



Halton Borough Council Local Plan Site Screening

**Level 2 Strategic Flood Risk
Assessment – Site SL-0073 Screening**

Draft Report

July 2019

www.jbaconsulting.com



Municipal Building

Kingsway

Widnes

WA8 7QF



JBA Project Manager

Mike Williamson
Mersey Bank House
Barbould Street
WARRINGTON
Cheshire
UNITED KINGDOM
WA1 1WA

Revision history

Revision Ref/Date	Amendments	Issued to
P01 / July 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.

Prepared by Hannah Bishop BSc (Hons)

Technical Assistant

Joseph Landells-Molloy MEng (Hons) GMICE

Assistant Engineer

Reviewed by Mike Williamson BSc MSc CGeog FRGS EADA

Principal Flood Risk Analyst

Approved by..... Howard Keeble MPhil BEng BSc CEng CEnv CSci CWEM
MICE MCIWEM MCMI IMaPS

Technical Director

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Proposed Site	SL-0073
Site area (ha)	7.14
Existing use	Employment
Existing flood risk vulnerability classification	Less vulnerable
Proposed use	Employment
Proposed development flood risk vulnerability classification	Less vulnerable
Proposed development impermeable area (ha)	6.07

Flood outlines (current day)

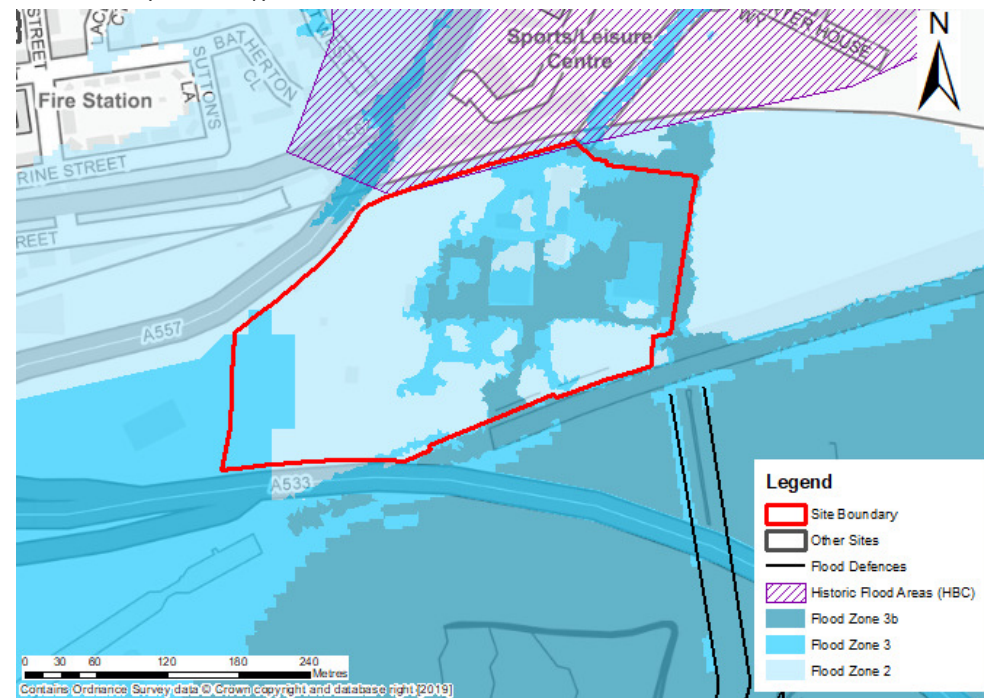


Figure 1-1: Flood Zone Mapping with Flood Defences

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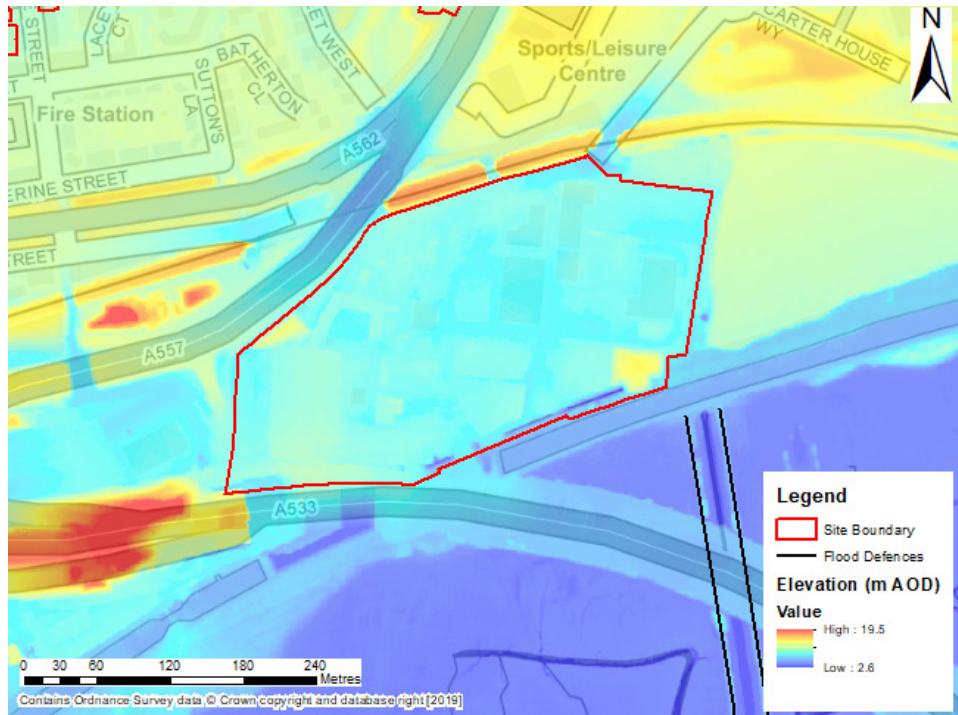


Figure 1-2: Site with 1m LIDAR (elevation data)

- The proposed site is located on relatively higher ground compared to the area located to the south of the site, LiDAR (see Figure 1-2:) indicates an average height of 9m AOD compared to those to the south of 5m AOD.

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Observations

- 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. The main issues are that over 20% of the site is within the functional floodplain where development is not permitted. As the proposed use is for employment, the areas within Flood Zone 3a can be developed but avoidance would be preferred. Much depends