



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

**Site details**

<b>Site Code</b>	<b>M5</b>
<b>Address</b>	Sewage Treatment Works, Piggottshill Lane, Harpenden, AL5 5UN
<b>Area</b>	4.01ha
<b>Current land use</b>	Mixed – Greenfield and Sewage Treatment Works
<b>Proposed land use</b>	Residential
<b>Flood Risk Vulnerability</b>	Highly Vulnerable

**Sources of flood risk**

<b>Location of the site within the catchment</b>	<p>The site is located at the eastern edge of Harpenden, a village to the north of St Albans. The site is situated west of Aldwickbury Park Golf Club. A public bridleway runs along the site’s northern boundary with Piggottshill Lane along the site’s eastern boundary. The southern boundary borders Crabtree Fields, an area of greenspace which also consist of several buildings including a Scout Hut. To the west is an area of woodland.</p> <p>The River Lee lies approximately 0.3km to the north of the site. The site lies within the River Lee catchment. This section of the River Lee stretches from Luton Hoo Lakes to Hertford, and is 31.7 km long, covering a catchment area of 98.6 km<sup>2</sup>. The catchment is mainly rural but includes some urban areas, such as the northeastern area of Harpenden, where this site is located. The River Lee is part of the broader Lee Upper Management Catchment, which covers an area of 1,025 km<sup>2</sup>. Within this Management Catchment, the site lies in the western upstream area.</p>
<b>Topography</b>	<p>Environment Agency 1m resolution LiDAR across the site shows that topography varies, as the site gently slopes in a northeastern direction. The mean elevation across the site is 94.6mAOD. The highest point is 104.8 mAOD, which is located at the southwestern region of the site. The lowest point is 87.3 mAOD, which is located in the northeast.</p>
<b>Existing drainage features</b>	<p>The site is currently a sewage treatment works so contains existing infrastructure with regards to the treatment works. However, there are no existing drainage features within the site that are visible on topographic mapping or aerial imagery. The nearest watercourse is the River Lee, which is located approximately 0.3km to the north of the site.</p>
<b>Fluvial</b>	<p><b>The proportion of site at risk FMFP:</b>  FZ3a – 0%  FZ3b – 0%  FZ2 – 0%</p>

	<p>FZ1 – 100%</p> <p>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%).</p> <p><b>Flood characteristics:</b></p> <p>The site is located within Flood Zone 1 and is therefore at negligible risk of fluvial flooding.</p>
<p><b>Surface Water</b></p>	<p><b>Proportion of site at risk (RoFSW):</b></p> <p><b>3.3% AEP 3%</b>  Max depth - 0.60 – 0.90m  Max velocity - 0.50 – 1.00m/s</p> <p><b>1% AEP 11%</b>  Max depth - 0.90 – 1.20m  Max velocity - 1.00 – 2.00m/s</p> <p><b>0.1% AEP – 27%</b>  Max depth - &gt;1.20m  Max velocity- &gt;2.00</p> <p><b>Available data:</b></p> <p>The Environment Agency’s Flood Zone mapping has been used in this assessment.</p> <p><b>Description of surface water flow paths:</b></p> <p>During the 3.3% event, there are small areas of ponding in the central and southern areas of the site. Maximum depths at both these locations are predominantly 0.3m - 0.60m. However, a very small region of this flooding has a maximum depth of 0.60m – 0.90m in the centre of the site. In this location surface water flooding has a maximum velocity of 0.50 – 1.00m/s.</p> <p>During the 1% AEP event, the area affected by surface water increases. The ponding in the south and centre of the site are joined by a surface water flow route that enters the site from the southwestern corner. There are also additional areas of ponding in the north and south of the site. Maximum depths increase to between 0.90 to 1.20m and maximum velocity increases to 1.00 – 2.00m/s.</p> <p>During the 0.1% AEP event, the flow routes have increased in size and severity. There is a large surface water flow route across the site entering the site in the southwestern corner before flowing in a northeastern direction across the site and exiting the site in the northeastern corner. There is an additional flow route entering the site from the southeastern corner flowing north. The maximum flood depth increases to &gt;1.20m in several places including in the northeast and north of the site. The maximum velocity increase to &gt;2.00m/s, this is located in the main flow route where it enters the site in the southwest.</p>

