	St Albans City and District Council Level 2 Strategic Flood Risk Assessment Detailed Site Summary Table
Site details	
Address	Motor Repair Garage, Park Street Lane, Park Street
Area	0.29ha
Current land use	Commercial - 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 Park Street, a village located to the south of St Albans. The site is bordered to the north by Park Street Lane and the east by Frogmore – A5183. To the south is a pub and residential houses, and to the west farmland. The River Ver is located approximately 70m to the east of the site. The River Ver covers a catchment of approximately 146 km2. The site is located within the lower catchment, which is largely urban, as the site is located within the urban area of Park Street and south of the larger urban area of St Albans. The River Ver is part of the Colne Management Catchment, which covers a larger area of 1,040 km^2.
Topography	Environment Agency 1m resolution LIDAR across the site shows that topography is fairly flat. The site is in a 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 LIDAR shows that the sites elevation is between 67.4 to 68.0mAOD.
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 Park Street urban area, it is likely that the site is drained by the surface water drainage network. The River Ver is only approximately 0.07km to the east of the site.
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 River Ver (2019) 1D-2D hydraulic model received for this Level 2 SFRA. **Flood characteristics:** The site is located within Flood Zone 1 and is at negligible risk of fluvial flooding, despite being in close proximity to the River Ver. The site is not shown to be at risk in the River Model during the 0.1% AEP event.
Surface Water	**Proportion of site at risk (RoFSW):** **3.3% AEP** – 15% Max depth – 0.30 to 0.60m Max velocity – 0.50 – 1.00m/s **1% AEP** – 22% Max depth – 0.30 – 0.60m Max velocity – 0.50 – 1.00m/s **0.1% AEP** – 33% Max depth – 0.30 to 0.60 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, the northern area of the site is affected by surface water ponding. Flood depths range from between 0.15 to 0.60mAOD. Flood velocity is mainly <0.25m/s but reaches between 0.50 to 1.00m/s along the northern boundary where the water enters the site from Park Street Lane. The flood hazard is 'Very low' to 'Danger for some'. During the 1% AEP event, a larger section of the northern area of the site is affected by surface water. Flood depths are mainly 0.30 to 0.60 with the outer areas of the ponding between 0.15 to 0.30m. The flood velocity is primarily <0.25m/s, reaching a maximum of 0.50 to 1.00m/s along the northern boundary. The flood hazard is 'Very low' to 'Danger for some'. During the 0.1% event, the northern and central areas of the site as well as a section of the eastern area are affected by surface water. The flood depths are mainly between 0.30 to 0.60m in the northern and central areas, the eastern area of flooding is <0.15m. Flood velocities through the site range from <0.25m/s to a reach a maximum of 1.00 to 2.00m/s. The flood hazard ranges from 'Very low' to 'Danger for most'.

Reservoir	The Environment Agency's reservoir maps show the site is not at risk of flooding from reservoir flooding.
Groundwater	The JBA Groundwater mapping shows that 93% of the site has groundwater 0.5 to 5m below ground level,. Within this area there is a risk to subsurface assets, but the risk of groundwater emergence is low. However, 7% of the eastern area of the site has groundwater 0.025-0.5m below ground level. Within this area there is a risk of groundwater flooding to surface and subsurface assets, and there is the possibility of groundwater emerging at the surface locally. The risk form 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 25 historic incidences of sewer flooding, according to the Thames Water Hydraulic Sewer Flood Risk Register.
Flood history	There are no reported flood incidents within the site. However there have been several flood incidences reported for within the immediate vicinity of the site. Two separate surface water flood incidents were reported to Hertfordshire County Council, one event occurred in February 2017 with the second in July 2017. St Albans District Council also hold 2 further records of flooding near the site in July 2015 and June 2016, attributed to surface water.
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	Access and egress to the site is currently via Park Street Lane and Frogmore/Park Street (A5183). During the 3.3% AEP surface water event, there is a flow path flowing east along Park Street Lane and then south once it meets the A5183. The flood depth is mainly <0.15m, however where it meets the entrance to the northern entrance of the site on Park Street Lane it reaches a maximum depth between 0.30 to 0.60m. The flow path also extends into the site at this point from Park Street Lane, affecting the northern section of the site. The flow velocities are primarily 0.50 to 1.00m/s with a slightly lower velocity in places. The flood hazard is 'Very low' to 'Danger for some', and access/egress may be affected.

