	St Albans City and District Council **Level 2 Strategic Flood Risk Assessment** **Detailed Site Summary Table**
Site details	
Site Code	**UC24**
Address	Garages Rear of Hill End Lane (North), St Albans
Area	0.21ha
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 within the residential area of The Camp in southeastern St Albans, Hertfordshire. The garage area is positioned at the rear of properties lining Drakes Drive and Hill End Lane, with a footpath making up the site's northern boundary. 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 northern area is at a slightly higher elevation to the rest of the site, 88.9mAOD, elevations then fall to 86.2mAOD in an area of southeast of the site. The elevation at the southern end of the site then starts to rise again from 86.2mAOD to 87.4mAOD. Most of the site's elevation is between 86.4 – 87.7mAOD.
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 1.4km east of the River Ver and approximately 2.8km to the north of the River Colne. 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. The site is in Flood Zone 1 and so 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** – 29% Max depth – 0.60 – 0.90m Max velocity – 1.00 – 2.00m/s **1% AEP** – 41% Max depth – 0.90 – 1.20m Max velocity – 1.00 – 2.00m/s **0.1% AEP** – 61% Max depth – >1.20m Max velocity – 1.00 – 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, theres a surface flow route through the southern end of the site, the route flows west to east, with some water pooling between the two garage blocks. Flood depths are generally 0.30 to 0.60m, with a large area of ponding in front of the eastern garage blocks with depths between 0.60 to 0.90m. Flood velocities vary across the flow route, where the flow route enters and leaves the site velocities are up to 1.00 to 2.00m/s. Within the large area of ponding velocities are <0.25m/s. The resulting hazard rating is mainly 'Danger to some' and 'Danger to most' specifically between the two garage blocks. During the 1% AEP event, the surface flow route across the southern part of the site has expanded covering 41% of the site. The ponding in between the garages has increased with a larger area with flood depths between 0.60 to 0.90m, reaching a maximum depth of 0.90 to 1.20m. Velocities vary reaching a maximum 1.00 – 2.00m/s where the route enters and leaves the site. The resulting hazard rating is mainly 'Danger to some' and 'Danger to most'. During the 0.1% event, surface water flood extent covers the southern 61% of the site. This is due to the flow route passing through the site from

	west to east expanding. The maximum flood depths are greater than 1.2m in front of the eastern garages, with a significant area with flood depths between 0.60 – 0.90m. Velocities vary across the flow route, with a large proportion of the route ranging between 0.25 – 0.50m/s, reaching a maximum between 1.00 – 2.00m/s. The resulting hazard rating is predominantly 'Danger to most' with a small area to the north as 'Danger to some'.
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 not at risk of groundwater flooding.
Sewers	The site is located within two postcode areas, with 16 and 24 historic incidences of sewer flooding, according to the Thames Water Hydraulic Sewer Flood Risk Register.
Flood history	There are several flood incidences reported to St Albans City and District Council, for several properties surrounding the site. In July 2015 flooding was reported by several properties along Drakes Drive, which borders the western side of the site, all affected by surface water runoff. External flooding to the front and rear of an affected property was reported to be up to 0.3m. External property flooding was also reported previously in October 2010 where the flood depth reached up to 0.15m. The most recent event recorded was in July 2021, surface water runoff caused external flooding to properties. No further incidences have been reported since the highway improvement scheme on Drakes Lane in January 2023. An additionally property whose gardens border the southeastern side of the site on Hill End Lane, also reported their garden had been flooded in July 2015, from water coming from the garage site. Two other properties on Hill End Lane have reported the front of their properties affected by surface water flooding from Hill End Lane, one reported in October 2020 and the other December 2018.
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 a single track access road off Drakes Drive.

