SITE 2.1.29 : New Covent Garden Market, Entrance Site, Nine Elms Lane, SW8

1) PROPOSED DEVELOPMENT

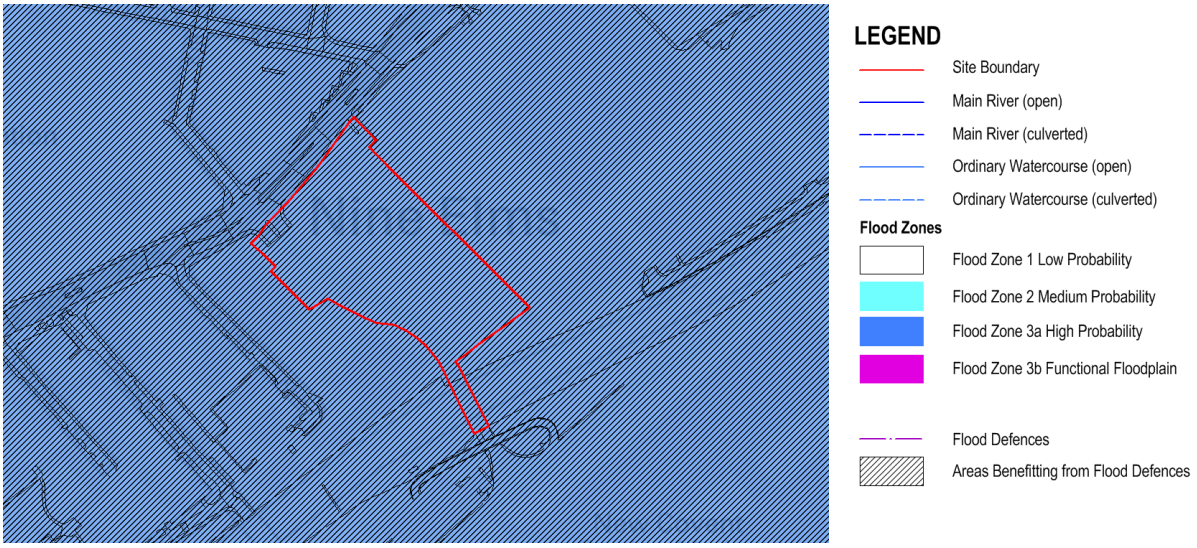
Site ID	2.1.29
Site Address	New Covent Garden Market, Entrance Site, Nine Elms Lane, SW8
Site Area	1.84 ha
Current Use	Access site to New Covent Garden Market.
Allocated Use	Residential-led mixed-use development with improved transport capacity and a new permeable network of streets and urban spaces including amenity space. Provision for a primary school including some nursery provision and sports pitches on part of the site in accordance with the Area Spatial Strategy.
Vulnerability	More vulnerable

2) SUMMARY OF LEVEL 1 FLOOD RISK

Flood risk from rivers

The site is in close proximity to the River Thames.

Proportion of potential development site within Flood Zone	Flood Zone 3b	Flood Zone 3a	Flood Zone 2	Flood Zone 1	Area Benefiting of Defences
	0 %	**100 %**	**0 %**	**0 %**	**100 %**



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Flood risk from all other sources			**Limitations**
Risk of flooding to the potential development site and surrounding area	Surface Water flooding: (Level 1 SFRA Appendix A Figure 5.2 - uFMfSW)	**High Risk** 1 in 30 year (3.33% annual probability)	The uFMfSW data does not show the susceptibility of individual properties to surface water flooding. The uFMfSW also does not take into account the details of the existing drainage system.
	Groundwater flooding: (Level 1 SFRA Appendix A Figure 5.4 - BGS Susceptibility to Groundwater Flooding)	**Medium Risk** Potential for groundwater flooding to occur at surface, but no historic records of groundwater flooding	The dataset cannot be used on its own to indicate risk of groundwater flooding and should not be used to inform planning decisions at a site scale. It is suitable for use in conjunction with a large number of other factors, e.g. records of previous incidence of groundwater flooding, to establish relative risk of groundwater flooding.

Historic records of flooding

Historic records of flooding from each source within a 100m radius of potential development site	Fluvial records	Surface water records	Groundwater records	Sewer records	Multiple source records	Other
	0	**0**	**0**	**1 Internal**	**0**	**0**

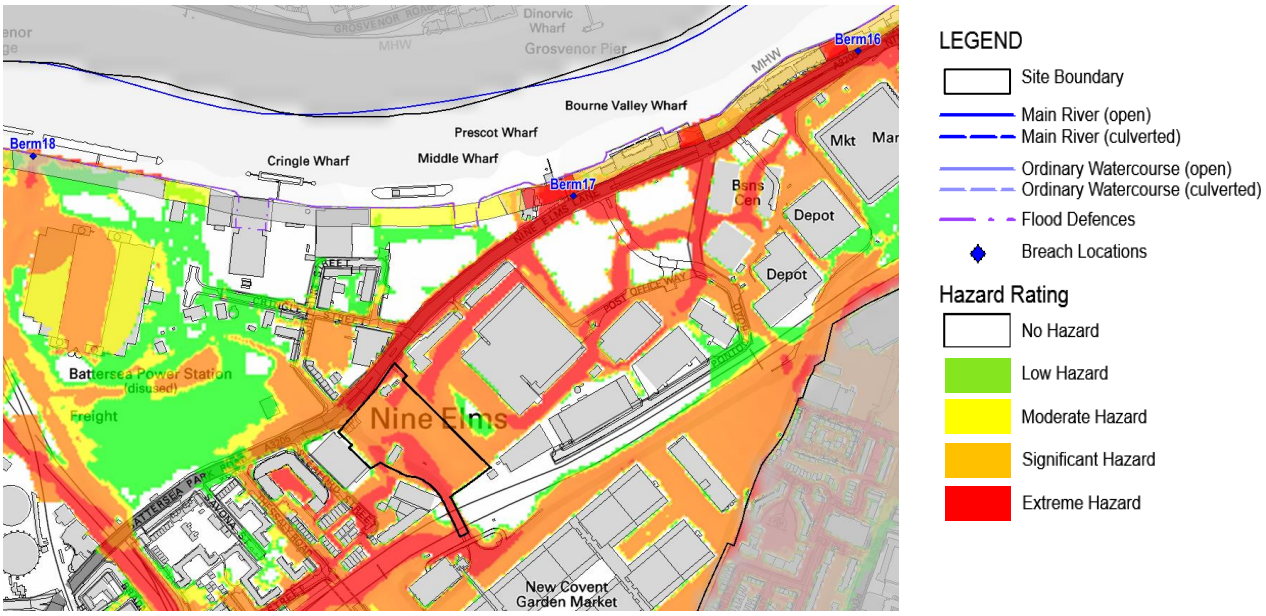
SITE 2.1.29 : New Covent Garden Market, Entrance Site, Nine Elms Lane, SW8

3) LEVEL 2 ASSESSMENT

The London Borough of Wandsworth is located upstream of the Thames Barrier where tidal water levels are a function of the maximum tide level allowed through the Thames Barrier (defined by the barrier closure rule / matrix). As a result, when undertaking modelling of the Thames upstream of the Barrier typical return periods cannot be applied. For the purpose of this Level 2 site assessment, maximum flood depth and hazard mapping from the Environment Agency's updated River Thames breach modelling (2015) have been used, using the Maximum Likely Water Level (MLWL) under climate change conditions for the year 2100.

The mapping shows combined result for each of the breach scenarios. The worst case breach location for the site is considered to be breach location Berm 17. The invert level was 3.25 mAOD and the width of the breach is 20m.

Thames Tidal Breach Modelling: Maximum Hazard Rating (MLWL 2100)



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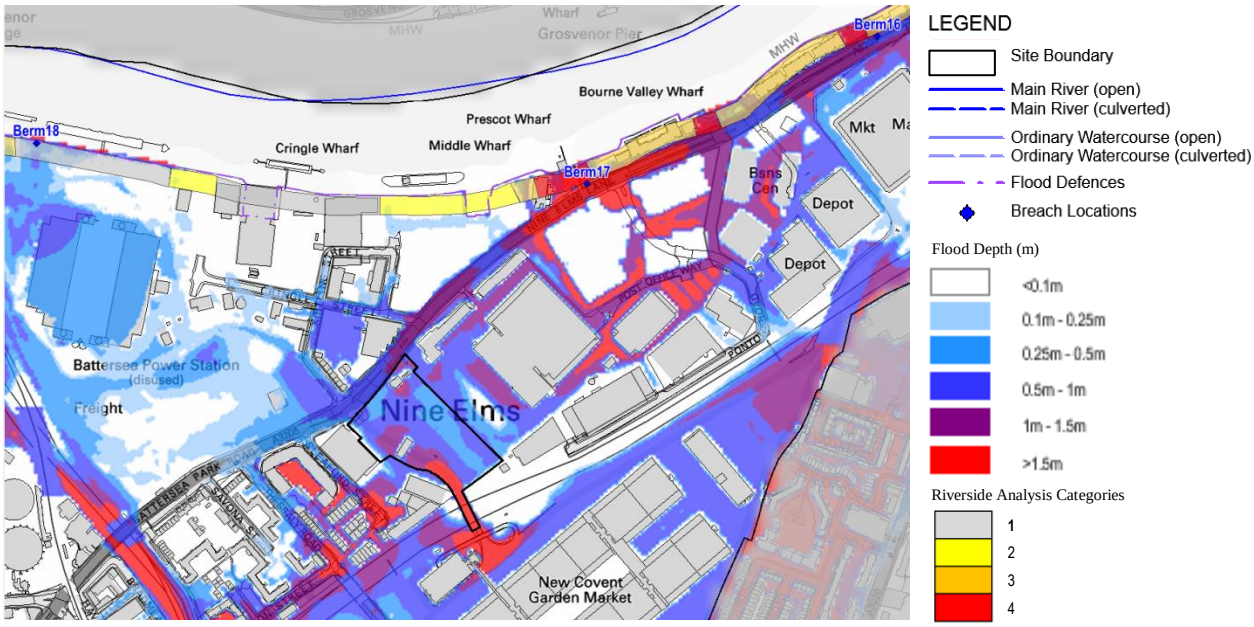
Thames Tidal Breach Modelling: Maximum Flood Depth (MLWL 2100) and Riverside Analysis Categories



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Riverside Analysis

There are 3 breach locations in close proximity to the site which provides a good indication of the likely impact to the site. Results from the riverside analysis completed as part of the 2008 SFRA identify the frontage adjacent to the site as Category 2, which is assumed Breach Level of 4.8 – 5.3 mAOD and Potential Peak Depth of Flow through breach (1 in 1000 year event) 0.5m – 0m.

SITE 2.1.29 : New Covent Garden Market, Entrance Site, Nine Elms Lane, SW8		
4) RECOMMENDATIONS AND POLICIES		
Development Layout and Sequential Approach	A sequential approach to site layout should be used. The entirety of the development site is within Flood Zone 3a of the River Thames. The majority of the site is also at either 'Significant Hazard' or 'Extreme Hazard'. Typically the area of greatest hazard is apparent in the south of the site and along the northern site boundary. The only the areas of 'No Hazard' are where there is currently development. For the current development site (without mitigation), the Thames Tidal breach modelling Berm17 identifies that under the MLWL 2100 scenario the site is at risk of flooding of greater than 1.5m in depth (to the south of the development site). To the south and north of the site, a risk of flooding of between 1m-1.5m is apparent. The area surrounding this is a risk of flooding between 0.5m-1m or 0.25m-0.5m. More vulnerable development, which includes the school, nursery and residential components of the development proposal, should be located toward the centre of the site. More Vulnerable uses must be located on the first floor or above, with Less Vulnerable uses at ground level. Where possible all development should be located anyway from hazardous areas, however, if development is required in hazardous areas then the Less Vulnerable development should be located in the areas of greatest hazard. Self-contained residential basements and bedrooms at basement level are not permitted in Flood Zone 3a or areas that have 'potential for groundwater to occur at the surface' (BGS Susceptibility to Groundwater Flooding. Less Vulnerable basements, basement extensions and conversions, such as plant, car parking etc, must provide safe internal access to higher floors situated above levels derived from the breach modelling. Further ground investigations would be required at this site to confirm the likelihood of groundwater occurrence. Measures to manage surface water on the site should be considered early in the site masterplan to enable inclusion of attenuation SuDS where possible.	Section 9.2
Finished Floor Levels	For More Vulnerable development, finished floor levels for habitable accommodation should be set at or above the Thames Tidal breach modelling MLWL 2100 scenario flood level. For Less Vulnerable uses (such as commercial development), finished floor levels do not need to be raised with regards to policy, however, internal access must be provided to upper floors to provide safe refuge in a tidal breach flood event.	Section 9.3
Safe Access/Egress	Access to the site is provided via Battersea Park Road to the west of the site. In the event of widespread flooding associated with a breach in the Tidal Thames Defence, and for precautionary purposes, it is recommended that a Flood Warning and Evacuation Plan (FWEP) is developed.	Section 9.7
Flood Warning and Evacuation Plan	A Flood Warning and Evacuation Plan (FWEP) must be prepared for the site, detailing how flood warning will be provided how the safety of occupants and access to/from the development will be ensured and what will be done to protect development and contents. The FWEP should consider arrangements for the evacuation of basement car parks. Where possible, the FWEP should also detail the length of time before the site becomes inaccessible by emergency vehicles. **Flood Warning Areas** The local area is covered by the Environment Agency Flood Warning Areas for 'Tidal Thames from Deptford Creek to Wandsworth Bridge'. Residents of the site should ensure they are signed up to the Environment Agency Flood Warning system. **Emergency Rest Centres** The closest designated emergency rest centre for this site is R.O.S.E. (Residents of Savona Estate), Ascalon Street, to the south of the development site.	Section 9.14
Surface Water Management	**Current risk of flooding** The site is within Drainage Catchment 1, which is completely within London Borough of Wandsworth, and drains the Battersea and Nine Elms area. The uFMfSW indicates that the majority of the site and surrounding area is at high risk of surface water flooding. The potential development must not increase flood risk to other areas in the Drainage Catchment.	
	Indicative existing runoff rate: 8.2 l/s (1 in 1 year), 30.6 l/s (1 in 100 year) **Indicative Greenfield Runoff Rate:** 5 l/s	Section 10

SITE 2.1.29 : New Covent Garden Market, Entrance Site, Nine Elms Lane, SW8

	SuDS Suitability Reference to the SWMP Appendix C2 Figure 4 identifies that (prior to the completion of a site investigation to determine precise local conditions) infiltration of surface water into the ground is potentially unsuitable for the site. There are also areas which will require further assessment through site visits as suitability is currently unknown. Site investigations will be required prior to the development of a Drainage Strategy for the site. The site is within an inner and outer Groundwater Source Protection Zone. Techniques which should be considered include green roofs, filter strips, detention basins and ponds, as well as permeable surfacing in combination with tanked systems	Section 10.3 and 10.9
	Drainage Strategy and Approvals Wandsworth Council will require a Drainage Strategy to be prepared outlining the surface water management for the site, runoff rates and consideration of SuDS in line with the London Plan policy 5.13 and Local Plan policies. Where it is not possible to achieve greenfield runoff rates in accordance with the preferred standards set out in the London Plan policy 5.13 and Design and Construction SPG (April 2014), then justification must be provided. Arrangements for the future maintenance of the drainage system must be made and detailed in the Drainage Strategy. There is no automatic right to connect to the existing Thames Water network. Any potential diversions and/or discharges into a sewer or main river must be agreed with Thames Water or Environment Agency, respectively.	Section 10.6
	Indicative Unit Costs Green roofs ~ £90/m^2. Permeable paving ~ £30-50/m^2. Filter strips £2-4m^2. Detention basin £15-50m^3. Concrete storage tank £449-518/m^3.	Section 10.4

5) EXCEPTION TEST CONSIDERATIONS

The NPPF states that there are two parts to the Exception Test that must be passed for development to be allocated or permitted:

1) *"it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk"* and
2) *"demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall"*.

This development site is located within Flood Zone 3a of the tidal River Thames, however it is defended by the Thames Tidal Defence System. For this development site, the most vulnerable development should be located in areas of lowest hazard. There is potential that dry routes out of the local area to a safe place of refuge may be limited and it is therefore necessary to prepare a FWEP for residents / occupants of the site detailing steps to evacuate the site prior to the onset of flooding. The potential impacts of flooding should be mitigated through careful site layout, resilient construction techniques, and incorporation of SuDS, to reduce the risk of increasing flood risk elsewhere. Therefore, on this basis, it is likely that this site would pass the Exception Test.

SITE 3.1.1 : Wandsworth Business Village, Buckhold Road/Broomhill Road, SW18

1) PROPOSED DEVELOPMENT

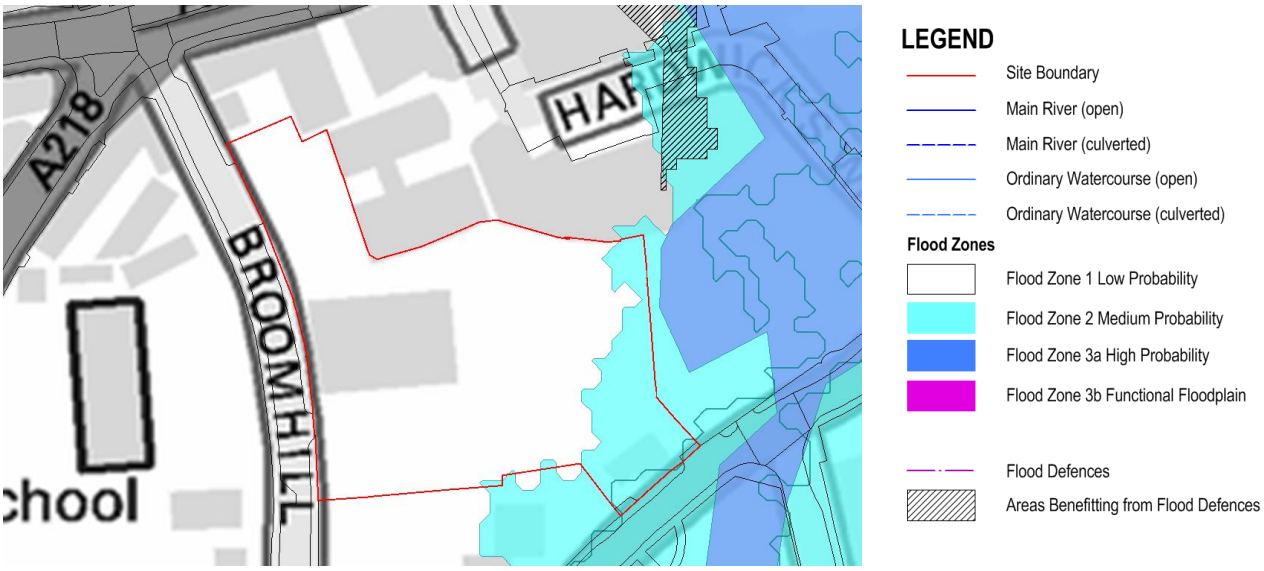
Site ID	3.1.1
Site Address	Wandsworth Business Village, Buckhold Road/Broomhill Road, SW18
Site Area	0.87 ha
Current Use	Site under construction
Proposed Use	Mixed use development including replacement employment floorspace, residential and improved links with the town centre.
Vulnerability	More vulnerable

2) SUMMARY OF LEVEL 1 FLOOD RISK

Flood risk from rivers

The site is in close proximity to the River Wandle.