<b>Reservoir</b>	The Environment Agency's reservoir maps show the site is not at risk of flooding from reservoir.
<b>Groundwater</b>	The JBA Groundwater mapping, shows that the site is at low risk of ground water flooding, as 93% of the site has groundwater located between 0.5m – 5m below ground level. The remaining 7% of the site located in the southwestern area of the site has groundwater >5m below ground level.
<b>Sewers</b>	The site is located within a postcode area with 12 historic incidences of sewer flooding, according to the Thames Water Hydraulic Sewer Flood Risk Register.
<b>Flood history</b>	There are no reported flood incidents reported by the Environment Agency, St Albans District Council or Hertfordshire County Council within the site
<b>Flood risk management infrastructure</b>	
<b>Defences</b>	The Environment Agency AIMS dataset shows that the site is protected by natural high ground along the River Lee to the north of the site.
<b>Residual risk</b>	The site is not at risk from residual risk.
<b>Emergency planning</b>	
<b>Flood warning</b>	The site is not located in an Environment Agency Flood Warning or Flood Alert Area.
<b>Access and egress</b>	Access to the site is currently via Piggottshill Lane to the east. Safe access could be obtained here as no surface water flooding occurs during the 3.3% AEP event. There is a surface water flow path along Piggottshill Lane during the 1% and 0.1% AEP events but will not impede access.
<b>Dry Islands</b>	The site is not located on a dry island.
<b>Climate change</b>	
<b>Implications for the site</b>	<p><b>Management Catchment: Upper Lee</b> Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard, and frequency of both fluvial and surface water flooding</p> <p><b>Fluvial:</b> In the absence of suitable hydraulic modelling, Flood Zone 2 has been used as an indication of future fluvial risk. This mapping shows that the site remains at negligible risk of fluvial flooding.</p> <p><b>Surface Water:</b> 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</p>

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 route across the site in a northeasterly direction, as well as several areas of surface water ponding. The maximum flood depths are >1.20m with maximum velocities >2.00m/s. As a result, the hazard is categorized as 'Danger for most' in places.

## 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 Sussex White Chalk Formation. This is a sedimentary bedrock.
- Soils at the site consist of:
  - Slightly acid loamy and clayey soils with impeded drainage.

#### Sustainable Drainage Systems (SuDS)

- Groundwater levels are indicated to be between 0.5 and 5m below ground level in over 90% of the site, therefore, the site is considered to be at moderate risk of groundwater flooding. Groundwater flooding could occur at the surface which may flow to and pool within topographic low spots during very wet winters. Detention and attenuation features should be designed to prevent groundwater ingress from impacting hydraulic capacity and structural integrity. Additional site investigation work may be required to support the detailed design of the drainage system. This may include groundwater monitoring to demonstrate that a sufficient unsaturated zone has been provided above the highest occurring groundwater level. Below ground development such as basements are not appropriate at this site.
- BGS data indicates that the underlying geology is chalk which is likely to be free draining. This should be confirmed through infiltration testing, with the use of infiltration maximised as much as possible in accordance with the SuDS hierarchy.
- The site is located within Groundwater Source Protection Zone 3. Proposed SuDS 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 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 area. However, the site's southern boundary is adjacent to an area of historic landfill, where the current Crabtree Fields is located.
- 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

	<p>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.</p> <ul style="list-style-type: none"> <li>• 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.</li> </ul>
<p><b>Opportunities for wider sustainability benefits and integrated flood risk management</b></p>	<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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</li> <li>• 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.</li> </ul>
<p><b>NPPF and planning implications</b></p>	
<p><b>Exception Test requirements</b></p>	<p>The site is within Flood Zone 1 but at risk from surface water and groundwater flooding. The Sequential Test must be passed, the criteria for which is highlighted within the Level 1 Assessment. The Exception Test is not required under the NPPF. However, it must be shown that the development will be safe for its lifetime and the risk can be managed through a sequential approach to design.</p>
<p><b>Requirements and guidance for site-specific Flood Risk Assessment</b></p>	<p><b>Flood Risk Assessment:</b></p> <ul style="list-style-type: none"> <li>• At the planning application stage, a site-specific FRA will be required as the site is: <ul style="list-style-type: none"> <li>○ Greater than one hectare</li> <li>○ At risk of other sources of flooding (surface water and groundwater)</li> </ul> </li> <li>• All sources of flooding should be considered as part of a site-specific FRA. Consideration of groundwater risk is likely to require ground investigations to confirm the risk to the site.</li> <li>• 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.</li> </ul>

- 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.
- 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 flooding.

Development is 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.
- 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 3.3% and 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.
- 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

<b>Flood Zones</b>	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.
<b>Climate change</b>	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 suitable hydraulic modelling, Flood Zone 2 has been used as an indicative assessment of future fluvial risk at 0.1% AEP.
<b>Fluvial depth, velocity and hazard mapping</b>	There is no detailed hydraulic modelling available at this location.
<b>Surface Water</b>	The Environment Agency's Risk of Flooding from Surface Water dataset has been used for this assessment.
<b>Surface water depth, velocity and hazard mapping</b>	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.

