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

Site details	
Site Code	**B5**
Address	Glinwell, Hatfield Road, St Albans, AL4 0HE
Area	20.85ha
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 in the village of Smallford, which lies between St Albans to the west and Hatfield to the east. The village is just to the north of the North Orbital Road which links to the A1 (M) via junction 3 to the east of the site. The A1057 runs through Smallford and makes up the site's northern boundary. The eastern boundary is comprised of Station Road, and the southern by Alban Way a shared-use path along the former Hatfield and St Albans Railway. The western boundary borders commercial units along Lyon Way. The Butterwick Brook flows through the western area of the site. 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 95.46km^2. The site is located within the lower catchment, in a mainly rural area. The Upper Colne and Ellen Brook is part of Colne Management Catchment, which spans 1,040 km^2.
Topography	Environment Agency 1m resolution LIDAR across the site shows that topography varies. The LIDAR data indicates that the highest elevations are in the northeastern area of the site, with lower elevations in the west along Butterwick Brook. The highest elevation within the site is 76.8mAOD in the northeastern area, where elevations range between 76.2 to 76.8mAOD. The southeastern corner is slightly lower, with elevations between 75.1 to 75.9mAOD. In the area where the current western warehouse is located, elevations are primarily around 75mAOD. Along Butterwick Brook, elevations range from 73.9mAOD at the upstream end to 72.1mAOD at the downstream end on the southern boundary. The area of the site to the west of the brook slopes down from the western boundary to the brook, with elevations ranging between 75.0m and 75.6mAOD.

Existing drainage features	Butterwick Brook, a tributary of the River Colne runs through the western side of the site, from north to south. The River Colne is approximately 2.6km to the south of the site.
Fluvial	**The proportion of site at risk FMFP:** FZ3b – 11% FZ3a – 11% FZ2 – 14% FZ1 – 86% 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. No detailed hydraulic modelling was available for this site. **Flood characteristics:** The Butterwick Brook, which flows through the western area of the site, is within the extents of Flood Zones 3a and 3b, including an area to the west of the brook. Additionally, there is anarea of ponding along the northern boundary on the A1057, where the brook enters the site, with an additional flow path entering the site before rejoining the brook. Flood Zone 2 covers a slightly larger extent, particularly at the upstream end of the Butterwick Brook.
Surface Water	**Proportion of site at risk (RoFSW):** **3.3% AEP** – 2% Max depth – >1.20m Max velocity – 1.00 – 2.00m/s **1% AEP** – 5% Max depth – >1.20m Max velocity – N/A **0.1% AEP** – 26% Max depth – >1.2m Max velocity – N/A **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 surface water flow path is along the topographic depression where the Butterwick Brook is located, with some small areas of ponding to the west of the flow path. Flood depths reach a maximum of >1.20m along the main surface water flow path, with the

	areas of ponding to the west reaching a maximum of 0.60 to 0.90m. Velocities along the surface flow path reach a maximum of 1.00 to 2.00m/s, while the areas of ponding experience velocities of <0.25m/s. The flood hazard ranges from 'Very low' to 'Danger for most'. During the 1% AEP event, there is a surface water flow route along the western side of the site, following the topographic depression where the Butterwick Brook is located. In addition, there are several areas of ponding located around this main flow path. There are also several smaller areas of ponding located around the current buildings in the eastern part of the site. Within the flow path along the western side of the site, the flood depth and velocity reach a maximum of >1.2m and >2.00m/s, respectively. The areas of ponding around the main flow path have various flood depths ranging from <0.15m to between 0.60 to 0.90m. The velocities within these areas are <0.25m/s. The areas of ponding in the eastern side of the site are small and along building boundaries. The maximum flood depths and velocities are 0.30 to 0.60m and <0.25m/s. The flood hazard varies across the site, from 'Very low' to 'Danger for all'. The areas with the higher hazard rating are along the main flow path in the western side of the site. During the 0.1% AEP event, the majority of the western side of the site is covered by surface water. There are also several areas of surface water ponding in the eastern side of the site along building boundaries. Flood depths within western flow path reach a maximum depth of >1.2m in the topographic depression where the Butterwick Brook is located. The wider flow path extends to the west and east and has depths mainly between 0.60 to 0.90m. The flow velocity is mainly 0.50 to 1.00m/s, with a maximum of >2.00m/s in some areas. The areas of surface water ponding in the east of the site have depths mainly between 0.30 to 0.60m, with the exception of the small area of ponding to the west of the current access road in the north of the site reaching between 0.60 to 0.90m. All areas of ponding have velocities <0.25m/s. The flood hazard varies from 'Very low' to 'Danger for most'.
Reservoir	The Environment Agency's reservoir maps show the site is not at risk of flooding from any reservoir.
Groundwater	The JBA Groundwater mapping, shows that the western half of the site, specifically the areas adjacent to the Butterwick Brook are at varied risk from groundwater flooding. 29% of the site is at high risk from surface water flooding, with groundwater levels within 0.025m of ground level. An additional 8% of the site is at moderate risk of groundwater flooding, with groundwater within 0.025 to 0.5m of ground level. The eastern half of the site, totalling 63% of the site, is not at risk from groundwater flooding.
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. .

