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

Site details	
Site Code	**P1**
Address	Smallford Works, Smallford Lane, AL4 0SA
Area	3.34ha
Current land use	Commercial
Proposed land use	Residential
Flood Risk Vulnerability	More Vulnerable
Sources of flood risk	
Location of the site within the catchment	The site is located to the east of St Albans in the rural village of Sleapshyde in Hertfordshire. To the north of the area is the A1057 and to the south the A414. The site is situated on the western side of the Sleapshyde and is predominantly surrounded by greenspace. Smallford Lane makes up the eastern boundary of the site and the Butterwick Brook borders part of the western boundary. The Butterwick Brook is a small tributary of the Ellen Brook and subsequently the River Colne. It is within the Upper Colne and Ellen Brook catchment, which covers an area of 95.46km2. The site is within the lower part of the catchment, in a mainly rural area. The site also falls within the Colne Management Catchment, which covers a larger area of 1,040 km².
Topography	Environment Agency 1m resolution LIDAR data across the site shows the elevation varies between 72.4 and 73.8 mAOD. The site currently consists of a commercial yard with several large warehouses, accessed by two main roads into Smallford Works. Lower elevations ranging from 72.4 to 72.8 mAOD are found along the access roads leading to the site entrances, as well as in the western corner near Butterwick Brook. The highest elevations within the site are in the northeast and northwest corners at 73.8 mAOD, sloping down towards the access roads.
Existing drainage features	According to the Environment Agency's Detailed River Network, the Butterwick Brook runs along a section of the western boundary of the site, flowing in a southerly direction. This watercourse later joins the Ellen Brook south of the A414 and eventually converges with the River Colne, approximately 1 km south of the site.

	North of the site is Smallford Fishery, a large pond. Along the eastern boundary, just outside Smallford Lane, runs a highway ditch. There are no visible existing drainage features within the site based on topographic mapping or aerial imagery.
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 lies outside the 0.1% AEP flood extents from the Environment Agency's Upper Colne (2010) Model. No detailed hydraulic modelling was available for this site. **Flood characteristics:** Despite the Butterwick Brook running close to the western boundary of the site, the site itself is not situated within the Environment Agency's Flood Zone 3a, 3bor Flood Zone 2. The site is located within Flood Zone 1 and is at negligible risk of fluvial flooding.
Surface Water	**Proportion of site at risk (RoFSW):** **3.3% AEP** – 0% Max depth – N/A Max velocity – N/A **1% AEP** – 0% Max depth – N/A Max velocity – N/A **0.1% AEP** – 46% Max depth – 0.60 – 0.90m 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:** There are no surface water flow paths through the site during the 3.33% or 1% AEP events. During the 0.1% AEP event, a large surface water flow path traverses through the site. The flow route enters from the north, splitting with one

	part heading southwest towards Butterwick Brook, and the other flowing south along the main access road. Flood depths across the site range primarily from 0.15 to 0.30 m, with some areas experiencing ponding between 0.30 to 0.60 m. The maximum flood depths are predicted along the western boundary where it meets Butterwick Brook, reaching depths of 0.60 to 0.90 m. Flood velocities vary between 0.25 to 0.5 m/s or 0.50 to 1.00 m/s, with localized higher velocities up to 1.00 to 2.00 m/s along the main access road, particularly near the southern entrance. The flood hazard is predominantly classified as 'very low' to 'danger for some', with small areas classified as 'danger for most' in the western corner of the site and at the junction where the two access roads meet.
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 55% of the site primarily in the western half of the site is at high risk of groundwater flooding with groundwater levels positioned at or within 0.025m of ground level. Additionally, 3% of the site faces groundwater levels ranging from 0.025 to 0.5m below ground level, while the remaining 42% on the eastern side is not at risk of groundwater flooding.
Sewers	The site is located within a postcode area with 2 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.
Flood risk management infrastructure	
Defences	The Environment Agency AIMS dataset shows that the site is not protected by any formal flood defences.
Residual risk	Part of the site is at residual risk of flooding, specifically the western border that runs along the Butterwick Brook. This is due to just downstream of the site the brook enters a culvert under a farm track. If this were to become blocked the western corner maybe at risk of flooding. Additionally, there is a large body of water close to the northern boundary of the site; Smallford Fishery, which if it overtopped, could cause flooding the site. The residual risk to the site posed from a culvert blockage and potential overtopping must be considered in a site-specific Flood Risk Assessment.
Emergency planning	
Flood warning	A small section of the western boundary by the Butterwick Brook is located in the following Environment Agency Alert Warning and Alert Areas. This is the: • 62WAF28UpColne Warning Area

