

Halton Borough Council Local Plan Site Screening

**Level 2 Strategic Flood Risk
Assessment – Site W49 Screening**

Draft Report

June 2019

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Revision history

Revision Ref/Date	Amendments	Issued to
P01 / June 2019	N/A	Alasdair Cross

Contract

This report describes work commissioned by Anne Moyers, on behalf of Halton Borough Council, by an email dated 3 May 2019. Hannah Bishop, Joseph Landells-Molloy and Mike Williamson of JBA Consulting carried out this work.

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1 W49 (DALP Sub)

Proposed Site	W49 (DALP Sub)
Site area (ha)	18.19
Existing use	Agriculture
Existing flood risk vulnerability classification	Less vulnerable
Proposed use	Residential
Proposed development flood risk vulnerability classification	More vulnerable
Proposed development impermeable area (ha)	15.46

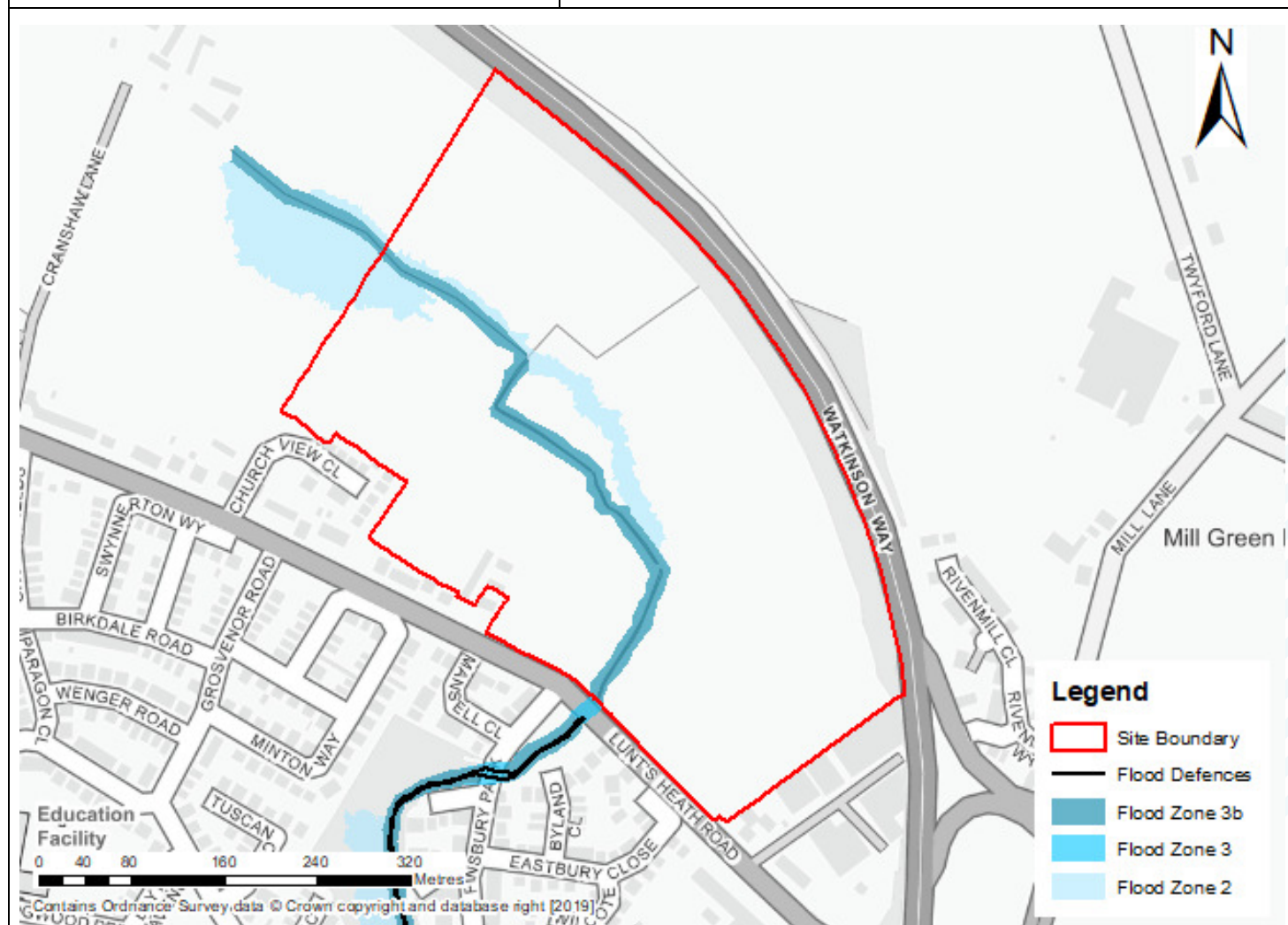


Figure 1-1: Flood zone mapping of the site with flood defences

Proposed Site

W49 (DALP Sub)

