

**SITE 430 : Grafton Quarter, Grafton Road**

**1) PROPOSED DEVELOPMENT**

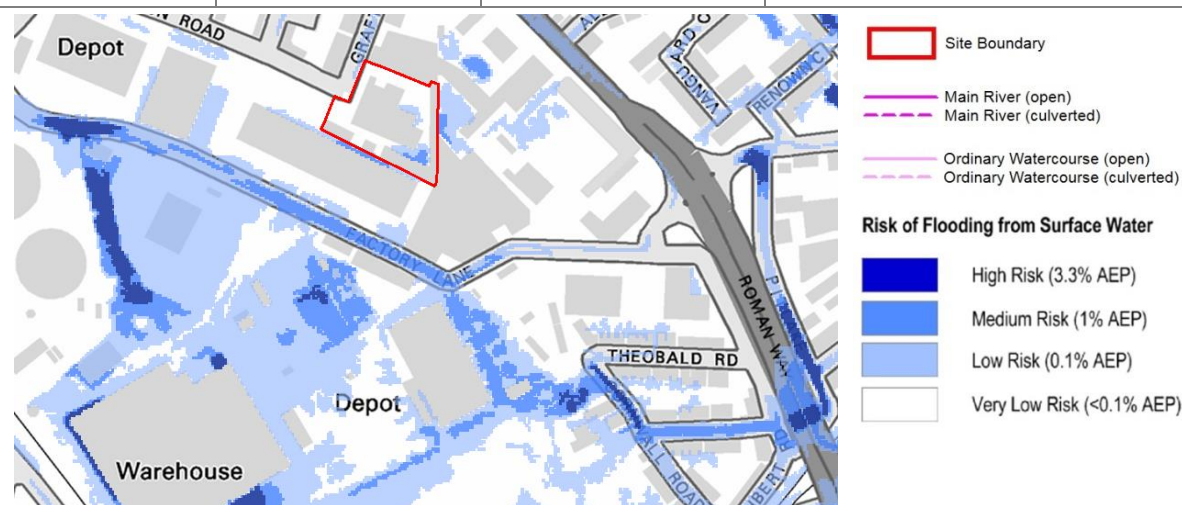
<b>Site ID</b>	430
<b>Site Address</b>	Grafton Quarter, Grafton Road
<b>Site Area</b>	0.611 ha
<b>Current Use</b>	Various industrial buildings and office blocks that are vacant
<b>Allocated Use</b>	Creative and Cultural Industries Enterprise Centre and residential development
<b>Vulnerability</b>	More Vulnerable

**2) SUMMARY OF LEVEL 1 FLOOD RISK**

**Flood risk from rivers**

The site is located approximately 400m north of the River Wandle and is located in Flood Zone 1, low probability of flooding from rivers. The southern boundary of the site borders Flood Zone 2.

Flood risk from all other sources			Limitations
<i>Risk of flooding to the potential development site and surrounding area</i>	Surface Water flooding: (uFMfSW)	<b>Medium Risk</b> 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: (BGS Susceptibility to Groundwater Flooding)	<b>Medium Risk</b> 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.



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**Historic records of flooding**

<i>Historic records of flooding from each source within a 100m radius of potential development site</i>	Fluvial records	Surface water records	Groundwater records	Sewer records	Multiple source records	Other
	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**3) RECOMMENDATIONS**

In accordance with the NPPF, More Vulnerable development is considered compatible within Flood Zone 1 and does not require the application of the Exception Test. However, given the risk of 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.