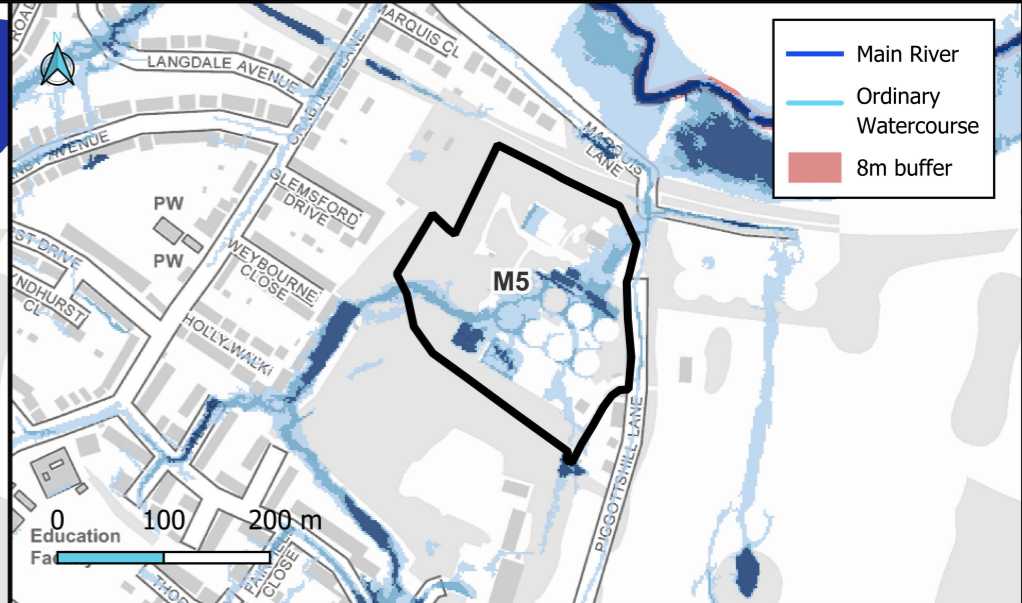
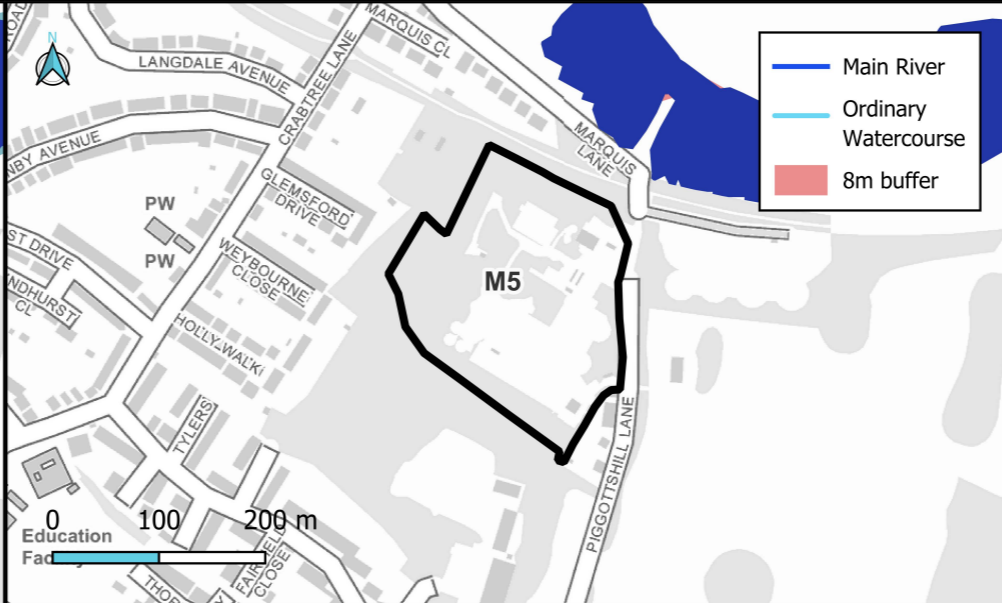
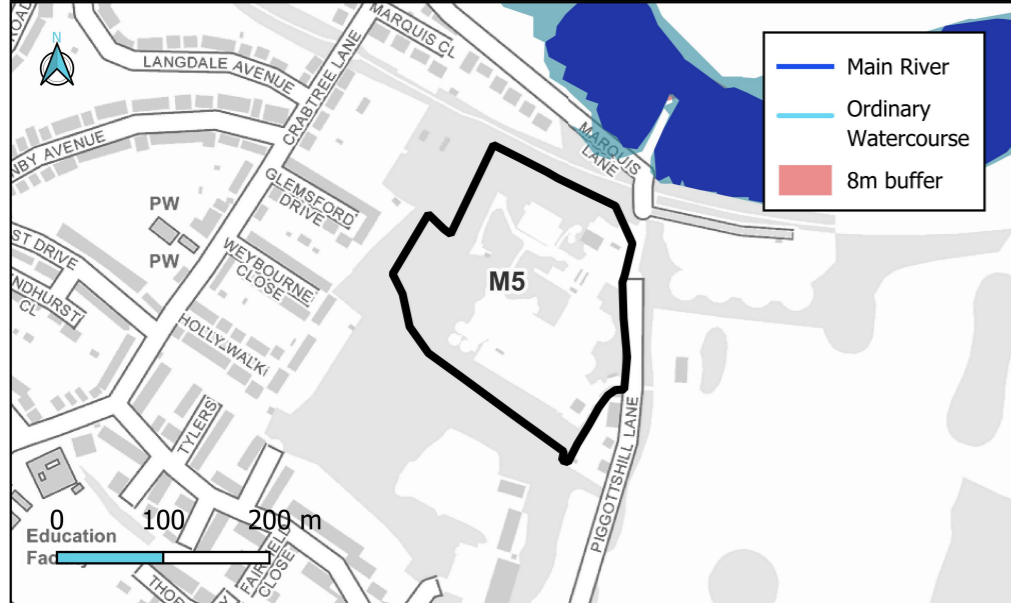
Site Reference	M5
Site Name	Harpenden Sewage Treatment Works, Piggottshill Lane