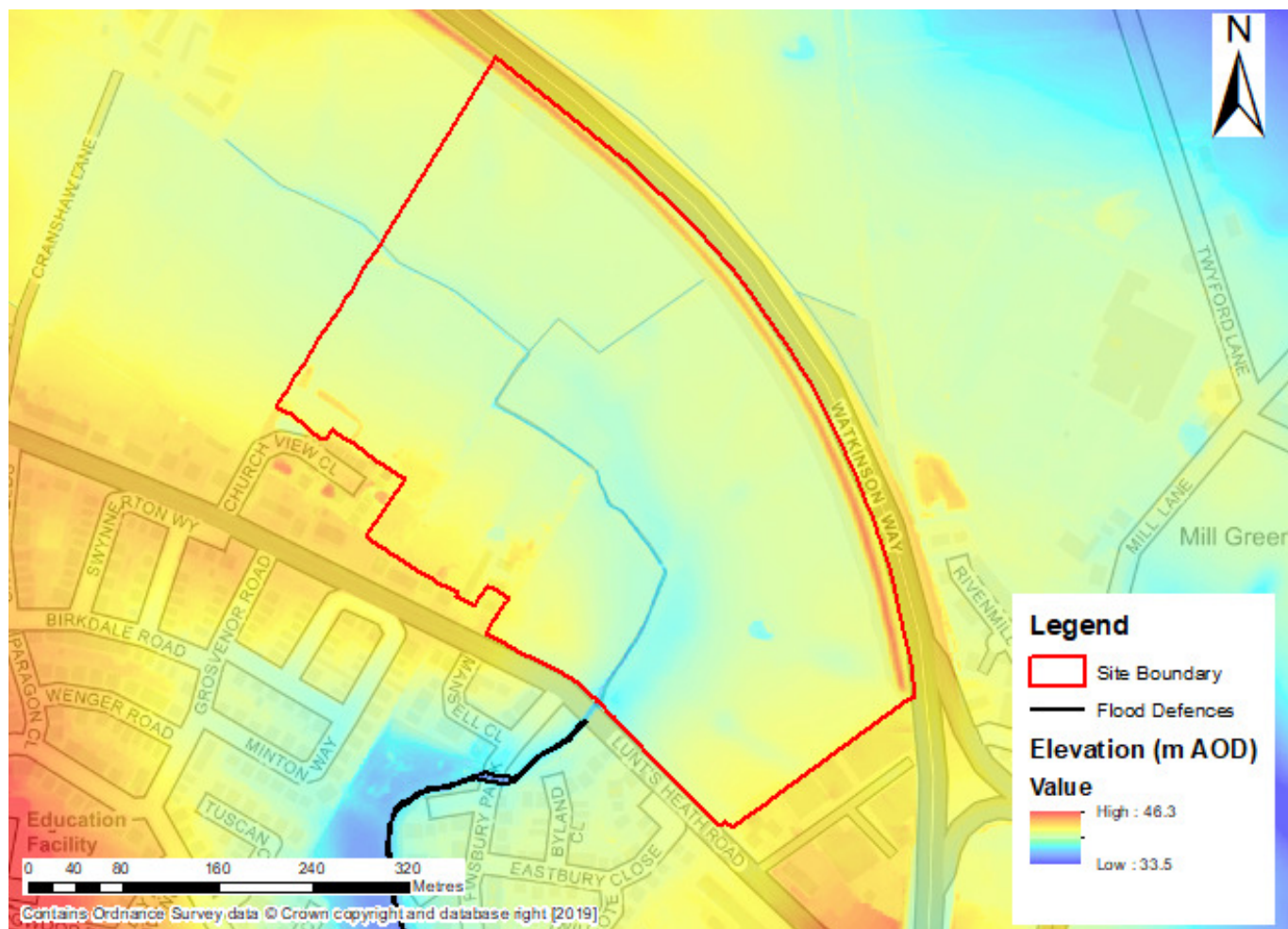


Figure 1-2: Site with 1m LIDAR (elevation data)

- The site has an average elevation across its entirety of approximately 40m AOD. The surrounding areas have a consistent elevation with the site.

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Observations

- There is a change in risk classification from less vulnerable to more vulnerable according to the NPPF. The site is currently open agricultural land where water can flow freely. Development should not obstruct the natural flow of water.
- 4% of the site is within the functional floodplain but this is contained in bank of Bower's Brook that runs through the site from the south and exits from the west. Development in Flood Zone 3b can easily be avoided as this zone falls within the 8 m access buffer.
- The Mersey Estuary 2016 model that has been used to observe fluvial and tidal risk to the site is still in draft form and therefore has not yet been used to update the Flood Map for Planning.
- There are several surface water flow routes, one of which follows Bower's Brook and one which flows in the same direction but not along the same route.

Proposed Site

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- Approximately 13% of the total site area is at risk of surface water flooding in the 1% AEP event to a maximum depth greater than 1.2 m (see Figure 1-5).
- Surface water flood outlines are more significant than fluvial and tidal based on available mapping; however, a detailed FRA will need to look at the downstream culvert capacity, at Lunt's Heath Road, as this appears to show a restriction in surface water flows. It is likely that the fluvial mapping is more detailed than the national surface water flood map. Further, more detailed surface water flow modelling should be carried out as part of the FRA.
- There appears to be a need for a blue green corridor through the site, following Bower's Brook and the surface water flow paths, including public open space and community/habitat potential.
- Safe access and egress are achievable via Watkinson Way and Lunt's Heath Road based on the 1% AEP outline, however, access roads and development should avoid the 1% AEP outline.
- The risk is not going to significantly reduce through further assessment, but the definition of surface water flood extents should improve. A primary consideration should be avoidance and consideration whether the available land provides suitable land for development.

Flood Source: Fluvial/Tidal

	Flood Zone 2	Flood Zone 3a	Flood Zone 3b
Flood Zones (%)	3.56	0.00	4.22
Tidal: Depth (m)	N/A	N/A	N/A
Tidal: Hazard	N/A	N/A	N/A