	One flood incident was reported to Hertfordshire County Council adjacent to the sites eastern border on Station Road. In June 2016 surface water flooded the road.
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 area around Butterwick Brook. Within the site the Brook enters a culvert under a small access road, additionally the brook also enters another culvert at the southern end of the site under the embankment of Alban Way. Both or one of these culverts could become blocked and causing a higher risk of flooding within the western area of the site. The residual risk to the site posed from a culvert blockage must be considered in a site-specific Flood Risk Assessment.
Emergency planning	
Flood warning	A large portion of the western and central area of the site is located in an Environment Agency Flood Alert Area. It is located specifically within the 062WAF28UpColne, The Upper River Colne and Radlett Brook at Colney Heath, London Colney, Borehamwood and Radlett flood alert area.
Access and egress	Access and egress into the site is currently via entrance on Hatfield road, and 3 secondary entrances on Station Road. There is the potential for a pedestrian entrance on the southern border onto Alban Way. There is safe access and egress during the 3.3% AEP surface water flood event as there is no flooding along any of the access routes. During the 1% AEP surface water event, there is only a small area of surface water on Hatfield Road to the west of the current main entrance. Flood depths reach a maximum of 0.30 to 0.60m, with velocities reaching a maximum of 0.50 to 1.00m/s. The flood hazard ranges from 'Very low' to 'Danger for some', therefore access and egress is possible along this area of Hatfield Road. The flow path from the Butterwick Brook across the road has been discounted as the water would ordinarily be in culvert which is not modelled in the RoFSW model. All other access and egress routes are safe for vehicular and pedestrian access as there is no surface water flooding along any of these routes. During the 0.1% AEP surface water event, there is a surface water flow route along the section of Hatfield Road that runs the northern boundary of the site, in addition to a flow route along Station Road along the site's eastern boundary. There is also surface water along Alban Way to the south of the site. The flow path along Hatfield Way at the upstream end, from the roundabout to just west of the entrance, has flood depths <0.15m, reaching a maximum slightly further west of between 0.60 to 0.90m. Velocities vary between 0.25 to 0.50m/s and 0.50 to 1.00m/s. The flood hazard ranges from 'Very low' to 'Danger for most', therefore access and