Proportion of potential development site within Flood Zone	Flood Zone 3b	Flood Zone 3a	Flood Zone 2	Flood Zone 1	Area Benefiting of Defences
	0 %	**0 %**	**15 %**	**85 %**	**0 %**



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Flood risk from all other sources			**Limitations**
Risk of flooding to the potential development site and surrounding area	Surface Water flooding: (Level 1 SFRA Appendix A Figure 5.2 - uFMfSW)	**Medium Risk** 1 in 100 year (1% annual probability)	The uFMfSW data does not show the susceptibility of individual properties to surface water flooding. The uFMfSW also does not take into account the details of the existing drainage system.
	Groundwater flooding: (Level 1 SFRA Appendix A Figure 5.4 - BGS Susceptibility to Groundwater Flooding)	**Medium Risk** Potential for groundwater flooding to occur at surface, but no historic records of groundwater flooding	The dataset cannot be used on its own to indicate risk of groundwater flooding and should not be used to inform planning decisions at a site scale. It is suitable for use in conjunction with a large number of other factors, e.g. records of previous incidence of groundwater flooding, to establish relative risk of groundwater flooding.

Historic records of flooding

Historic records of flooding from each source within a 100m radius of potential development site	Fluvial records	Surface water records	Groundwater records	Sewer records	Multiple source records	Other
	0	**0**	**0**	**1 Internal 2 External**	**0**	**0**

SITE 3.1.1 : Wandsworth Business Village, Buckhold Road/Broomhill Road, SW18

4) RECOMMENDATIONS AND POLICIES

In accordance with the NPPF, Less Vulnerable development is considered compatible within Flood Zones 1 and 2 and **does not require the application of the Exception Test**. However, given the risk of fluvial and surface water flooding to this site, the principles of the Exception Test should still be considered when developing on this site, namely:

1) *"it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk"* and
2) *"demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall"*.

The following information and recommendations are therefore provided for consideration.

Development Layout and Sequential Approach	15% of the south eastern area intersects with Flood Zone 2 of the River Wandle; the rest of the site is within Flood Zone 1. The most vulnerable aspects of the development should be allocated within the Flood Zone 1. Self-contained residential basements and bedrooms at basement level are not permitted in areas that have 'potential for groundwater to occur at the surface' (BGS Susceptibility to Groundwater Flooding). Less Vulnerable basements, basement extensions and conversions, such as plant, car parking etc, must provide safe internal access to higher floors situated above levels derived from the breach modelling. Further ground investigations would be required at this site to confirm the likelihood of groundwater occurrence. Measures to manage surface water on the site should be considered early in the site masterplan to enable inclusion of attenuation SuDS where possible.	Section 9.2
Flood Resistance	It is recommended that flood resistant construction methods should be considered along the south eastern edge where the site intersects with Flood Zone 2. This could include use of construction materials with low permeability, raising property thresholds, using landscaping to manage surface water and fluvial floodwater.	Section 9.4
Flow Routing	New development should not adversely affect flood routing and thereby increase flood risk elsewhere (including surrounding area). On this site, opportunities should be sought to make space for water, such as: • Removing boundary walls or replacing with other boundary treatments such as hedges, fences (with gaps). • Create under-croft car parks or consider reducing ground floor footprint and creating an open area under the building to allow flood water flow. • Where proposals include floodable outbuildings or garages, design the external walls to enable the free flow of floodwater.	Section 9.12
Surface Water Management	**Current risk of flooding** The uFMfSW indicates that the site and surrounding area is at medium risk of surface water flooding. The site is within Drainage Catchment 6, which is within the London Borough of Wandsworth. The potential development must not increase flood risk to other areas in the Drainage Catchment.	
	Indicative existing runoff rate: 3.9 l/s (1 in 1 year), 14.5 l/s (1 in 100 year) **Indicative Greenfield Runoff Rate:** 5 l/s	Section 10
	SuDS Suitability Reference to the SWMP Appendix C2 Figure 4 identifies that (prior to the completion of a site investigation to determine precise local conditions) infiltration of surface water into the ground is potentially uncertain and requires further investigation. If unsuitable the techniques which should be considered include green roofs, filter strips, detention basins and ponds, as well as permeable surfacing in combination with tanked systems. If infiltration SuDS are suitable then infiltration basins and/or trenches could be considered.	Section 10.3 and 10.9
	Drainage Strategy and Approvals The London Borough of Wandsworth will require a Drainage Strategy to be prepared outlining the surface water management for the site, runoff rates and consideration of SuDS in line with the London Plan policy 5.13 and Local Plan policies. Where it is not possible to achieve greenfield runoff rates in accordance with the preferred standards set out in the London Plan policy 5.13 and Design and Construction SPG (April 2014), then justification must be provided. Arrangements for the future maintenance of the drainage system must be made and detailed in the Drainage Strategy. There is no automatic right to connect to the existing Thames Water network. Any potential diversions and/or discharges into a sewer or main river must be agreed with Thames Water or Environment Agency, respectively.	Section 10.6

SITE 3.1.1 : Wandsworth Business Village, Buckhold Road/Broomhill Road, SW18		
	Indicative Unit Costs Green roofs ~ £90/m^2. Permeable paving ~ £30-50/m^2. Filter strips £2-4m^2. Detention basin £15-50m^3. Concrete storage tank £449-518/m^3. Infiltration trench £55-65 /m^3. Infiltration basin £10-15 /m^3.	Section 10.4

SITE 3.1.3 : Southside Shopping Centre (northern end), Wandsworth High Street, SW18

1) PROPOSED DEVELOPMENT

Site ID	3.1.3
Site Address	Southside Shopping Centre (northern end), Wandsworth High Street, SW18
Site Area	4.53 ha
Current Use	A1 Shops, A2 Financial and Professional Services, A3 Restaurants and Cafes, A5 Hot food takeaways, B1 Offices, C3 Dwelling houses, D1 Non-residential institutions, D2 Assembly and Leisure. Part of site (former Arndale Walk) under redevelopment.
Allocated Use	Improvements to shopping centre through refurbishment and where possible, redevelopment, to provide improved and additional retail space and residential, including improved links to the High Street, Garratt Lane and Buckhold Road.
Vulnerability	Less Vulnerable (commercial)

2) SUMMARY OF LEVEL 1 FLOOD RISK

Flood risk from rivers

The site is in close proximity to the River Wandle. A culverted section of the River Wandle flows underneath the site.

Proportion of potential development site within Flood Zone	Flood Zone 3b	Flood Zone 3a	Flood Zone 2	Flood Zone 1	Area Benefiting of Defences
	0 %	**10 %**	**84 %**	**6 %**	**5 %**

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Flood risk from all other sources			**Limitations**
Risk of flooding to the potential development site and surrounding area	Surface Water flooding: (Level 1 SFRA Appendix A Figure 5.2 - uFMfSW)	**High Risk** 1 in 30 year (3.33% annual probability)	The uFMfSW data does not show the susceptibility of individual properties to surface water flooding. The uFMfSW also does not take into account the details of the existing drainage system.
	Groundwater flooding: (Level 1 SFRA Appendix A Figure 5.4 - BGS Susceptibility to Groundwater Flooding)	**Medium Risk** Potential for groundwater flooding to occur at surface, but no historic records of groundwater flooding	The dataset cannot be used on its own to indicate risk of groundwater flooding and should not be used to inform planning decisions at a site scale. It is suitable for use in conjunction with a large number of other factors, e.g. records of previous incidence of groundwater flooding, to establish relative risk of groundwater flooding.

Historic records of flooding

Historic records of flooding from each source within a 100m radius of potential development site	Fluvial records	Surface water records	Groundwater records	Sewer records	Multiple source records	Other
	0	**3**	**0**	**0**	**0**	**0**

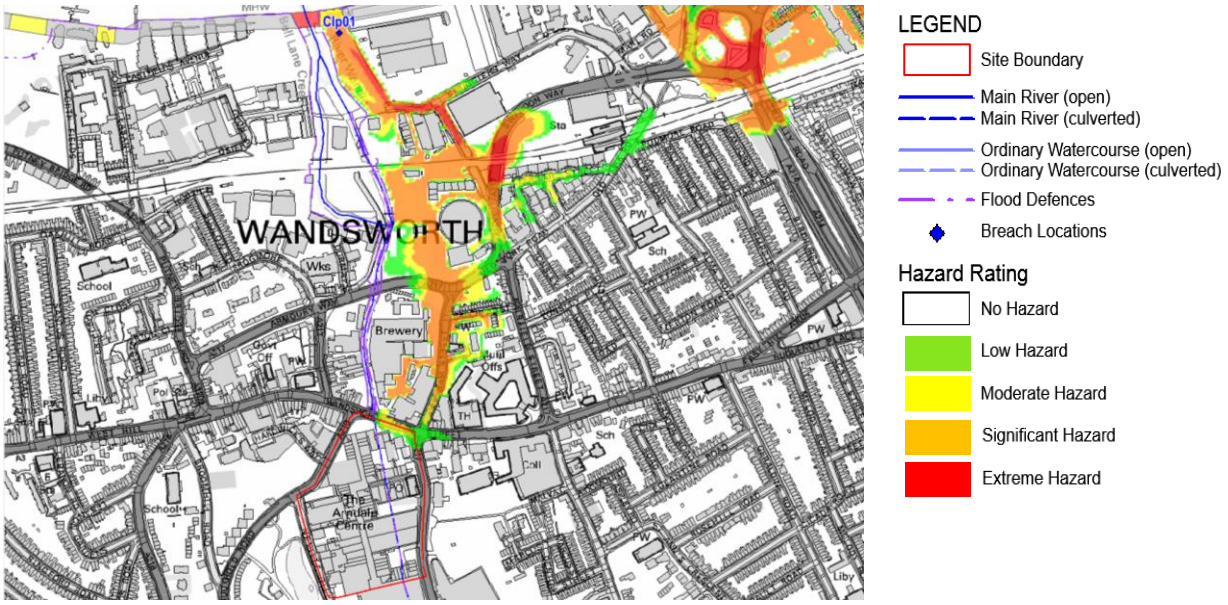
SITE 3.1.3 : Southside Shopping Centre (northern end), Wandsworth High Street, SW18

3) LEVEL 2 ASSESSMENT – TIDAL RESIDUAL RISK

The London Borough of Wandsworth is located upstream of the Thames Barrier where tidal water levels are a function of the maximum tide level allowed through the Thames Barrier (defined by the barrier closure rule / matrix). As a result, when undertaking modelling of the Thames upstream of the Barrier typical return periods cannot be applied. For the purpose of this Level 2 site assessment, maximum flood depth and hazard mapping from the Environment Agency's updated River Thames breach modelling (2015) have been used, using the Maximum Likely Water Level (MLWL) under climate change conditions for the year 2100.

The mapping shows combined result for each of the breach scenarios. The worst case breach location for the site is considered to be breach location Clp 01. The invert level was 4.88 mAOD and the width of the breach is 20m.

Thames Tidal Breach Modelling: Maximum Hazard Rating (MLWL 2100)



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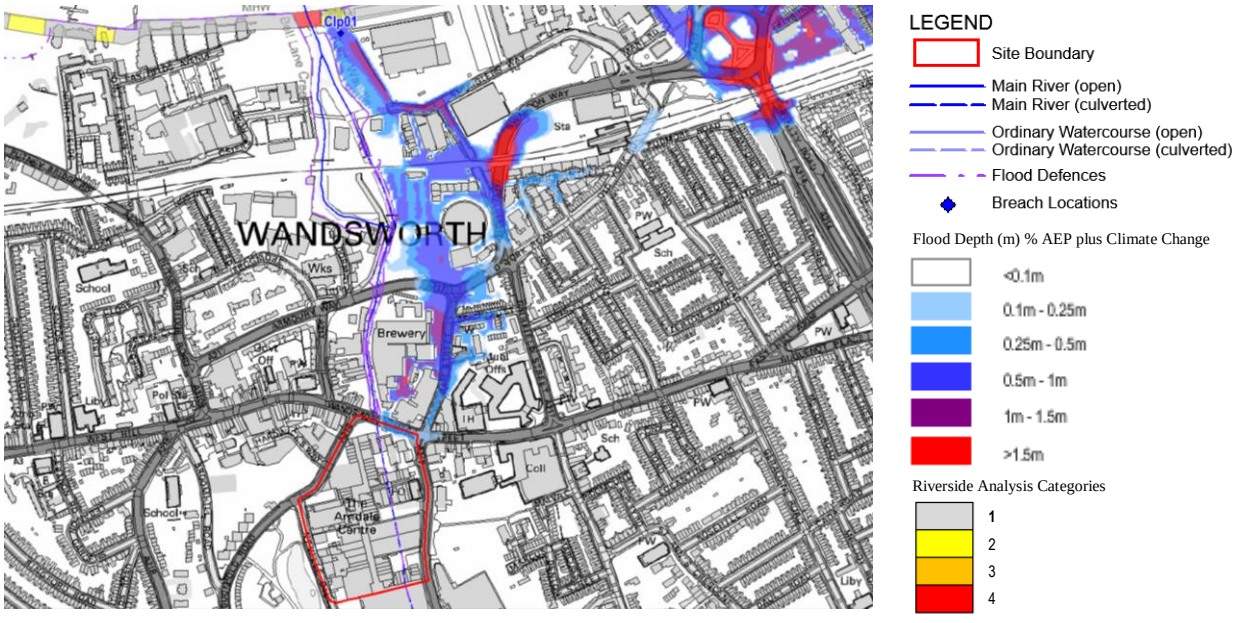
Thames Tidal Breach Modelling: Maximum Flood Depth (MLWL 2100) and Riverside Analysis Categories



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Riverside Analysis

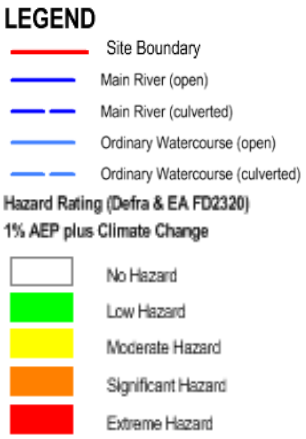
There is 1 breach location in close proximity to the site which provides a good indication of the likely impact to the site. Results from the riverside analysis completed as part of the 2008 SFRA identify the frontage adjacent to the site as mainly a Category 1, with Assumed Breach Level of >5.3 mAOD and Potential Peak Depth of Flow through breach (1 in 1000 year event) of 0m.

SITE 3.1.3 : Southside Shopping Centre (northern end), Wandsworth High Street, SW18

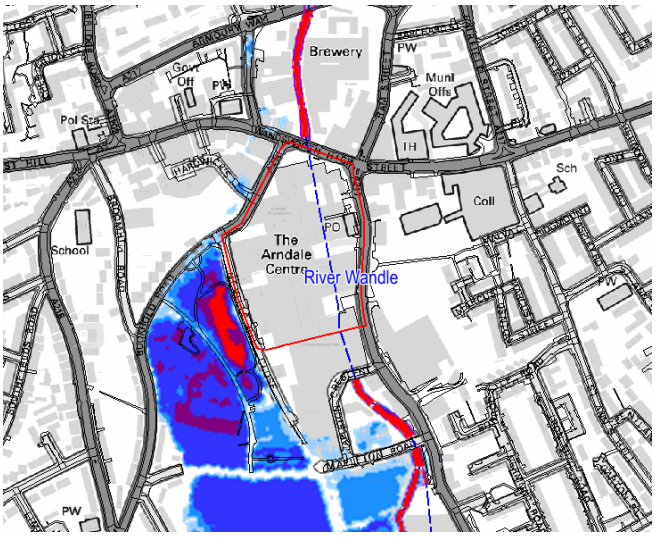
3) LEVEL 2 ASSESSMENT – FLUVIAL RESIDUAL RISK

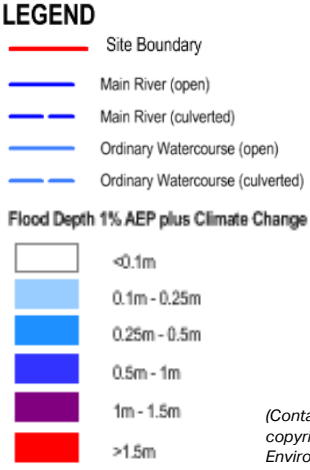
The fluvial hazard, depth and velocity outputs used in the Level 2 SFRA assessment and mapped below are based on the Environment Agency modelling of the River Wandle (2015) and are provided for the 1% AEP plus Climate Change event.