	• The Upper River Colne and Radlett Brook at Colney Heath Flood Alert Area • London Colney, Borehamwood and Radlett Flood Alert Area However, the rest of the site is not within an Environment Agency Alert or Warning Area.
Access and egress	Access and egress to the site is currently via Smallford Lane, with the site having two entrances on the eastern boundary. One in the centre of the eastern boundary and the other in the southeastern corner where the junction of Smallford Lane and Sleapshyde Lane is located. During the 3.3% and 1% AEP surface water events, all access routes are minorly inundated by surface water; however, access and egress is not impeded. During the 0.1% AEP surface water event there is a flow route along the Smallford Lane, from north of the site to the A414. Flood depths are mainly 0.30 to 0.60m however there are some areas of ponding which reach 0.9 to 1.2m, with velocities reaching 1.00 to 2.00m/s. The flood hazard for Smallford Lane reaches 'Danger for most'. Therefore, vehicular access is not possible. 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 Butterwick Brook is not included within the Upper Colne (2010) model. Therefore, the impact from climate change on the fluvial flooding is unknown. Mapping shows that the site is within Flood Zone 1 and with the latest climate change allowances applied 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. Unlike the 1% AEP scenario, the 1% AEP plus 40% climate change event effects most of the site. The extent is similar to that of the 0.1% AEP, with a large flow route through the site affecting the main access road and the

	western corner. The maximum depth, velocity, and hazard of this surface water is 0.7m, 1.5m/s, and 'Danger for most'. This change in extent and depth shows that this site is sensitive 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 is comprised of Lowestoft Formation – Diamicton, a chalky till with outwash sands and gravels, silts and clays. A sedimentary superficial deposit.
	• Soils at the site consist of:
	  ○ Freely draining slightly acid loamy soils.
	
	Sustainable Drainage Systems (SuDS)
	• Groundwater levels are indicated to be at or very near (within 0.025m) ground level and there is a risk of groundwater flooding at the surface during a 1% AEP event, which may flow to and pool within topographic low spots. 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. Although, groundwater mapping indicates that the site is at moderate risk of groundwater flooding, therefore infiltration techniques may not be suitable. This should be confirmed through infiltration testing 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, the Lead Local Flood Authority 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. However, the land adjacent to the site to the north and west was 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 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 (St Albans City and District Council, Hertfordshire County Council (LLFA) 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. • The potential to utilise conveyance features such as swales to intercept and convey surface water runoff should be considered. Conveyance features should be located on common land or public open space to facilitate ease of access. Where slopes are >5%, features should follow contours or utilise check dams to slow flows.
NPPF and planning implications	
Exception Test requirements	The site is within Flood Zone 1 but at risk from surface water and groundwater. 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:
	  ○ Greater than one hectare
	  ○ At risk of other sources of flooding (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 form groundwater flooding to the site.
	• Consultation with the St Albans City and District Council, Hertfordshire County Council (Lead Local Flood 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).
	• Mitigation for seasonal high groundwater levels must be considered (for example by raising finished floor levels to an appropriate height above ground level).
	• Due to the high groundwater flood risk, basements are not advisable.
	• The design of the development and its 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.
	• 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.

- Arrangements for safe access and egress will need to be demonstrated for the 1% AEP surface water plus an allowance for climate change rainfall events with an appropriate allowance for climate change, using the depth, velocity, and hazard outputs.
- Planning permission is required to surface more than 5 square metres of unpaved ground using a material that cannot absorb water.
- 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 only likely to be able to proceed if:

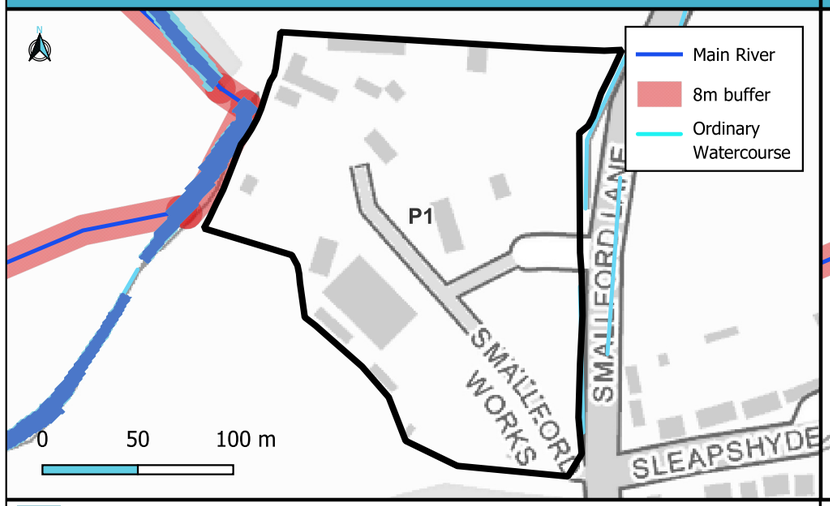
- A site-specific FRA demonstrates that the site is not at an increased risk of flooding in the future and that development of the site does not increase the risk of surface water flooding on the site and to neighbouring areas.
- The site will need to be subject to a contaminated land Risk Assessment and if necessary, any appropriate treatment.
- 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 and 1% AEP surface water plus an allowance for climate change rainfall events with an appropriate allowance for climate change, using the depth, velocity, and hazard outputs.
- A site-specific Surface Water Drainage Strategy, and SuDS maintenance and management plan is submitted along with the FRA.
- 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 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	P1
Site Name	Smallford Works, Smallford Lane, AL4 0SA

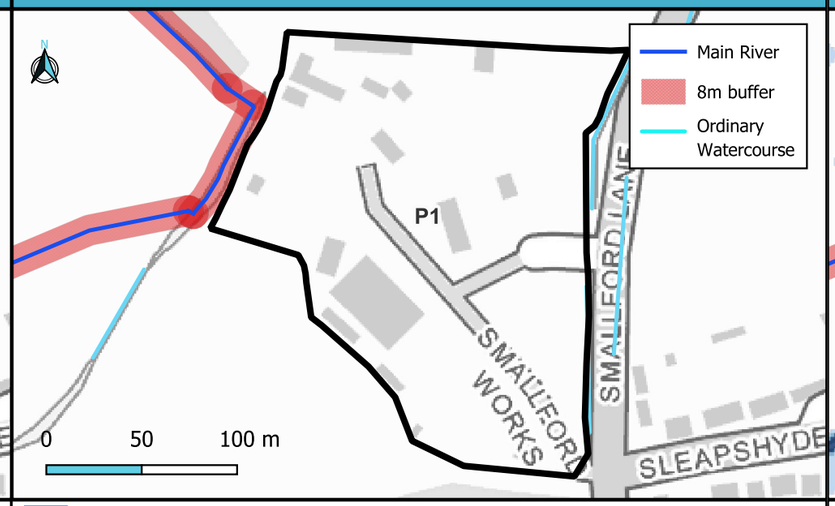
St Albans District Council
Strategic Flood Risk Assessment
Level 2 Detailed Site Summary

Flood Zone Map (present day)



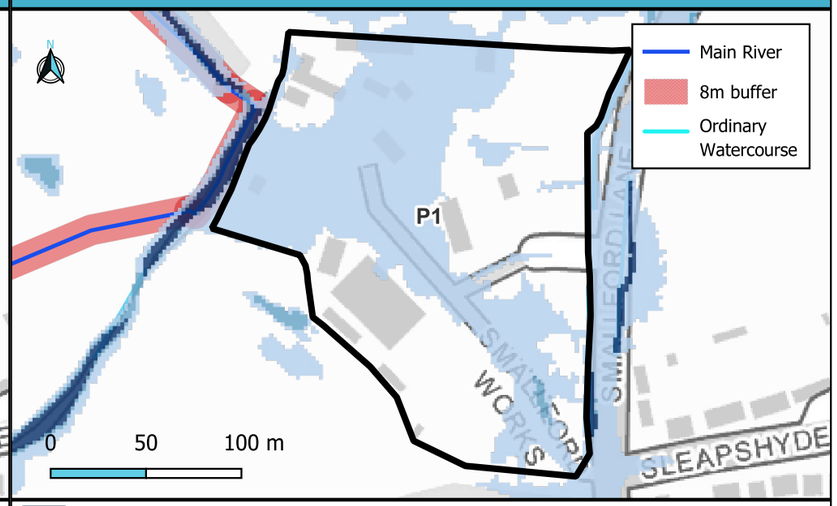
- Flood Zone 2 (Between 1% and 0.1% AEP)
- Flood Zone 3a (Between 3.33% and 1% AEP)
- Flood Zone 3b (Less than 3.33% AEP)
- Site boundary