Modelled Tidal
Flood Risk and
Climate
Change

**Mersey
Estuary
2016 model**

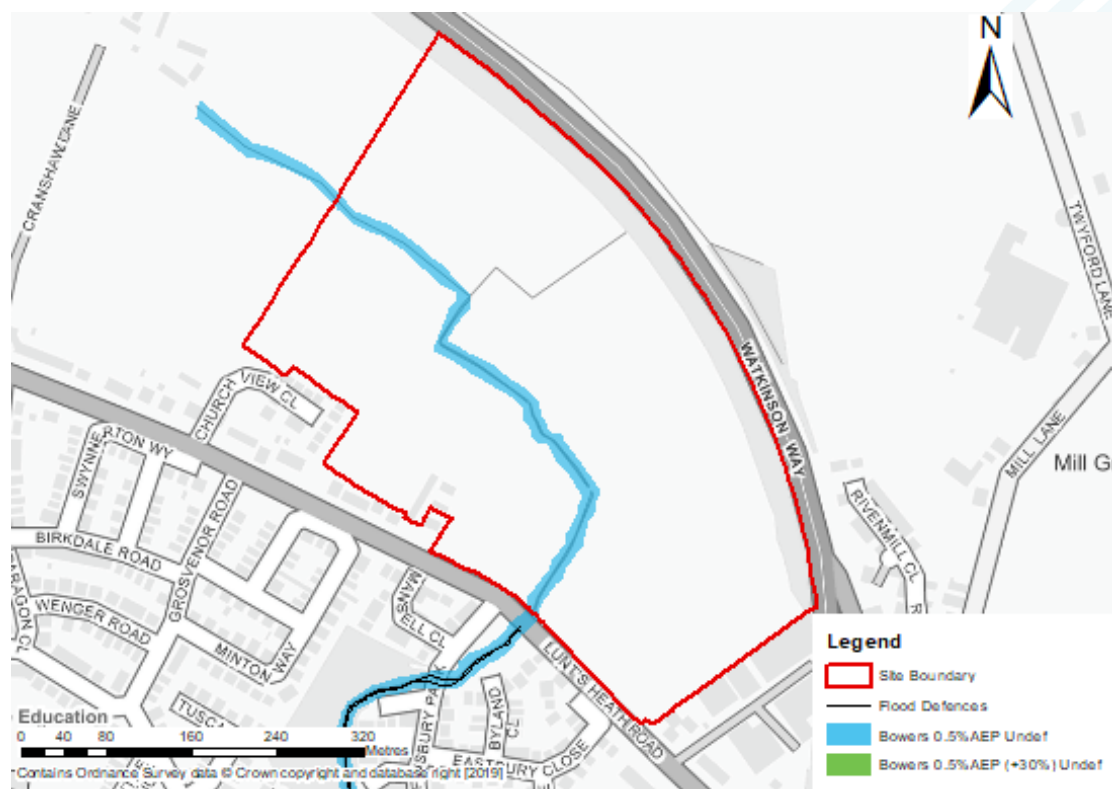
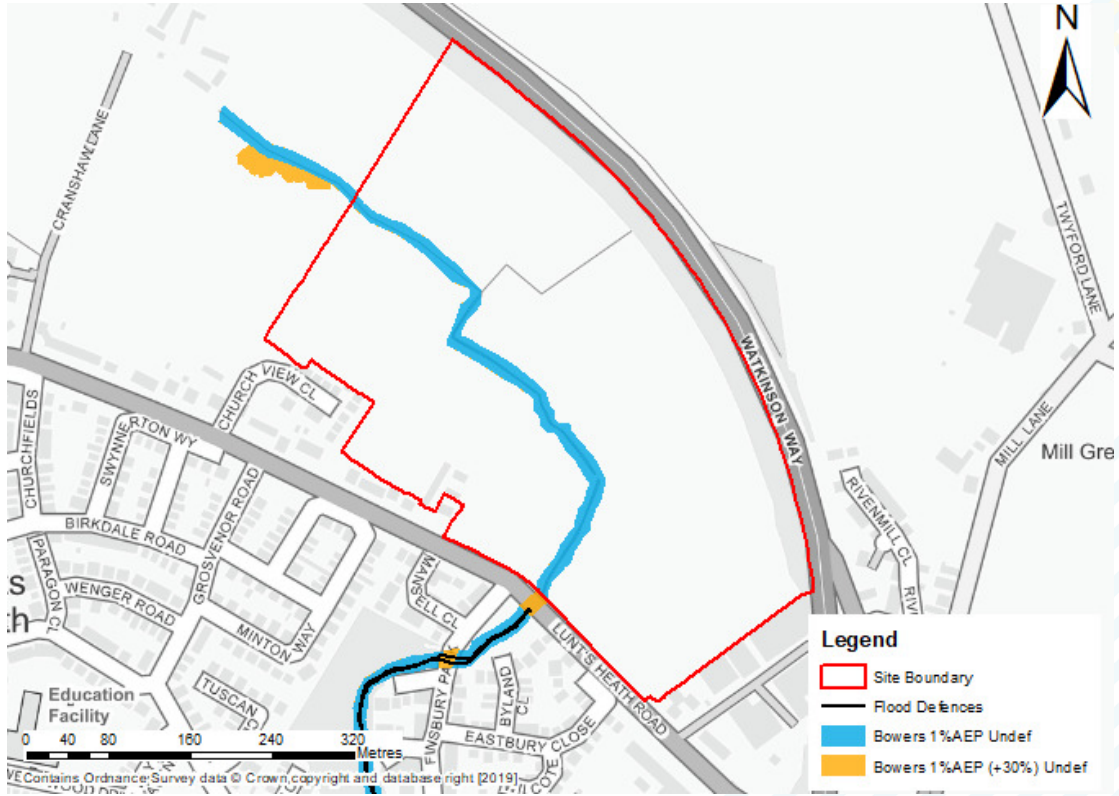