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

© JBA Consulting 2024. Some of the responses contained in this mapping are based on data and information provided by the Natural Environment Research Council (NERC) or its component body the British Geological Survey (BGS). Your use of any information contained in this mapping is at your own risk. Neither JBA, NERC nor BGS gives any warranty, condition or representation as to the quality, accuracy or completeness of such information and all liability (including for negligence) arising from its use is excluded to the fullest extent permitted by law. Your use of the mapping constitutes your agreement to bring no claim against JBA, NERC or BGS in connection with it. Contains Ordnance Survey data © Crown copyright and database right 2024. Contains public sector information licensed under the Open Government Licence v3.0.

Flood Zone Map (present day)	Flood Zone 3b + Climate Change	Surface Water Map (RoFSW)
------------------------------	--------------------------------	---------------------------

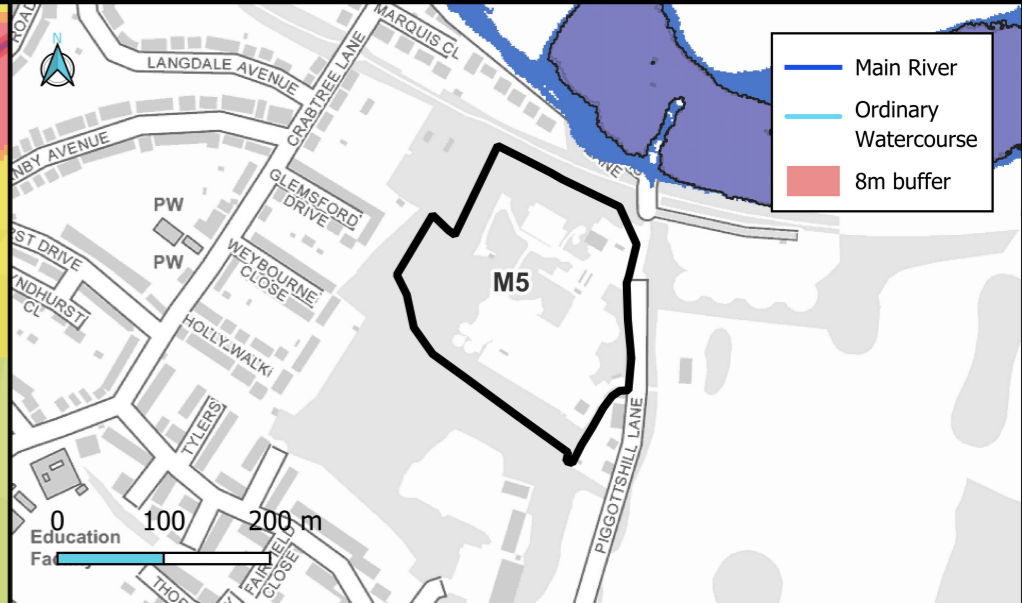
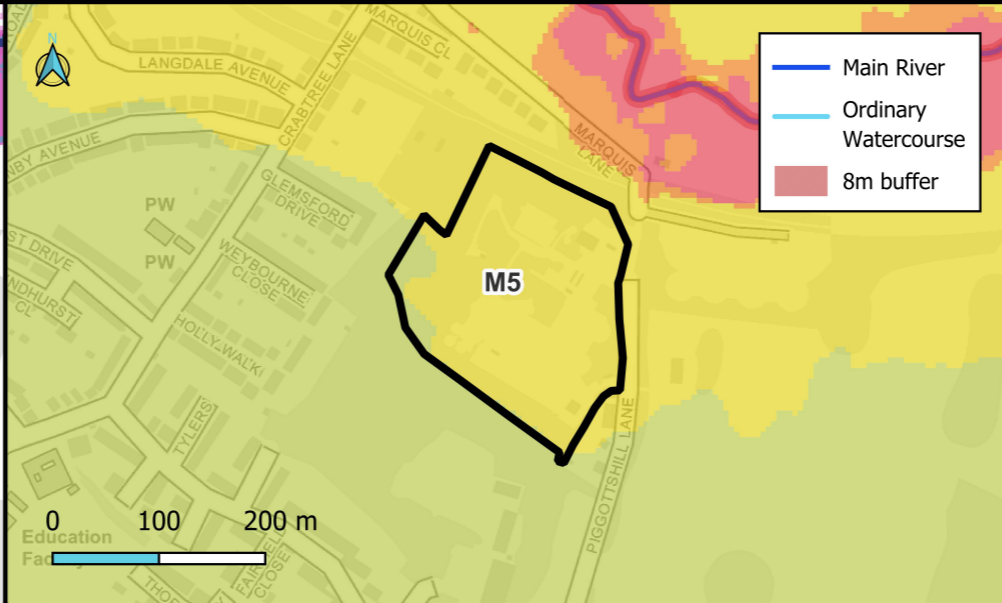
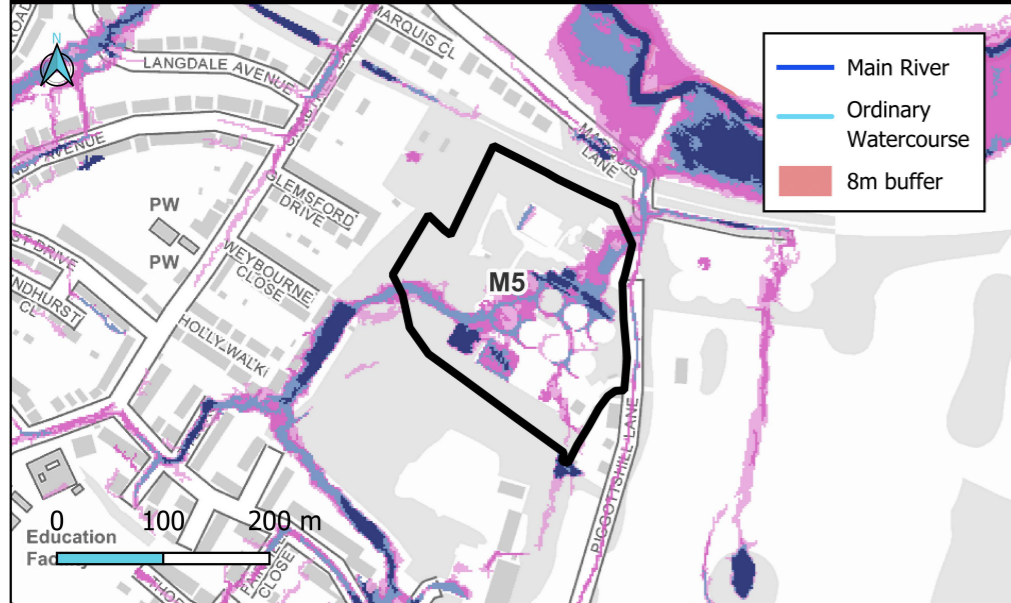


- Flood Zone 2 (Between 1% and 0.1% AEP)
- Flood Zone 3a (Between 3.33% and 1% AEP)
- Flood Zone 3b (Less than 3.33% AEP)
- Site boundary
- Other site

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

- 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	Groundwater (Gw) Flood Risk 1% AEP	Reservoir Flood Risk
------------------------------------	------------------------------------	----------------------



- 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

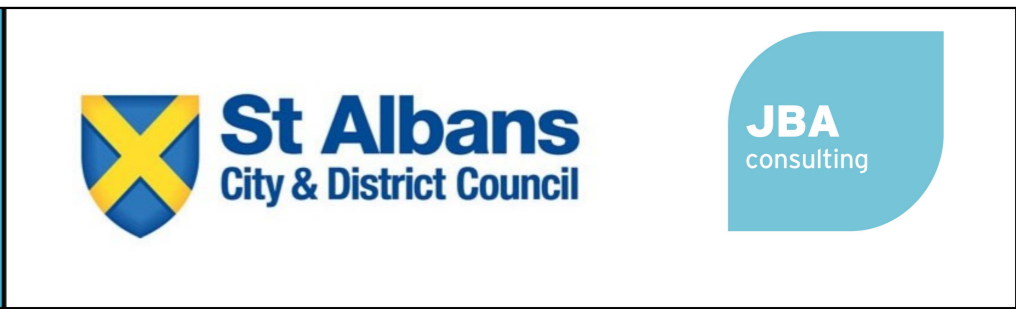
- GW levels <0.025m below ground
- GW levels 0.025m to 0.5m below ground
- GW levels 0.5 to 5m below ground
- Site boundary
- Other site