<b>SITE 430 : Grafton Quarter, Grafton Road</b>		
<b>Development Layout and Sequential Approach</b>	<p>An assessment of surface water flow paths should be made prior to site design, to encourage the location of buildings and more vulnerable aspects of the development away from those areas at risk of surface water ponding.</p> <p>Measures to manage surface water on the site should be considered early in the site masterplan to enable inclusion of attenuation SuDS where possible.</p> <p>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 car parking, must provide safe internal access to higher floors situated above ground level. Further ground investigations would be required at this site to confirm the the likelihood of groundwater occurrence.</p>	Section 9.2
<b>Flood Resistance</b>	Where there may be a future risk of surface water flooding on the site, flood resistant construction measures may be employed, such as raising property thresholds, and the use of landscaping to manage surface water and fluvial floodwater.	Section 9.4
<b>Flood Resilience</b>	Where parts of proposed buildings may be affected by surface water floodwaters, e.g. undercroft parking areas, flood resilient design techniques should be employed to minimise damage to buildings and structures. The use of concrete flooring and waterproof building materials could be considered.	Section 9.5
<b>Flow Routing</b>	Potential overland flow paths should be determined and appropriate solutions proposed to minimise the impact of the development, for example by configuring road and building layouts to preserve existing flow paths and improve flood routing, whilst ensuring that flows are not diverted towards other properties elsewhere.	Section 9.12
<b>Surface Water Management</b>	<p><b>Current risk of flooding</b></p> <p>The site is located within Critical Drainage Area (CDA) Group8_042, which is an area with localised flooding issues. The potential development must not increase flood risk to other areas in the CDA.</p> <p>The site is within Drainage Catchment 38, which is located at the west part of the borough. The uFMFSW indicates that the site lies within an area of medium risk of surface water flooding, with small areas within and bordering the southern boundary of the site to be at medium to low risk.</p>	
	<p><b>Indicative existing runoff rate:</b> 3.1 l/s (1 in 1 year), 11.6 l/s (1 in 100 year)</p> <p><b>Indicative Greenfield Runoff Rate:</b> 5.0 l/s</p>	Level 2 Appendix B
	<p><b>SuDS Suitability</b></p> <p>Reference to the SWMP Appendix C2 Figure 5 identifies that infiltration of surface water into the ground is potentially uncertain and requires further investigation prior to the development of a Drainage Strategy for the site.</p> <p>Techniques which should be considered include green roofs, filter strips, detention basins and ponds, as well as permeable surfacing in combination with tanked systems.</p>	Section 10.3 and 10.9
	<p><b>Drainage Strategy and Approvals</b></p> <p>Croydon 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.</p> <p>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.</p> <p>Arrangements for the future maintenance of the drainage system must be made and detailed in the Drainage Strategy.</p> <p>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.</p>	Section 10.6
	<p><b>Indicative Unit Costs</b></p> <p>Green roofs ~ £90/m<sup>2</sup>.</p> <p>Filter strips £2-4m<sup>2</sup>.</p> <p>Detention basin £15-50m<sup>3</sup>.</p> <p>Permeable paving ~ £30-50/m<sup>2</sup>.</p> <p>Concrete storage tank £449-518/m<sup>3</sup>.</p>	Section 10.4

**SITE 490 : 95-111 Brighton Road**

**1) PROPOSED DEVELOPMENT**

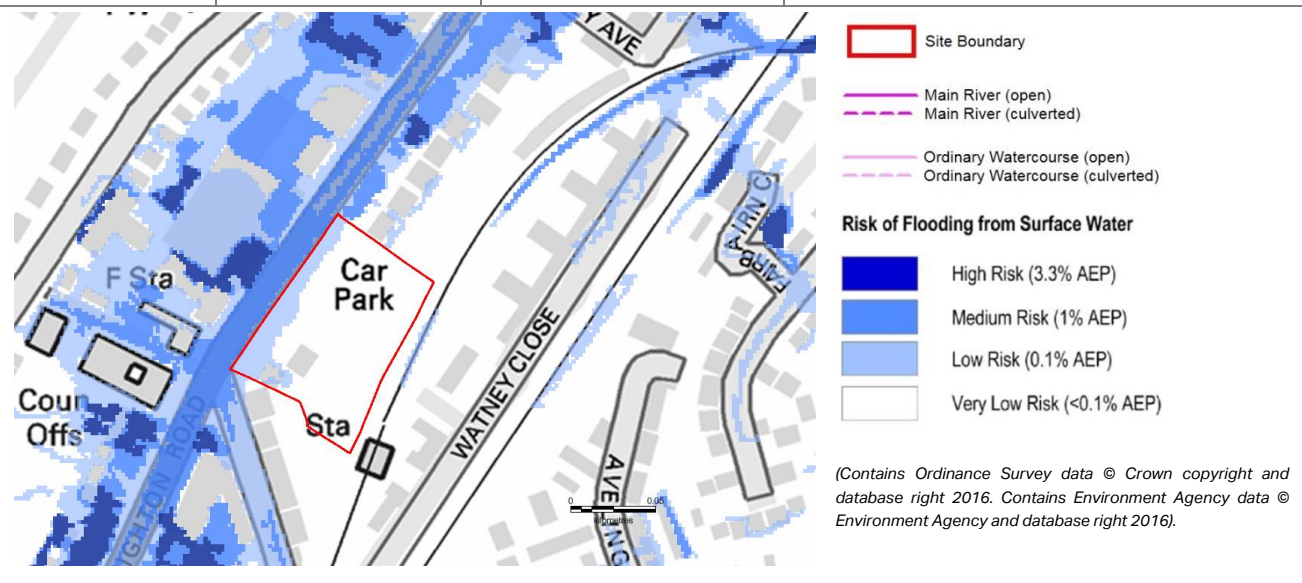
<b>Site ID</b>	490
<b>Site Address</b>	95-111 Brighton Road
<b>Site Area</b>	0.823 ha
<b>Current Use</b>	Gym car park and derelict houses
<b>Allocated Use</b>	Primary School
<b>Vulnerability</b>	More Vulnerable

**2) SUMMARY OF LEVEL 1 FLOOD RISK**

**Flood risk from rivers**

The site is located approximately 4km south of the River Wandle and is located in Flood Zone 1, low probability of flooding from rivers.