	During the 3.33% AEP event, there is surface water along Drakes Drive affecting the entrance to the site's access road. By the access road flood depths are between 0.15 to 0.30m, with deeper depths on Drakes Drive just to the north of the entrance between 0.30 to 0.60m. Flood velocities by the entrance to the access road are range between 0 – 0.5m/s. The resulting flood hazard is 'Very low' by the entrance to the site, with the area of Drakes Drive just to the north of the entrance 'Danger for some'. Vehicular and pedestrian access and egress to the site is possible. During the 1% AEP event, there is a large flow path along Drakes Drive covering the entrance to the site. There is also a flow path along the access road into the site. The maximum flood depths along the access road are between 0.15 to 0.30m, and 0.30 to 0.60m by the junction of Drakes Drive and the access road. Velocities range between 0.25 to 0.5m/s on Drakes Road by the entrance to the access road and between 0.50 – 1.00m/s on the access road. The resulting flood hazard is 'Very low' along the access road but 'Danger for some' at the junction of the access road and Drakes Drive. Vehicular access and egress may still be possible to the site, however pedestrian access and egress is not possible. During the 0.1% AEP event, similar to the 1% AEP event, the surface water extent covers the site's access road. Additionally, Drakes Drive has a large surface water flow path along a greater proportion of the road, extending further north and south along the road. Flood depths along the access road are predominantly between 0.30 to 0.60m, including at the entrance where it joins Drakes Drive. Velocities along the access road are mainly between 0.50 to 1.00m/s, with a maximum between 1.00 to 2.00m/s. Furthermore, on Drakes Drive by the junction the flood depths reach between 0.60 to 0.90m, with associated velocities of 0.50 to 1.00m/s. The resulting flood hazard is 'Danger for most', vehicular and pedestrian access and egress will not be possible for residents. 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 mapping shows that even with the climate change allowances applied, the site remains in Flood Zone 1. **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 a large surface water flow path running across the southern half of the site. The maximum flood depth, velocity and hazard within the site is, 1.3m, 1.44m/s and 'Danger to most'. 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 – 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 Lowerstoft Formation – Diamicton, a chalky till with outwash sands and gravels, silts and clays.
	• Soils at the site consist of:
	  ○ Slightly acid loamy and clayey soils with impeded drainage
	
	Sustainable Drainage Systems (SuDS)
	• The site is not considered to be susceptible to groundwater flooding, due to the nature of the local geological conditions. This should be confirmed through additional site investigation work.
	• 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 and the southern 11% is within Groundwater Source Protection Zone 2. 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 Groundwater Source Protection Zone guidance is currently undergoing 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 3.33%, 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. 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. • 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 filter strips, filter drains and 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 is 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 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.
- 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.
- 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

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 0.1% 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).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).

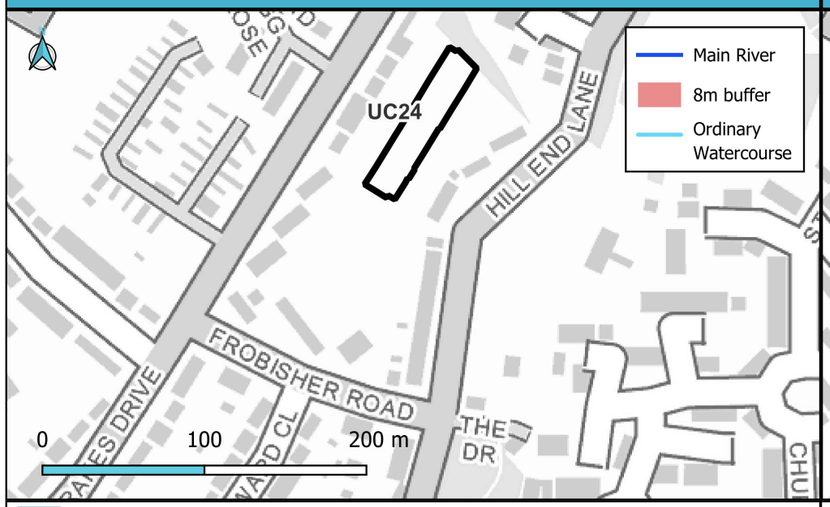
Mapping Information

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	UC24
Site Name	Garages Rear of Hill End Lane (North)