	During the 1% AEP surface water event, the depth of flooding along Park Street Lane and the A5183 reaches a maximum of 0.30 to 0.60m, with the remaining depths mainly between 0.15 to 0.30m. The northern section of the site is again affected by the flooding along Park Street Lane, reaching 0.30 to 0.60m. Flow velocities reach a maximum of 1.00 to 2.00m/s along Park Street Lane and small areas of the A5183. The flood hazard on Park Street to the west of the site is 'Danger for most' and access/egress will not be possible. The remaining flow route along the eastern part of Park Street Lane and the A5183 is classified as 'very low' to 'Danger for some' and access/egress will again be affected. During the 0.1% AEP surface water event, there is a large surface water flow route along Park Street Lane, affecting the northern part of the site. The flow route then extends south down the A5183 with an additional flow path joining from the northern part of the A5183. The flood depths are primarily between 0.30 to 0.60m with the A5183 north of the Park Street Lane junction <0.15m. The flow velocity is mainly between 1.00 to 2.00m/s along the flow paths adjacent to the site, with areas of lower velocity, 0.50 to 1.00m/s along parts of the A5183. The flood hazard along Park Street Lane is 'Danger for most' to 'Danger for all', as a result vehicular access and egress is not possible via this route. Along the A5183, the flood hazard is 'very low' to 'Danger for most', therefore vehicular access and egress to the site will not be possible. Developers will need to demonstrate safe access and egress in the 1% AEP event including an allowance for climate change. Raising of access routes must not impede ephemeral surface water flow routes.
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 latest climate change allowances have been applied to the River Ver (2019) model to indicate the impact of fluvial flood risk. Mapping from the model 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 a flow path entering the site from the north, affecting the central area of the site and exiting along the eastern boundary. The maximum flood depth, velocity and hazard is 0.65m, 1.39m/s and 'Danger for most'. The flow path along Park Street Lane is entirely classified as 'Danger for most', with flood velocities reaching >2.00m/s. The site is therefore highly sensitive to increased surface water risk as a result of 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 is comprised of Alluvium – Clay, silt, sand and gravel. A sedimentary superficial deposit.
	• Soils at the site consist of:
	  ○ Freely draining slightly acid bust base-rich soils, in the northern half of the site.
	  ○ Loamy and clayey floodplain soils with naturally high groundwater
	
	Sustainable Drainage Systems (SuDS)
	• Groundwater levels are indicated to be between 0.5 and 5m below ground level, for the majority of the site, and there is a risk of flooding to subsurface assets and below ground development such as basements. In the southeastern area of the site groundwater levels are indicated to be between 0.25 and 0.50m below ground level, detention and attenuation features in this area should be designed to prevent groundwater ingress from impacting hydraulic capacity and structural integrity. 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 with superficial deposits of clay, silt, sand and gravel 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 Zones 2 and 3. Proposed SuDS should be discussed with relevant stakeholders (LPA, LLFA and EA) 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. • 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 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 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 (LPA, LLFA and EA) 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 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 other sources of 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 and groundwater. • 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. **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 across the site, 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. • Arrangements for safe access and egress will need to be demonstrated for the 0.1% surface water event and 1% AEP plus climate change using the depth, velocity, and hazard outputs. • Should built development be proposed within the 1% AEP surface water flood extent, careful consideration will need to be given to flood resistance and resilience measures. • Flood resilience and resistance measures should be implemented where appropriate during the construction phase, e.g. raising of floor

	levels. These measures should be assessed to make sure that flooding is not increased elsewhere. ○ raise them as much as possible ○ include extra flood resistance and resilience measures. • Other examples of flood resistance and resilience measures include: ○ using flood resistant materials that have low permeability to at least 600mm above the estimated flood level ○ making sure any doors, windows or other openings are flood resistant to at least 600mm above the estimated flood level ○ by raising all sensitive electrical equipment, wiring and sockets to at least 600mm above the estimated flood level.

Key messages

The site is within Flood Zone 1, however is shown to be at significant risk of surface water flooding and may also be at risk form groundwater. Development may 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 0.1% AEP surface water and 1% AEP plus climate change event. Measures to reduce flood risk along these routes such as raising access, must not displace 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).