Flood Hazard Rating

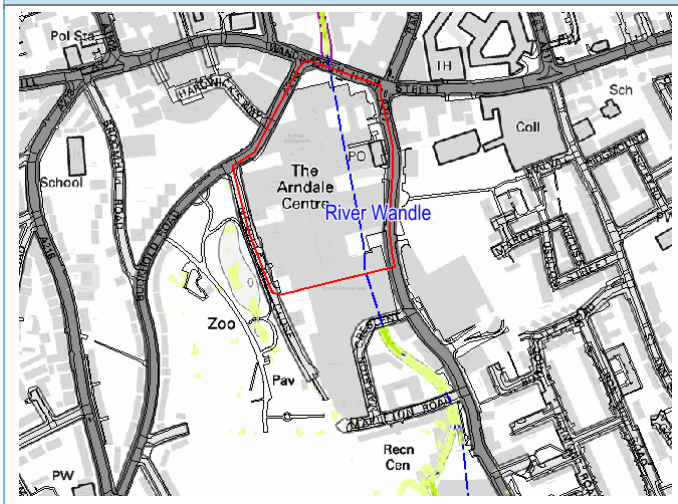


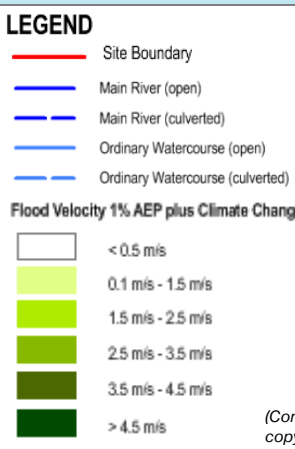
Maximum Flood Depth





Maximum Velocity





SITE 3.1.3 : Southside Shopping Centre (northern end), Wandsworth High Street, SW18		
4) RECOMMENDATIONS AND POLICIES		
Development Layout and Sequential Approach	A sequential approach to site layout should be used. The north eastern boundary intersects Flood Zone 3a of the River Wandle as is at 'Moderate Hazard' of flooding up to 1m due to tidal breaching. Vulnerable development should be located away from this location. The River Wandle flows beneath the site in a culvert. It surfaces immediately north of the site into an open channel. All development should be set back at least 8m along the whole length of the River Wandle, this applies to both open and culverted sections. A Flood Risk Activity Permit is required for works within the 8m zone from the River Wandle. Within Flood Zone 3a or areas that have 'potential for groundwater to occur at the surface' (BGS Susceptibility to Groundwater Flooding), Less Vulnerable (commercial) basements, basement extensions and conversions, such as plant, car parking etc, must provide safe internal access to higher floors situated above levels derived from the breach modelling. Further ground investigations would be required at this site to confirm the likelihood of groundwater occurrence. Measures to manage surface water on the site should be considered early in the site masterplan to enable inclusion of attenuation SuDS where possible.	Section 9.2
Finished Floor Levels	For Less Vulnerable uses (such as commercial development), finished floor levels do not need to be raised with regards to policy, however, internal access must be provided to upper floors to provide safe refuge in a tidal breach flood event. This is only applicable to the northern part of the site where there is 'Moderate Hazard'. There is no set guidance for the setting of finished floor levels of development in relation to surface water flood risk. The site is at high risk of surface water flooding and it is therefore recommended that consideration is given to the flow or surface water during the development of the site masterplan and layout to ensure effective management of surface water flows.	Section 9.3
Flood Resistance (Fluvial Residual Risk)	It is recommended that flood resistant construction methods should be considered where risk of flooding is up to 0.6m. This includes the use of construction materials with low permeability, raising property thresholds, using landscaping to manage surface water and fluvial floodwater.	Section 9.4
Flood Resilience (Fluvial Residual Risk)	It is recommended that flood resilient measures should also be considered on the site. These measures are appropriate where modelled flood depths are greater than 0.6m[1]. The strategy should be to allow water into the building, but to implement careful design in order to minimise damage and allow rapid re-occupancy. For example, concrete flooring and waterproofing building materials such as timber joists and render and flood resilient air brick covers.	Section 9.5
Safe Access/Egress	Access to the site is provided via Wandsworth High Street to the east of the site. Wandsworth High Street is shown as an area of 'Low Hazard' from the 1% AEP plus Climate Change event for the River Wandle, it is therefore recommended that a Flood Warning and Evacuation Plan (FWEP) is developed, described further below.	Section 9.7
Flood Warning and Evacuation Plan	A Flood Warning and Evacuation Plan (FWEP) must be prepared for the site, detailing how flood warning will be provided, how the safety of occupants and access to/from the development will be ensured and what will be done to protect development and contents. The FWEP should consider arrangements for the evacuation of basement car parks. Where possible, the FWEP should also detail the length of time before the site becomes inaccessible by emergency vehicles. **Flood Warning Areas** The local area is covered by the Environment Agency Flood Warning Areas for 'River Wandle at Wandsworth'. Residents of the site should ensure they are signed up to the Environment Agency Flood Warning system. **Emergency Rest Centres** The closest designated emergency rest centre for this site is the Wandle Recreation Centre, Mapleton Road, to the south of the development site.	Section 9.14
Surface Water Management	**Current risk of flooding** The site is within Drainage Catchment 6, which is completely within London Borough of Wandsworth, and drains the Wandsworth town area. The potential development must not increase flood risk to other areas in the Drainage Catchment. The uFMfSW indicates that the majority of the site and surrounding area is at high risk of surface water flooding. There are three historic records of surface water flooding held by Wandsworth Council in this location.	

[1] Department for Communities and Local Government (2007) Improving the flood performance of new buildings, Flood resilient construction.

SITE 3.1.3 : Southside Shopping Centre (northern end), Wandsworth High Street, SW18		
	Indicative existing runoff rate: 20.2 l/s (1 in 1 year), 75.7 l/s (1 in 100 year) **Indicative Greenfield Runoff Rate:** 9.1 l/s	Section 10
	SuDS Suitability Reference to the SWMP Appendix C2 Figure 4 identifies that (prior to the completion of a site investigation to determine precise local conditions) infiltration of surface water into the ground is potentially unsuitable for the site. Site investigations will be required prior to the development of a Drainage Strategy for the site as SuDS feasibility is uncertain for some areas of the site. Techniques which should be considered include green roofs, filter strips, detention basins and ponds, as well as permeable surfacing in combination with tanked systems	Section 10.3 and 10.9
	Drainage Strategy and Approvals Wandsworth Council will require a Drainage Strategy to be prepared outlining the surface water management for the site, runoff rates and consideration of SuDS in line with the London Plan policy 5.13 and Local Plan policies. Where it is not possible to achieve greenfield runoff rates in accordance with the preferred standards set out in the London Plan policy 5.13 and Design and Construction SPG (April 2014), then justification must be provided. Arrangements for the future maintenance of the drainage system must be made and detailed in the Drainage Strategy. There is no automatic right to connect to the existing Thames Water network. Any potential diversions and/or discharges into a sewer or main river must be agreed with Thames Water or Environment Agency, respectively.	Section 10.6
	Indicative Unit Costs Green roofs ~ £90/m^2. Permeable paving ~ £30-50/m^2. Filter strips £2-4m^2. Detention basin £15-50m^3. Concrete storage tank £449-518/m^3.	Section 10.4

5) EXCEPTION TEST CONSIDERATIONS

The NPPF states that there are two parts to the Exception Test that must be passed for development to be allocated or permitted:

1) *"it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk"* and
2) *"demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall"*.

The north of this development site is located within the 'Moderate Hazard' zone for the tidal River Thames and the Flood Zones 2 and 3a of the River Wandle. The majority of the site is in Flood Zone 2 with no hazard; therefore vulnerable aspects of development can be located away from the higher risk northern area. There is potential that dry routes out of the local area to a safe place of refuge may be flooded and it is therefore necessary to prepare a FWEP for residents / occupants of the site detailing steps to evacuate the site prior to the onset of flooding. The potential impacts of flooding should be mitigated through careful site layout, resilient construction techniques, and incorporation of SuDS, to reduce the risk of increasing flood risk elsewhere. Therefore, on this basis, it is likely that this site would pass the Exception Test.

SITE 3.2.1 : Causeway Island including land to the east, SW18

1) PROPOSED DEVELOPMENT

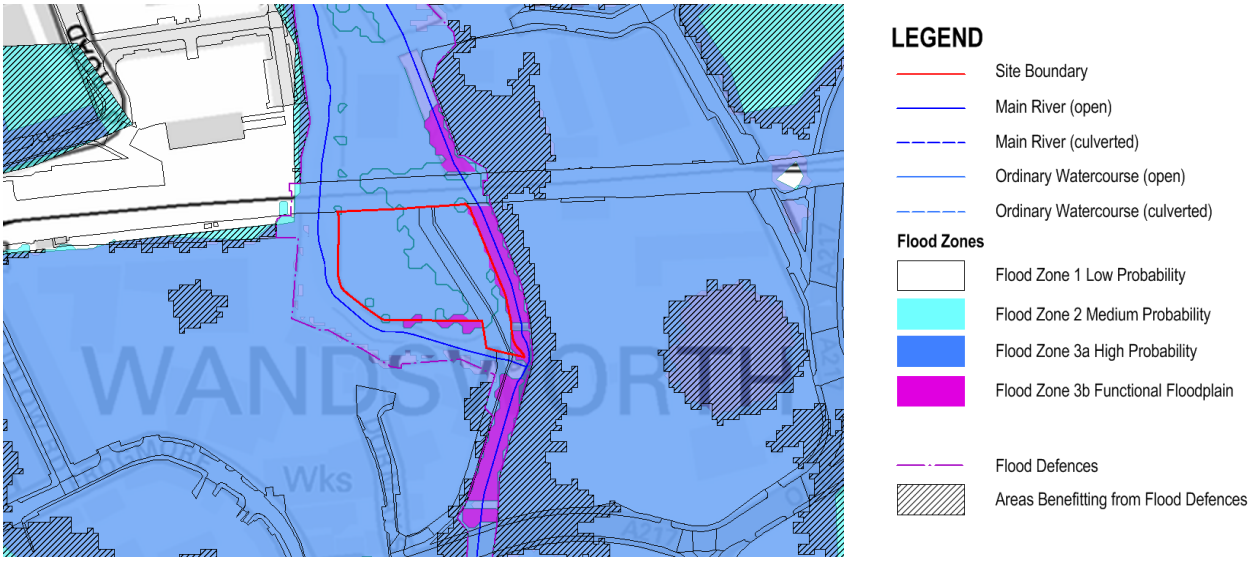
Site ID	3.2.1
Site Address	Causeway Island including land to the east, SW18
Site Area	0.54 ha
Current Use	Causeway Island is used for open storage of motor vehicles and materials, and the land to the east is an open area laid out as an ecological area.
Allocated Use	Industrial uses: B1(c), B2 and B8 uses. Any development should incorporate public open space, a link between Thames riverside and Wandsworth town centre and the retention and enhancement of the existing ecological area.
Vulnerability	Less vulnerable and Water Compatible (open space)

2) SUMMARY OF LEVEL 1 FLOOD RISK

Flood risk from rivers

The River Wandle borders the site.

Proportion of potential development site within Flood Zone	Flood Zone 3b	Flood Zone 3a	Flood Zone 2	Flood Zone 1	Area Benefiting of Defences
	3 %	**97 %**	**0 %**	**0 %**	**0 %**



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Flood risk from all other sources			**Limitations**
Risk of flooding to the potential development site and surrounding area	Surface Water flooding: (Level 1 SFRA Appendix A Figure 5.2 - uFMfSW)	**High Risk** 1 in 30 year (3.33% annual probability)	The uFMfSW daa does not show the susceptibility of individual properties to surface water flooding. The uFMfSW also does not take into account the details of the existing drainage system.
	Groundwater flooding: (Level 1 SFRA Appendix A Figure 5.4 - BGS Susceptibility to Groundwater Flooding)	**Medium Risk** Potential for groundwater flooding to occur at surface, but no historic records of groundwater flooding	The dataset cannot be used on its own to indicate risk of groundwater flooding and should not be used to inform planning decisions at a site scale. It is suitable for use in conjunction with a large number of other factors, e.g. records of previous incidence of groundwater flooding, to establish relative risk of groundwater flooding.

Historic records of flooding

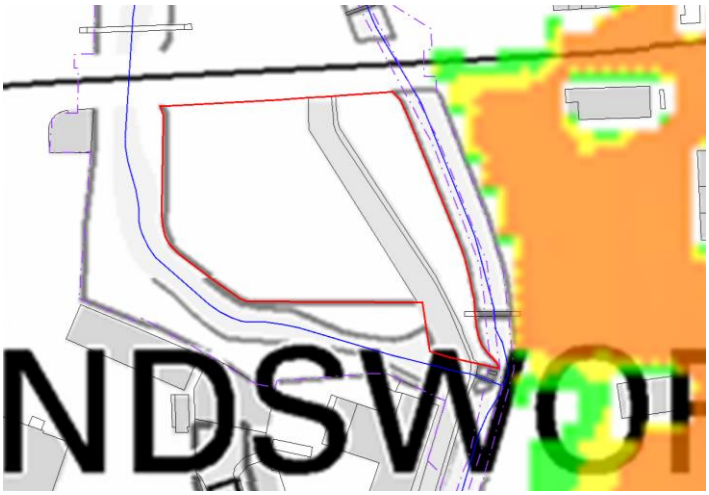
Historic records of flooding from each source within a 100m radius of potential development site	Fluvial records	Surface water records	Groundwater records	Sewer records	Multiple source records	Other
	0	**1**	**0**	**3 Internal**	**0**	**0**

SITE 3.2.1 : Causeway Island including land to the east, SW18

3) LEVEL 2 ASSESSMENT

The fluvial hazard, depth and velocity outputs used in the Level 2 SFRA assessment and mapped below are based on the Environment Agency modelling of the River Wandle (2015) and are provided for the 1% AEP plus Climate Change event.

Flood Hazard Rating



LEGEND
- Site Boundary
- Main River (open)
- Main River (culverted)
- Ordinary Watercourse (open)
- Ordinary Watercourse (culverted)
- Flood Defences

Hazard Rating **1% AEP plus Climate Change**
- No Hazard
- Low Hazard
- Moderate Hazard
- Significant Hazard
- Extreme Hazard

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Maximum Flood Depth

LEGEND
- Site Boundary
- Main River (open)
- Main River (culverted)
- Ordinary Watercourse (open)
- Ordinary Watercourse (culverted)
- Flood Defences

Flood Depth (m) % AEP plus Climate Change
- <0.1m
- 0.1m - 0.25m
- 0.25m - 0.5m
- 0.5m - 1m
- 1m - 1.5m
- >1.5m

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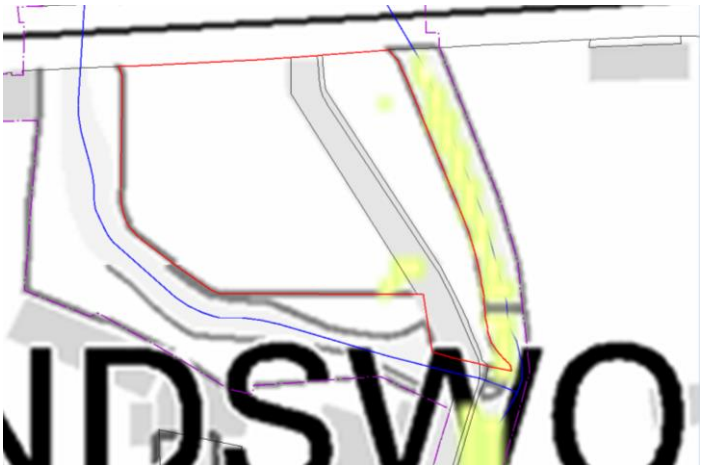
Maximum Velocity



LEGEND
- Site Boundary
- Main River (open)
- Main River (culverted)
- Ordinary Watercourse (open)
- Ordinary Watercourse (culverted)
- Flood Defences

Flood Velocity 1% AEP plus Climate Change
- < 0.5 m/s
- 0.1 m/s - 1.5 m/s
- 1.5 m/s - 2.5 m/s
- 2.5 m/s - 3.5 m/s
- 3.5 m/s - 4.5 m/s
- > 4.5 m/s

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SITE 3.2.1 : Causeway Island including land to the east, SW18

4) RECOMMENDATIONS AND POLICIES

In accordance with the NPPF, **Less Vulnerable development is considered compatible within Flood Zone 3a and does not require the application of the Exception Test**. However, given the risk of fluvial and surface water flooding to this site, the principles of the Exception Test should still be considered when developing on this site, namely:

1) *"it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk"* and
2) *"demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall"*.

The following information and recommendations are therefore provided for consideration.