Flood risk from all other sources		Limitations	
<i>Risk of flooding to the potential development site and surrounding area</i>	Surface Water flooding: (uFMfSW)	<b>Medium Risk</b> 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: (BGS Susceptibility to Groundwater Flooding)	<b>Medium Risk</b> 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	2	0	1 (TW External)

**3) RECOMMENDATIONS**

In accordance with the NPPF, More Vulnerable development is considered compatible within Flood Zone 1 and does not require the application of the Exception Test. However, given the risk of 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.

## SITE 490 : 95-111 Brighton Road

<b>Development Layout and Sequential Approach</b>	<p>The proposed development is for a primary school, which is classed as More Vulnerable. assessment of surface water flow paths should be made prior to site design, to encourage the location of buildings and more vulnerable aspects of the development (e.g. the school building) away from those areas at risk of surface water ponding.</p> <p>Measures to manage surface water on the site should be considered early in the site masterplan to enable inclusion of attenuation SuDS where possible, including raising finished floor levels 300mm above ground level.</p> <p>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 car parking, must provide safe internal access to higher floors situated above ground level. Further ground investigations would be required at this site to confirm the likelihood of groundwater occurrence.</p>	Section 9.2
<b>Flood Resistance</b>	Where there may be a future risk of surface water flooding on the site, flood resistant construction measures may be employed, such as raising property thresholds, and the use of landscaping to manage surface water and fluvial floodwater.	Section 9.4
<b>Flood Resilience</b>	Where parts of proposed buildings may be affected by surface water floodwaters, e.g. undercroft parking areas, flood resilient design techniques should be employed to minimise damage to buildings and structures. The use of concrete flooring and waterproof building materials could be considered.	Section 9.5
<b>Flow Routing</b>	Potential overland flow paths should be determined and appropriate solutions proposed to minimise the impact of the development, for example by configuring road and building layouts to preserve existing flow paths and improve flood routing, whilst ensuring that flows are not diverted towards other properties elsewhere.	Section 9.12
<b>Surface Water Management</b>	<p><b>Current risk of flooding</b></p> <p>The site is located within Critical Drainage Area (CDA) Group8_040, which is an area with localised flooding issues. The potential development must not increase flood risk to other areas in the CDA.</p> <p>The site is within Drainage Catchment 39, which is located at the south west part of the borough. The uFMfSW indicates that the site lies adjacent to a surface water flow path along Brighton Road as an area of medium risk of surface water flooding.</p>	
	<p><b>Indicative existing runoff rate:</b> 4.7 l/s (1 in 1 year), 17.8 l/s (1 in 100 year)</p> <p><b>Indicative Greenfield Runoff Rate:</b> 5.0 l/s</p>	Level 2 Appendix B
	<p><b>SuDS Suitability</b></p> <p>Reference to the SWMP Appendix C2 Figure 5 identifies that (prior to the completion of a site investigation to determine precise local conditions) infiltration of surface water into the ground is potentially suitable. Site investigations will be required prior to the development of a Drainage Strategy for the site.</p> <p><b>Groundwater Source Protection Zones (SPZs)</b></p> <p>The site is within a SPZ1 (inner protection zone). Where infiltration SuDS are to be used for surface runoff from roads, car parking and public or amenity areas, they should have a suitable series of treatment steps to prevent the pollution of groundwater.</p> <p>Where infiltration SuDS are proposed for anything other than clean roof drainage in a SPZ1, the Environment Agency require a risk assessment to demonstrate that the SuDS scheme will not pose an unacceptable risk to the drinking water abstraction.</p> <p>The design of infiltration SuDS schemes and their treatment stages needs to be appropriate to the sensitivity of the location and subject to a relevant risk assessment considering the types of pollutants likely to be discharged, design volumes and the dilution and attenuation properties of the aquifer.</p> <p>Techniques which should be considered include infiltration suds like soakaways, green roofs, filter strips, detention basins and ponds, as well as permeable surfacing. Infiltration tests should be carried out on site to confirm SUDS suitability.</p>	Section 10.3 and 10.9

## SITE 490 : 95-111 Brighton Road

	<p><b>Drainage Strategy and Approvals</b></p> <p>Croydon 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.</p> <p>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.</p> <p>Arrangements for the future maintenance of the drainage system must be made and detailed in the Drainage Strategy.</p> <p>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.</p>	Section 10.6
	<p><b>Indicative Unit Costs</b></p> <p>Green roofs ~ £90/m<sup>2</sup>.</p> <p>Filter strips £2-4m<sup>2</sup>.</p> <p>Detention basin £15-50m<sup>3</sup>.</p> <p>Permeable paving ~ £30-50/m<sup>2</sup>.</p> <p>Concrete storage tank £449-518/m<sup>3</sup>.</p>	Section 10.4