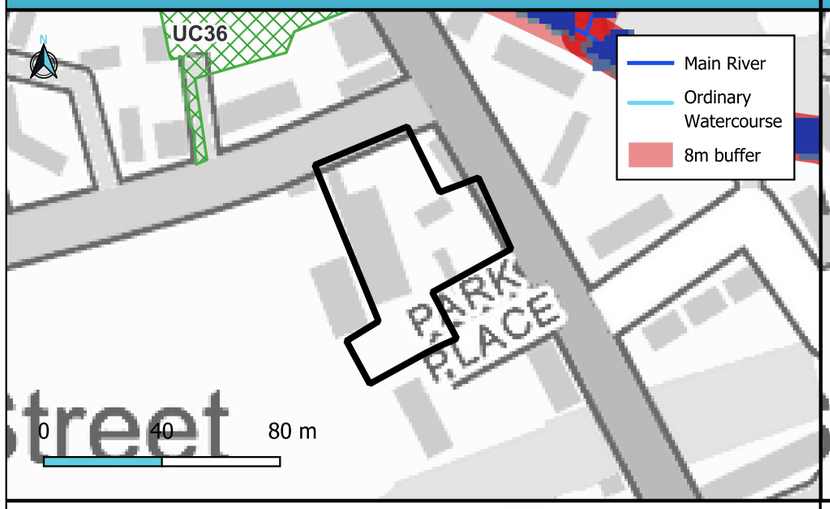
Mapping Information

Flood Zones	Flood Zones 2 and 3a have been taken from the Environment Agency's Flood Map for Planning mapping. Flood Zone 3b has been created from the River Ver (2019) hydraulic model.
Climate change	The most recent uplifts have been applied to the River Ver (2019) hydraulic model to indicate the impacts on fluvial flood risk. The latest climate change allowances have been applied to the Environment Agency's 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 River Ver (2019) 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	
Site Name	Motor Repair Garage, Park Street Lane, Park Street

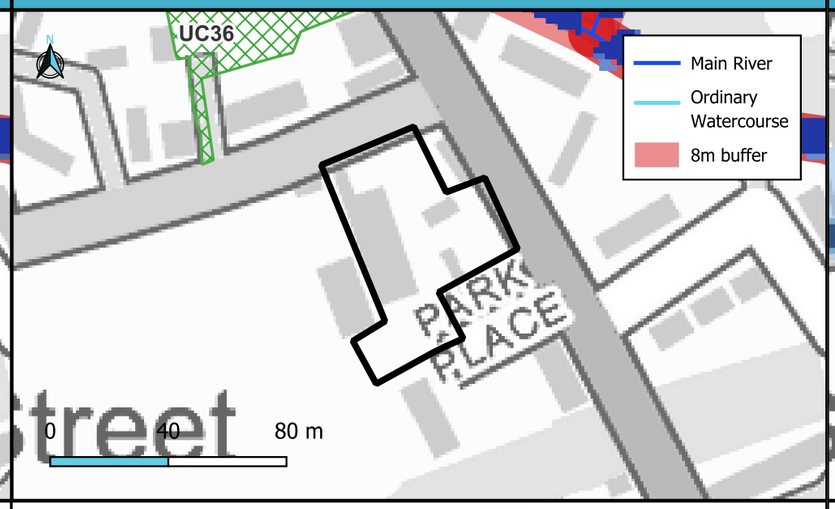
St Albans District Council
Strategic Flood Risk Assessment
Level 2 Detailed Site Summary

Flood Zone Map (present day)



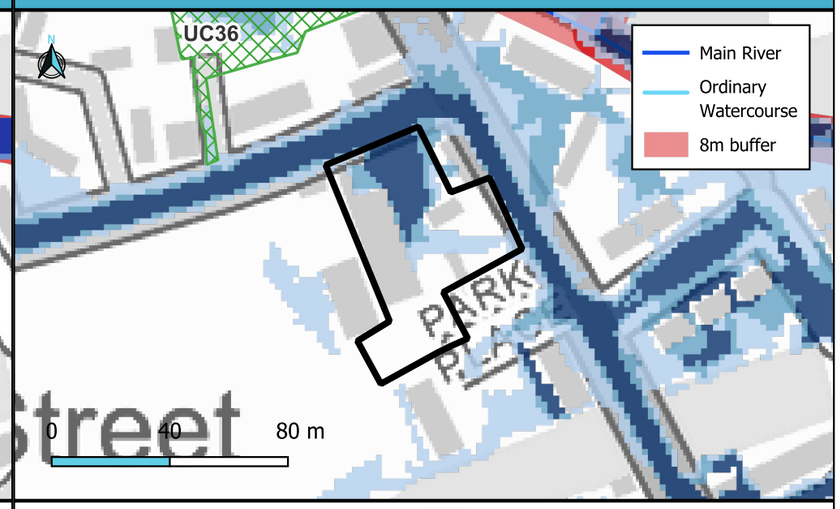
Flood Zone 2 (Between 1% and 0.1% AEP)
Flood Zone 3a (Between 3.33% and 1% AEP)
Flood Zone 3b (Less than 3.33% AEP)
Site boundary
Other site