Figure 1-3: Undefended tidal outlines for the present day 0.5% AEP event on Bowers Brook and future risk of 0.5% AEP +30% climate change uplift.

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	Tidal - The tidal outline runs through the centre of the site to the north west corner and remains within the banks of Bowers Brook. As it remains in-bank, there are no depth or hazard grids produced for tidal risk. - The undefended outline did not change when the CC30% was added and still remains in bank.
Fluvial Flood Risk and Climate Change Mersey Estuary 2016 model	 Figure 1-4: Undefended fluvial outlines for the present day 1% AEP and future risk of 1% AEP + 30% climate change uplift Fluvial - There is a fluvial flood risk to the site according to the 1% AEP modelled outline that remains in bank of Bowers Brook running through the centre of the site and exiting in the north west corner. - The climate change (+30%) uplift does not affect the site but is close to the north west boundary edge. - Figure 1-4 indicates that the site is potentially suitable for a river restoration scheme to introduce a more natural meander to the river profile. - From inspection of the fluvial model outputs, it appears that there are no modelled culvert blockage outlines, which would almost certainly show increased risk from the inlet to the culvert beneath Lunt's Heath Road. - The site is effectively divided by the watercourse and suitable access will need to be considered as part of any development planning.

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Historic Flooding		The site lies outside of any Environment Agency's historic flood mapping.
Defences		There are areas of high ground located just outside the site's southern boundary which are informal defences with a condition grade of 3 (Table 1.1 Condition Assessment Manual 2012¹).
Flood Warning Area (FWA)		The site is not affected by any EA FWAs.
Mitigation options & site suitability		It should be possible for this site to pass the Exception Test at the FRA stage, assuming the advice provided in this Level 2 assessment is followed, though residential yields will undoubtedly be reduced. The main issues are with the on-site Main River, Bower's Brook, and with surface water flow paths, which must be integrated into site design. The culvert of Lunt's Heath Road should be assessed to provide condition and capacity information. Both fluvial and tidal modelled outlines show flood risk to be contained in-bank of Bowers Brook with climate change uplifts having no impact, same with the extreme 0.1% outline. Site design must integrate the watercourses into the site layout, accounting for the 8m access buffer strip, in the form of a blue/green amenity corridor. The FRA should include emergency planning procedures with particular consideration to safety around the on-site watercourses in a residential area.
Flood source: Groundwater		
Flood risk: groundwater		Data unavailable. Possible risk from groundwater must be assessed as part of the FRA.
Flood Source: Infrastructure Failure – Reservoirs		
Flood risk: reservoirs		There is risk to the site associated with reservoirs according to the EA's Reservoir Flood Map. The risk runs along Bower's Brook and continues to stretch to the west once out of the site.
Flood Source: Infrastructure Failure – Canals		
Flood risk: canal		Data unavailable. Residual risk from canals (if applicable) must be assessed as part of the FRA.
Flood Source: Surface Water		
Surface Water Flood Risk to Proposed Development Site		