	egress is not possible to the west along Hatfield Road from the site. The surface water flow route south along Station Road reaches a maximum depth of 0.15 to 0.30m, with velocities varying from <0.25m/s to a maximum of 0.50 to 1.00m/s. The associated flood hazard is 'Very low' to 'Danger for some'. As a result, vehicular access and egress is possible along this route. The surface water flooding along Alban Way reaches a maximum depth and velocity of 0.60 to 0.90m and 1.00 to 2.00m/s. The flood hazard is classified as 'Danger for some' to 'Danger for most', therefore pedestrian 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 has not been included within the Upper Colne (2010) or London Colney (2018) models. Instead, the Environment Agency's Flood Zone 2 has been used as an indicative assessment of future fluvial risk at 1% AEP. Therefore 14% of the site is predicted to be affected by fluvial risk in the future, specifically the area around the Butterwick Brook. **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 path through the western half of the site, and small areas of ponding in the eastern area along building boundaries. The maximum depth, velocity, and hazard of this surface water is >1.20m, 1.00 to 2.00m/s, and 'Danger for most'. This change in extent and depth indicates 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 – There are 3 different superficial deposits within the site, Alluvium – Clay, silt, sand and gravel. The second is Kesgrave Catchment Subgroup – Sand and gravel. And the third is Lowestoft Formation – Diamicton, which is comprised of chalky till with sands, gravels, silts and clays. All three are types of sedimentary superficial deposits.
	• Soils at the site consist of:
	  ○ Freely draining slightly acid loamy soils.
	
	Sustainable Drainage Systems (SuDS)
	• Groundwater levels covering 29% of the site in the western area 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 with sedimentary superficial deposits 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 Zone 3 with 94% of the site also in Groundwater Source Protection Zone 2. 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 available.
	• The site is not located within a historic landfill site but is in close proximity to one.
	• Proposed attenuation features such as basins, ponds and tanks should be located outside of Flood Zone 3 to avoid the potential risks to the hydraulic capacity or structural integrity of these features. Surface water outfalls that discharge into the Butterwick Brook may be susceptible to surcharging due to water levels in the Butterwick

	Brook. The impacts of flood flows will need to be considered in terms of the attenuation storage requirements of the site and placement of the outfalls. • Surface water discharge rates should not exceed pre-development discharge rates for the site and should be designed to be as close to greenfield runoff rates as reasonably practical in consultation with the LLFA. It may be possible to reduce site runoff by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques. • The Risk of Flooding from Surface Water (RoFSW) mapping indicates the presence of surface water flow paths during the 3.3%, 1% and 0.1% AEP events. Existing flow paths should be retained and integrated with blue-green infrastructure and public open space. • If it is proposed to discharge runoff to a watercourse or sewer system, the condition and capacity of the receiving watercourse or asset should be confirmed through surveys and the discharge rate agreed with the asset owner.
Opportunities for wider sustainability benefits and integrated flood risk management	• Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. 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, 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 Local Authority will need to confirm that the Sequential Test has been carried out in line with national guidelines. The Sequential Test will need to be passed before the Exception Test is applied. The NPPF classifies residential development as 'More Vulnerable'. The Exception Test is required for this site as the western side of the site is within Flood Zones 2, 3a and 3b and the development type is 'More Vulnerable'.

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:
	  ○ Within fluvial flood zones 2, 3a and 3b
	  ○ 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 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).
	• This development is proposed within Flood Zone 3b extent careful consideration will need to be given to flood resistance and resilience measure and an appropriate Flood Warning and Evacuation Plan will be essential. Most forms of built development are not appropriate within Flood Zone 3b.
	• 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.

- Given that the Butterwick Brook runs through the site, and the significant flood risk posed, a flood warning and evacuation plan should be prepared for the site.
- 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.
- 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.
- 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

Key messages

The site is at significant risk of flooding from fluvial, surface water and groundwater surfaces, and may be at residual risk from the failure of flood alleviation measures upstream. The Exception Test will be required for this site, and St Albans City and District Council will need to carefully consider the benefits of developing the site against the significant risks. Development may be possible provided the flood risk part of the Exception Test can be satisfied as below:

- 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 western area of the site located in Flood Zone 3b is left undeveloped.
- Development is steered away from the area of fluvial flood risk in the western side of the site and the large flow paths/areas of surface water ponding.