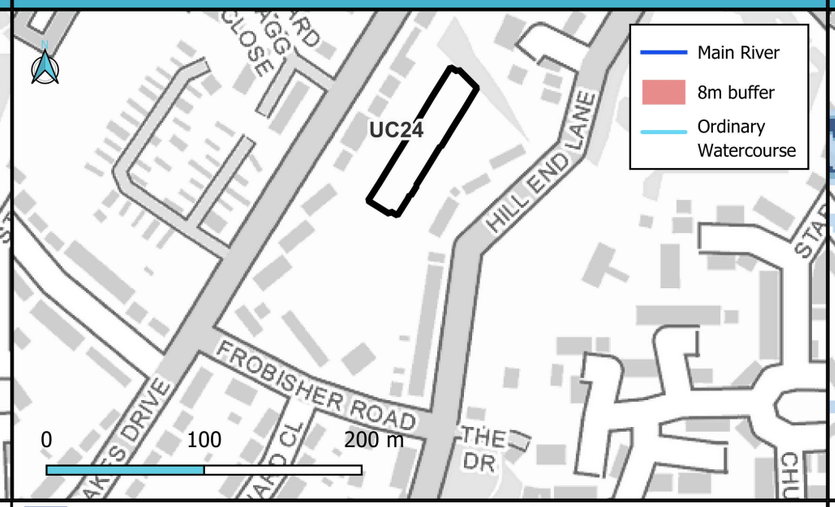
St Albans District Council
Strategic Flood Risk Assessment
Level 2 Detailed Site Summary

Flood Zone Map (present day)



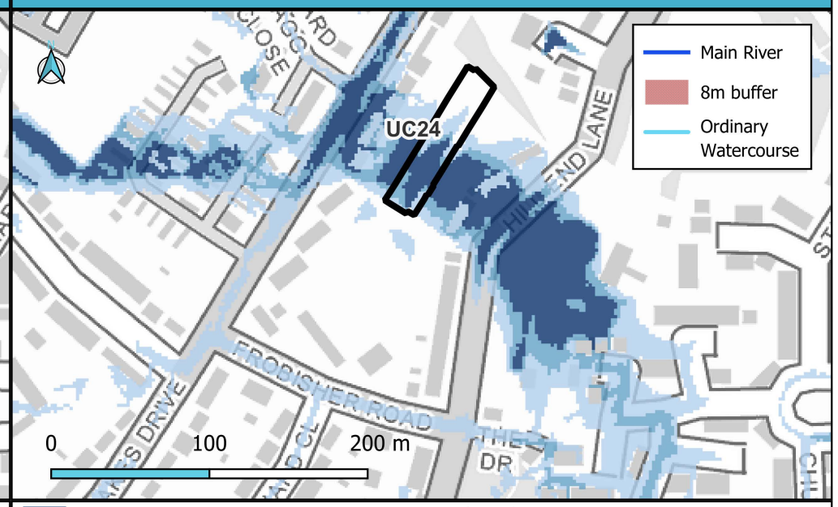
- Flood Zone 2 (Between 1% and 0.1% AEP)
- Flood Zone 3a (Between 3.33% and 1% AEP)
- Flood Zone 3b (Less than 3.33% AEP)
- Site boundary

Flood Zone 3b + Climate Change



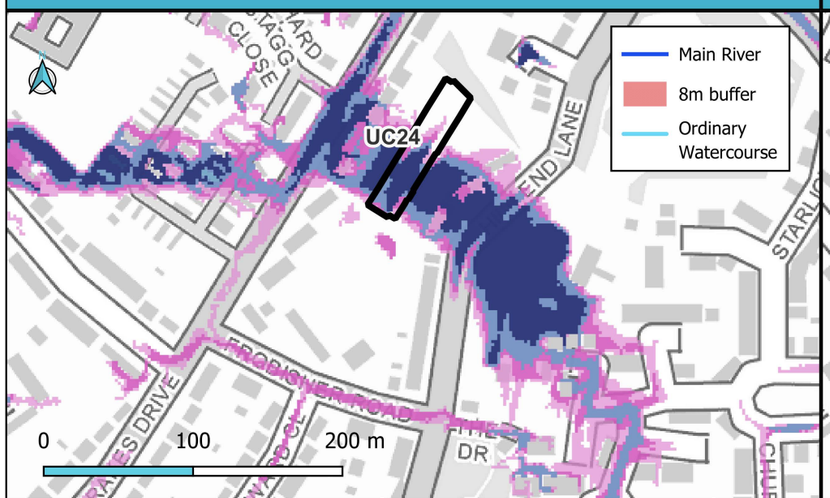
- Flood Zone 3b + 21% (Central allowance)
- Flood Zone 3b + 35% (Higher allowance)
- Flood Zone 3b
- Site boundary