Development Layout and Sequential Approach	The majority of the development site is within Flood Zone 3a of the River Wandle, with a small section on the southern boundary intersecting Flood Zone 3b. Less Vulnerable development is **not appropriate under the NPPF** in Flood Zone 3b, therefore the water compatible elements of the proposed development should be considered in this area. Development should be set back at least 8m from the River Wandle river frontage. Environment Agency consent is required for works within the 8m buffer zone and developers should explore opportunities for river restoration as part of any development. In Flood Zone 3a or areas that have 'potential for groundwater to occur at the surface' (BGS Susceptibility to Groundwater Flooding), Less Vulnerable basements, basement extensions and conversions, such as plant, car parking etc, must provide safe internal access to higher floors situated above levels derived from the breach modelling. Further ground investigations would be required at this site to confirm the likelihood of groundwater occurrence. The potential impacts of flooding should be mitigated through careful site layout, resilient construction techniques, and incorporation of SuDS, to reduce the risk of increasing flood risk elsewhere.	Section 9.2
Safe Access/Egress	Access to the site is provided via access off Armoury Way, to the south of the site. Based on the fluvial modelling, in the event of widespread flooding associated with River Wandle, it is likely that dry routes out of the local area to safe places of refuges may be limited. Therefore it is necessary to prepare a Flood Warning and Evacuation Plan (FWEP), which is described below.	Section 9.7
Floodplain Compensation Storage	Where proposed development results in an increase in building footprint, the developer must ensure that it does not impact upon the ability of the floodplain to store water and that it does not impact upon floodwater flow conveyance. This site is located within the outline of the 1% annual probability (1 in 100 year) flood event including an allowance for climate change. Within this area, new development must not result in a net loss of flood storage capacity. The requirement for no loss of floodplain storage means that it is not possible to modify ground levels on sites which lie completely within the floodplain (when viewed in isolation), as there is no land available for lowering to bring it into the floodplain. It is possible to provide off-site compensation within the local area e.g. on a neighbouring or adjacent site, or indirect compensation, by lowering land already within the floodplain, however, this would be subject to detailed investigations and agreement with the Environment Agency to demonstrate (using an appropriate flood model where necessary) that the proposals would improve and not worsen the existing flooding situation or could be used in combination with other measures to limit the impact on floodplain storage[2].	Section 9.9
Flow Routing	New development should not adversely affect flood routing and thereby increase flood risk elsewhere (including surrounding area). On this site, opportunities should be sought to make space for water, such as: • Removing boundary walls or replacing with other boundary treatments such as hedges, fences (with gaps). • Create under-croft car parks or consider reducing ground floor footprint and creating an open area under the building to allow flood water flow. • Where proposals include floodable outbuildings or garages, design the external walls to enable the free flow of floodwater.	Section 9.12

[2] Aecom (2015) Level 1 Strategic Flood Risk Assessment

SITE 3.2.1 : Causeway Island including land to the east, SW18		
Flood Warning and Evacuation Plan	A Flood Warning and Evacuation Plan (FWEP) must be prepared for the site, detailing how flood warning will be provided how the safety of occupants and access to/from the development will be ensured and what will be done to protect development and contents. The FWEP should consider arrangements for the evacuation of basement car parks. Where possible, the FWEP should also detail the length of time before the site becomes inaccessible by emergency vehicles. **Flood Warning Areas** The local area is covered by the Environment Agency Flood Warning Areas for 'River Wandle at Wandsworth. Residents of the site should ensure they are signed up to the Environment Agency Flood Warning system. **Emergency Rest Centres** The closest designated emergency rest centre for this site is the Wandle Recreation Centre, approximately 800m south.	Section 9.14
Surface Water Management	**Current risk of flooding** The site is within Drainage Catchment 7, which is within the London Borough of Wandsworth and drains much of Wandsworth Park. The potential development must not increase flood risk to other areas in the Drainage Catchment. The uFMfSW indicates that the site and surrounding area is at high risk of surface water flooding. Wandsworth Council have one historic record of surface water flooding within 100m of the site.	
	Indicative existing runoff rate: 2.4 l/s (1 in 1 year), 9.0 l/s (1 in 100 year) **Indicative Greenfield Runoff Rate:** 5 l/s	Section 10
	SuDS Suitability Reference to the SWMP Appendix C2 Figure 4 identifies that (prior to the completion of a site investigation to determine precise local conditions) infiltration of surface water into the ground is potentially uncertain and requires further investigation. If unsuitable the techniques which should be considered include green roofs, filter strips, detention basins and ponds, as well as permeable surfacing in combination with tanked systems. If infiltration SuDS are suitable then infiltration basins and/or trenches could be considered.	Section 10.3 and 10.9
	Drainage Strategy and Approvals Wandsworth Council will require a Drainage Strategy to be prepared outlining the surface water management for the site, runoff rates and consideration of SuDS in line with the London Plan policy 5.13 and Local Plan policies. Where it is not possible to achieve greenfield runoff rates in accordance with the preferred standards set out in the London Plan policy 5.13 and Design and Construction SPG (April 2014), then justification must be provided. Arrangements for the future maintenance of the drainage system must be made and detailed in the Drainage Strategy. There is no automatic right to connect to the existing Thames Water network. Any potential diversions and/or discharges into a sewer or main river must be agreed with Thames Water or Environment Agency, respectively.	Section 10.6
	Indicative Unit Costs Green roofs ~ £90/m^2. Permeable paving ~ £30-50/m^2. Filter strips £2-4m^2. Detention basin £15-50m^3. Concrete storage tank £449-518/m^3. Infiltration trench £55-65 /m^3. Infiltration basin £10-15 /m^3.	Section 10.4

SITE 3.2.2: Hunts Trucks and adjoining Gasholder, Armoury Way, SW18

1) PROPOSED DEVELOPMENT

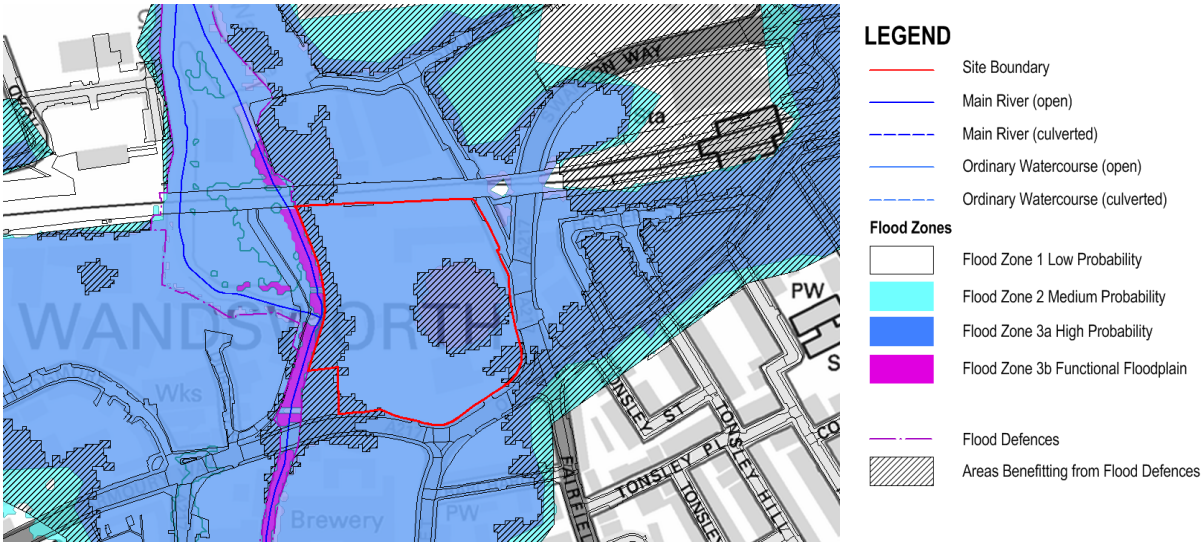
Site ID	3.2.2
Site Address	Hunts Trucks and adjoining Gasholder, Armoury Way, SW18
Site Area	2.76 ha
Current Use	Open storage and sale of motor vehicles and motor vehicle repair workshop with ancillary single storey buildings. Gasholder and associated plant. An industrial estate occupies the north of the site.
Allocated Use	Industrial uses: B1(c), B2 and B8. Any development should incorporate a link between Thames riverside and Wandsworth town centre.
Vulnerability	Less vulnerable

2) SUMMARY OF LEVEL 1 FLOOD RISK

Flood risk from rivers

The River Wandle borders the site.

Proportion of potential development site within Flood Zone	Flood Zone 3b	Flood Zone 3a	Flood Zone 2	Flood Zone 1	Area Benefiting of Defences
	0 %	**100 %**	**0 %**	**0 %**	**17 %**



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Flood risk from all other sources			**Limitations**
Risk of flooding to the potential development site and surrounding area	Surface Water flooding: (Level 1 SFRA Appendix A Figure 5.2 - uFMfSW)	**High Risk** 1 in 30 year (3.3% annual probability)	The uFMfSW data does not show the susceptibility of individual properties to surface water flooding. The uFMfSW also does not take into account the details of the existing drainage system.
	Groundwater flooding: (Level 1 SFRA Appendix A Figure 5.4 - BGS Susceptibility to Groundwater Flooding)	**Medium Risk** Potential for groundwater flooding to occur at surface, but no historic records of groundwater flooding	The dataset cannot be used on its own to indicate risk of groundwater flooding and should not be used to inform planning decisions at a site scale. It is suitable for use in conjunction with a large number of other factors, e.g. records of previous incidence of groundwater flooding, to establish relative risk of groundwater flooding.

Historic records of flooding

Historic records of flooding from each source within a 100m radius of potential development site	Fluvial records	Surface water records	Groundwater records	Sewer records	Multiple source records	Other
	0	**1**	**0**	**3 Internal**	**0**	**0**

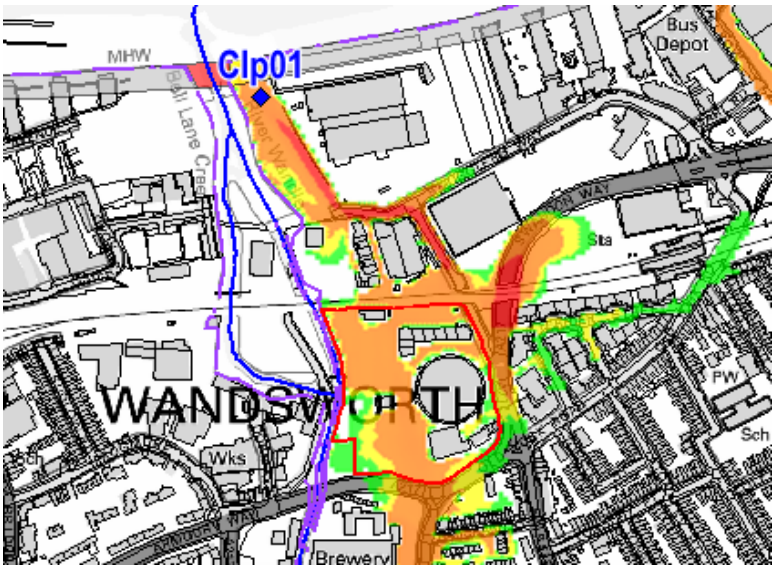
SITE 3.2.2: Hunts Trucks and adjoining Gasholder, Armoury Way, SW18

3a) LEVEL 2 ASSESSMENT – TIDAL RESIDUAL RISK

The London Borough of Wandsworth is located upstream of the Thames Barrier where tidal water levels are a function of the maximum tide level allowed through the Thames Barrier (defined by the barrier closure rule / matrix). As a result, when undertaking modelling of the Thames upstream of the Barrier typical return periods cannot be applied. For the purpose of this Level 2 site assessment, maximum flood depth and hazard mapping from the Environment Agency's updated River Thames breach modelling (2015) have been used, using the Maximum Likely Water Level (MLWL) under climate change conditions for the year 2100.

The mapping shows combined result for each of the breach scenarios. The worst case breach location for the site is considered to be breach location Clp 01. The invert level was 4.88 mAOD and the width of the breach is 20m.

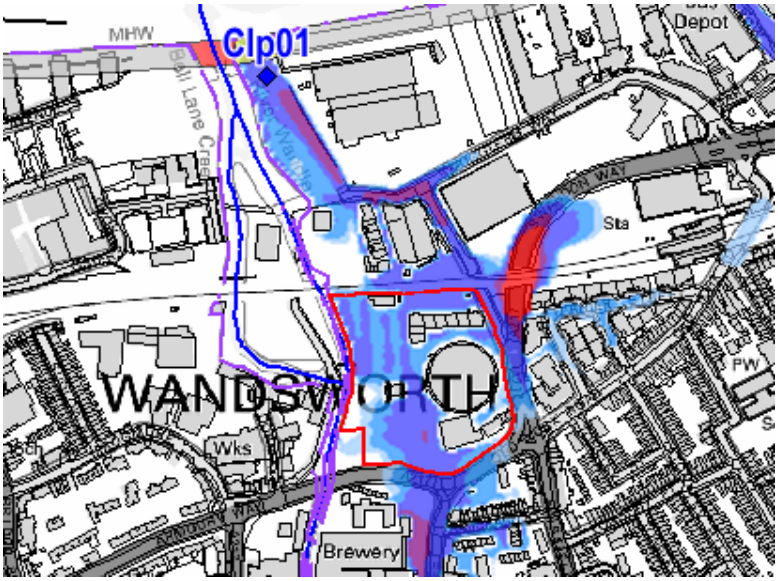
Thames Tidal Breach Modelling: Maximum Hazard Rating (MLWL 2100)



LEGEND
- Site Boundary
- Main River (open)
- Main River (culverted)
- Ordinary Watercourse (open)
- Ordinary Watercourse (culverted)
- Flood Defences
- Breach Locations

Hazard Rating
- No Hazard
- Low Hazard
- Moderate Hazard
- Significant Hazard
- Extreme Hazard

Thames Tidal Breach Modelling: Maximum Flood Depth (MLWL 2100) and Riverside Analysis Categories



LEGEND
- Site Boundary
- Main River (open)
- Main River (culverted)
- Ordinary Watercourse (open)
- Ordinary Watercourse (culverted)
- Flood Defences
- Breach Locations

Flood Depth (m)
- <0.1m
- 0.1m - 0.25m
- 0.25m - 0.5m
- 0.5m - 1m
- 1m - 1.5m
- >1.5m

Riverside Analysis Categories
- 1
- 2
- 3
- 4

Riverside Analysis

There is one breach location in close proximity to the site which provides a good indication of the likely impact to the site. Results from the riverside analysis completed as part of the 2008 SFRA identify the frontage adjacent to the site as Category 1, which is assumed Breach Level of >5.3 mAOD and Potential Peak Depth of Flow through breach (1 in 1000 year event) 0m.

3b) LEVEL 2 ASSESSMENT – Fluvial Residual Risk

Although the western boundary of the proposed development site is located adjacent to the River Wandle, there are flood defences present along this stretch of the river. The Environment Agency modelling of the River Wandle (2015) for the 1% AEP plus Climate Change event showed that there is no hazard associated with the site.

SITE 3.2.2: Hunts Trucks and adjoining Gasholder, Armoury Way, SW18

4) RECOMMENDATIONS AND POLICIES

In accordance with the NPPF, **Less Vulnerable development is considered compatible within Flood Zone 3a and does not require the application of the Exception Test**. However, given the risk of fluvial and surface water flooding to this site, the principles of the Exception Test should still be considered when developing on this site, namely:

1) *"it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk"* and
2) *"demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall"*.

The following information and recommendations are therefore provided for consideration.

Development Layout and Sequential Approach	A sequential approach to site layout should be used. The majority of the site is classified as 'Significant Hazard'. The only areas of lower hazard categories are located to the south west and south east corner of the site. For the current development site (without mitigation), the Thames Tidal breach modelling Clp 01 identifies that under the MLWL 2100 scenario the site is at risk of flooding greater than 1.5m in depth in a small area in the south. There are areas throughout the site at risk of flooding between 0.5m-0.1m and surrounding this, there are areas at risk of flooding between 0.25m-0.5m. The proposed development should be designed so the least vulnerable aspects of development (e.g. car parks) are located in the areas of greatest hazard, notably in the north where flood waters could reach >1.5m. In Flood Zone 3a or areas that have 'potential for groundwater to occur at the surface' (BGS Susceptibility to Groundwater Flooding), Less Vulnerable basements, basement extensions and conversions, such as plant, car parking etc, must provide safe internal access to higher floors situated above levels derived from the breach modelling. Further ground investigations would be required at this site to confirm the likelihood of groundwater occurrence. Measures to manage surface water on the site should be considered early in the site masterplan to enable inclusion of attenuation SuDS where possible.	Section 9.2
Safe Access/Egress	Access to the site is provided via Old York Road to the south east of the site. In the event of widespread flooding associated with a breach in the Tidal Thames Defence, and for precautionary purposes, it is recommended that a Flood Warning and Evacuation Plan (FWEP) is developed.	Section 9.7
Flood Warning and Evacuation Plan	A Flood Warning and Evacuation Plan (FWEP) must be prepared for the site, detailing how flood warning will be provided how the safety of occupants and access to/from the development will be ensured and what will be done to protect development and contents. The FWEP should consider arrangements for the evacuation of basement car parks. Where possible, the FWEP should also detail the length of time before the site becomes inaccessible by emergency vehicles. **Flood Warning Areas** The local area is covered by the Environment Agency Flood Warning Areas for 'River Wandle at Wandsworth'. Residents of the site should ensure they are signed up to the Environment Agency Flood Warning system. **Emergency Rest Centres** The closest designated emergency rest centre for this site is the Wandle Recreation Centre, Mapleton Road, to the south of the development site.	Section 9.14
Surface Water Management	**Current risk of flooding** The site is within Drainage Catchment 7, which is within London Borough of Wandsworth. The potential development must not increase flood risk to other areas in the Drainage Catchment. The uFMfSW indicates that the majority of the site and surrounding area is at high risk of surface water flooding. There is one incident of surface water flooding recorded by Wandsworth Council in this location.	
	Indicative existing runoff rate: 11.8 l/s (1 in 1 year), 44.2 l/s (1 in 100 year) **Indicative Greenfield Runoff Rate:** 5.3 l/s	Section 10

SITE 3.2.2: Hunts Trucks and adjoining Gasholder, Armoury Way, SW18		
	SuDS Suitability Reference to the SWMP Appendix C2 Figure 4 identifies that (prior to the completion of a site investigation to determine precise local conditions) infiltration of surface water into the ground is potentially unsuitable for the site. There are also areas which will require further assessment through site visits as suitability is currently unknown. Site investigations will be required prior to the development of a Drainage Strategy for the site. The site is within an inner and outer Groundwater Source Protection Zone. Techniques which should be considered include green roofs, filter strips, detention basins and ponds, as well as permeable surfacing in combination with tanked systems	Section 10.3 and 10.9
	Drainage Strategy and Approvals Wandsworth Council will require a Drainage Strategy to be prepared outlining the surface water management for the site, runoff rates and consideration of SuDS in line with the London Plan policy 5.13 and Local Plan policies. Where it is not possible to achieve greenfield runoff rates in accordance with the preferred standards set out in the London Plan policy 5.13 and Design and Construction SPG (April 2014), then justification must be provided. Arrangements for the future maintenance of the drainage system must be made and detailed in the Drainage Strategy. There is no automatic right to connect to the existing Thames Water network. Any potential diversions and/or discharges into a sewer or main river must be agreed with Thames Water or Environment Agency, respectively.	Section 10.6
	Indicative Unit Costs Green roofs ~ £90/m^2. Permeable paving ~ £30-50/m^2. Filter strips £2-4m^2. Detention basin £15-50m^3. Concrete storage tank £449-518/m^3.	Section 10.4

SITE 3.2.3 : Keltbray site, Wentworth House and adjacent land at Dormay Street, SW18

1) PROPOSED DEVELOPMENT

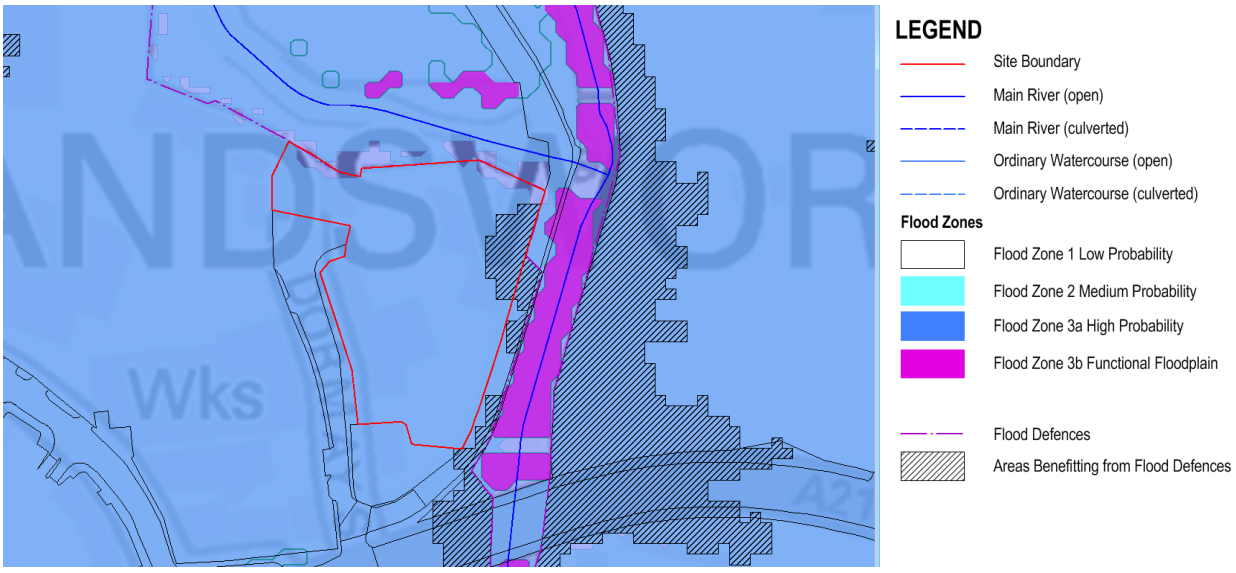
Site ID	3.2.3
Site Address	Keltbray site, Wentworth House and adjacent land at Dormay Street, SW18
Site Area	0.39 ha
Current Use	Business - B1(c).
Allocated Use	Industrial employment uses - B1c, B2 and B8. Any development should incorporate links between Thames riverside and Wandsworth town centre.
Vulnerability	Less vulnerable

2) SUMMARY OF LEVEL 1 FLOOD RISK

Flood risk from rivers

The River Wandle borders the site and the River Thames is approximately 0.5km to the north.