on the proposed layout i.e. will the layout remain the same? Are the existing buildings to remain? Any redevelopment or refurbishment of the site should, through the FRA, investigate minimum floor levels required to prevent the 1% AEP + climate change event from entering the buildings. Modelling should show what would happen to floodwaters were floor levels to be raised. Allowance in the site layout may

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be required to accommodate, on-site, the displaced floodwater. Retrofitting of property flood resilience techniques should also be investigated.

- According the Flood Map for Planning, the risk is predominantly fluvial from the River Mersey and Bower's Brook which runs adjacent to the eastern site boundary. The Flood Map is based on the Mersey Estuary 2016 model modelled flood outlines.
- The River Mersey is located to the south of the site, separated by the St Helen's Canal.
- There is no change in risk classification for the proposed development according to the NPPF.
- Updated modelling outputs show very low risk from tidal sources during the current defended scenario at the site.
- Flood defences in place protect the site from tidal risk. Modelled undefended scenarios detail partial site inundation in a 0.5% AEP event therefore tidal risk is residual. According to the EA's Spatial Flood Defences dataset, the defences on Bowers Brook are in very poor condition and may require replacement. The EA should be consulted as to the actual condition of these defences and should provide any details on possible refurbishment or replacement.
- Approximately 6% of the total site area is at risk of surface water flooding in the 1% AEP event to a maximum depth of 0.30-0.60m (see Figure 1-6).
- The main access route via Earle Road is inundated with floodwaters based on the 1% AEP outline. Alternative access and egress routes should therefore be explored and included in the proposed layout design.