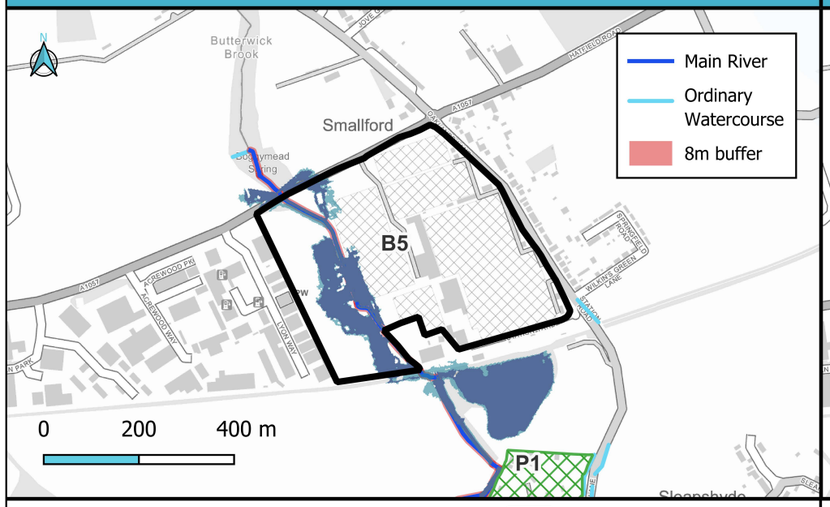
- A carefully considered and integrated flood resilient and sustainable drainage design is put forward, with development steered away from the areas identified to be at risk of surface water flooding across the site.
- Safe access and egress can be demonstrated in the fluvial and surface water plus climate change events. This includes measures to reduce flood risk along these routes such as raising access, but not displacing floodwater elsewhere. Given the significant risk to the site and close proximity to the watercourse, a flood warning and evacuation plan should be prepared for the site.
- A site-specific Surface Water Drainage Strategy, and SuDS maintenance and management plan is submitted along with the FRA.
- The surface water flow paths which cross the site are incorporated into SuDS/blue-green infrastructure.
- 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	In the absence of detailed hydraulic modelling, Flood Zone 2 has been used as an indicative assessment of future fluvial risk at 1% AEP. The latest climate change allowances have been applied to the Environment Agency's RoFSW map to indicate the impact on surface water flood risk
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	B5
Site Name	Glinwell, Hatfield Road

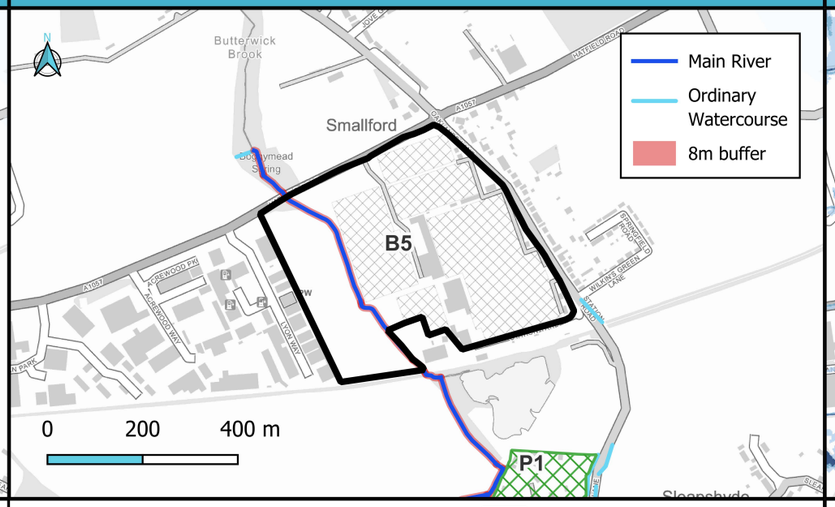
St Albans District Council
Strategic Flood Risk Assessment
Level 2 Detailed Site Summary

Flood Zone Map (present day)