¹https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/291126/scho0509bqat-e-e.pdf

Proposed Site

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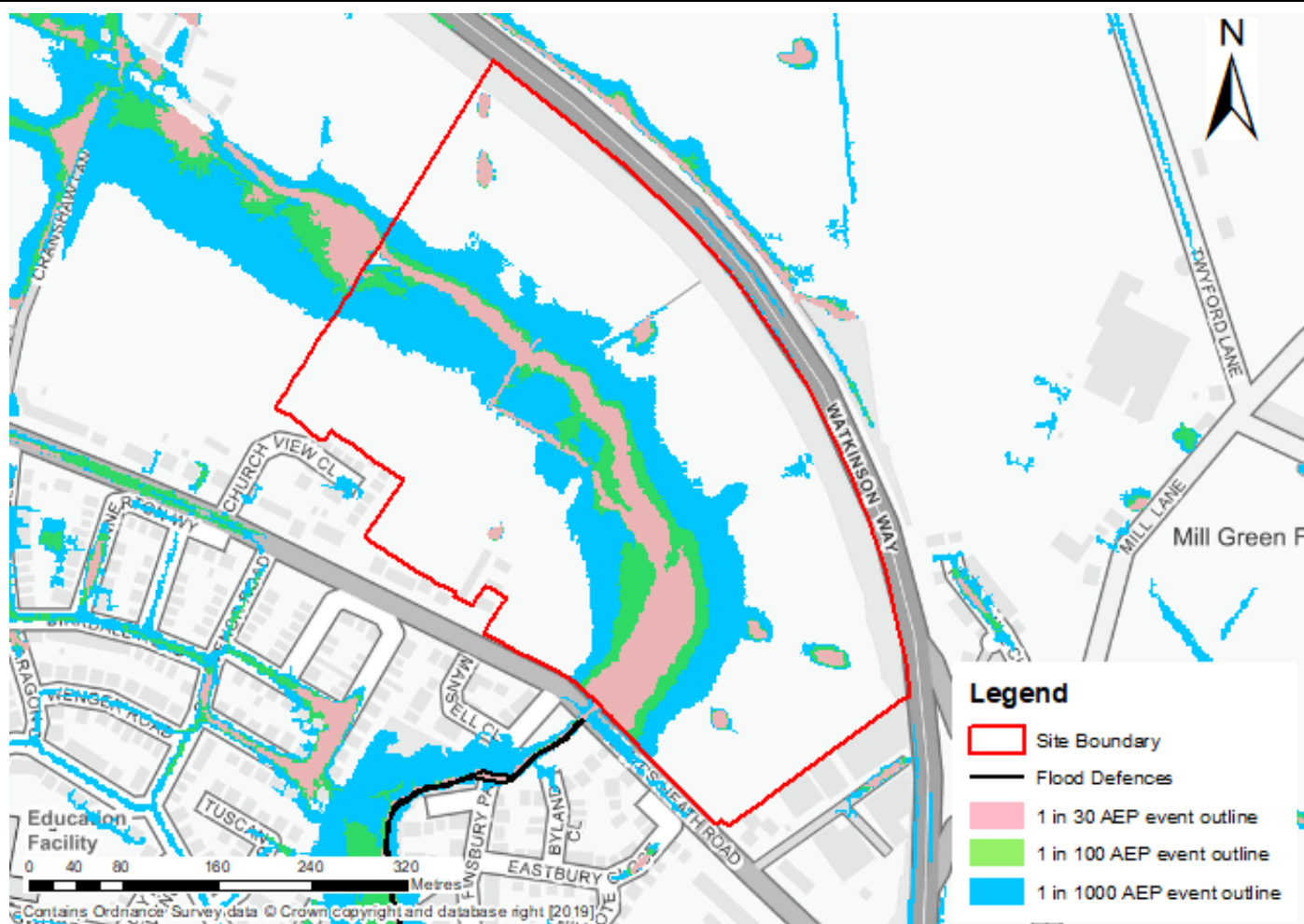