**SITE 495: Dairy Crest dairy, 823-825 Brighton Road**

**1) PROPOSED DEVELOPMENT**

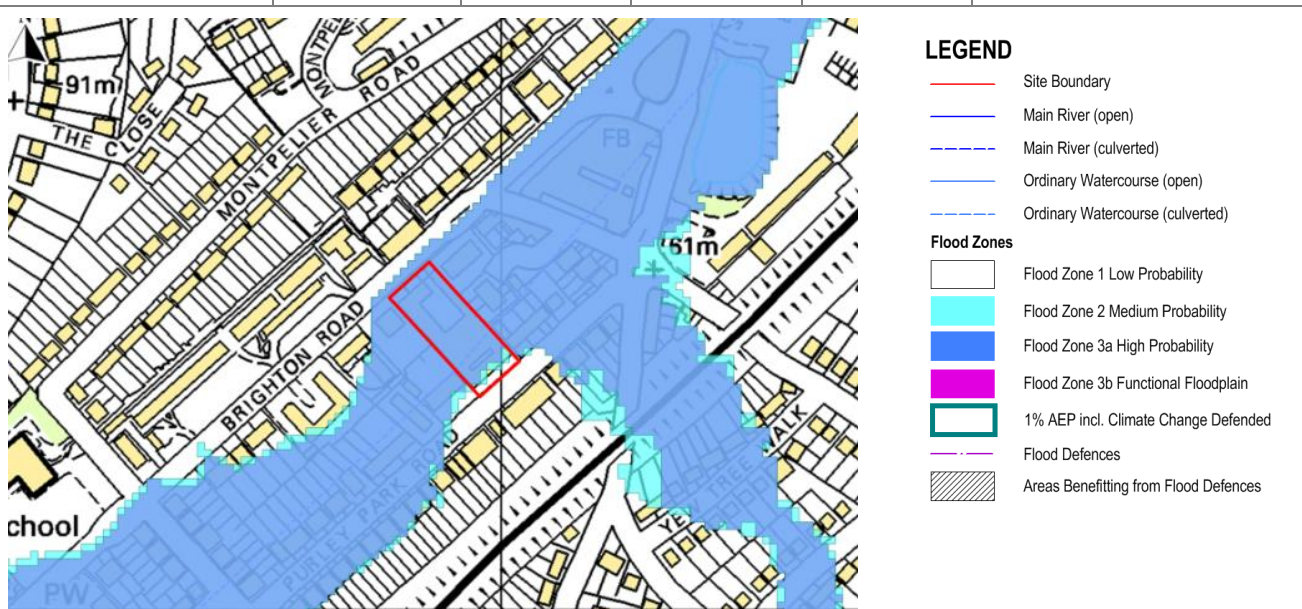
<b>Site ID</b>	495
<b>Site Address</b>	Dairy Crest dairy, 823-825 Brighton Road
<b>Site Area</b>	0.337 ha
<b>Current Use</b>	Dairy depot with buildings fronting on to Brighton Road being a locally listed building
<b>Allocated Use</b>	Conversion of buildings fronting Brighton Road to studio space (with potential for a Creative and Cultural Industries Enterprise Centre serving Purley) with new light industrial units to the rear
<b>Vulnerability</b>	Less Vulnerable

**2) SUMMARY OF LEVEL 1 FLOOD RISK**

**Flood risk from rivers**

The site is located in Flood Zone 3a associated with the culverted River Wandle. At this location, the culverted River Wandle has been incorporated into the surface water sewer system as it flows north below the A235 Brighton Road.

<i>Proportion of potential development site within Flood Zone</i>	Flood Zone 3b	Flood Zone 3a	Flood Zone 2	Flood Zone 1	Area Benefiting of Defences
	<b>0%</b>	<b>89%</b>	<b>5%</b>	<b>6%</b>	<b>0%</b>



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<b>Flood risk from all other sources</b>			<b>Limitations</b>
<i>Risk of flooding to the potential development site and surrounding area</i>	Surface Water flooding: (uFMfSW)	<b>High Risk</b> 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.  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.
	Groundwater flooding: (BGS Susceptibility to Groundwater Flooding)	<b>Medium Risk</b> Potential for groundwater flooding to occur at surface, but no historic records of groundwater flooding	

<b>Historic records of flooding</b>						
<i>Historic records of flooding from each source within a 100m radius of potential development site</i>	Fluvial records	Surface water records	Groundwater records	Sewer records	Multiple source records	Other
	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2 (TW External)</b>

## SITE 495: Dairy Crest dairy, 823-825 Brighton Road

### 3) LEVEL 2 ASSESSMENT

The Environment Agency hydraulic model of the River Wandle prepared in 2015, does not extend upstream to include the culverted section of the River Wandle beneath the Brighton Road. As a result, flood depth and hazard information are not available from the revised modelling for the area adjacent to the site.