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



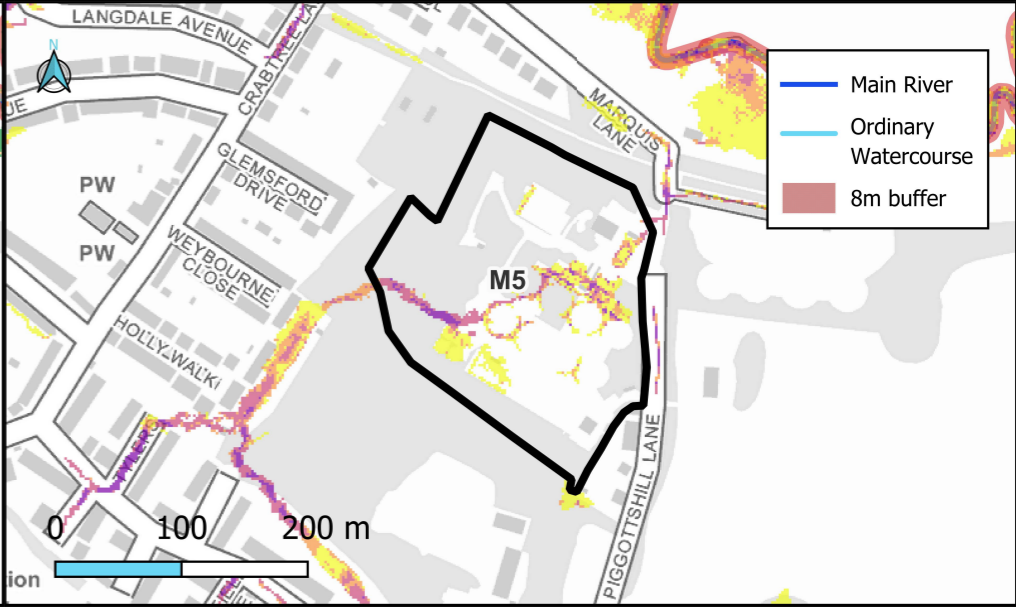
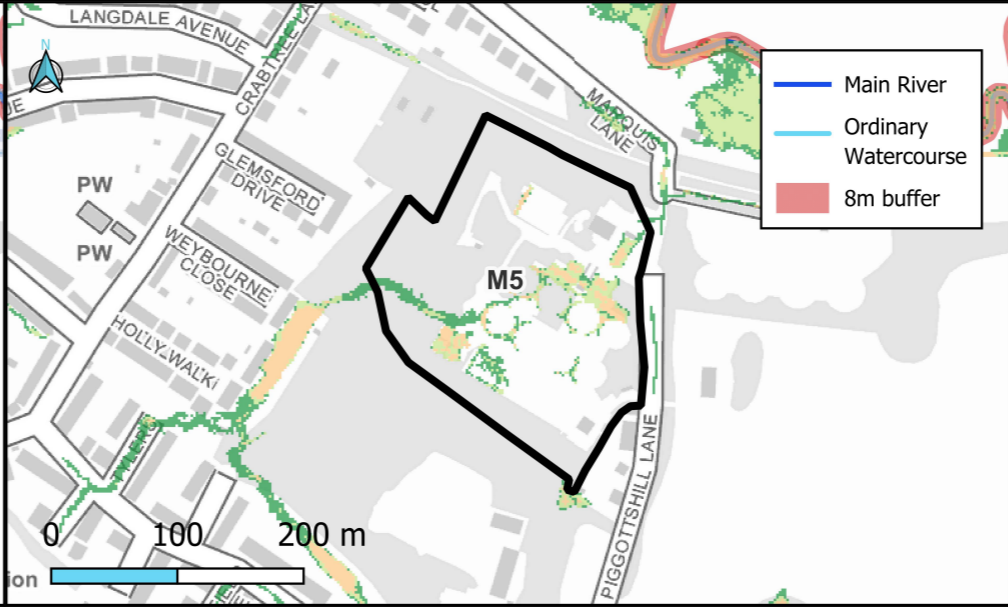
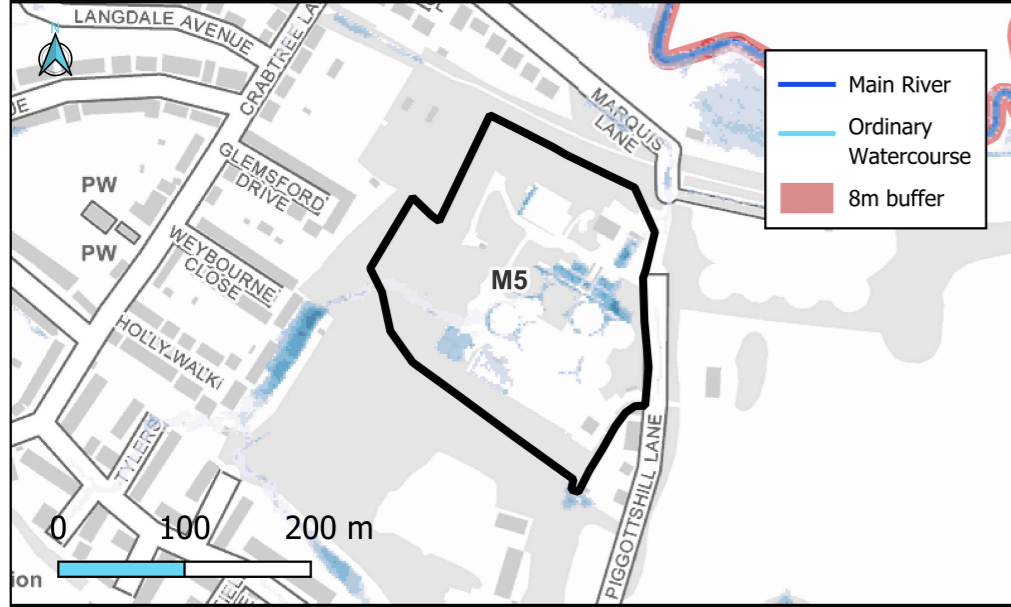
Site Reference	M5
Site Name	Harpenden Sewage Treatment Works, Piggottshill Lane