Flood Zone 3b + Climate Change



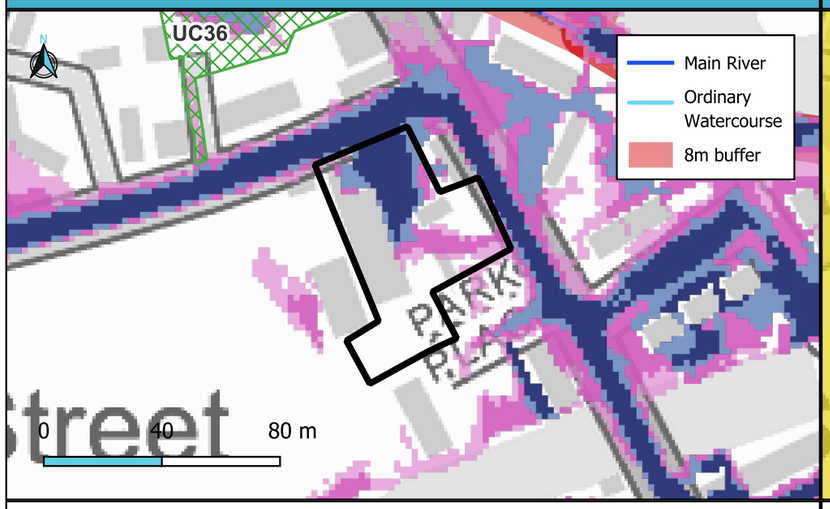
Flood Zone 3b + 21% (Central allowance)
Flood Zone 3b + 35% (Higher allowance)
Flood Zone 3b
Site boundary
Other site

Surface Water Map (RoFSW)



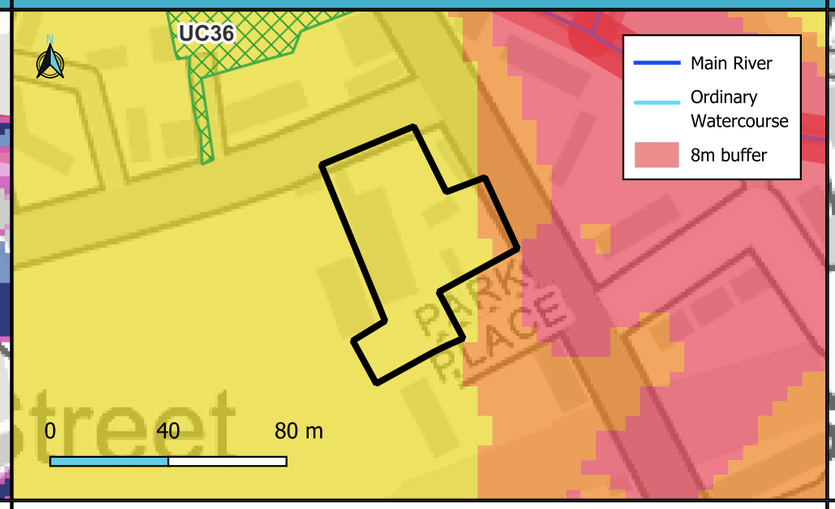
RoFSW 1 in 30-year (3.33% AEP)
RoFSW 1 in 100-year (1% AEP)
RoFSW 1 in 1000-year (0.1% AEP)
Site boundary
Other site

Surface Water Map + Climate Change



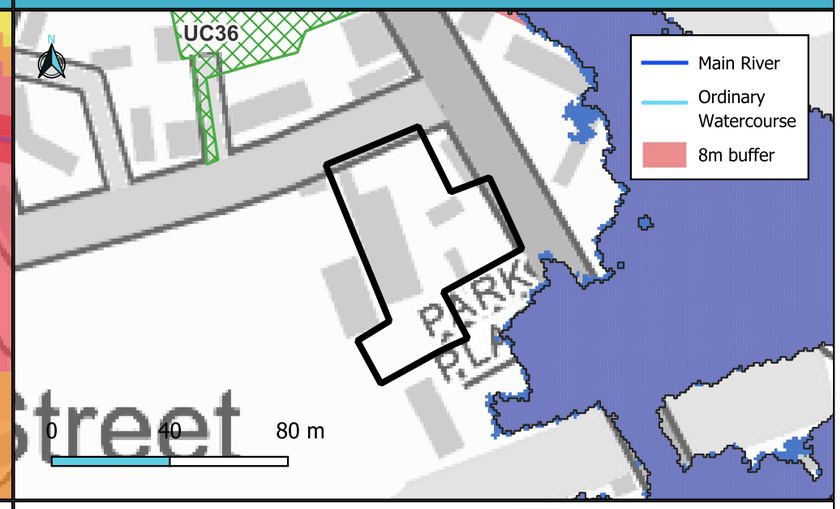
RoFSW 1 in 30-year (3.33% AEP)
RoFSW 1 in 30-year (3.33% AEP) plus 40%
RoFSW 1 in 100-year (1% AEP)
RoFSW 1 in 100-year 1% AEP plus 40%
Site boundary
Other site