Surface Water Map (RoFSW)



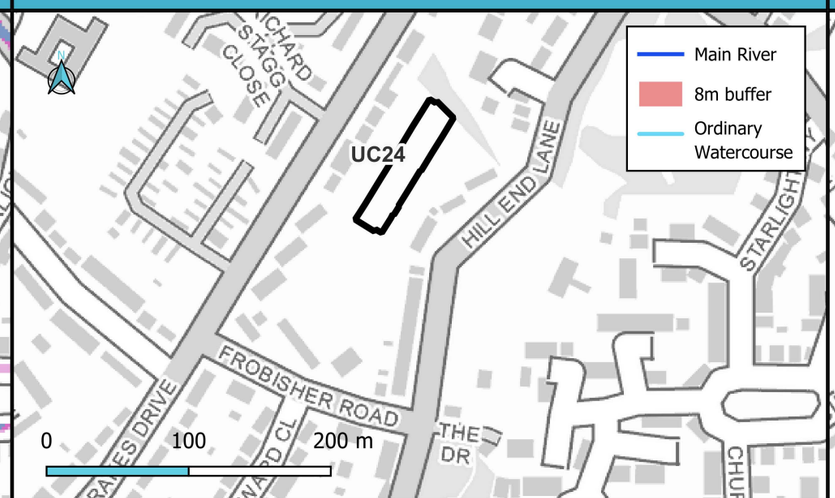
- RoFSW 1 in 30-year (3.33% AEP)
- RoFSW 1 in 100-year (1% AEP)
- RoFSW 1 in 1000-year (0.1% AEP)
- Site boundary

Surface Water Map + Climate Change



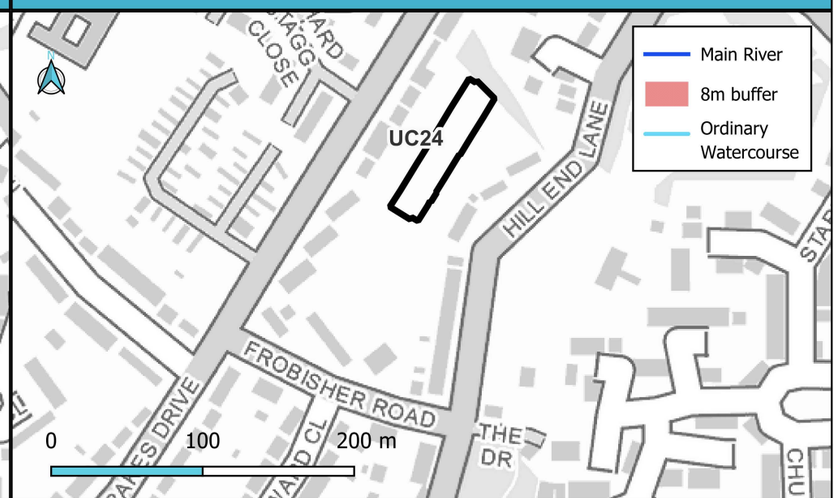
- RoFSW 1 in 30-year (3.33% AEP)
- RoFSW 1 in 30-year (3.33% AEP) plus 40%
- RoFSW 1 in 100-year (1% AEP)
- RoFSW 1 in 100-year 1% AEP plus 40%
- Site boundary

