

SITE ASSESSMENT - Bentall Centre Car Park

Address: Steadfast Road, Kingston, KT1 1TY	Area: 0.77 Ha
	Site Reference: SA 011

Current Use	Proposed Use
Multi-Storey Car Park	Mixed Use (Residential, Commercial, Business, Leisure). 282 units (if 100% residential)

Current Vulnerability Classification	Proposed Vulnerability Classification
Less Vulnerable	More Vulnerable

Current Risk Summary					
Fluvial / Tidal			Groundwater		
FZ2	100	% of Site	<25	0	% of Site
FZ3a	14.2	% of Site	25-50	0	% of Site
FZ3b	0	% of Site	50-75	100%	% of Site
Surface Water			>75	0	% of Site
1 in 30*	0	% of Site	Artificial		
1 in 100*	0.23	% of Site	Reservoir	Yes	At risk?
1 in 1000*	2.18	% of Site	Canal	No	At risk?
Sewer Flooding			Town Centre		
No. Incidents	65		Y/N	Y	

Flood Defences
The site is not in an area benefitting from flood defences.
Flood Warning Area
The EA Flood Warning Service is available at this site.

FLUVIAL / TIDAL

Risk Assessment (Defended) - River Thames				
Parameter	FZ3b	FZ3a	*FZ3a+CC	Units
Speed of inundation	N/A	N/D	N/D	Hrs
Min. Depth	N/A	0.03	0.154	m
Max. Depth	N/A	0.67	1.97	m
Max. Velocity	N/A	0.18	0.36	m/s
Max Flood Level	N/A	6.95	8.27	m AOD
Max Ground Level	N/A	5.5	5.5	m AOD
Min Ground Level	N/A	8.22	8.22	m AOD
Max Flood Hazard	N/A	1.24	2.17	N/A
Duration of Flood	N/A	N/D	N/D	Hrs

*The +35% Climate Change Allowance event (central allowance) is reviewed

Risk Assessment (Defended) - Hogsmill River				
Parameter	FZ3b	FZ3a	*FZ3a+CC	Units
Speed of inundation	N/A	N/A	13.25	Hrs
Min. Depth	N/A	N/A	0	m
Max. Depth	N/A	N/A	1.45	m
Max. Velocity	N/A	N/A	0.98	m/s
Max. Hazard	N/A	N/A	1.73	N/A
Duration of Flood	N/A	N/A	> 14.5	Hrs

Description of Flood Mechanism

- The site is at risk of flooding from the River Thames and Hogsmill River.
- The River Thames flows northerly, 50m from the western boundary of the site. Flooding originating from the River Thames, inundates the site from the west and covers a small segment of the site.
- The predicted flood risk extent for the climate change scenario covers the entire site. Maximum flood depths and velocities are both greater.
- The site is also at risk from the Hogsmill River in the climate change scenario. Flooding originates from the south eastern corner, surrounding the site.
- Figure 1 and 2 show the fluvial risk from the River Thames.

Note: EA are due to update River Thames model

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

- Site access / egress routes should be directed towards the eastern edge of the site along Skerne Road, where there is a lower risk of flooding.
- Safe refuge areas should be provided on site to account for the predicted impact of climate change on flooding at the site.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

- 'More Vulnerable' developments should be directed away from the western boundary of the site (FZ3a).
- Only basements with 'Low Vulnerable' or water compatible uses are permitted in the western side of the site (FZ3a).
- Self-contained basement dwellings and bedrooms are not permitted in FZ2. See SFRA Level 2 Report mitigation requirement number 4.10 for additional basement stipulations.
- See SFRA Level 2 Report mitigation requirement numbers 4.2, 4.4 and 4.5 for further development stipulations.
- Develop a Flood Emergency and Evacuation Plan for the site.
- Site users should be signed up to the EA's Flood Warning Service.

SURFACE WATER

Risk Assessment				
Parameter	1 in 30	1 in 100	1 in 1000*	Units
Min. Depth	0	0	0	m
Max. Depth	0	0.60-0.90	0.90-1.20	m
Max. Velocity	0	0.50-1.00	1.00-2.00	m/s
Max. Hazard	0	1.25-2.00	1.25-2.00	N/A

*The 1 in 1000-year flood extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

- A very small section in the south east of the site is at risk of surface water flooding.
- Climate change is predicted to slightly increase the flood extent. The maximum depth and velocity is also predicted to increase in the climate change scenario.

Site Access / Egress

Site access / egress routes should be directed towards the north eastern edge of the site along Skerne Road, where there is a lower risk of surface water flooding.