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

Site Reference	
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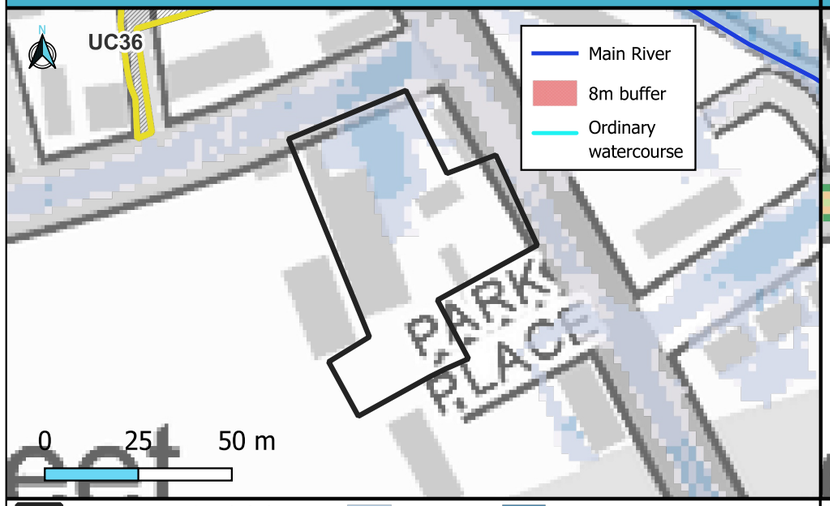
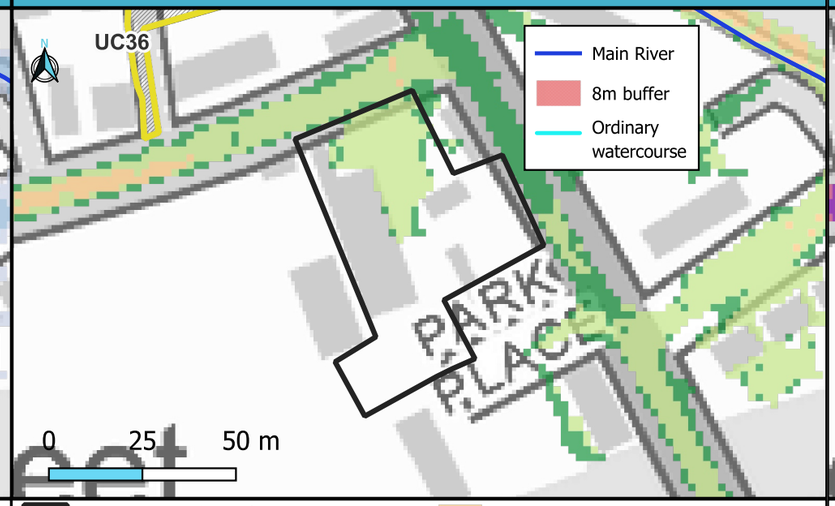
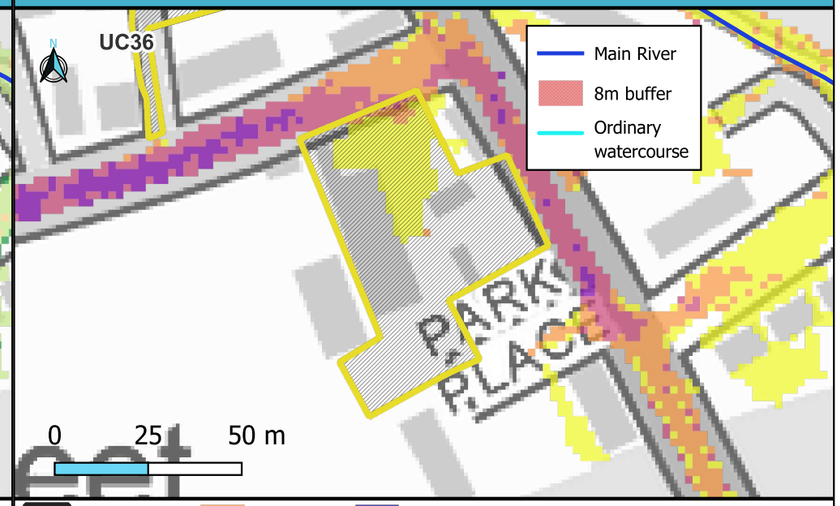
RoFSW Max Depth - 1% AEP