### 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 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.

<b>Development Layout and Sequential Approach</b>	<p>As the development is Less Vulnerable, the NPPF considers the development to be appropriate in this location. However, an assessment of surface water flow paths should be made prior to site design, to encourage the location of buildings and more vulnerable aspects of the development away from those areas at risk of surface water ponding.</p> <p>Measures to manage surface water on the site should be considered early in the site masterplan to enable inclusion of attenuation SuDS where possible.</p> <p>For Less Vulnerable basements, basement extensions and conversions, such as car parking, safe internal access to higher floors situated above ground level must be provided. Further ground investigations would be required at this site to confirm the the likelihood of groundwater occurrence.</p>	Section 9.2
<b>Finished Floor Levels</b>	<p>The Environment Agency's requirements for a freeboard for finished floor levels within 'less vulnerable' commercial and industrial units vary, depending upon the proposals. For such land uses, finished floor levels may not be required to be raised. However, it is strongly recommended that internal access is provided to upper floors to provide safe refuge in a flood event.</p> <p>The site is at high risk of surface water flooding. It is considered that the finished floor level requirement for fluvial flood levels would also protect the property from a 0.33% AEP (1 in 30 year) surface water flood event.</p>	Section 9.3
<b>Flood Resistance</b>	<p>Where there may be a future risk of surface water flooding on the site, flood resistant construction measures may be employed, such as raising property thresholds, and the use of landscaping to manage surface water and fluvial floodwater.</p>	Section 9.4
<b>Safe Access/Egress</b>	<p>For commercial development ('less vulnerable') dry access and egress from the site is desirable, though not essential, during an extreme flood event.</p>	Section 9.7
<b>Flow Routing</b>	<p>Any new development in Flood Zones 2 and 3 should not adversely affect flood routing and thereby increase flood risk elsewhere. Within these areas opportunities should be sought within the site design to make space for water, such as:</p> <ul style="list-style-type: none"> <li>• Removing boundary walls or replacing with other boundary treatments such as hedges, fences (with gaps).</li> <li>• Considering alternatives to solid wooden gates, or ensuring that there is a gap beneath the gates to allow the passage of floodwater.</li> </ul>	Section 9.12
<b>Flood Warning and Evacuation Plan</b>	<p>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.</p> <p><b>Flood Warning Areas</b></p> <p>The local area is not covered by an Environment Agency Flood Warning Area.</p> <p><b>Emergency Rest Centres</b></p> <p>The closest designated emergency rest centre for this site is United Reformed Church on Sanderstead Hill, approximately 1.5km east of the proposed development site.</p>	Section 9.14

## SITE 495: Dairy Crest dairy, 823-825 Brighton Road

<b>Surface Water Management</b>	<p><b>Current risk of flooding</b></p> <p>The site is located within Critical Drainage Area (CDA) Group8_041, which is an area with localised flooding issues. The potential development must not increase flood risk to other areas in the CDA. The site is within Drainage Catchment 39, which is located at the south west part of the borough. The uFMfSW indicates that the site lies within an area of high risk of surface water flooding. There is one historic record of surface water flooding held by Croydon Council in this location.</p>	
	<p><b>Indicative existing runoff rate:</b> 1.9 l/s (1 in 1 year), 7.1 l/s (1 in 100 year)  <b>Indicative Greenfield Runoff Rate:</b> 5.0 l/s</p>	Section 10
	<p><b>SuDS Suitability</b></p> <p>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 suitable for the site. Site investigations will be required prior to the development of a Drainage Strategy for the site.</p> <p><b>Groundwater Source Protection Zones (SPZs)</b></p> <p>The site is within a SPZ1 (inner protection zone). Where infiltration SuDS are to be used for surface runoff from roads, car parking and public or amenity areas, they should have a suitable series of treatment steps to prevent the pollution of groundwater.</p> <p>Where infiltration SuDS are proposed for anything other than clean roof drainage in a SPZ1, the Environment Agency require a risk assessment to demonstrate that the SuDS scheme will not pose an unacceptable risk to the drinking water abstraction.</p> <p>The design of infiltration SuDS schemes and their treatment stages needs to be appropriate to the sensitivity of the location and subject to a relevant risk assessment considering the types of pollutants likely to be discharged, design volumes and the dilution and attenuation properties of the aquifer.</p> <p>Techniques which should be considered include infiltration suds such as soakaways, green roofs, filter strips, detention basins and ponds, as well as permeable surfacing. Infiltration tests should be carried out on site to confirm SUDS suitability.</p>	Section 10.3 and 10.9
	<p><b>Drainage Strategy and Approvals</b></p> <p>Croydon 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.</p> <p>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.</p> <p>Arrangements for the future maintenance of the drainage system must be made and detailed in the Drainage Strategy.</p> <p>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.</p>	Section 10.6
	<p><b>Indicative Unit Costs</b></p> <p>Green roofs ~ £90/m<sup>2</sup>.  Permeable paving ~ £30-50/m<sup>2</sup>.  Filter strips £2-4m<sup>2</sup>.  Detention basin £15-50m<sup>3</sup>.  Concrete storage tank £449-518/m<sup>3</sup>.</p>	Section 10.4