Proportion of potential development site within Flood Zone	Flood Zone 3b	Flood Zone 3a	Flood Zone 2	Flood Zone 1	Area Benefiting of Defences
	0 %	**100 %**	**0 %**	**0 %**	**6 %**



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Flood risk from all other sources			**Limitations**
Risk of flooding to the potential development site and surrounding area	Surface Water flooding: (Level 1 SFRA Appendix A Figure 5.2 - uFMfSW)	**High Risk** 1 in 30 year (3.3% annual probability)	The uFMfSW data does not show the susceptibility of individual properties to surface water flooding. The uFMfSW also does not take into account the details of the existing drainage system.
	Groundwater flooding: (Level 1 SFRA Appendix A Figure 5.4 - BGS Susceptibility to Groundwater Flooding)	**Low Risk** Limited potential for groundwater flooding	The dataset cannot be used on its own to indicate risk of groundwater flooding and should not be used to inform planning decisions at a site scale. It is suitable for use in conjunction with a large number of other factors, e.g. records of previous incidence of groundwater flooding, to establish relative risk of groundwater flooding.

Historic records of flooding

Historic records of flooding from each source within a 100m radius of potential development site	Fluvial records	Surface water records	Groundwater records	Sewer records	Multiple source records	Other
	0	**4**	**0**	**3 Internal**	**0**	**0**

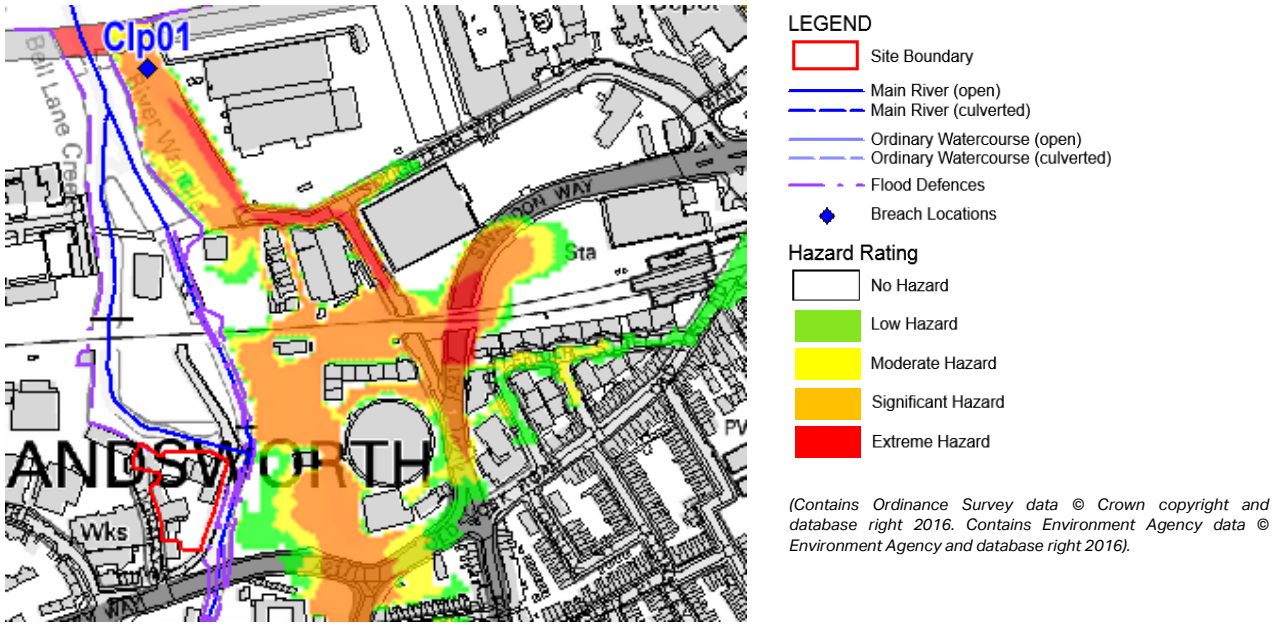
SITE 3.2.3 : Keltbray site, Wentworth House and adjacent land at Dormay Street, SW18

3) LEVEL 2 ASSESSMENT

The London Borough of Wandsworth is located upstream of the Thames Barrier where tidal water levels are a function of the maximum tide level allowed through the Thames Barrier (defined by the barrier closure rule / matrix). As a result, when undertaking modelling of the Thames upstream of the Barrier typical return periods cannot be applied. For the purpose of this Level 2 site assessment, maximum flood depth and hazard mapping from the Environment Agency's updated River Thames breach modelling (2015) have been used, using the Maximum Likely Water Level (MLWL) under climate change conditions for the year 2100.

The mapping shows combined result for each of the breach scenarios. The worst case breach location for the site is considered to be breach location Clp 01. The invert level was 4.88 mAOD and the width of the breach is 20m.

Thames Tidal Breach Modelling: Maximum Hazard Rating (MLWL 2100)



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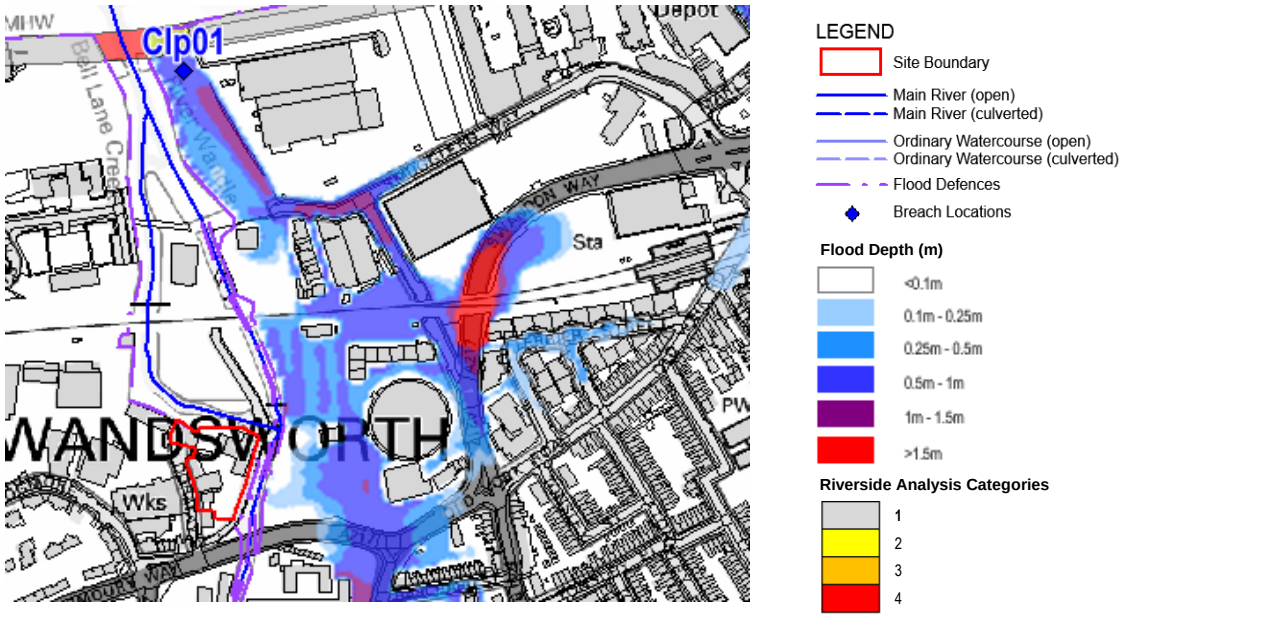
Thames Tidal Breach Modelling: Maximum Flood Depth (MLWL 2100) and Riverside Analysis Categories



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Riverside Analysis

This site is unaffected by the Thame Breach Modelling scenario. Results from the riverside analysis completed as part of the 2008 SFRA identify the frontage adjacent to the site as Category 1, which is assumed Breach Level of >5.3 mAOD and Potential Peak Depth of Flow through breach (1 in 1000 year event) 0m, therefore it is unlikely that there will be a breach in the surrounding area that impacts this site.

SITE 3.2.3 : Keltbray site, Wentworth House and adjacent land at Dormay Street, SW18

4) RECOMMENDATIONS AND POLICIES

In accordance with the NPPF, **Less Vulnerable development is considered compatible within Flood Zone 3a and does not require the application of the Exception Test**. However, given the risk of fluvial and surface water flooding to this site, the principles of the Exception Test should still be considered when developing on this site, namely:

1) *"it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk"* and
2) *"demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall"*.

The following information and recommendations are therefore provided for consideration.

Finished Floor Levels	The development is classed as Less Vulnerable; therefore there are no requirements in terms of policy for finished flood levels. However, it is good practice to raise the finished floor levels are raised a minimum of 300mm from the Flood Zone 3a in order to protect from surface water flooding, which is at high risk in this area. Alternatively, Less Vulnerable developments can be designed to be floodable instead of raising floor levels; this may have the added benefit of minimising the impact of development on the displacement of floodwater and the risk of flooding to the surrounding area.	Section 9.3
Flood Warning and Evacuation Plan	A Flood Warning and Evacuation Plan (FWEP) should be prepared for the site in case of a breach in the River Wandle flood defences. It should detail how a flood warning will be provided and the safest point of refuge for the occupants of the site and what will be done to protect development and contents. Where possible, the FWEP should also detail the length of time before the site becomes inaccessible by emergency vehicles. **Flood Warning Areas** The local area is covered by the Environment Agency Flood Warning Areas for 'River Wandle at Wandsworth'. Residents of the site should ensure they are signed up to the Environment Agency Flood Warning system. **Emergency Rest Centres** The closest designated emergency rest centre for this site is the Wandle Recreation Centre, Mapleton Road, to the south of the development site.	Section 9.14
Surface Water Management	**Current risk of flooding** The site is within Drainage Catchment 6, which is within London Borough of Wandsworth. The potential development must not increase flood risk to other areas in the Drainage Catchment. The uFMfSW indicates that the majority of the site and surrounding area is at high risk of surface water flooding. There are four previous recorded incidents of surface water flooding recorded by Wandsworth Council in this location.	
	Indicative existing runoff rate: 1.7 l/s (1 in 1 year), 6.6 l/s (1 in 100 year) **Indicative Greenfield Runoff Rate:** 5 l/s	Section 10
	SuDS Suitability Reference to the SWMP Appendix C2 Figure 4 identifies that (prior to the completion of a site investigation to determine precise local conditions) infiltration of surface water into the ground is potentially unsuitable for the site. Site investigations will be required prior to the development of a Drainage Strategy for the site. Techniques which should be considered include green roofs, filter strips, detention basins and ponds, as well as permeable surfacing in combination with tanked systems	Section 10.3 and 10.9
	Drainage Strategy and Approvals Wandsworth Council will require a Drainage Strategy to be prepared outlining the surface water management for the site, runoff rates and consideration of SuDS in line with the London Plan policy 5.13 and Local Plan policies. Where it is not possible to achieve greenfield runoff rates in accordance with the preferred standards set out in the London Plan policy 5.13 and Design and Construction SPG (April 2014), then justification must be provided. Arrangements for the future maintenance of the drainage system must be made and detailed in the Drainage Strategy. There is no automatic right to connect to the existing Thames Water network. Any potential diversions and/or discharges into a sewer or main river must be agreed with Thames Water or Environment Agency, respectively.	Section 10.6

SITE 3.2.3 : Keltbray site, Wentworth House and adjacent land at Dormay Street, SW18		
	Indicative Unit Costs Green roofs ~ £90/m^2. Permeable paving ~ £30-50/m^2. Filter strips £2-4m^2. Detention basin £15-50m^3. Concrete storage tank £449-518/m^3.	Section 10.4

SITE 3.3.3: 9, 11 and 19 Osiers Road, SW18

1) PROPOSED DEVELOPMENT

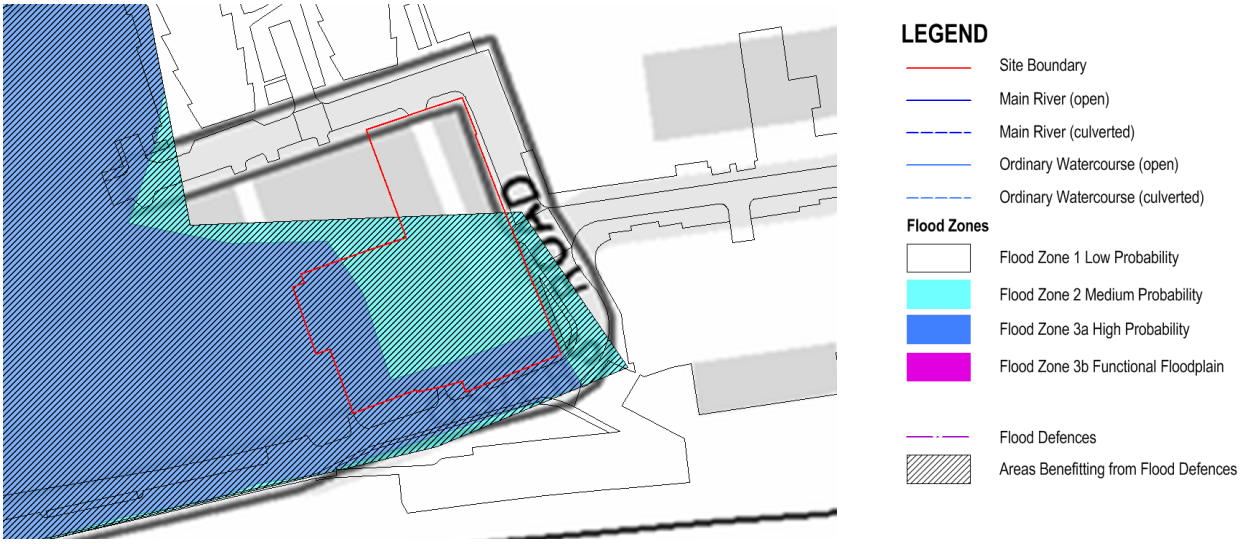
Site ID	3.3.3
Site Address	9, 11 and 19 Osiers Road, SW18
Site Area	0.39 ha
Current Use	B1 Business.
Allocated Use	Mixed use development including replacement employment floorspace, residential and improved links with the town centre.
Vulnerability	More vulnerable (residential), Less Vulnerable (commercial)

2) SUMMARY OF LEVEL 1 FLOOD RISK

Flood risk from rivers

The River Thames is approximately 300m to the north and the River Wandle is to the east of the site but the site is outside the floodplain of the River Wandle.

Proportion of potential development site within Flood Zone	Flood Zone 3b	Flood Zone 3a	Flood Zone 2	Flood Zone 1	Area Benefiting of Defences
	0 %	**27 %**	**49 %**	**24%**	**76 %**



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Flood risk from all other sources			**Limitations**
Risk of flooding to the potential development site and surrounding area	Surface Water flooding: (Level 1 SFRA Appendix A Figure 5.2 - uFMfSW)	**High Risk** 1 in 30 year (3.33% annual probability)	The uFMfSW data does not show the susceptibility of individual properties to surface water flooding. The uFMfSW also does not take into account the details of the existing drainage system.
	Groundwater flooding: (Level 1 SFRA Appendix A Figure 5.4 - BGS Susceptibility to Groundwater Flooding)	**Medium Risk** Potential for groundwater flooding to occur at surface, but no historic records of groundwater flooding	The dataset cannot be used on its own to indicate risk of groundwater flooding and should not be used to inform planning decisions at a site scale. It is suitable for use in conjunction with a large number of other factors, e.g. records of previous incidence of groundwater flooding, to establish relative risk of groundwater flooding.