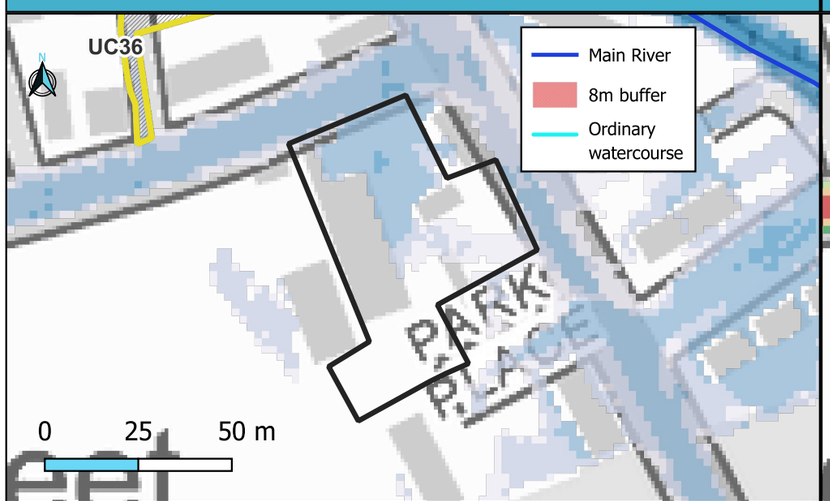
RoFSW Max Hazard - 1% AEP



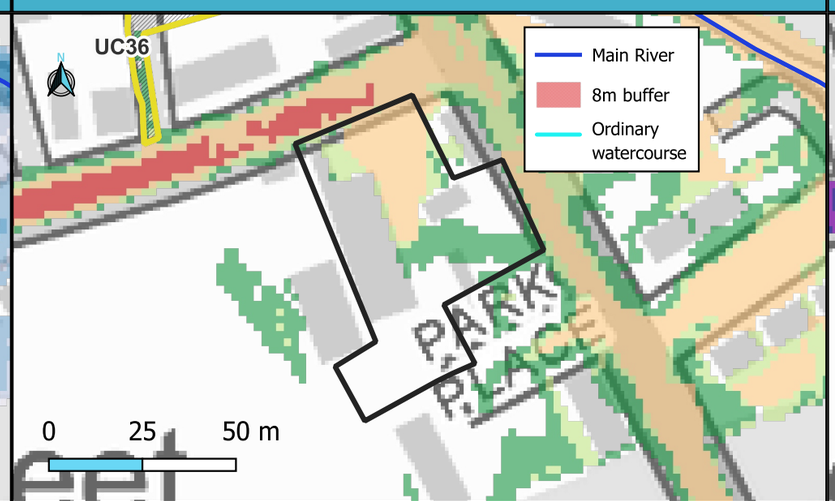
RoFSW Max Velocity - 1% AEP



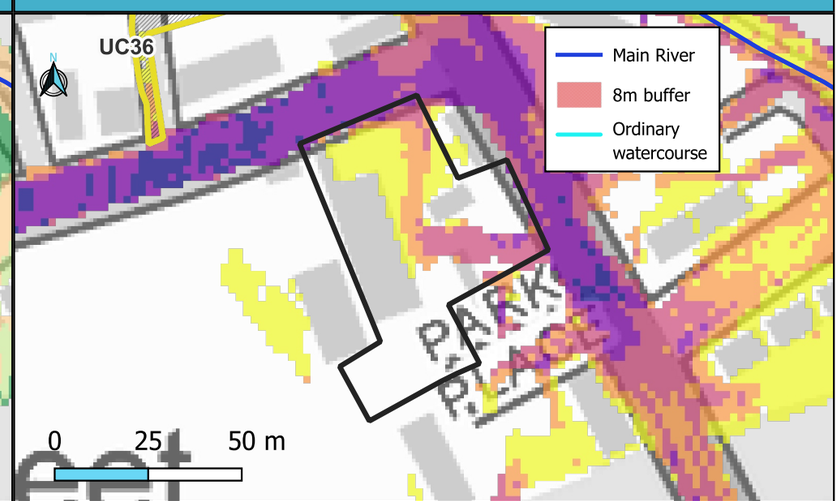
RoFSW Max Depth - 1% AEP + 40% CC



RoFSW Max Hazard - 1% AEP + 40% CC



RoFSW Max Velocity - 1% AEP + 40% CC



Site Reference	
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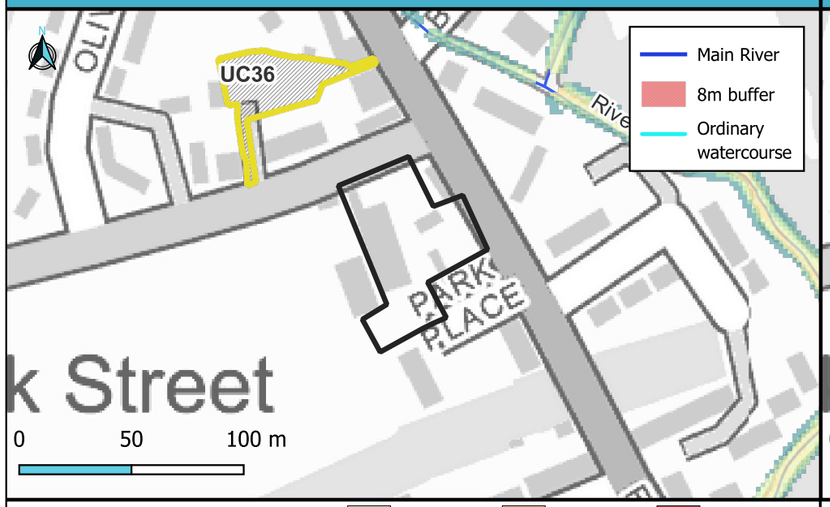