Flood Source: Fluvial/Tidal

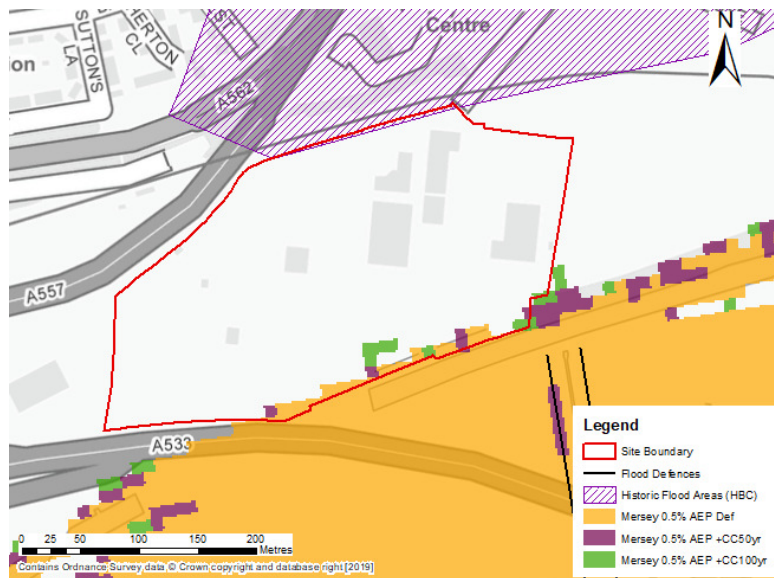
	Flood Zone 2	Flood Zone 3a	Flood Zone 3b
Flood Zones (%)	50.21	29.51	20.28
Tidal: Depth (m)	0.33	0.16	Not available
Tidal: Hazard	Moderate	Moderate	Not available

Commented [MW1]: How come there isn't an ABD in place then? Worth flagging to EA?

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Modelled Tidal
Flood Risk and
Climate
Change



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0.5% AEP 100yr epoch (cumulative sea level rise for the next 100 years) climate change scenario.

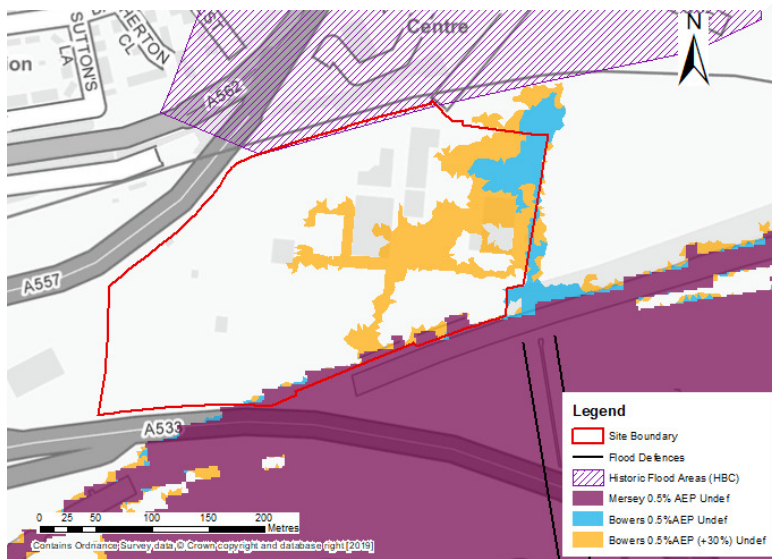
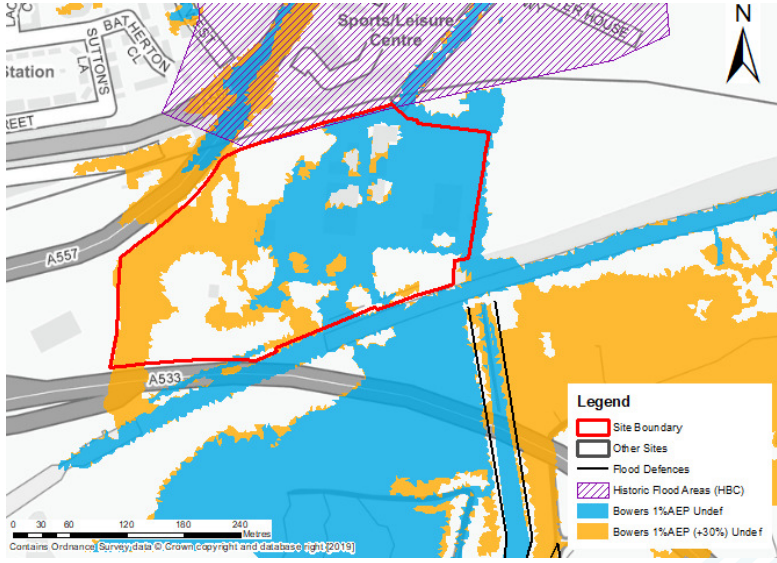


Figure 1-4: Undefended tidal outlines of the Mersey and the Bowers tributary for the current scenario 0.5% AEP and future risk 0.5% AEP plus 30% climate change uplift.