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

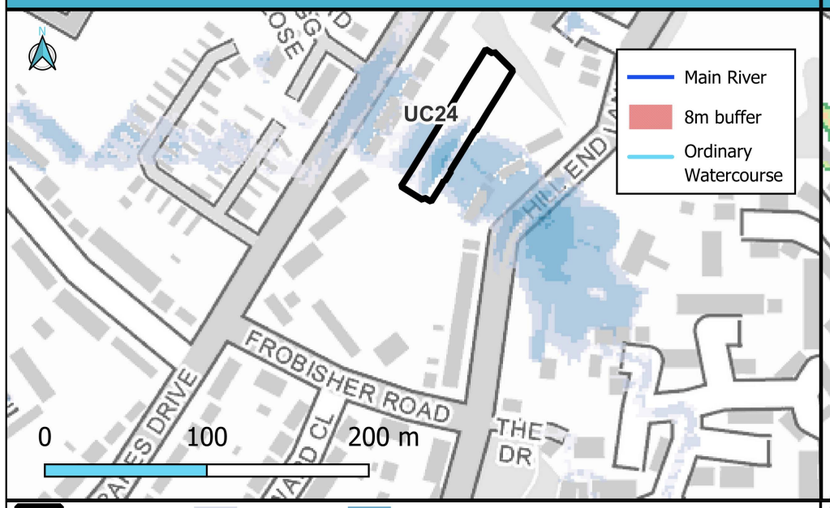


- Reservoir 'Dry Day' flood extent
- Reservoir 'Wet Day' flood extent
- Site boundary
- Reservoir - Fluvial contribution to flood extent

Site Reference	UC24
Site Name	Garages Rear of Hill End Lane (North)

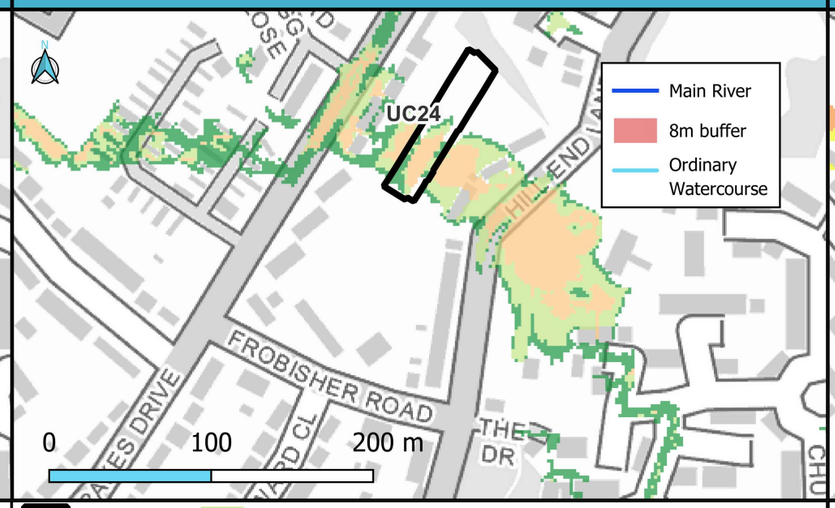
St Albans District Council
Strategic Flood Risk Assessment
Level 2 Detailed Site Summary

RoFSW Max Depth - 1% AEP



Site boundary
Depth (m)
0.00 - 0.15
0.15 - 0.30
0.30 - 0.60
0.60 - 0.90
0.90 - 1.20
> 1.20