Figure 3 - RoFSW Flood Depth Map

Mitigation - Flood Risk Requirements

See SFRA - Level 2 Report mitigation requirement numbers 4.2, 4.3, 4.5 and 4.6 for additional development stipulations.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Surface Water Drainage

- A Kingston SuDS Proforma must be submitted with the planning application.
- Developments should apply the Sustainable Drainage Hierarchy set out in Policy SI13 of the London Plan.
- Ground investigations are required to confirm whether infiltration based SuDS are suitable.

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SEWER	GROUNDWATER	ARTIFICIAL
<p align="center">Risk Assessment</p> <ul style="list-style-type: none"> The site is served by separate surface water and foul sewer networks. The site falls within a postcode area where there are 65 reported flood incidents from sewer flooding. <p>Figure 5 - Thames Water Sewer Flood Map</p>	<p align="center">Risk Assessment</p> <ul style="list-style-type: none"> The entire site is classified as having 50-75% susceptibility to groundwater flooding. The site is underlain by London Clay bedrock with Alluvium superficial deposits in the north western half of the site and Langley Silt deposits in the south-east. <p>Figure 6 - Areas Susceptible to Groundwater Flooding Map</p>	<p align="center">Risk Assessment</p> <ul style="list-style-type: none"> The site is at risk from a number of reservoirs including the Hampton (Grand Junction, Stain Hill, Sunnyside), Island Barn, Queen Elizabeth II, Queen Mother, Staines (North & South), Walton (Bessborough & Knight), and Wraysbury reservoirs. If any of these reservoirs breach on a wet day i.e. when the local rivers are at capacity, the site will be at risk of flooding. <p>Figure 7 - Outline Reservoir Flood Map</p>
<p align="center">Mitigation Requirements</p> <ul style="list-style-type: none"> Applicant must consult with TWUL to confirm if the site has historically flooded. If historic flooding has occurred, the applicant must show how this risk will be managed for the lifetime of the development. 	<p align="center">Mitigation Requirements</p> <ul style="list-style-type: none"> Applicant should carry out a screening study (as a minimum) to establish if there are any subterranean flood risk issues that may require further investigation. If there is a potential impact, mitigation actions must be proposed. Must be prepared by a chartered professional or specialist. 	<p align="center">Mitigation Requirements</p> <ul style="list-style-type: none"> Propose appropriate and proportionate risk management measures. A suitable emergency response plan should be put in place, including an emergency warning system in the event of a reservoir flooding incident. Local Authority Emergency Planning Officers must be consulted to create a reservoir failure emergency and evacuation plan.

PLANNING CONSIDERATIONS

Safety of Development

A. Can the development be future proofed for climate change considerations?
 Yes. See SFRA - Level 2 Report mitigation requirement number 4.2 and 4.4 for the required finished floor levels and flood resistant / resilient building stipulations.

B. Can the development be designed safe throughout its lifetime without increasing flood risk elsewhere?

- Yes. The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and / or below ground attenuation. Green drainage infrastructure should be prioritised to provide wider ecological / biodiversity benefits as per London Plan Policy SI 13.
- See SFRA - Level 2 Report mitigation requirement number 4.5 for compensatory flood storage stipulations.

C. What is the cumulative impact of the development land use change and will flood risk increase?

- The development land use is changing from the 'Less Vulnerable' to 'More Vulnerable' classification, as the site is proposed to be used for residential purposes.
- The site is currently a brownfield site with hardstanding areas and no green space. This offers an opportunity to improve flood attenuation through new development.

D. How can the development reduce risk overall?

- Restricting development to lower risk areas i.e. away from the western edge of the site.
- Include SuDS to manage surface water runoff and reduce runoff rates to comply with Policy DM 4 in Kingston's Core Strategy.
- By complying with SFRA - Level 2 Report mitigation requirement numbers 4.2, 4.4 and 4.5.

E. Will development require a flood risk permit / watercourse consent?

- No. The site is not within 8m of a Main River or 5m of an Ordinary Watercourse.

F. Is the Exception Test required?

- The Exception Test is required for 'More Vulnerable' classification located within FZ3a i.e. the western border of the site.
- The Exception Test can be passed by making the site safe throughout its lifetime without increasing flood risk elsewhere (see questions A, B, and C). The site could also reduce flood risk overall with appropriate SuDS and flood storage compensation measures implemented (see Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

G. What are the delivery challenges for developing this site in terms of the passing the Exception Test?

- Due to the high flood levels predicted for the 1 in 100 year + CC event, achieving the required finished floor levels may not be feasible (see SFRA requirement 4.3).
- A large proportion of the site requires flood compensation storage which may not be feasible given the volume-for-volume / level- for- level stipulation. (See SFRA - Level 2 Report mitigation requirement number 4.5).
- Flood resistance measures will be required.