## SITE 499 : Croydon University Hospital Site, London Road

### 1) PROPOSED DEVELOPMENT

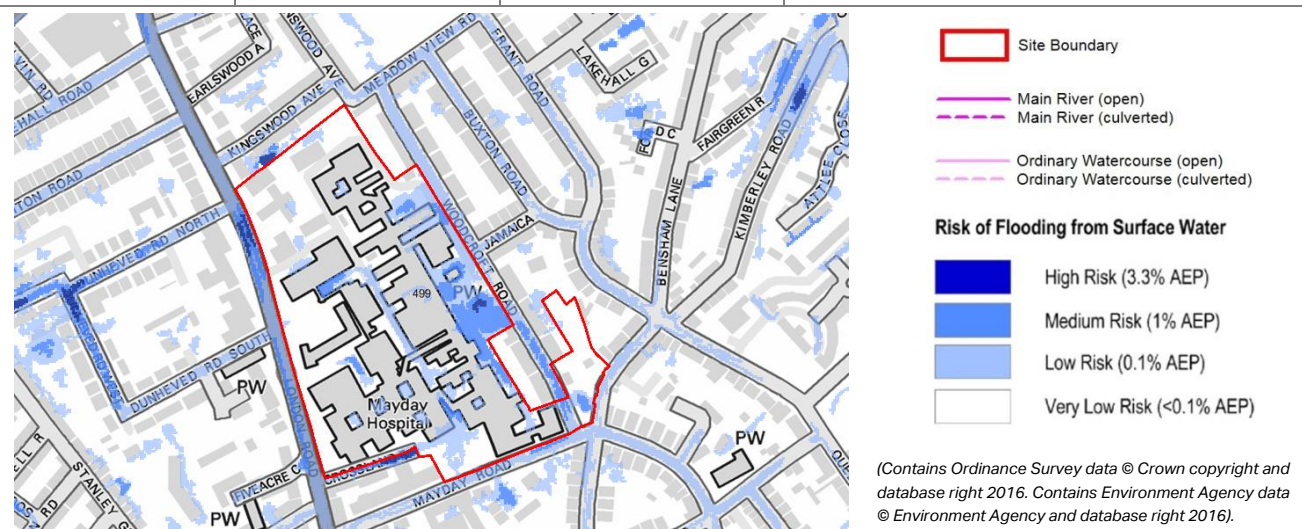
<b>Site ID</b>	499
<b>Site Address</b>	Croydon University Hospital Site, London Road
<b>Site Area</b>	8.193 ha
<b>Current Use</b>	Various industrial buildings and office block that are vacant
<b>Allocated Use</b>	Consolidation of the hospital uses on a smaller area of the site with enabling residential development on remaining part subject to there being no loss of services provided by the hospital in terms of both quantity and quality
<b>Vulnerability</b>	More Vulnerable

### 2) SUMMARY OF LEVEL 1 FLOOD RISK

#### Flood risk from rivers

The site is located approximately 800m west of the Norbury Brook and is located in Flood Zone 1, low probability of flooding from rivers.

Flood risk from all other sources		Limitations	
<i>Risk of flooding to the potential development site and surrounding area</i>	Surface Water flooding: (uFMfSW)	<b>High Risk</b> 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: (BGS Susceptibility to Groundwater Flooding)	<b>Medium Risk</b> Potential for groundwater flooding to occur below 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	0	0	0

### 3) RECOMMENDATIONS

In accordance with the NPPF, More Vulnerable development is considered compatible within Flood Zone 1 and does not require the application of the Exception Test. However, given the risk of 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.