Figure 1-5: Surface water flood risk to the site

Existing development risk of flooding from surface water (%)	High Risk (3.33% AEP outline)	Medium Risk (1% AEP outline)	Low Risk (0.1% AEP outline)
	7.68	13.06	32.28
Surface water flooding depths	Max: 0.90-1.20m	Max: >1.20m	Max: >1.20m
Surface water hazards	Max: Significant Mean: Moderate	Max: Significant Mean: Significant	Max: Significant Mean: Significant
Climate change	The current day 0.1% AEP outline provides an indication of the likely increase in extent of the more frequent events in the future.		
Surface water: flood risk to development site	- Approximately 13% of the total site area is at risk of surface water flooding in the 1% AEP event to a maximum depth greater than 1.20m. This is a significant depth in terms of hazard to people - The extent of flooding in the 3.33% AEP outline is largely associated with Bower's Brook and several areas of localised ponding. The		

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	extent of flooding generally increases in the 1% AEP and 0.1% AEP outlines. The main access routes via Watkinson Way (for land east of Bower's Brook) and Lunt's Heath Road (for land west of Bower's Brook) are generally at very low risk from surface water flooding.					
Surface water: mitigation options & site suitability	Development should avoid the 1% AEP outline – approximately 13% of the total site area and focus away from the areas of the site immediately adjacent to Bower's Brook i.e. through provision of a blue/green corridor into site design. Safe access and egress are achievable via Watkinson Way based on the 1% AEP outline, however, access roads and development should avoid the 1% AEP outline. Surface water runoff should be fully attenuated to the greenfield runoff rate, and as such, ensure that there is no increase in surface water flood risk elsewhere. The required volumes of attenuation have been calculated below. The site is currently greenfield and therefore, infiltration SuDS may be feasible (subject to ground investigation) where existing low-lying areas that are currently showing localised ponding may be utilised for attenuation. Surface water attenuation measures should avoid Flood Zone 3 (approximately 4% of the site). Surface water runoff currently drains to Bower's Brook; therefore, redevelopment of the site may significantly change the behaviour of surface water.					
Indicative Surface Water Flood Risk from Proposed Development (for Proposed Site in its Entirety)						
Proposed Development limiting runoff rate: Greenfield – FEH Statistical		Qbar: 126.8 Q30: 215.56 Q100: 263.74				
Design flood event (inc CC)	Critical storm duration (Hrs)	Inflow volume (m³)	Outflow volume (m³)	Attenuation required (m³)	Time to empty assuming no infiltration (Hrs)	Total storage required: Area (ha) and % of site area
3.33% AEP Rainfall + 20%	3	6985	1630	5355	9.8	0.357 ha 1.963 %
3.33% AEP Rainfall + 40%	3.5	8444	1901	6542	12	0.436 ha 2.398 %

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1% AEP Rainfall + 20%	3.25	9608	2160	7448 (2093 exceedance storage)	11.2	0.497 ha 2.730 %
1% AEP Rainfall + 40%	4	11747	2658	9088 (2546 exceedance storage)	13.6	0.606 ha 3.331 %
Climate change	Application of the central (20%) and upper band (40%) potential change anticipated for climate change in the table above shows the estimated attenuation volumes for the 1% AEP and 3.33% AEP rainfall events.					
Surface water: flood risk impacts from development site & mitigation	- As part of this Level 2 Screening we have included calculations to provide an estimated land take if a pond with an assumed depth of 1.5m was included as part of the development. - Attenuation volumes are presented for the critical storm duration for the 1 in 30-year events with exceedance flows quantified up to the 1 in 100-year event. To prevent development worsening flood risk elsewhere, surface water runoff must be managed on site.					

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