Broadwater Dock

Summary Information	
Site Reference	P5-TA2
Address	Broadwater Dock, Thamesmead, SE28
Area (ha)	5.17
Current Use	The site is currently vacant with the majority being vegetated greenfield land, as well as the canal, lock gates and derelict swing bridge.
Current Vulnerability	Water Compatible
Proposed Use	Residential uses, ancillary community uses and publicly accessible open space.
Proposed Vulnerability	More Vulnerable

Current Risk Summary					
Fluvial / Tidal			Groundwater		
FZ2	6.28	% of site	Limited potential for flooding to occur	41.50	% of site
FZ3a	35.61	% of site	Potential for flooding of properties below ground level	34.43	% of site
FZ3b	27.72	% of site	Potential for flooding to occur at surface	24.07	% of site
Surface Water			Sewer Flooding		
High	2.30	% of site	Number of incidents within the predominant postcode	10 - 20	
Medium	14.60	% of site	Is the site located within the Thamesmead area?	No	
Low	25.68	% of site			
Flood Defences			Flood Warning Area		
The site is at risk of flooding from rivers taking into account the presence and condition of flood defences according to the EA's RoFRS layer. There is a flood defence along part of the northern boundary of the site.			The EA Flood Warning Service is available at this site.		

See webmap supporting assessment: Greenwich - Level 1 and 2 SFRA

1.1 Fluvial

Description of Flood Mechanism
• The site is at risk from fluvial flooding from the Marsh Dykes model. The Broadwater channel covers the western boundary and northern section of the site. • The extent of flooding covers the Broadwater channel some of the adjacent land.
Mitigation / FRA Requirements
• Only water compatible or essential uses (subject to the Exception Test) are permitted in FZ3b which covers the channel and some of the adjacent land. • Self-contained basement dwellings and bedrooms are not permitted in FZ3a. See SFRA Level 2 Report mitigation requirement numbers 4.7 and 4.8 for additional basement stipulations. • A FRA must be submitted as part of a planning application. • Include appropriate flood resistance or resilience measures to address predicted flood depths. • See SFRA Level 2 Report mitigation requirement numbers 4.1, 4.2, 4.3, 4.5 and 4.9 for further development stipulations. • Develop a Flood Risk Emergency Plan for the site. • Site users should be signed up to the EA's Flood Warning Service. • Due to the lack of 2D data onsite for fluvial flood risk only, the PLE_MID 1D node has been assessed which is the only node located within the site, to provide an indication of the maximum velocity and flood level impacting the site. • Developers will need to determine the 1 in 100 year plus climate change flood level and depths based on the most relevant development scenario provided in the Marsh Dykes 2020 Modelling Report. • As no baseline 1 in 100 year plus climate change modelled event was provided, the 1 in 1000 year modelled event has been assessed to determine a climate change influence.
Climate Change Considerations
For the fluvial only Marsh Dykes extents, there is no change to the extent with a 20% climate change scenario applied to the 1 in 100 year event. Climate change is however expected to increase the maximum flood level from -0.57mAOD to -0.24mAOD and the maximum velocity from 1.55m/s to 2.89m/s.

Risk Assessment (Fluvial) – Marsh Dykes (2020) 1D				
Parameter	FZ3b	FZ3a	FZ3a+CC*	Units
Max. Velocity	0.59	1.55	2.89	m/s
Max Flood Level	-0.80	-0.57	-0.24	m AOD
Max Ground Level	9.33	9.33	9.33	m AOD
Min Ground Level	0.82	0.82	0.82	m AOD

* The 1 in 1000 year critical duration event level was used to assess climate change and an assumption has been made on the parameter based on the provided figures