Flood Zone 3b + Climate Change



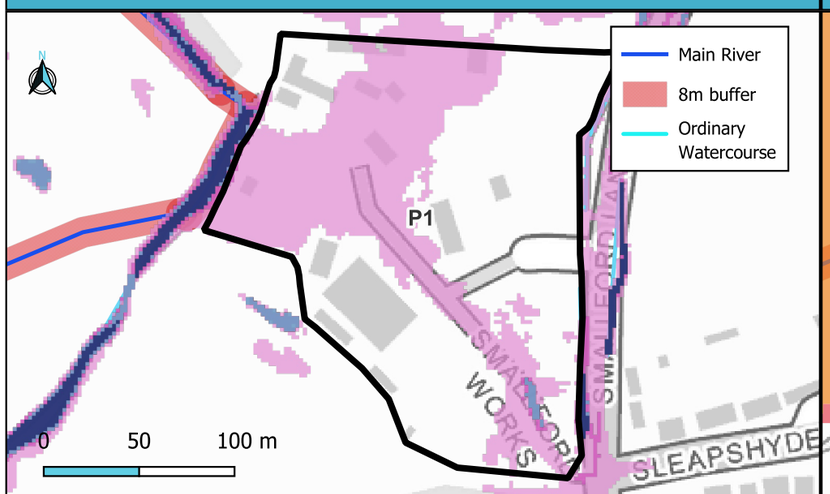
- Flood Zone 3b + 21% (Central allowance)
- Flood Zone 3b + 35% (Higher allowance)
- Flood Zone 3b
- Site boundary

Surface Water Map (RoFSW)



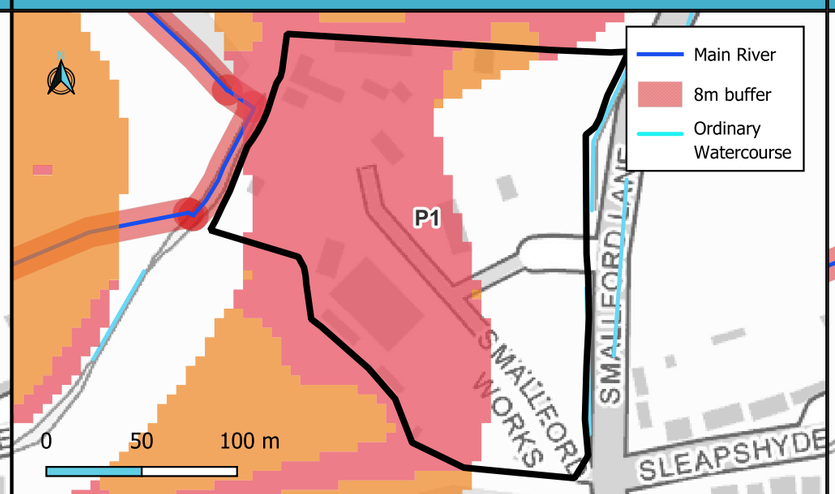
- RoFSW 1 in 30-year (3.33% AEP)
- RoFSW 1 in 100-year (1% AEP)
- RoFSW 1 in 1000-year (0.1% AEP)
- Site boundary

Surface Water Map + Climate Change



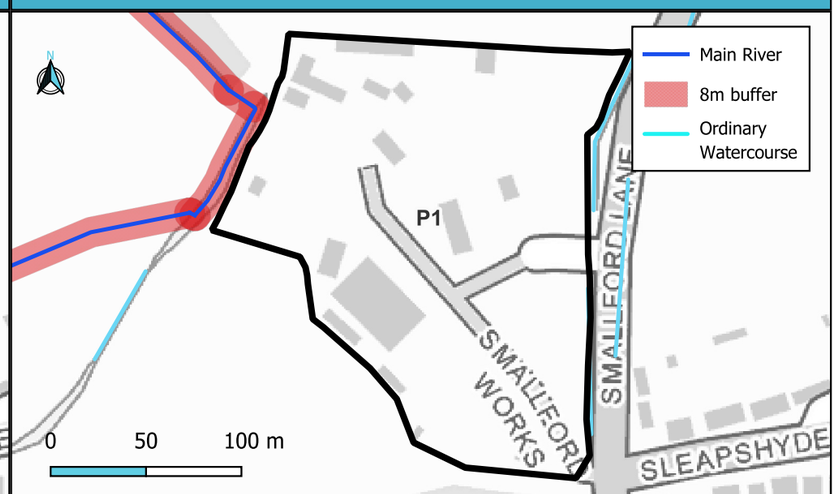
- RoFSW 1 in 30-year (3.33% AEP)
- RoFSW 1 in 30-year (3.33% AEP) plus 40%
- RoFSW 1 in 100-year (1% AEP)
- RoFSW 1 in 100-year 1% AEP plus 40%
- Site boundary