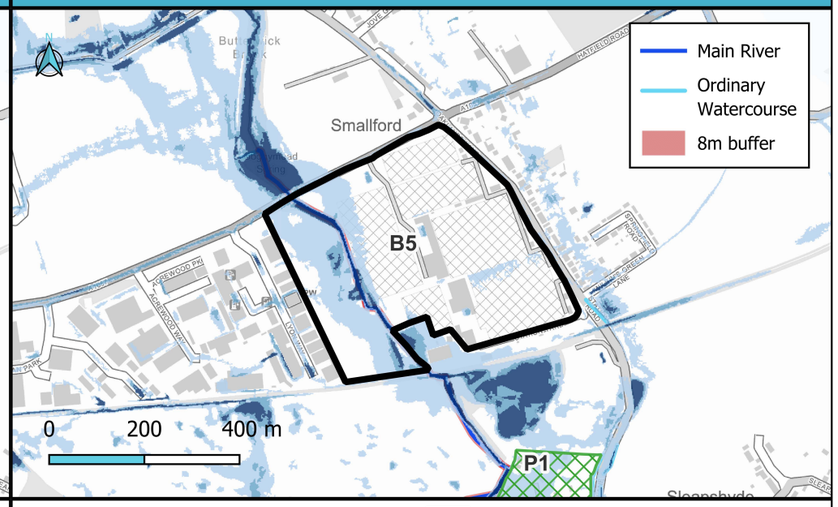
Flood Zone 2 (Between 1% and 0.1% AEP)
Flood Zone 3a (Between 3.33% and 1% AEP)
Flood Zone 3b (Less than 3.33% AEP)
Site boundary
Other site

Flood Zone 3b + Climate Change



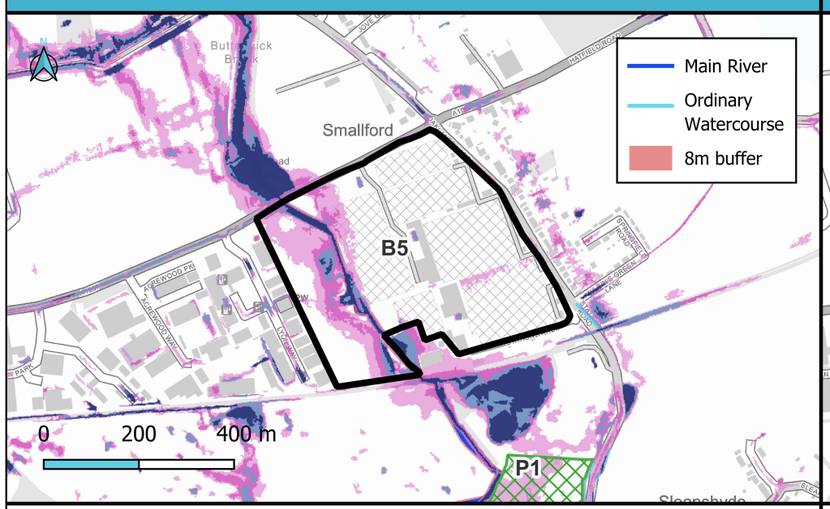
Flood Zone 3b + 21% (Central allowance)
Flood Zone 3b + 35% (Higher allowance)
Flood Zone 3b
Site boundary
Other site

Surface Water Map (RoFSW)



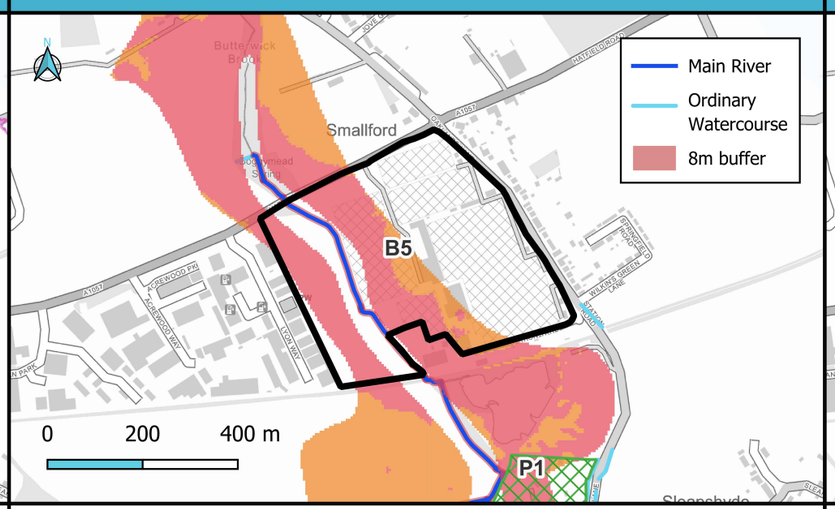
RoFSW 1 in 30-year (3.33% AEP)
RoFSW 1 in 100-year (1% AEP)
RoFSW 1 in 1000-year (0.1% AEP)
Site boundary
Other site