RoFSW Max Hazard - 1% AEP

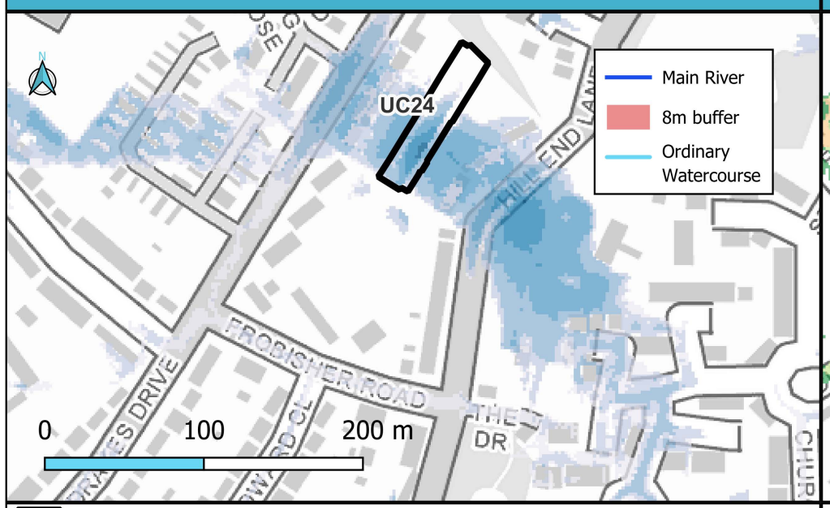


Site boundary
Hazard
< 0.75: Low
0.75 - 1.25: Moderate
1.25 - 2.00: Significant
> 2.00: Extreme

RoFSW Max Velocity - 1% AEP

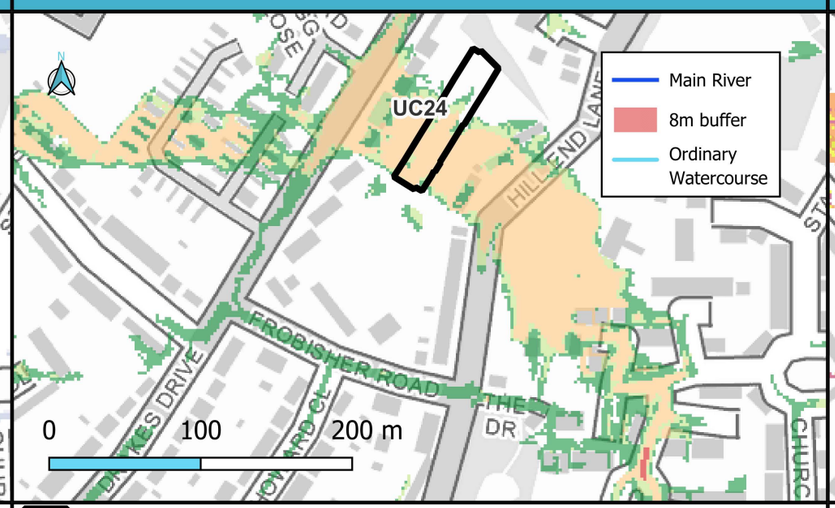
Site boundary
Velocity (m/s)
0.00 - 0.25
0.25 - 0.50
0.50 - 1.00
1.00 - 2.00
> 2.00

RoFSW Max Depth - 1% AEP + 40% CC



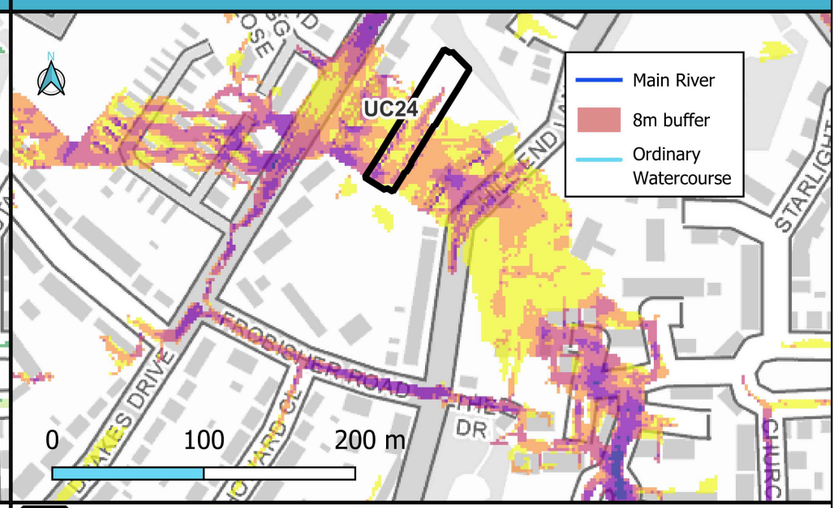
Site boundary
Depth (m)
<= 0.15
0.15 - 0.30
0.30 - 0.60
0.60 - 0.90
0.90 - 1.20
> 1.20

RoFSW Max Hazard - 1% AEP + 40% CC



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

RoFSW Max Velocity - 1% AEP + 40% CC



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