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



© JBA Consulting 2024. Some of the responses contained in this mapping are based on data and information provided by the Natural Environment Research Council (NERC) or its component body the British Geological Survey (BGS). Your use of any information contained in this mapping is at your own risk. Neither JBA, NERC nor BGS gives any warranty, condition or representation as to the quality, accuracy or completeness of such information and all liability (including for negligence) arising from its use is excluded to the fullest extent permitted by law. Your use of the mapping constitutes your agreement to bring no claim against JBA, NERC or BGS in connection with it. Contains Ordnance Survey data © Crown copyright and database right 2024. Contains public sector information licensed under the Open Government Licence v3.0.

RoFSW Max Depth - 1% AEP	RoFSW Max Hazard - 1% AEP	RoFSW Max Velocity - 1% AEP
--------------------------	---------------------------	-----------------------------

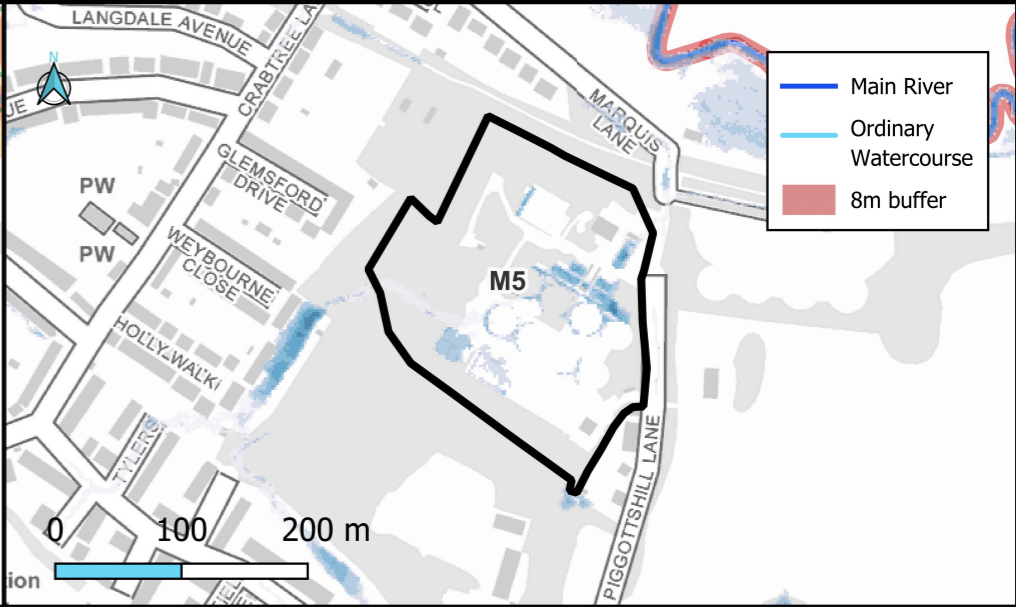
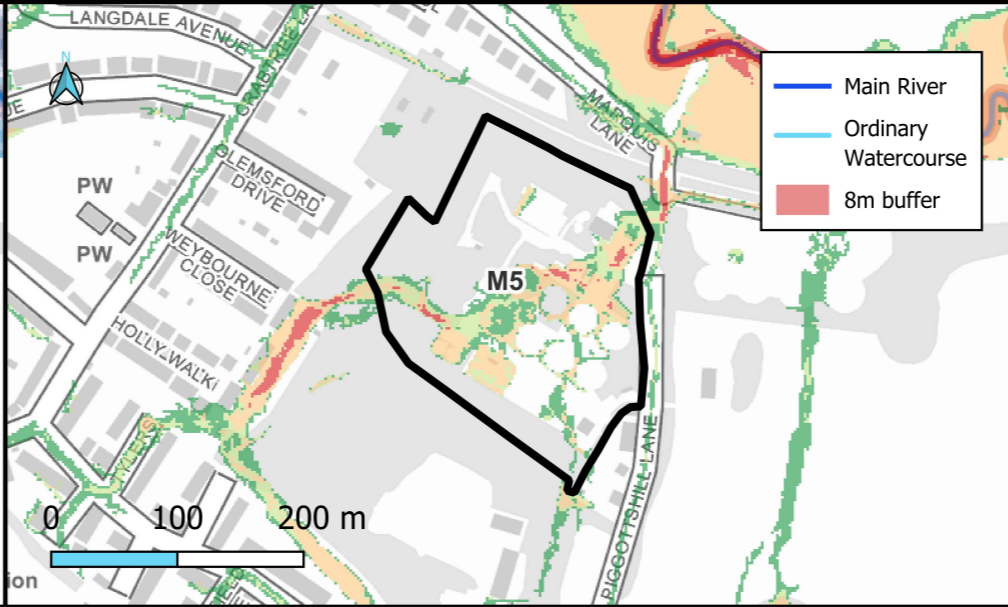
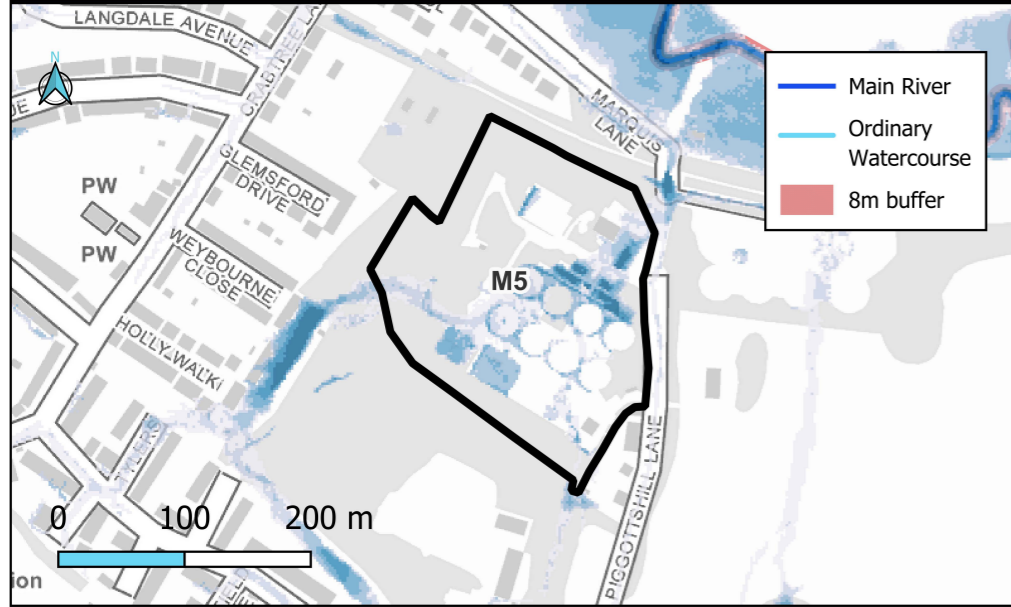


Depth (m)	0.00 - 0.15	0.15 - 0.30	0.30 - 0.60	0.60 - 0.90	0.90 - 1.20	> 1.20	Site boundary	Other site
-----------	-------------	-------------	-------------	-------------	-------------	--------	---------------	------------

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

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	RoFSW Max Hazard - 1% AEP + 40% CC	RoFSW Max Velocity - 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
-----------	---------	-------------	-------------	-------------	-------------	--------	---------------	------------

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

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
----------------	-------------	-------------	-------------	-------------	--------	---------------	------------