Historic records of flooding

Historic records of flooding from each source within a 100m radius of potential development site	Fluvial records	Surface water records	Groundwater records	Sewer records	Multiple source records	Other
	0	**0**	**0**	**3 Internal**	**0**	**0**

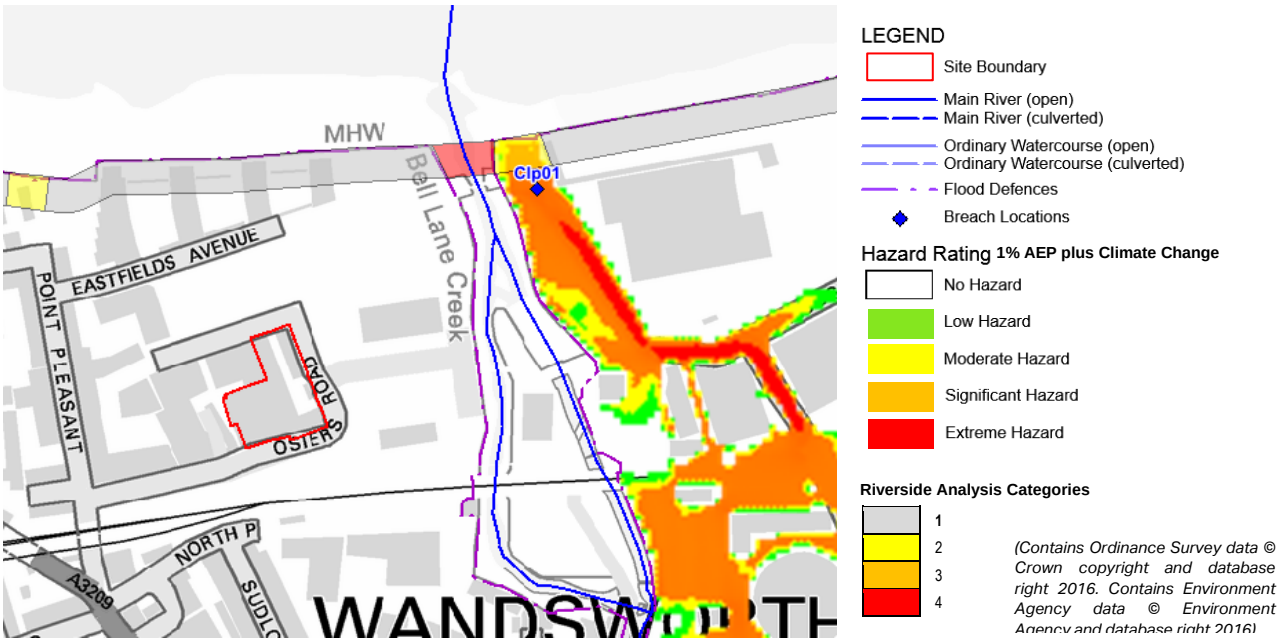
SITE 3.3.3: 9, 11 and 19 Osiers Road, SW18

3) LEVEL 2 ASSESSMENT

The London Borough of Wandsworth is located upstream of the Thames Barrier where tidal water levels are a function of the maximum tide level allowed through the Thames Barrier (defined by the barrier closure rule / matrix). As a result, when undertaking modelling of the Thames upstream of the Barrier typical return periods cannot be applied. For the purpose of this Level 2 site assessment, maximum flood depth and hazard mapping from the Environment Agency's updated River Thames breach modelling (2015) have been used, using the Maximum Likely Water Level (MLWL) under climate change conditions for the year 2100.

The mapping shows that the closest breach location for the site is considered to be breach location Clp 01, however the breach does not impact the site.

Thames Tidal Breach Modelling: Maximum Hazard Rating (MLWL 2100)



Riverside Analysis

This site is unaffected by the Thame Breach Modelling scenario. Results from the riverside analysis completed as part of the 2008 SFRA identify the frontage adjacent to the site as Category 1, which is assumed Breach Level of >5.3 mAOD and Potential Peak Depth of Flow through breach (1 in 1000 year event) 0m, therefore it is unlikely that there will be a breach in the surrounding area that impacts this site.

4) RECOMMENDATIONS AND POLICIES

Development Layout and Sequential Approach	The fluvial hazard mapping shows "No Hazard" from a breach in the Thames Tidal Defence at breach location Clp01. The site intercepts Flood Zone 2 and 3a of the River Thames, which indicates that part of this site is at risk of flooding from a 0.5%-0.1% AEP (1 in 200-1000) tidal flood event if there were no tidal defence system. The north of the site is within Flood Zone 1 and therefore any new development should be located here. Self-contained residential basements and bedrooms at basement level are not permitted in Flood Zone 3a or areas that have 'potential for groundwater to occur at the surface' (BGS Susceptibility to Groundwater Flooding). Less Vulnerable basements, basement extensions and conversions, such as plant, car parking etc, must provide safe internal access to higher floors situated above levels derived from the breach modelling. Further ground investigations would be required at this site to confirm the likelihood of groundwater occurrence.	Section 9.2
Finished Floor Levels	For More Vulnerable development, finished floor levels for habitable accommodation should be set at or above the Thames Tidal breach modelling MLWL 2100 scenario flood level. For Less Vulnerable uses (such as commercial development), finished floor levels do not need to be raised with regards to policy, however, internal access must be provided to upper floors to provide safe refuge in a tidal breach flood event. However, it is good practice to raise all new floor levels a minimum of 300mm above this flood level in order to reduce the risk of flooding from surface water flooding, which is at high risk in this area. Alternatively, the development can be designed to be floodable, however, this is only really appropriate when flood depth mapping is greater than 0.6 metres.	Section 9.3

SITE 3.3.3: 9, 11 and 19 Osiers Road, SW18		
Flood Warning and Evacuation Plan	A Flood Warning and Evacuation Plan (FWEP) should be prepared for the site in case of a breach in the River Wandle flood defences. It should detail how a flood warning will be provided and the safest point of refuge for the occupants of the site and what will be done to protect development and contents. Where possible, the FWEP should also detail the length of time before the site becomes inaccessible by emergency vehicles. **Flood Warning Areas** The local area is covered by the Environment Agency Flood Warning Areas for 'Tidal Thames from Wandsworth Bridge to Putney Bridge'. Residents of the site should ensure they are signed up to the Environment Agency Flood Warning system. **Emergency Rest Centres** The closest designated emergency rest centre for this site is the Wandle Recreation Centre, Mapleton Road, to the south of the development site.	Section 9.14
Surface Water Management	**Current risk of flooding** The site is within Drainage Catchment 3, which is within London Borough of Wandsworth. The potential development must not increase flood risk to other areas in the Drainage Catchment. The uFMfSW indicates that the majority of the site and surrounding area is at high risk of surface water flooding.	
	Indicative existing runoff rate: 1.7 l/s (1 in 1 year), 6.5 l/s (1 in 100 year) **Indicative Greenfield Runoff Rate:** 5 l/s	Section 10
	SuDS Suitability Reference to the SWMP Appendix C2 Figure 4 identifies that (prior to the completion of a site investigation to determine precise local conditions) infiltration of surface water into the ground is potentially unsuitable for the site. Site investigations will be required prior to the development of a Drainage Strategy for the site. Techniques which should be considered include green roofs, filter strips, detention basins and ponds, as well as permeable surfacing in combination with tanked systems	Section 10.3 and 10.9
	Drainage Strategy and Approvals Wandsworth Council will require a Drainage Strategy to be prepared outlining the surface water management for the site, runoff rates and consideration of SuDS in line with the London Plan policy 5.13 and Local Plan policies. Where it is not possible to achieve greenfield runoff rates in accordance with the preferred standards set out in the London Plan policy 5.13 and Design and Construction SPG (April 2014), then justification must be provided. Arrangements for the future maintenance of the drainage system must be made and detailed in the Drainage Strategy. There is no automatic right to connect to the existing Thames Water network. Any potential diversions and/or discharges into a sewer or main river must be agreed with Thames Water or Environment Agency, respectively.	Section 10.6
	Indicative Unit Costs Green roofs ~ £90/m^2. Permeable paving ~ £30-50/m^2. Filter strips £2-4m^2. Detention basin £15-50m^3. Concrete storage tank £449-518/m^3.	Section 10.4

5) EXCEPTION TEST CONSIDERATIONS

The NPPF states that there are two parts to the Exception Test that must be passed for development to be allocated or permitted:

1) *"it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk"* and
2) *"demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall"*.

This development site is located within Flood Zone 2 and 3a of the River Thames, however, it is defended by the Thames Tidal Defence. Under the River Thames breach modelling (2015), the site is not impacted by the closest breach location at Clp01. The results from the riverside analysis completed as part of the 2008 SFRA identify the frontage adjacent to the site as Category 1, therefore it is unlikely that there will be a breach in the surrounding area that impacts this site. Although the probability of a breach in the defence system is low, a FWEP should be prepared. It is also still good practice to raise finished floor levels and incorporate SuDS into the development plan in order to reduce the risk of surface water flooding and to avoid transferring flood risk elsewhere. Therefore, on this basis, it is likely that this site would pass the Exception Test.

SITE 3.3.4 : Linton Fuels site, Osiers Road, SW18

1) PROPOSED DEVELOPMENT

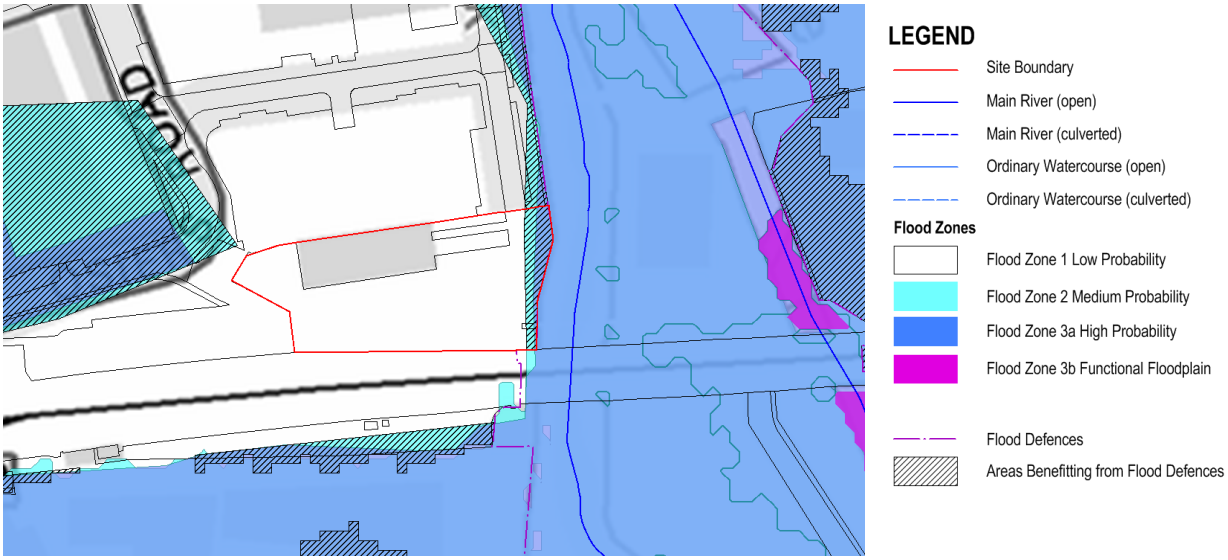
Site ID	3.3.4
Site Address	Linton Fuels site, Osiers Road, SW18
Site Area	0.34 ha
Current Use	Fuel depot
Allocated Use	Mixed use development including replacement employment floorspace and residential. Any development should incorporate public open space and a link between the Thames riverside and Wandsworth town centre.
Vulnerability	More vulnerable

2) SUMMARY OF LEVEL 1 FLOOD RISK

Flood risk from rivers

The River Wandle borders the site. The site is outside the floodplain for the River Thames but inside the floodplain for the River Wandle.

Proportion of potential development site within Flood Zone	Flood Zone 3b	Flood Zone 3a	Flood Zone 2	Flood Zone 1	Area Benefiting of Defences
	0 %	**4 %**	**4 %**	**92 %**	**8 %**



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Flood risk from all other sources			**Limitations**
Risk of flooding to the potential development site and surrounding area	Surface Water flooding: (Level 1 SFRA Appendix A Figure 5.2 - uFMfSW)	**Low Risk** Less than 1 in 1000 year (0.1% annual probability)	The uFMfSW data does not show the susceptibility of individual properties to surface water flooding. The uFMfSW also does not take into account the details of the existing drainage system.
	Groundwater flooding: (Level 1 SFRA Appendix A Figure 5.4 - BGS Susceptibility to Groundwater Flooding)	**Medium Risk** Potential for groundwater flooding to occur at surface, but no historic records of groundwater flooding	The dataset cannot be used on its own to indicate risk of groundwater flooding and should not be used to inform planning decisions at a site scale. It is suitable for use in conjunction with a large number of other factors, e.g. records of previous incidence of groundwater flooding, to establish relative risk of groundwater flooding.

Historic records of flooding

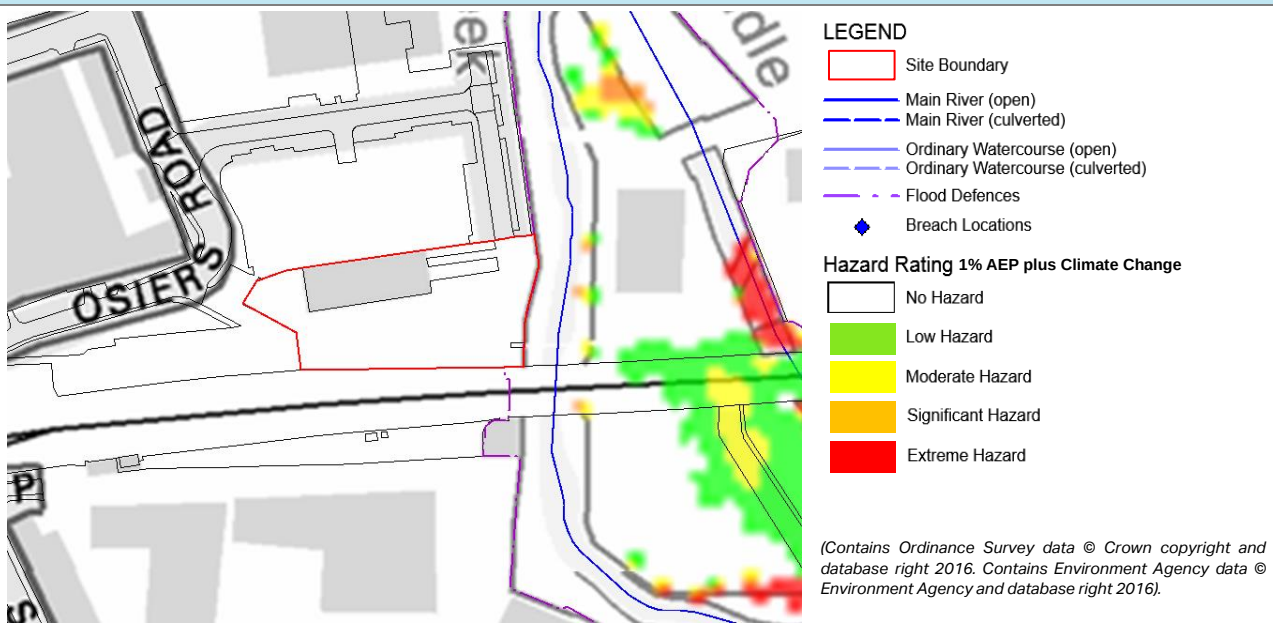
Historic records of flooding from each source within a 100m radius of potential development site	Fluvial records	Surface water records	Groundwater records	Sewer records	Multiple source records	Other
	0	**1**	**0**	**3 Internal**	**0**	**0**

SITE 3.3.4 : Linton Fuels site, Osiers Road, SW18

3) LEVEL 2 ASSESSMENT

The fluvial hazard, depth and velocity outputs used in the Level 2 SFRA assessment and mapped below are based on the Environment Agency modelling of the River Wandle (2015) and are provided for the 1% AEP plus Climate Change event.

Flood Hazard Rating



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4) RECOMMENDATIONS AND POLICIES

Development Layout and Sequential Approach	The eastern border of this site intersects Flood Zone 2 and 3a of the River Wandle, which flows immediately adjacent. The rest of the site is Flood Zone 1 and at "No Hazard" as shown by the fluvial hazard mapping. The area intersecting Flood Zones 2 and 3a is protected by the Wandle Defence System. All development should be set back at least 8m from the River Wandle. A Flood Risk Activity Permit is required for works within the 8m zone from the River Wandle. More Vulnerable residential development should be allocated in Flood Zone 1. The Water Compatible uses (e.g. public open space) can be located in next to the river. Self-contained residential basements and bedrooms at basement level are not permitted in Flood Zone 3a or areas that have 'potential for groundwater to occur at the surface' (BGS Susceptibility to Groundwater Flooding). Less Vulnerable basements, basement extensions and conversions, such as plant, car parking etc, must provide safe internal access to higher floors situated above levels derived from the breach modelling. Further ground investigations would be required at this site to confirm the likelihood of groundwater occurrence.	Section 9.2
Finished Floor Levels	This site is at No Hazard and is outside the outline of the 1% AEP (1 in 100 year) fluvial flood event including an allowance for climate change. Therefore there are no policy requirements for finished floor levels. However, it is good practice to raise finished floor levels, especially if development is classed as More Vulnerable. Alternatively, the Less Vulnerable uses can be allocated to the ground floors and be designed to be floodable, however, this is only really appropriate when flood depth mapping is greater than 0.6 metres.	Section 9.3
Flood Resistance (Fluvial Residual Risk)	It is recommended that flood resistant construction methods should be considered where risk of flooding is up to 0.6m. This includes the use of construction materials with low permeability, raising property thresholds, using landscaping to manage surface water and fluvial floodwater.	Section 9.4
Flood Resilience (Fluvial Residual Risk)	It is recommended that flood resilient measures should also be considered on the site. These measures are appropriate where modelled flood depths are greater than 0.6m[3]. The strategy should be to allow water into the building, but to implement careful design in order to minimise damage and allow rapid re-occupancy. For example, concrete flooring and waterproofing building materials such as timber joists and render and flood resilient air brick covers.	Section 9.5

[3] Department for Communities and Local Government (2007) Improving the flood performance of new buildings, Flood resilient construction.