<b>SITE 499 : Croydon University Hospital Site, London Road</b>		
<b>Development Layout and Sequential Approach</b>	The proposed development is classed as More Vulnerable. An assessment of surface water flow paths should be made prior to site design, to encourage the location of buildings and more vulnerable aspects of the development away from those areas at risk of surface water ponding. 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
<b>Finished Floor Levels</b>	Although the majority of the site is within Flood Zone 1, it is good practice to set finished floor levels a minimum of 300mm above ground level in order to reduce the risk of flooding from surface water, which is at high risk in this area. It is 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.	
<b>Flood Resistance</b>	Where there may be a future risk of surface water flooding on the site, flood resistant construction measures may be employed, such as raising property thresholds, and the use of landscaping to manage surface water and fluvial floodwater.	Section 9.4
<b>Flood Resilience</b>	Where parts of proposed buildings may be affected by surface water floodwaters, e.g. undercroft parking areas, flood resilient design techniques should be employed to minimise damage to buildings and structures. The use of concrete flooring and waterproof building materials could be considered.	Section 9.5
<b>Flow Routing</b>	Potential overland flow paths should be determined and appropriate solutions proposed to minimise the impact of the development, for example by configuring road and building layouts to preserve existing flow paths and improve flood routing, whilst ensuring that flows are not diverted towards other properties elsewhere.	Section 9.12
<b>Surface Water Management</b>	<p><b>Current risk of flooding</b></p> <p>The site is not located within a Critical Drainage Area (CDA). The site is within Drainage Catchment 22, which is located at the north west part of the borough. The uFMfSW indicates that the site lies within an area of high risk of surface water flooding, with small areas of medium and high risk within and bordering the western boundary of the site.</p>	
	<p><b>Indicative existing runoff rate:</b> 40.7 l/s (1 in 1 year), 152.9 l/s (1 in 100 year) <b>Indicative Greenfield Runoff Rate:</b> 16.4 l/s</p>	Level 2 Appendix B
	<p><b>SuDS Suitability</b></p> <p>Reference to the SWMP Appendix C2 Figure 5 identifies that infiltration of surface water into the ground is potentially uncertain and requires further investigation 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.</p>	Section 10.3 and 10.9
	<p><b>Drainage Strategy and Approvals</b></p> <p>Croydon 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.</p>	Section 10.6
	<p><b>Indicative Unit Costs</b></p> <p>Green roofs ~ £90/m<sup>2</sup>. Filter strips £2-4m<sup>2</sup>. Detention basin £15-50m<sup>3</sup>. Permeable paving ~ £30-50/m<sup>2</sup>. Concrete storage tank £449-518/m<sup>3</sup>.</p>	Section 10.4

## SITE 504 : Stroud Green Pumping Station, 140 Primrose Lane

### 1) PROPOSED DEVELOPMENT

<b>Site ID</b>	504
<b>Site Address</b>	Stroud Green Pumping Station, 140 Primrose Lane
<b>Site Area</b>	0.721 ha
<b>Current Use</b>	Thames Water pumping station (which is a Locally Listed Building) and surrounding land
<b>Allocated Use</b>	Residential development (including the conversion of the Locally Listed pumping station) if the site is no longer required for its current use in the future
<b>Vulnerability</b>	More Vulnerable

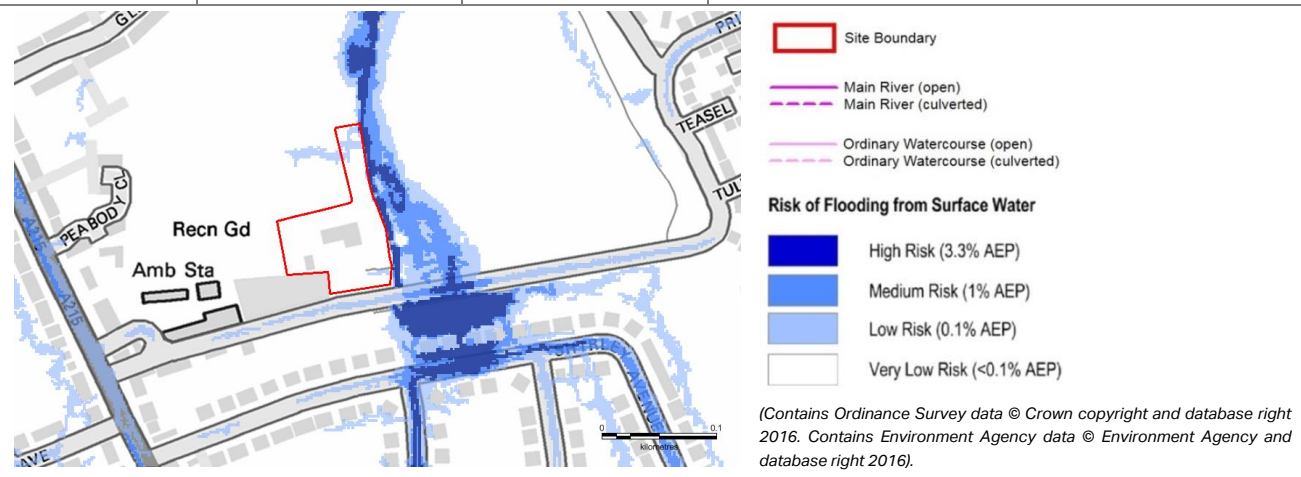
### 2) SUMMARY OF LEVEL 1 FLOOD RISK

#### Flood risk from rivers

The site is located in Flood Zone 1, low probability of flooding from rivers. An ordinary watercourse flows north along the eastern boundary of the site.