Surface Water Map + Climate Change



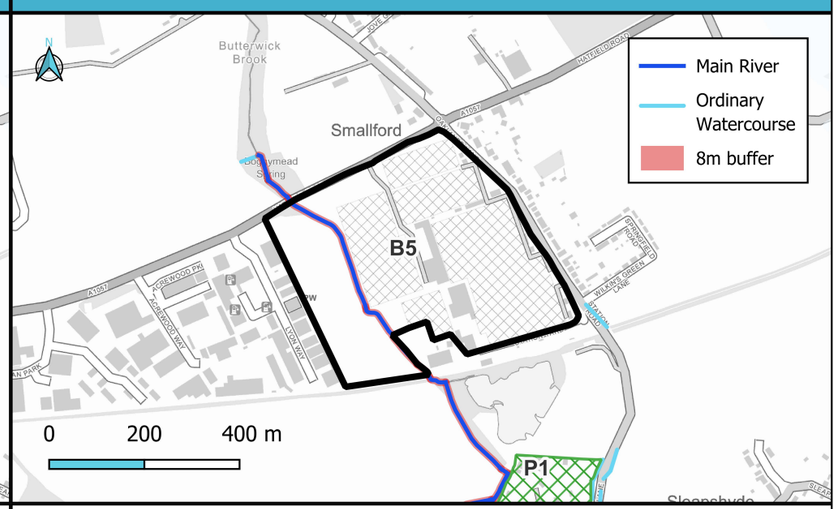
RoFSW 1 in 30-year (3.33% AEP)
RoFSW 1 in 30-year (3.33% AEP) plus 40%
RoFSW 1 in 100-year (1% AEP)
RoFSW 1 in 100-year 1% AEP plus 40%
Site boundary
Other site

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

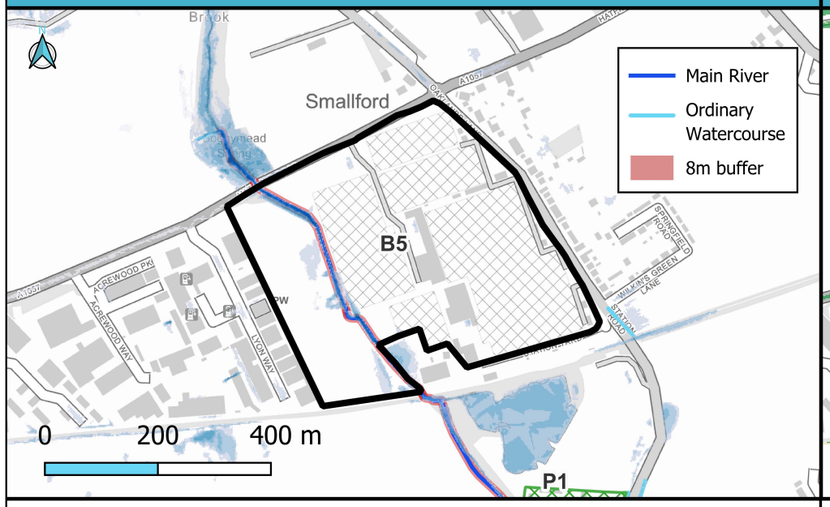


Reservoir 'Dry Day' flood extent
Reservoir 'Wet Day' flood extent
Reservoir - Fluvial contribution to flood extent
Site boundary
Other site