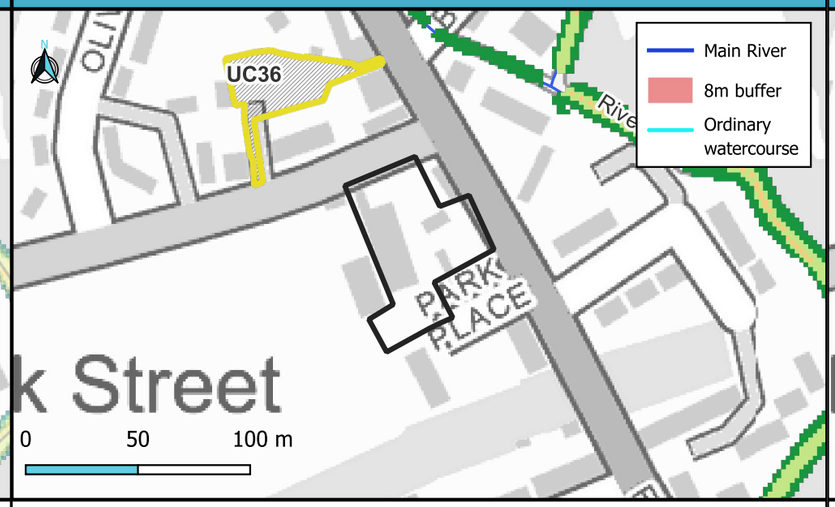
Max Fluvial Flood Depth (m) - 1% AEP



Site boundary
Site boundary
Other sites

Depth (m)
<= 0.25
0.25 - 0.50
0.50 - 0.75
0.75 - 1.00
1.00 - 1.25
1.25 - 1.50
1.50 - 1.75
1.75 - 2.00
> 2.00

Max Fluvial Flood Hazard - 1% AEP



Site boundary
Site boundary
Other sites

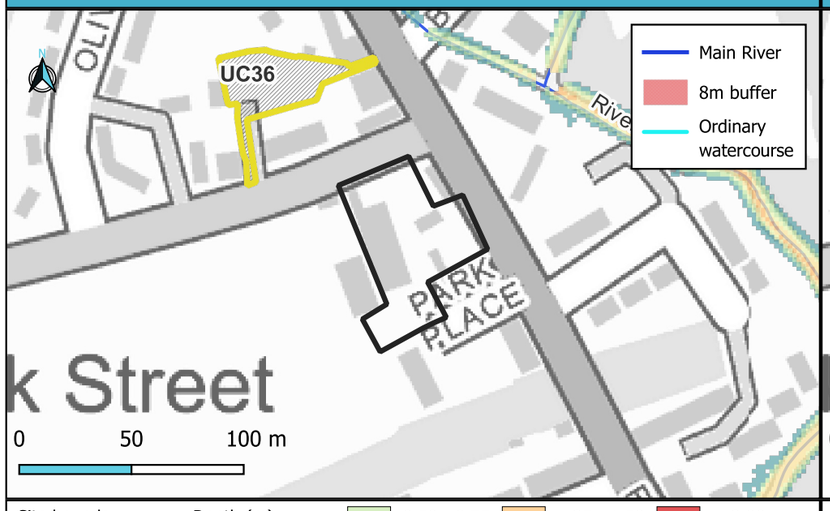
Hazard
<= 0.75: Low
0.75 - 1.25: Moderate
1.25 - 2.00: Significant
> 2.00: Extreme