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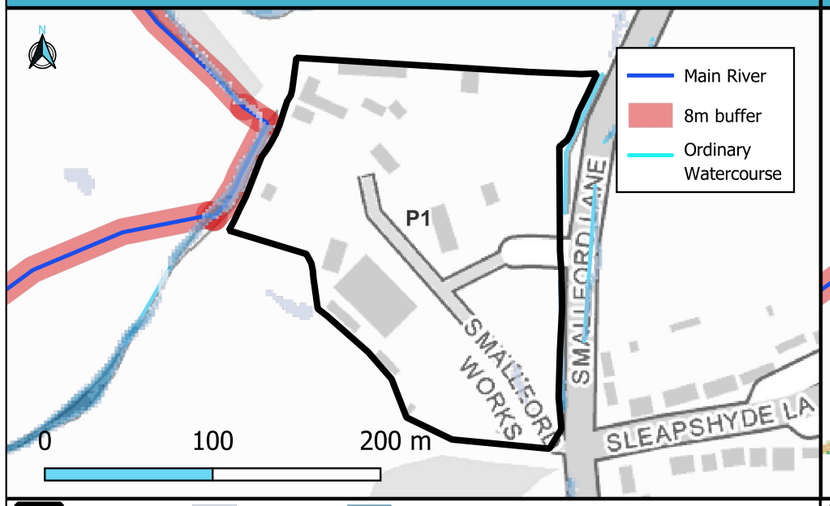
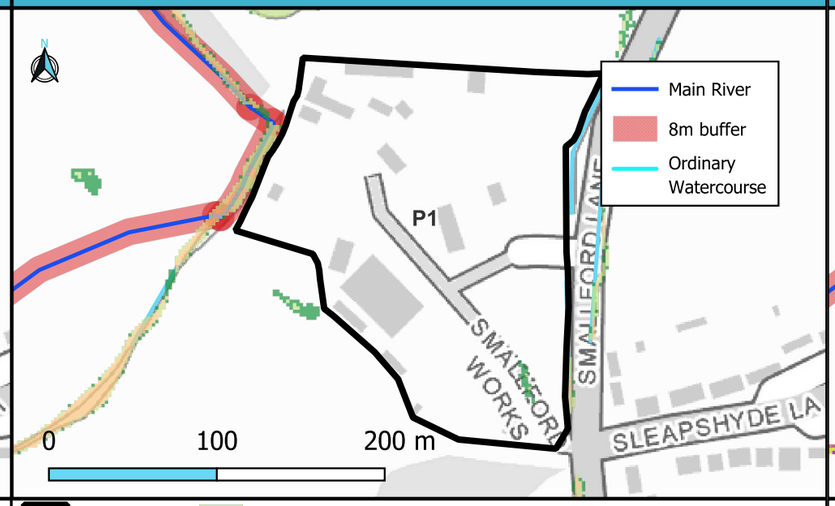
St Albans District Council
Strategic Flood Risk Assessment
Level 2 Detailed Site Summary