1.2 Tidal

Description of Flood Mechanism
The site is at risk of tidal flooding from the River Thames which is located approximately 10m away from the northern boundary of the site. • During the 1 in 200 year (2005) Thames Downriver modelled event, tidal flood risk is concentrated along the Broadwater channel and the northeastern corner of the site. • During the 1 in 1000 year (2005) Thames Downriver modelled event, tidal flood risk covers the Broadwater channel and some northern and western areas of the site. • During the 1 in 200 (2115) Thames Downriver modelled event, tidal flood risk covers the Broadwater channel, and some northern, northeastern and western areas of the site. • During the 1 in 1000 (2115) Thames Downriver modelled event, tidal flood risk covers the Broadwater channel, and the northern, northeastern and western areas of the site.
Mitigation / FRA Requirements
• A FRA must be submitted as part of a planning application. • Include appropriate flood resistance or resilience measures to address predicted flood depths. • See SFRA Level 2 Report mitigation requirement numbers 4.3 and 4.4, Policies E2 and E3 of the existing Greenwich Local Plan, and Policy EN6 of the draft Local Plan for further development stipulations. • Site users should be signed up to the EA's Flood Alert and Flood Warning Service. • Sea Level Allowances, provided by the EA, should be considered to inform flood resilient construction and design measures. • Site users should be signed up to the EA's Flood Alert and Flood Warning Service. • Future defence raisings may be required in line with the TE2100 Plan crest levels guidance. They must consider the lifetime of the development and the status of current flood defence crest levels in the site-specific FRA.
Climate Change Considerations

During the Thames Breach Downriver 1 in 200 year events, climate change is expected to increase the extent of tidal flood risk around the Broadwater channel, and in the northern and western areas of the site. The maximum depth increases from 4.95m to 5.65m, the maximum velocity increases from 5.49m/s to 6.20m/s, the maximum flood level increases from 5.85mAOD to 6.63mAOD and the maximum hazard increases from 11.47 to 14.89.

During the Thames Breach Downriver 1 in 1000 year events, climate change is expected to increase the extent of tidal flood risk around the Broadwater channel, and the western and northern areas of the site. The maximum depth increases from 5.21m to 5.87m, the maximum velocity increases from 5.80m/s to 6.83m/s, the maximum flood level increases from 6.11mAOD to 6.94mAOD and the maximum hazard increases from 12.65 to 16.15.

Risk Assessment (Tidal – Thames Breach Downriver 2018)					
Parameter	2005_0200	2005_1000	2115_0200	2115_1000	Units
Max. Depth	4.95	5.21	5.65	5.87	m
Max. Velocity	5.49	5.80	6.20	6.38	m/s
Max Flood Level	5.85	6.11	6.63	6.94	m AOD
Max Ground Level	9.33	9.33	9.33	9.33	m AOD
Min Ground Level	0.82	0.82	0.82	0.82	m AOD
Max Flood Hazard	11.47	12.65	14.89	16.15	N/A

1.3 Surface Water

Description of Flood Mechanism	
Flood risk is primarily concentrated along the eastern boundary of the site, predominantly associated with the Broadwater channel and areas within its immediate vicinity. Additional surface water flood risk is present within localised areas in the western part of the site, and the central-eastern area of the site. The only area classified as high risk is situated in the southeastern section of the site, within the Broadwater channel.	
Mitigation – Flood Risk Requirements	Mitigation – Surface Water Drainage
Development should be directed away from the eastern area of the site and towards the central areas of the site. Development should comply with SFRA - Level 2 Report Section 4 mitigation requirement numbers 4.3 and 4.9.	See SFRA Level 2 Report mitigation requirement 5.0 for further development stipulations. Developments should apply the Sustainable Drainage Hierarchy set out in Policy SI 13 of the London Plan as well as Policy E2 of the existing Greenwich Local Plan and Policy EN6 of the draft Local Plan.

	Ground investigations are required to confirm whether infiltration SuDS are suitable.

Climate Change Considerations
During the high risk events, the extent increases within the southeastern section of the Broadwater channel, and there is a new area of high risk in the northern section of the channel. Another new area of high risk also occurs within the western area of the site. The maximum depth increases from <0.2m to 0.2m, the maximum velocity increases from 0.0m/s to 0.25m/s and the maximum hazard increases from 0.5 to 0.75. During the medium risk events, the extent increases within the Broadwater channel, particularly in the central area of the channel, as well as increasing within the previously identified area within the western area of the site. The maximum depth increases from 0.2m to 0.3m. The maximum velocity increases from 0.2m/s to 0.5m/s. The maximum hazard remains unchanged. During the low risk events, the extent expands slightly within the Broadwater channel. The extent also increases within the site, within the three areas of risk in the western area of the site and a small area of risk in the central-eastern area of the site. The maximum depth increases from 0.3m to 0.6m. The maximum velocity and hazard remain unchanged.