SITE 3.3.4 : Linton Fuels site, Osiers Road, SW18

Flood Warning and Evacuation Plan	A Flood Warning and Evacuation Plan (FWEP) should be prepared for the site in case of a breach in the River Wandle flood defences. It should detail how a flood warning will be provided and the safest point of refuge for the occupants of the site and what will be done to protect development and contents. Where possible, the FWEP should also detail the length of time before the site becomes inaccessible by emergency vehicles. **Flood Warning Areas** The local area is covered by the Environment Agency Flood Warning Areas for 'River Wandle at Wandsworth including King George'. Residents of the site should ensure they are signed up to the Environment Agency Flood Warning system. **Emergency Rest Centres** The closest designated emergency rest centre for this site is the Wandle Recreation Centre, Mapleton Road, to the south of the development site.	Section 9.14
Surface Water Management	**Current risk of flooding** The site is within Drainage Catchment 3, which is within London Borough of Wandsworth. The potential development must not increase flood risk to other areas in the Drainage Catchment. The uFMfSW indicates that the majority of the site and surrounding area is at low risk of surface water flooding. There is one previous recorded incident of surface water flooding recorded by Wandsworth Council in this location.	
	Indicative existing runoff rate: 1.5 l/s (1 in 1 year), 5.6 l/s (1 in 100 year) **Indicative Greenfield Runoff Rate:** 5 l/s	Section 10
	SuDS Suitability Reference to the SWMP Appendix C2 Figure 4 identifies that (prior to the completion of a site investigation to determine precise local conditions) infiltration of surface water into the ground is potentially unsuitable for the site. Site investigations will be required prior to the development of a Drainage Strategy for the site. Techniques which should be considered include green roofs, filter strips, detention basins and ponds, as well as permeable surfacing in combination with tanked systems	Section 10.3 and 10.9
	Drainage Strategy and Approvals Wandsworth Council will require a Drainage Strategy to be prepared outlining the surface water management for the site, runoff rates and consideration of SuDS in line with the London Plan policy 5.13 and Local Plan policies. Where it is not possible to achieve greenfield runoff rates in accordance with the preferred standards set out in the London Plan policy 5.13 and Design and Construction SPG (April 2014), then justification must be provided. Arrangements for the future maintenance of the drainage system must be made and detailed in the Drainage Strategy. There is no automatic right to connect to the existing Thames Water network. Any potential diversions and/or discharges into a sewer or main river must be agreed with Thames Water or Environment Agency, respectively.	Section 10.6
	Indicative Unit Costs Green roofs ~ £90/m^2. Permeable paving ~ £30-50/m^2. Filter strips £2-4m^2. Detention basin £15-50m^3. Concrete storage tank £449-518/m^3.	Section 10.4

5) EXCEPTION TEST CONSIDERATIONS

The NPPF states that there are two parts to the Exception Test that must be passed for development to be allocated or permitted:

1) *"it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk"* and
2) *"demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall"*.

This development site is mainly a designated Flood Zone 1, however, where the site borders the River Wandle there is intersection with Flood Zone 2 and 3a. Nonetheless, these zones are protected by the Wandle Flood Defence System. In case of a defence failure, all new development should be set back at least 8m from the River Wandle. A FWEP should be prepared in case of a defence failure which would detail the safest place of refuge. SuDS should be incorporated into the development plan in order to reduce the risk of flooding elsewhere. Therefore, on this basis, it is likely that this site would pass the Exception Test.

SITE 3.3.5 : Feather's Wharf, The Causeway, SW18

1) PROPOSED DEVELOPMENT

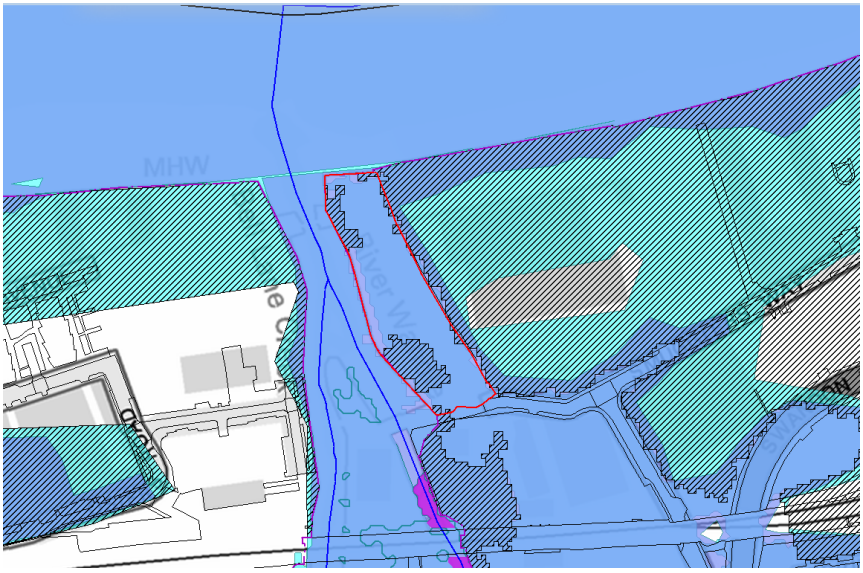
Site ID	3.3.5
Site Address	Feather's Wharf, The Causeway, SW18
Site Area	0.79 ha
Current Use	Vacant land.
Proposed Use	Longer term - mixed use development of residential and commercial uses should include riverside walks and public open space at the mouth of the River Wandle. Short to medium term - appropriate temporary uses including potential use of southern part of the site for waste management purposes which do not compromise the long term development of the site.
Vulnerability	More Vulnerable (residential), Less Vulnerable (commercial), Water Compatible (public open space)

2) SUMMARY OF LEVEL 1 FLOOD RISK

Flood risk from rivers

The site is located along the River Wandle and adjacent to the tidal River Thames.

Proportion of potential development site within Flood Zone	Flood Zone 3b	Flood Zone 3a	Flood Zone 2	Flood Zone 1	Area Benefiting of Defences
	0 %	**100 %**	**0 %**	**0 %**	**12 %**



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Flood risk from all other sources			**Limitations**
Risk of flooding to the potential development site and surrounding area	Surface Water flooding: (Level 1 SFRA Appendix A Figure 5.2 - uFMfSW)	**High Risk** 1 in 30 year (3.33% annual probability)	The uFMfSW data does not show the susceptibility of individual properties to surface water flooding. The uFMfSW also does not take into account the details of the existing drainage system.
	Groundwater flooding: (Level 1 SFRA Appendix A Figure 5.4 - BGS Susceptibility to Groundwater Flooding)	**Medium Risk** Potential for groundwater flooding to occur at surface, but no historic records of groundwater flooding	The dataset cannot be used on its own to indicate risk of groundwater flooding and should not be used to inform planning decisions at a site scale. It is suitable for use in conjunction with a large number of other factors, e.g. records of previous incidence of groundwater flooding, to establish relative risk of groundwater flooding.

Historic records of flooding

Historic records of flooding from each source within a 100m radius of potential development site	Fluvial records	Surface water records	Groundwater records	Sewer records	Multiple source records	Other
	0	**0**	**0**	**3 Internal**	**0**	**0**

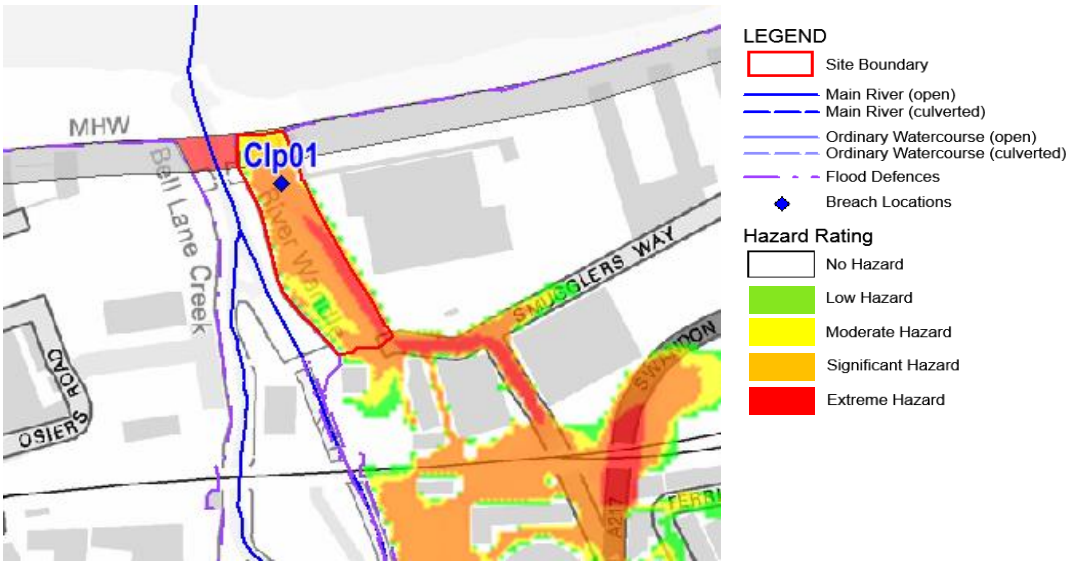
SITE 3.3.5 : Feather's Wharf, The Causeway, SW18

3) LEVEL 2 ASSESSMENT

The London Borough of Wandsworth is located upstream of the Thames Barrier where tidal water levels are a function of the maximum tide level allowed through the Thames Barrier (defined by the barrier closure rule / matrix). As a result, when undertaking modelling of the Thames upstream of the Barrier typical return periods cannot be applied. For the purpose of this Level 2 site assessment, maximum flood depth and hazard mapping from the Environment Agency's updated River Thames breach modelling (2015) have been used, using the Maximum Likely Water Level (MLWL) under climate change conditions for the year 2100.

This site is within the hazard zone for the modelled breach at Clp01. The invert level was 4.88 mAOD and the width of the breach is 20m.

Thames Tidal Breach Modelling: Maximum Hazard Rating (MLWL 2100)



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Thames Tidal Breach Modelling: Maximum Flood Depth (MLWL 2100) and Riverside Analysis Categories

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Riverside Analysis

There is one breach location in close proximity to the site which provides a good indication of the likely impact to the site. Results from the riverside analysis completed as part of the 2008 SFRA identify the frontage adjacent to the site as mainly a Category 4, with Assumed Breach Level of <4.3 mAOD and Potential Peak Depth of Flow through breach (1 in 1000 year event) of >1.0m. Adjacent to this section the frontage is catergorised as Category 1, with Assumed Breach Level of >5.3 mAOD and Potential Peak Depth Flow through breach (1 in 1000 year event) of 0m.

SITE 3.3.5 : Feather's Wharf, The Causeway, SW18		
4) RECOMMENDATIONS AND POLICIES		
Development Layout and Sequential Approach	A sequential approach to site layout should be used. The site is within Flood Zone 3a of the defended River Thames. However the site is also in the undefended River Wandle floodplain which flows along the western boundary and joins the Thames to the north of the site. There are some areas within the site that benefit from the Thames Tidal Flood Defence System. The Hazard mapping of the breach modelling shows that there is risk of "Extreme Hazard" along the eastern site boundary. The majority of the site is at "Significant" Hazard and there is a small area in the southern corner that is defined as Low-Moderate Hazard. The proposed site use is a mixture of More and Less Vulnerable development. The longer term proposal involves the development of residential buildings; these should be located in the south where there is Low Hazard. The Water Compatible open space should be allocated where there is Extreme Hazard. The areas of Significant Hazard should house the Less Vulnerable development. All development should be set back at least 8m from the River Wandle and 16m from the River Thames. A Flood Risk Activity Permit is required for works within 8m from the River Wandle and 16m from the River Thames. More Vulnerable uses must be located on the first floor or above, with Less Vulnerable uses at ground level. Self-contained residential basements and bedrooms at basement level are not permitted in Flood Zone 3a or areas that have 'potential for groundwater to occur at the surface' (BGS Susceptibility to Groundwater Flooding). Less Vulnerable basements, basement extensions and conversions, such as plant, car parking etc, must provide safe internal access to higher floors situated above levels derived from the breach modelling. Further ground investigations would be required at this site to confirm the likelihood of groundwater occurrence. Measures to manage surface water on the site should be considered early in the site masterplan to enable inclusion of attenuation SuDS where possible.	Section 9.2
Finished Floor Levels	For the current development site (without mitigation), the Thames Tidal breach modelling Clp01 identifies that under the MLWL 2100 scenario the site is at risk of flooding of greater than 1.5m in depth along the eastern boundary. To the north of the site, a risk of flooding between 0.5-1m is apparent. The area in the south west is at risk of flooding up to 0.5m. For More Vulnerable development, finished floor levels for habitable accommodation should be set at or above the Thames Tidal breach modelling MLWL 2100 scenario flood level. For Less Vulnerable uses (such as commercial development), finished floor levels do not need to be raised with regards to policy, however, internal access must be provided to upper floors to provide safe refuge in a tidal breach flood event.	Section 9.3
Safe Access/Egress	Access to the site is provided via Smugglers Way to the southeast of the site. In the event of widespread flooding associated with a breach in the Tidal Thames Defence, and for precautionary purposes, it is recommended that a Flood Warning and Evacuation Plan (FWEP) is developed.	Section 9.7
Flood Warning and Evacuation Plan	A Flood Warning and Evacuation Plan (FWEP) must be prepared for the site, detailing how flood warning will be provided how the safety of occupants and access to/from the development will be ensured and what will be done to protect development and contents. The FWEP should consider arrangements for the evacuation of basement car parks. Where possible, the FWEP should also detail the length of time before the site becomes inaccessible by emergency vehicles. **Flood Warning Areas** The local area is covered by the Environment Agency Flood Warning Areas for 'Tidal Thames from Wandsworth Bridge to Putney Bridge'. Residents of the site should ensure they are signed up to the Environment Agency Flood Warning system. **Emergency Rest Centres** The closest designated emergency rest centre for this site is the Wandle Recreation Centre, Mapleton Road, to the south of the development site.	Section 9.14
Surface Water Management	**Current risk of flooding** The site is within Drainage Catchment 2, which is within London Borough of Wandsworth, and drains much of Clapham Junction. The potential development must not increase flood risk to other areas in the Drainage Catchment. The uFMfSW indicates that the majority of the site and surrounding area is at medium risk of surface water flooding.	
	Indicative existing runoff rate: 3.5 l/s (1 in 1 year), 13.2 l/s (1 in 100 year) **Indicative Greenfield Runoff Rate:** 5 l/s	Section 10

SITE 3.3.5 : Feather's Wharf, The Causeway, SW18

	SuDS Suitability Reference to the SWMP Appendix C2 Figure 4 identifies that (prior to the completion of a site investigation to determine precise local conditions) infiltration of surface water into the ground is unsuitable at this location as it is a historic landfill site.	Section 10.3 and 10.9

5) EXCEPTION TEST CONSIDERATIONS

The NPPF states that there are two parts to the Exception Test that must be passed for development to be allocated or permitted:

1) *"it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk"* and
2) *"demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall"*.

This development site is located within Flood Zone 3a of the tidal River Thames; however, it is defended by the Thames Tidal Defence System. The hazard mapping shows Extreme Hazard from a Thames defence breach along the eastern boundary, the More Vulnerable elements of development should avoid this area and be located in the southern corner, where there is Low Hazard. For More Vulnerable development it may be appropriate to raise ground floor levels, alternatively Less Vulnerable uses can be allocated on the groundfloor with flood resistant or resilient measures taken. There is potential that dry routes out of the local area to a safe place of refuge may be limited and it is therefore necessary to prepare a FWEP for residents / occupants of the site detailing steps to evacuate the site prior to the onset of flooding. The use of infiltration SuDS is unsuitable due to the site historic use as a landfill site. Therefore, on this basis, it is likely that this site would pass the Exception Test.

SITE 3.3.6 : Land at the Causeway, SW18

1) PROPOSED DEVELOPMENT

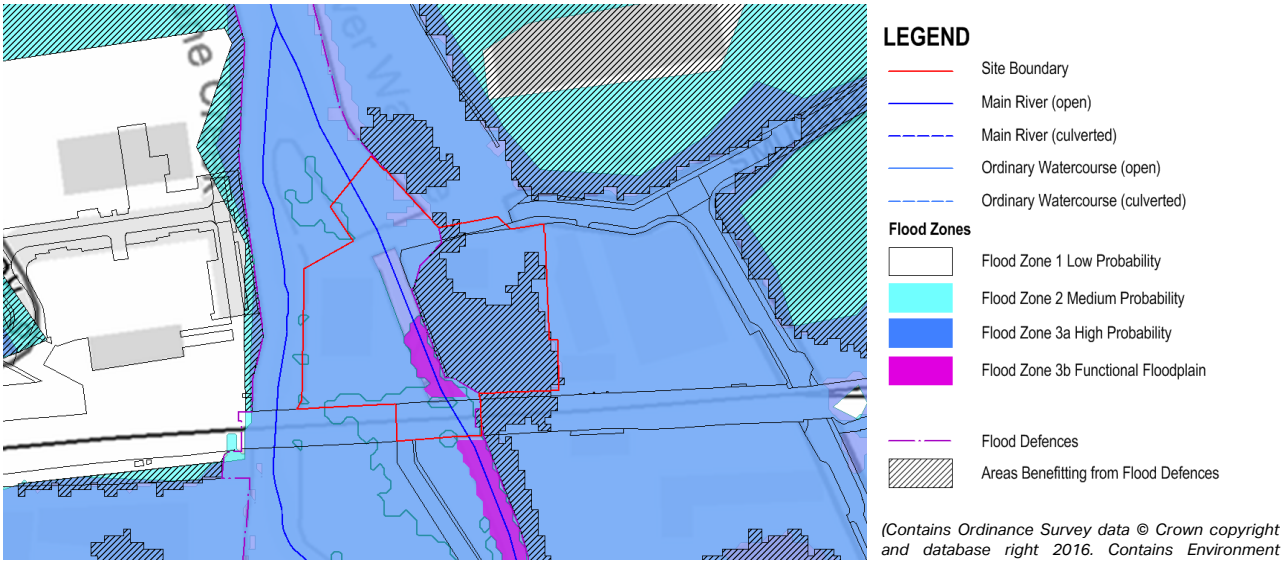
Site ID	3.3.6
Site Address	Land at the Causeway, SW18
Site Area	1.02 ha
Current Use	EDF Energy Switch House and Head House.
Allocated Use	Mixed use development including replacement employment floorspace, residential and improved links with the town centre.
Vulnerability	More vulnerable (residential) Less Vulnerable (employment)

2) SUMMARY OF LEVEL 1 FLOOD RISK

Flood risk from rivers

The River Wandle flows through the site. The site is also within the River Thames floodplain.

Proportion of potential development site within Flood Zone	Flood Zone 3b	Flood Zone 3a	Flood Zone 2	Flood Zone 1	Area Benefiting of Defences
	4 %	**96 %**	**0 %**	**0 %**	**28 %**



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Flood risk from all other sources			**Limitations**
Risk of flooding to the potential development site and surrounding area	Surface Water flooding: (Level 1 SFRA Appendix A Figure 5.2 - uFMfSW)	**High Risk** 1 in 30 year (3.33% annual probability)	The uFMfSW data does not show the susceptibility of individual properties to surface water flooding. The uFMfSW also does not take into account the details of the existing drainage system.
	Groundwater flooding: (Level 1 SFRA Appendix A Figure 5.4 - BGS Susceptibility to Groundwater Flooding)	**Medium Risk** Potential for groundwater flooding to occur at surface, but no historic records of groundwater flooding	The dataset cannot be used on its own to indicate risk of groundwater flooding and should not be used to inform planning decisions at a site scale. It is suitable for use in conjunction with a large number of other factors, e.g. records of previous incidence of groundwater flooding, to establish relative risk of groundwater flooding.