Site Reference	B5
Site Name	Glinwell, Hatfield Road

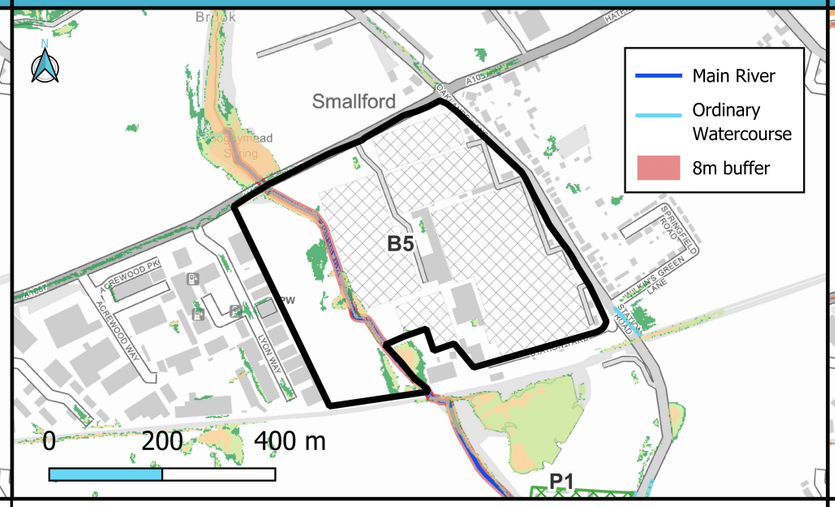
St Albans District Council
Strategic Flood Risk Assessment
Level 2 Detailed Site Summary

RoFSW Max Depth - 1% AEP



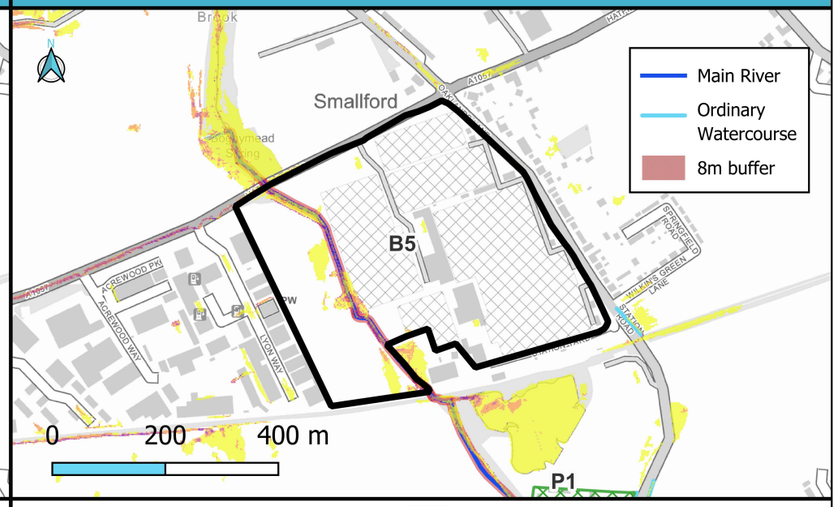
Depth (m)
0.00 - 0.15
0.15 - 0.30
0.30 - 0.60
0.60 - 0.90
0.90 - 1.20
> 1.20
Site boundary
Other site

RoFSW Max Hazard - 1% AEP



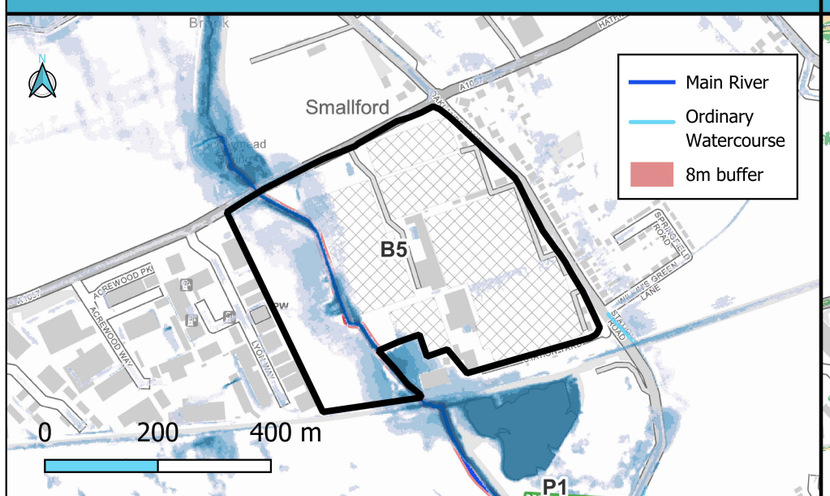
Hazard
< 0.75: Low
0.75 - 1.25: Moderate
1.25 - 2.00: Significant
> 2.00: Extreme
Site boundary
Other site