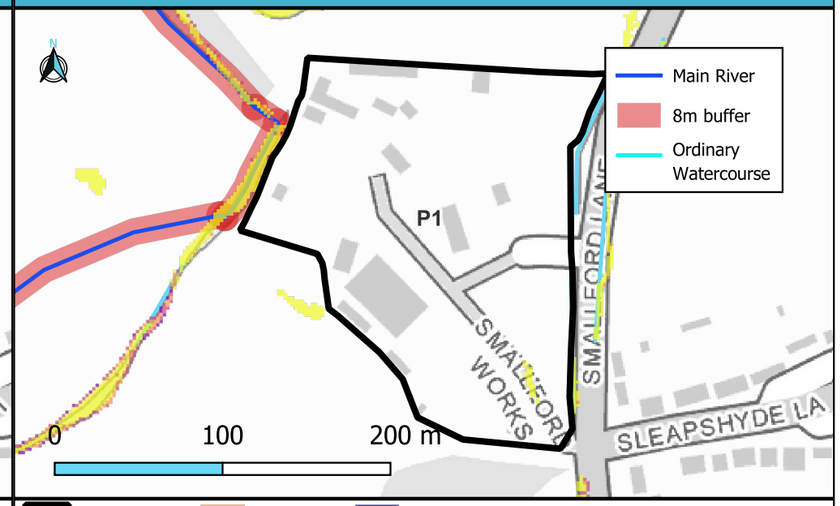
RoFSW Max Depth - 1% AEP



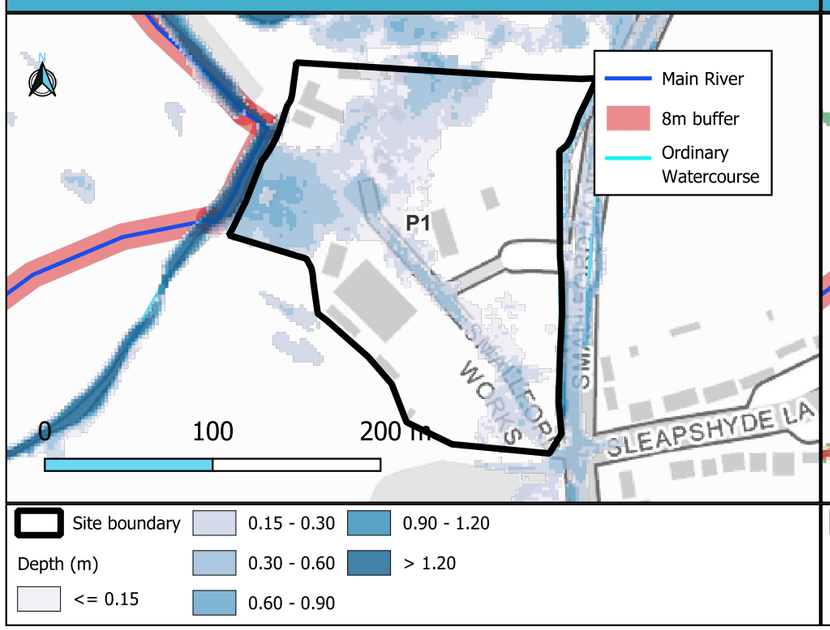
RoFSW Max Hazard - 1% AEP



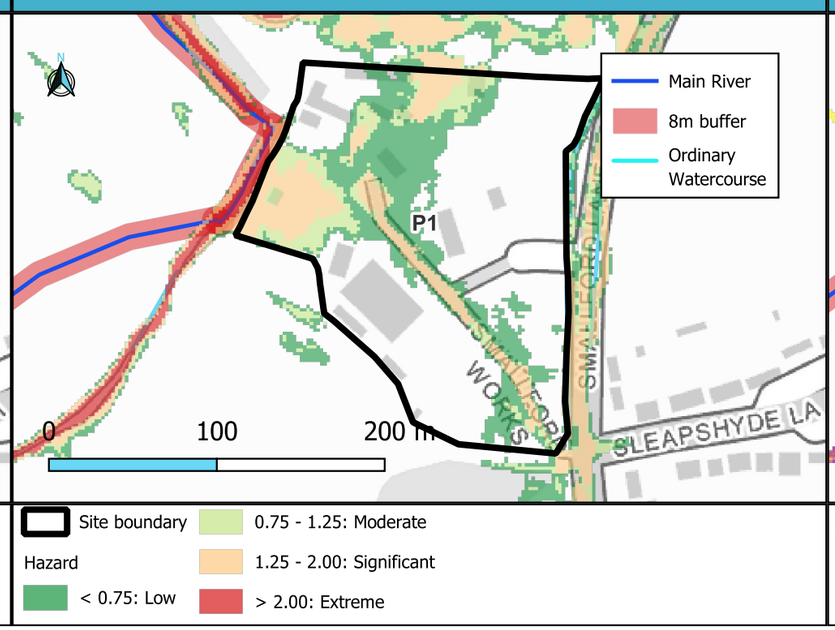
RoFSW Max Velocity - 1% AEP



RoFSW Max Depth - 1% AEP + 40% CC



RoFSW Max Hazard - 1% AEP + 40% CC



RoFSW Max Velocity - 1% AEP + 40% CC