- In an undefended scenario, see above Figure 1-4, flooding extents have a much more prominent coverage of the site on the eastern side moving towards the centre.

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Fluvial Flood Risk and Climate Change	 Figure 1-5: Undefined fluvial outlines, of the Bowers tributary of the Mersey, for the current scenario 1% AEP and future risk 1% AEP plus 30% climate change uplift In the current scenario, the 1% AEP event covers a large majority of the centre and east of the site. With the climate change scenario, the outline extends to the west of the site with a larger proportion being covered. The depths of the climate change scenario reach a maximum of 500mm in places, primarily in the north-eastern corner of the site; the average depth across the site is approximately 160mm.
Historic Flooding	As shown in Figure 1-1, there is a historic flood area recorded by HBC to the north of the site with a very small proportion overlapping the site boundary. This historic event was caused by surface water due to culverted sections of Bowers Brook surcharging in extreme events.
Defences	There are embankments on either side of Bower's Brook located to the south of the site. These embankments have been assessed as condition grade 5 which means there are severe defects resulting in complete performance failure (Table 1.1 Condition Assessment Manual 2012¹). Consultation with the EA is required to ascertain whether these defences are due to be replaced in the future.
Flood Warning Area (FWA)	The proposed site is outside of any Environment Agency FWAs.

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

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Mitigation options & site suitability	- Depending on the redevelopment plans, 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. The main issues are that over 20% of the site is within the functional floodplain where development is not permitted. If possible, the existing buildings within the area areas of functional floodplain should be removed and the land left clear and returned to natural floodplain. If this isn't possible then existing development footprints should remain and not be extended. As the proposed use is for employment, the areas within Flood Zone 3a can be developed but avoidance would be preferred. - If possible, floor levels should be raised above the modelled 1% AEP + climate change levels of a maximum of 500mm above current levels - Updated modelling outputs show very low risk from tidal sources during the current defended scenario at the site. - Flood defences in place protect the site from tidal risk. Modelled undefended scenarios detail partial site inundation in a 0.5% AEP event therefore tidal risk is residual.	
Flood source: Groundwater		
Flood risk: groundwater	Data unavailable. Possible risk from groundwater must be assessed as part of an FRA.	
Flood Source: Infrastructure Failure – Reservoirs		
Flood risk: reservoirs	There is no risk of reservoir inundation to the site according to the EA's Reservoir Flood Map (RFM).	
Flood Source: Infrastructure Failure – Canals		
Flood risk: canal	Data unavailable. Residual risk from the St Helen's Canal should be considered within an FRA through modelling of overtopping / breach scenarios.	
Flood Source: Surface Water		
Surface Water Flood Risk to Proposed Development Site		