Historic records of flooding

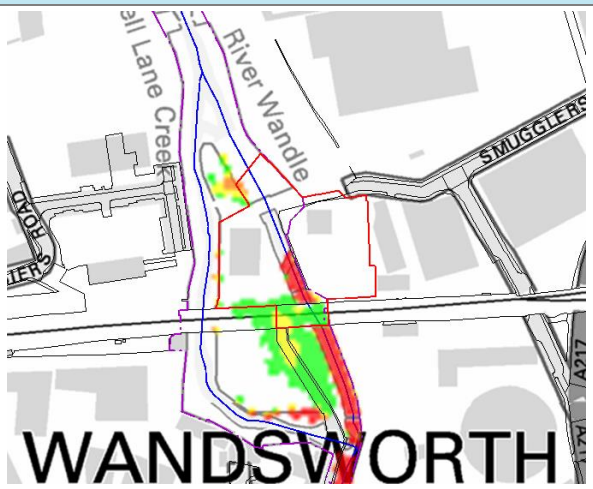
Historic records of flooding from each source within a 100m radius of potential development site	Fluvial records	Surface water records	Groundwater records	Sewer records	Multiple source records	Other
	0	**0**	**0**	**3 Internal**	**0**	**0**

SITE 3.3.6 : Land at the Causeway, SW18

3a) LEVEL 2 ASSESSMENT – FLUVIAL FLOOD RISK

The fluvial hazard, depth and velocity outputs used in the Level 2 SFRA assessment and mapped below are based on the Environment Agency modelling of the River Wandle (2015) and are provided for the 1% AEP plus Climate Change event.

Flood Hazard Rating



LEGEND
- Site Boundary
- Main River (open)
- Main River (culverted)
- Ordinary Watercourse (open)
- Ordinary Watercourse (culverted)
- Flood Defences
- Breach Locations

Hazard Rating 1% AEP plus Climate Change
- No Hazard
- Low Hazard
- Moderate Hazard
- Significant Hazard
- Extreme Hazard

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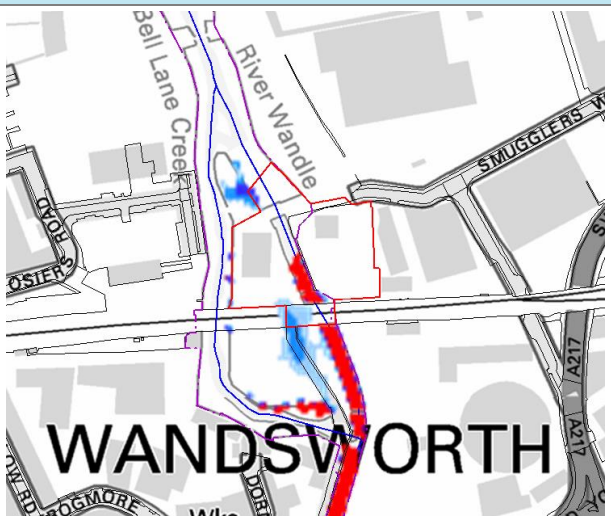
Maximum Flood Depth



LEGEND
- Site Boundary
- Main River (open)
- Main River (culverted)
- Ordinary Watercourse (open)
- Ordinary Watercourse (culverted)
- Flood Defences
- Breach Locations

Flood Depth (m) % AEP plus Climate Change
- <0.1m
- 0.1m - 0.25m
- 0.25m - 0.5m
- 0.5m - 1m
- 1m - 1.5m
- >1.5m

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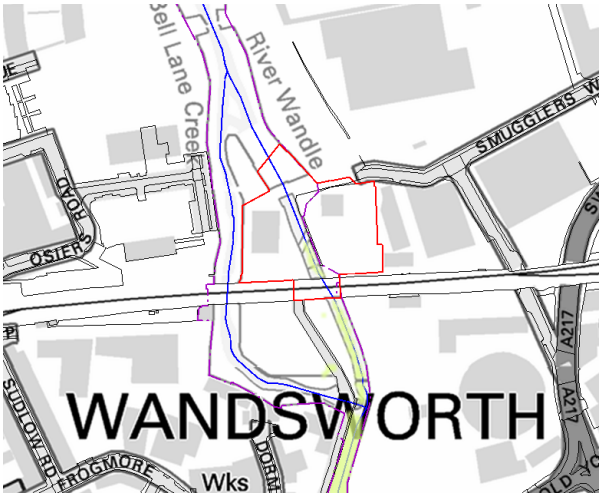
Maximum Velocity



LEGEND
- Site Boundary
- Main River (open)
- Main River (culverted)
- Ordinary Watercourse (open)
- Ordinary Watercourse (culverted)
- Flood Defences
- Breach Locations

Flood Velocity 1% AEP plus Climate Change
- < 0.5 m/s
- 0.1 m/s - 1.5 m/s
- 1.5 m/s - 2.5 m/s
- 2.5 m/s - 3.5 m/s
- 3.5 m/s - 4.5 m/s
- > 4.5 m/s

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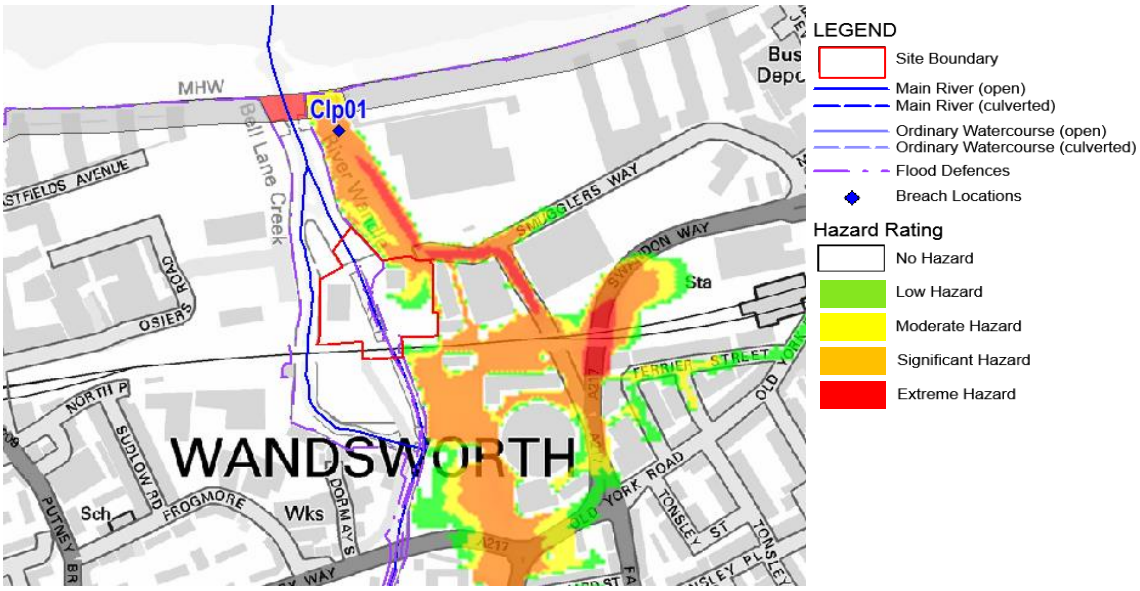
SITE 3.3.6 : Land at the Causeway, SW18

3b) LEVEL 2 ASSESSMENT – TIDAL FLOOD RISK

The London Borough of Wandsworth is located upstream of the Thames Barrier where tidal water levels are a function of the maximum tide level allowed through the Thames Barrier (defined by the barrier closure rule / matrix). As a result, when undertaking modelling of the Thames upstream of the Barrier typical return periods cannot be applied. For the purpose of this Level 2 site assessment, maximum flood depth and hazard mapping from the Environment Agency's updated River Thames breach modelling (2015) have been used, using the Maximum Likely Water Level (MLWL) under climate change conditions for the year 2100.

This site is within the hazard zone for the modelled breach at Clp01. The invert level was 4.88 mAOD and the width of the breach is 20m.

Thames Tidal Breach Modelling: Maximum Hazard Rating (MLWL 2100)



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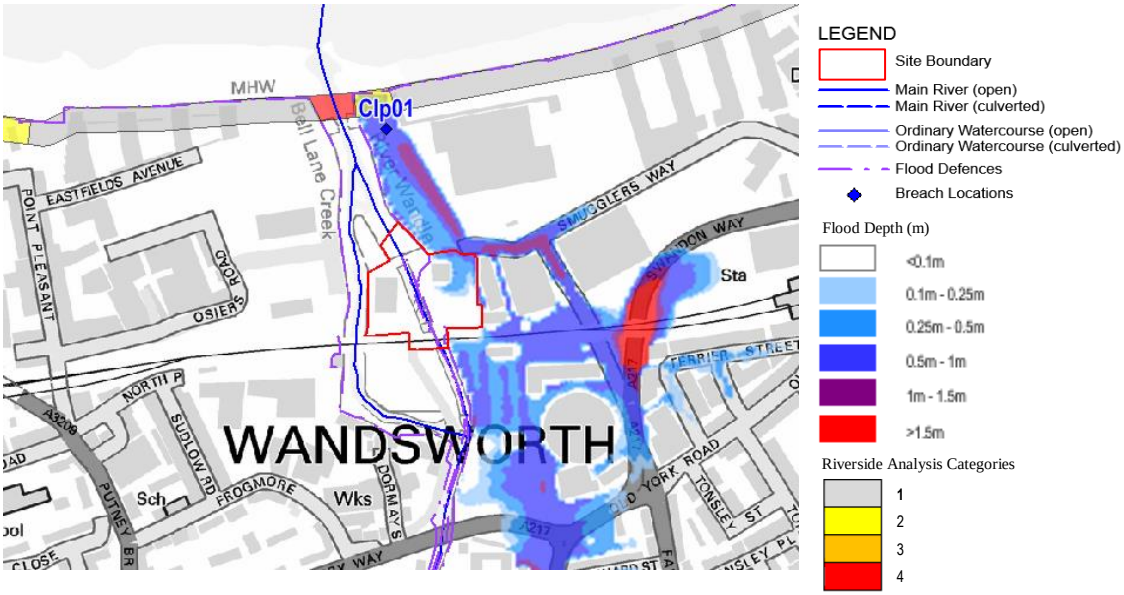
Thames Tidal Breach Modelling: Maximum Flood Depth (MLWL 2100) and Riverside Analysis Categories



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Riverside Analysis

There is one breach location in close proximity to the site which provides a good indication of the likely impact to the site. Results from the riverside analysis completed as part of the 2008 SFRA identify the frontage adjacent to the site as mainly a Category 4, with Assumed Breach Level of <4.3 mAOD and Potential Peak Depth of Flow through breach (1 in 1000 year event) of >1.0m. Adjacent to this section the frontage is catergorised as Category 1, with Assumed Breach Level of >5.3 mAOD and Potential Peak Depth Flow through breach (1 in 1000 year event) of 0m.

SITE 3.3.6 : Land at the Causeway, SW18		
4) RECOMMENDATIONS AND POLICIES		
Development Layout and Sequential Approach	A sequential approach to site layout should be used. The site is within the defended tidal Thames and also within Flood Zone 3a of the River Wandle, with a small section of Functional Floodplain surrounding the River Wandle which flows through the middle of the site. A section in the eastern half of the site is protected by flood defences. The hazard mapping from the River Wandle shows Low Hazard from fluvial flooding in the south. The Thames Breach Modelling shows Significant Hazard in the north eastern corner with the rest of the sight at No Hazard. On this basis, all More Vulnerable residential development should be located in the No Hazard areas, with the Less Vulnerable development located towards the areas of greatest hazard. All development should be set back at least 8 metres from the River Wandle and 16m from the River Thames. A Flood Risk Activity Permit is required for works within 8m from the River Wandle and 16m from the River Thames. Self-contained residential basements and bedrooms at basement level are not permitted in Flood Zone 3a or areas that have 'potential for groundwater to occur at the surface' (BGS Susceptibility to Groundwater Flooding. Less Vulnerable basements, basement extensions and conversions, such as plant, car parking etc, must provide safe internal access to higher floors situated above levels derived from the breach modelling. Further ground investigations would be required at this site to confirm the likelihood of groundwater occurrence. Measures to manage surface water on the site should be considered early in the site masterplan to enable inclusion of attenuation SuDS where possible.	Section 9.2
Finished Floor Levels	For the current development site (without mitigation), the Thames Tidal breach modelling Clp01 identifies that under the MLWL 2100 scenario the site is at risk of flooding between 0.25-1m in the north eastern corner. For More Vulnerable development, finished floor levels for habitable accommodation should be set at or above the Thames Tidal breach modelling MLWL 2100 scenario flood level. For Less Vulnerable uses (such as commercial development), finished floor levels do not need to be raised with regards to policy, however, internal access must be provided to upper floors to provide safe refuge in a tidal breach flood event. There is no set guidance for the setting of finished floor levels of development in relation to surface water flood risk. The site is at medium risk of surface water flooding and it is considered that finished floor levels should be set at or above the Thames Tidal breach modelling MLWL 2100 scenario flood level to protect the property from a 0.33% annual probability (1 in 30 year) surface water flood event.	Section 9.3
Flood Resistance (Fluvial Residual Risk)	It is recommended that flood resistant construction methods should be considered where risk of flooding is up to 0.6m. This includes the use of construction materials with low permeability, raising property thresholds, using landscaping to manage surface water and fluvial floodwater.	Section 9.4
Flood Resilience (Fluvial Residual Risk)	It is recommended that flood resilient measures should also be considered on the site. These measures are appropriate where modelled flood depths are greater than 0.6m[4]. The strategy should be to allow water into the building, but to implement careful design in order to minimise damage and allow rapid re-occupancy. For example, concrete flooring and waterproofing building materials such as timber joists and render and flood resilient air brick covers.	Section 9.5
Floodplain Compensation Storage	Areas in the north of this site are located within the outline of the 1% annual probability (1 in 100 year) flood event including an allowance for climate change. Within this area, new development must not result in a net loss of flood storage capacity. Due to the site lying wholly within the floodplain it will not be possible to provide floodplain compensation storage within the site boundary. The extent of any increase in building footprint should therefore be reduced as much as possible. The use of flood voids may be considered to mitigate any loss of floodplain storage.	Section 9.9
Safe Access/Egress	Access to the site is provided via Smugglers Way to the northeast of the site. In the event of widespread flooding associated with a breach in the Tidal Thames Defence, and for precautionary purposes, it is recommended that a Flood Warning and Evacuation Plan (FWEP) is developed.	Section 9.7

[4] Department for Communities and Local Government (2007) Improving the flood performance of new buildings, Flood resilient construction.

SITE 3.3.6 : Land at the Causeway, SW18		
Flood Warning and Evacuation Plan	A Flood Warning and Evacuation Plan (FWEP) must be prepared for the site, detailing how flood warning will be provided how the safety of occupants and access to/from the development will be ensured and what will be done to protect development and contents. The FWEP should consider arrangements for the evacuation of basement car parks. Where possible, the FWEP should also detail the length of time before the site becomes inaccessible by emergency vehicles. ***Flood Warning Areas*** The local area is covered by the Environment Agency Flood Warning Areas for 'River Wandle at Wandsworth'. Residents of the site should ensure they are signed up to the Environment Agency Flood Warning system. ***Emergency Rest Centres*** The closest designated emergency rest centre for this site is the Wandle Recreation Centre, Mapleton Road, to the south of the development site.	Section 9.14
Surface Water Management	**Current risk of flooding** The site is within Drainage Catchment 2, which is within London Borough of Wandsworth, and drains much of Clapham Junction. The potential development must not increase flood risk to other areas in the Drainage Catchment. The uFMfSW indicates that the majority of the site and surrounding area is at high risk of surface water flooding.	
	Indicative existing runoff rate: 4.5 l/s (1 in 1 year), 17.0 l/s (1 in 100 year) **Indicative Greenfield Runoff Rate:** 5 l/s	Section 10
	SuDS Suitability Reference to the SWMP Appendix C2 Figure 4 identifies that (prior to the completion of a site investigation to determine precise local conditions) infiltration of surface water into the ground is potentially unsuitable for the site. Site investigations will be required prior to the development of a Drainage Strategy for the site. Techniques which should be considered include green roofs, filter strips, detention basins and ponds, as well as permeable surfacing in combination with tanked systems	Section 10.3 and 10.9
	Drainage Strategy and Approvals Wandsworth Council will require a Drainage Strategy to be prepared outlining the surface water management for the site, runoff rates and consideration of SuDS in line with the London Plan policy 5.13 and Local Plan policies. Where it is not possible to achieve greenfield runoff rates in accordance with the preferred standards set out in the London Plan policy 5.13 and Design and Construction SPG (April 2014), then justification must be provided. Arrangements for the future maintenance of the drainage system must be made and detailed in the Drainage Strategy. There is no automatic right to connect to the existing Thames Water network. Any potential diversions and/or discharges into a sewer or main river must be agreed with Thames Water or Environment Agency, respectively.	Section 10.6
	Indicative Unit Costs Green roofs ~ £90/m^2. Permeable paving ~ £30-50/m^2. Filter strips £2-4m^2. Detention basin £15-50m^3. Concrete storage tank £449-518/m^3.	Section 10.4

5) EXCEPTION TEST CONSIDERATIONS

The NPPF states that there are two parts to the Exception Test that must be passed for development to be allocated or permitted:

1) *"it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk"* and
2) *"demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall"*.

This development site is located within Flood Zone 3a of the tidal River Thames; however, it is defended by the Thames Tidal Defence System. The River Wandle flows through the middle of the site and results in 'Low Hazard' in the event of flooding in the south of the site. The Breach Modelling shows Significant Hazard in the northeast; all More Vulnerable development should avoid this area. For More Vulnerable development it may be appropriate to raise ground floor levels, alternatively Less Vulnerable uses can be allocated on the groundfloor with flood resistant or resilient measures taken. There is potential that dry routes out of the local area to a safe place of refuge may be limited and it is therefore necessary to prepare a FWEP for residents / occupants of the site detailing steps to evacuate the site prior to the onset of flooding. If possible the use of infiltration SuDS should be applied to reduce the spread of flooding risk to surrounding areas. Therefore, on this basis, it is likely that this site would pass the Exception Test.