RoFSW Max Velocity - 1% AEP



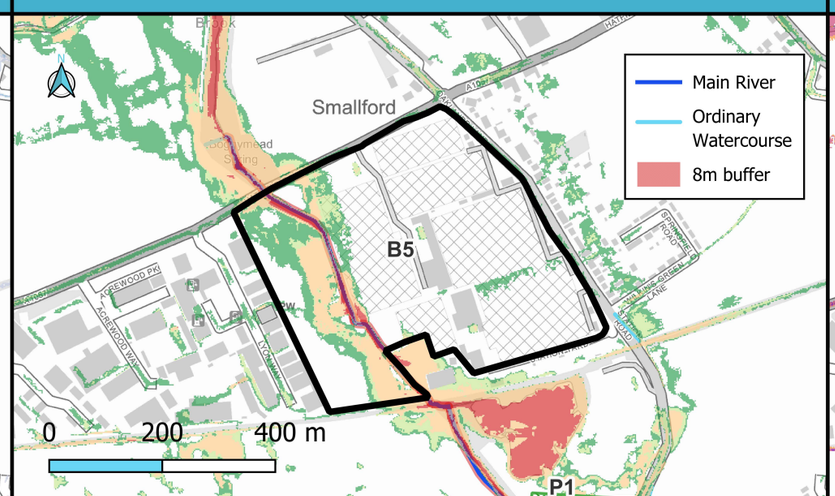
Velocity (m/s)
0.00 - 0.25
0.25 - 0.50
0.50 - 1.00
1.00 - 2.00
> 2.00
Site boundary
Other site

RoFSW Max Depth - 1% AEP + 40% CC



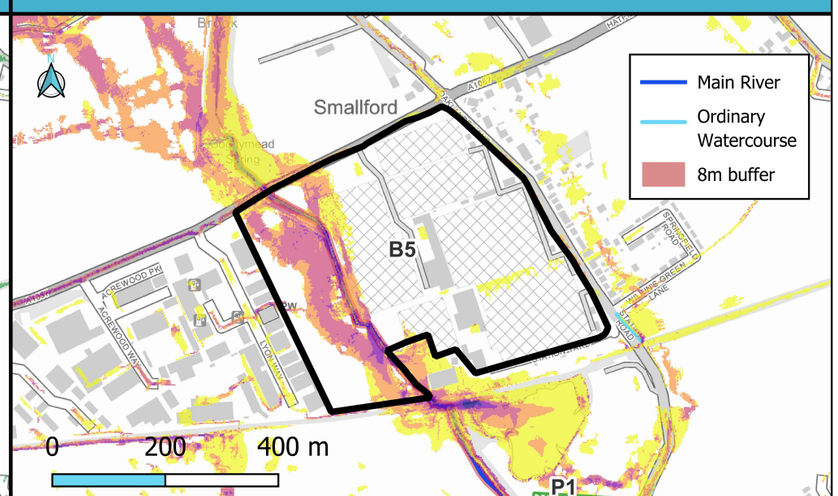
Depth (m)
<= 0.15
0.15 - 0.30
0.30 - 0.60
0.60 - 0.90
0.90 - 1.20
> 1.20
Site boundary
Other site

RoFSW Max Hazard - 1% AEP + 40% CC



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

RoFSW Max Velocity - 1% AEP + 40% CC



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