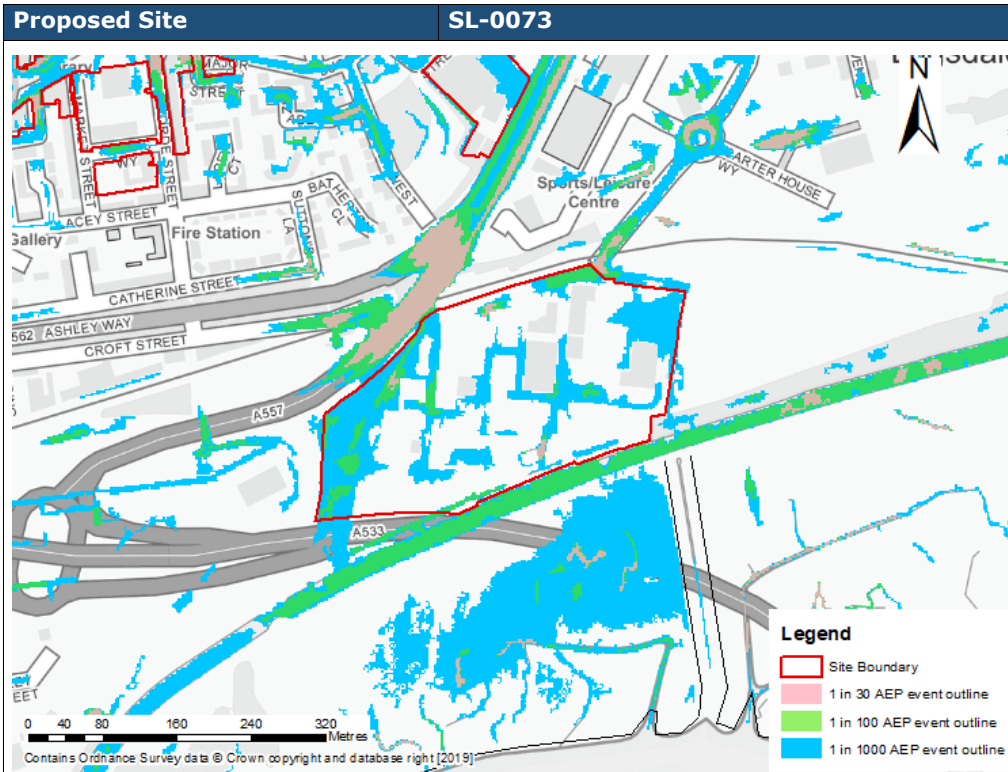


Figure 1-6: Surface Water Flood Risk to the site

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)
	0.55	6.40	35.18
Surface water flooding depths	Max: 0.15-0.30m	Max: 0.30-0.60m	Max: 0.90-1.20m
Surface water hazards	Max: Low Mean: Low	Max: Moderate Mean: Moderate	Max: Significant Mean: Moderate
Climate change	The current day 0.1% AEP outline provides an indication of the likely increase in extent of climate change events.		
Surface water: flood risk to development site	- Approximately 6% of the total site area is at risk of surface water flooding in the 1% AEP event to a maximum depth of 0.30-0.60m. - The extent of flooding in the 3.33% and 1% AEP events is localised with no defined flow routes indicated on published mapping. The		

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		extent of flooding in the 0.1% AEP event is more widespread and largely contained by existing development. - It is noted that the proposed development site is bounded by Bower's Brook and St Helens Canal to the south. - The main access route via Earle Road is inundated with floodwaters based on the 1% AEP outline.				
Surface water: mitigation options & site suitability		Development should avoid the 1% AEP outline – approximately 6% of the total site area, mainly confined to a flow path in the west of the site. Flow paths should not be obstructed and should be allowed to flow freely. The FRA or drainage strategy should assess appropriate SuDS techniques for this area. Safe access and egress are not considered to be achievable via Earle Road based on the 1% AEP outline, alternative access/egress should be proposed. Surface water runoff should be fully attenuated to a pre-agreed runoff rate (typically, this is a betterment on the existing runoff rate for currently developed sites) and as such, ensure that there is no increase in surface water flood risk elsewhere. The required volumes of attenuation have been calculated below for discharge at the greenfield rate. This provides a conservative estimate for the storage requirements that will likely be required. The site is currently developed and therefore, infiltration SuDS may not be feasible (subject to ground investigation and contaminated land assessment). Attenuation measures should avoid Flood Zone 3 (approximately 50% of the site). Surface water flood risk is largely contained by existing development; therefore, redevelopment of the site may significantly change the behaviour of surface water and this must be accounted for in an FRA.				
Indicative Surface Water Flood Risk from Proposed Development (for Proposed Site in its Entirety)						
Proposed Development limiting runoff rate: Greenfield – FEH Statistical		Qbar: 29.19 l/s Q30: 49.62 l/s Q100: 60.71 l/s				
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

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3.33% AEP Rainfall + 20%	5.5	3167	688	2479	19.8	0.165 ha 2.315 %
3.33% AEP Rainfall + 40%	6.75	3860	844	3016	24.1	0.201 ha 2.816 %
1% AEP Rainfall + 20%	5.75	4340	880	3461 (982 exceedance storage)	22.6	0.231 ha 3.232 %
1% AEP Rainfall + 40%	6.75	5228	1033	4195 (1179 exceedance storage)	27.3	0.280 ha 3.917 %
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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Registered Office:

1 Broughton Park
Old Lane North
Broughton
Skipton
North Yorkshire
BD23 3FD
United Kingdom

+44(0)1756 799919
info@JBA - consulting.com
www.JBA - consulting.com
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