Max Fluvial Flood Velocity (m/s) - 1% AEP

Site boundary
Site boundary
Other sites

Velocity (m/s)
<= 0.25
0.25 - 0.50
0.50 - 1.00
1.00 - 2.00
> 2.00

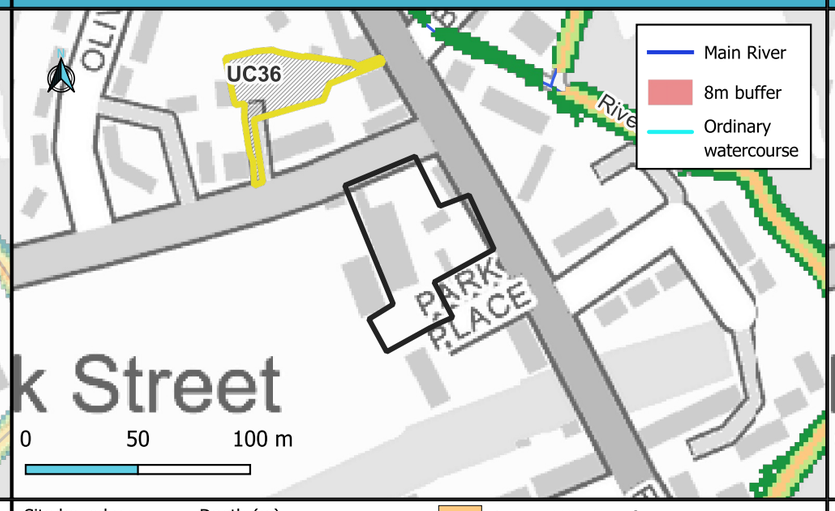
Max Fluvial Flood Depth - 1% AEP +35% CC



Site boundary
Site boundary
Other sites

Depth (m)
<= 0.25
0.25 - 0.50
0.50 - 0.75
0.75 - 1.00
1.00 - 1.25
1.25 - 1.50
1.50 - 1.75
1.75 - 2.00
> 2.00

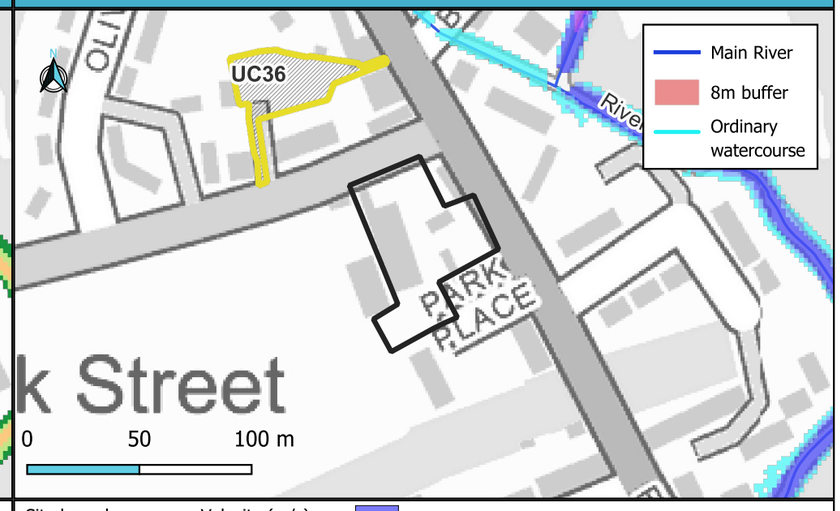
Max Fluvial Flood Hazard - 1% AEP +35% CC



Site boundary
Site boundary
Other sites

Depth (m)
<= 0.75: Low
0.75 - 1.25: Moderate
1.25 - 2.00: Significant
> 2.00: Extreme

Max Fluvial Flood Velocity - 1% AEP +35% CC



Site boundary
Site boundary
Other sites

Velocity (m/s)
<= 0.25
0.25 - 0.50
0.50 - 1.00
1.00 - 2.00
> 2.00