Risk Assessment				
Parameter	High	Medium	Low	Units
Max. Depth	<0.2	0.2	0.3	m
Max. Velocity	0.0	0.25	1.0	m/s
Max. Hazard	0.5	0.75	1.25	N/A

Risk Assessment – with Climate Change				
Parameter	High	Medium	Low	Units
Max. Depth	0.2	0.3	0.6	m
Max. Velocity	0.25	0.5	1.0	m/s
Max. Hazard	0.75	0.75	1.25	N/A

1.4 Sewer

Risk Assessment	Mitigation Requirements
The site falls within a postcode area where there are 10 - 20 reported flood incidents from sewer flooding. The site is assumed to be served by separate surface water and foul sewer	The applicant must consult with TWUL to confirm if the development site has historically flooded. TWUL must agree to any proposed sewer connections.

networks, given their proximity to the site.	If historic flooding has occurred, the applicant must demonstrate how this risk will be managed throughout the development's lifetime.

1.5 Groundwater

Risk Assessment	Mitigation Requirements
The site has a limited potential for groundwater flooding to occur within the central areas. There is also potential for groundwater flooding of property situated below ground level in the northeastern and western sections of the site. In addition, there is a potential risk of groundwater flooding to occur at surface in the southeastern areas of the site. The site is predominantly underlain by the Thanet Sand Formation bedrock geology and the superficial deposits in the southeastern section of the site are comprised of Alluvium. There is no other data available for the other sections of the site.	For new developments that involve groundworks, especially if basements are planned, the 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 level of impact, mitigation actions must be proposed. This must be prepared by a chartered professional or specialist.

1.6 Artificial

Risk Assessment	Mitigation Requirements
This site is at risk of flooding from the Lockwood reservoir. The reservoir extent map predicts that if this reservoir breaches on a wet day, the site will be at risk of flooding.	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.

1.7 Planning Considerations – Safety of Development

A.	Can the development be future proofed for climate change considerations?
	• Surface water flood risk extent is expected to increase in the high, medium and low risk events due to climate change. The maximum depth increases in all events, the maximum velocity increases in the high and medium risk events, and the maximum hazard increases in the high risk event. • The extent of fluvial flooding from the Marsh Dykes model does not change due to climate change, however the maximum flood level and velocity are expected to increase. • In the Thames Tidal Breach Downriver modelled scenarios, there is an increase in extent due to climate change. The maximum depth, velocity, flood level and hazard increase in a climate change scenario. • See SFRA - Level 2 Report Section 4 mitigation requirement number 4.4 for the required flood resistant / resilient building stipulations.
B.	Can the development be designed safe throughout its lifetime without increasing flood risk elsewhere?
	• 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 numbers 4.1, 4.2, 4.3, 4.5, 4.7, 4.8 and 4.9 and Policies E2, E3 of the Greenwich Local Plan and Policy EN6 of the draft Local Plan for further development 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 'Water Compatible' to 'More Vulnerable'. • The site is currently predominantly permeable, with two sections of impermeable area located at the south of the site and to the western boundary of the site. • Development must mitigate any increase in impermeable area to the site with flood plain compensation and runoff storage to prevent any increase in flood risk. An increase in impermeable area coverage on site will increase surface water runoff and flood risk if not managed properly.
D.	How can the development reduce risk overall?
	• Development should be directed away from the eastern area of the site by the Broadwater channel and instead should be directed towards the central areas of the site, where there is less risk of surface water and fluvial flooding. • By complying with Policy E2 of the Greenwich Local Plan and Policy EN6 of the draft Local Plan through demonstrating that the development will avoid or minimise all sources of flood risk to people and property taking climate change into account, and incorporating SuDS measures in order to manage surface

water runoff as close to its source as possible and to meet the required SuDS performance standards. • By complying with SFRA - Level 2 Report Section 4 mitigation requirement 4.4.
E. Which safe access and egress routes are recommended?
Given the risk of surface water and tidal flooding to the available access and egress routes, the applicant should provide a Flood Risk Emergency Plan in line with Adept guidance.
F. Will development require a flood risk permit / watercourse consent?
Yes, the site is within 16m of a Tidal River.
G. Can the site pass the Exception Test?
• Part of the site is located within Flood Zone 3b, therefore 'More Vulnerable' development is not permitted in the area within this Flood Zone. • The site is located within Flood Zone 3a and the proposed vulnerability classification is 'More Vulnerable', therefore the Exception Test is required.