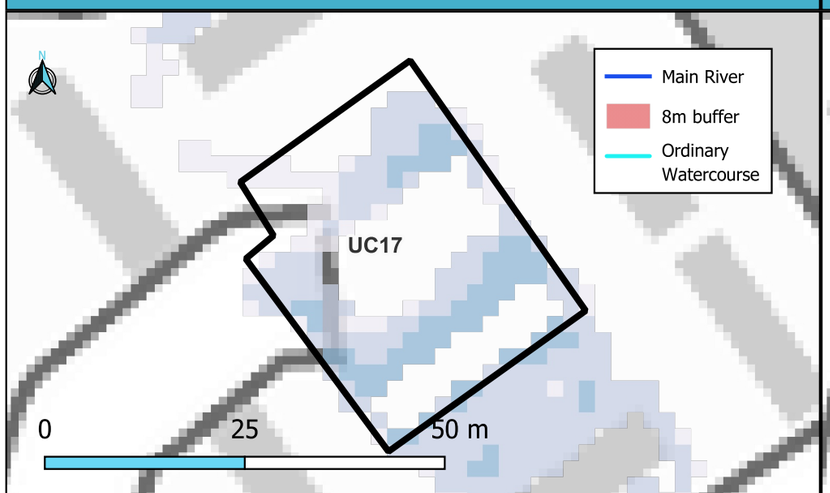
RoFSW Max Hazard - 1% AEP



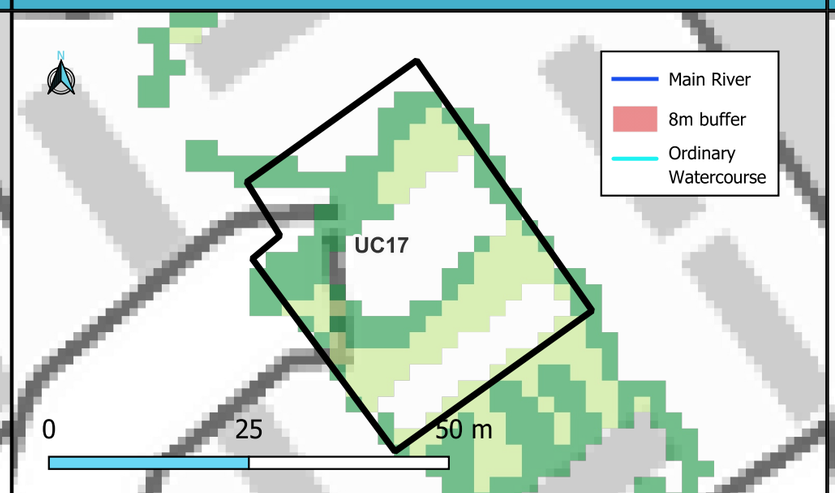
RoFSW Max Velocity - 1% AEP



RoFSW Max Depth - 1% AEP + 40% CC



RoFSW Max Hazard - 1% AEP + 40% CC



RoFSW Max Velocity - 1% AEP + 40% CC