It should be noted that ordinary watercourses have not have been included in the fluvial modelling of the River Wandle and therefore a fluvial flood risk from this watercourse may be present. As set out in Section 11.3.2 of the Level 1 SFRA, applicants considering development of this site may need to prepare a simple hydraulic model to enable a more accurate assessment of the probability of flooding associated with this ordinary watercourse to inform the site specific FRA. This should be carried out in line with industry standards and in agreement with the LLFA.

Flood risk from all other sources			Limitations
<i>Risk of flooding to the potential development site and surrounding area</i>	Surface Water flooding: (uFMfSW)	<b>Low Risk</b> 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.  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.
	Groundwater flooding: (BGS Susceptibility to Groundwater Flooding)	<b>Low Risk</b> Limited potential for groundwater flooding to occur	



#### Historic records of flooding

<i>Historic records of flooding from each source within a 100m radius of potential development site</i>	Fluvial records	Surface water records	Groundwater records	Sewer records	Multiple source records	Other
	0	0	0	0	0	1 (TW External)

### 3) RECOMMENDATIONS

In accordance with the NPPF, More Vulnerable development is considered compatible within Flood Zone 1 and does not require the application of the Exception Test. However, given the risk of 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.

<b>SITE 504 : Stroud Green Pumping Station, 140 Primrose Lane</b>		
<b>Development Layout and Sequential Approach</b>	<p>The proposed development is residential and therefore classified as More Vulnerable. An assessment of surface water flow paths should be made prior to site design, to encourage the location of buildings and more vulnerable aspects of the development away from those areas at risk of surface water ponding.</p> <p>Measures to manage surface water on the site should be considered early in the site masterplan to enable inclusion of attenuation SuDS where possible.</p>	Section 9.2
<b>Flood Resistance</b>	Where there may be a future risk of surface water flooding on the site, flood resistant construction measures may be employed, such as raising property thresholds, and the use of landscaping to manage surface water and fluvial floodwater.	Section 9.4
<b>Flood Resilience</b>	Where parts of proposed buildings may be affected by surface water floodwaters, e.g. undercroft parking areas, flood resilient design techniques should be employed to minimise damage to buildings and structures. The use of concrete flooring and waterproof building materials could be considered.	Section 9.5
<b>Flow Routing</b>	Potential overland flow paths should be determined and appropriate solutions proposed to minimise the impact of the development, for example by configuring road and building layouts to preserve existing flow paths and improve flood routing, whilst ensuring that flows are not diverted towards other properties elsewhere.	Section 9.12
<b>Surface Water Management</b>	<p><b>Current risk of flooding</b></p> <p>The site is within Drainage Catchment 40, which is located at the east part of the borough. The potential development must not increase flood risk to other areas in the Drainage Catchment.</p> <p>The uFMfSW indicates that the site lies within an area of low risk of surface water flooding, however, the site borders a surface water flow path of high risk of surface water flooding associated with the ordinary watercourse along the eastern boundary of the site.</p>	
	<p><b>Indicative existing runoff rate:</b> 3.8 l/s (1 in 1 year), 14.2 l/s (1 in 100 year)</p> <p><b>Indicative Greenfield Runoff Rate:</b> 5.0 l/s</p>	Level 2 Appendix B
	<p><b>SuDS Suitability</b></p> <p>Reference to the SWMP Appendix C2 Figure 5 identifies that (prior to the completion of a site investigation to determine precise local conditions) infiltration of surface water into the ground is potentially suitable for the site. Site investigations will be required prior to the development of a Drainage Strategy for the site.</p> <p>Techniques which should be considered include infiltration SUDS such as soakaways, green roofs, filter strips, detention basins and ponds, as well as permeable surfacing. Infiltration tests should be carried out onsite to confirm SUDS suitability.</p>	Section 10.3 and 10.9
	<p><b>Drainage Strategy and Approvals</b></p> <p>Croydon 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.</p> <p>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.</p> <p>Arrangements for the future maintenance of the drainage system must be made and detailed in the Drainage Strategy.</p> <p>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.</p>	Section 10.6
	<p><b>Indicative Unit Costs</b></p> <p>Green roofs ~ £90/m<sup>2</sup>.</p> <p>Filter strips £2-4/m<sup>2</sup>.</p> <p>Detention basin £15-50/m<sup>3</sup>.</p> <p>Permeable paving ~ £30-50/m<sup>2</sup>.</p> <p>Concrete storage tank £449-518/m<sup>3</sup>.</p>	Section 10.4



**SITE 517 : Milton House, 2-36 Milton Avenue**

**1) PROPOSED DEVELOPMENT**

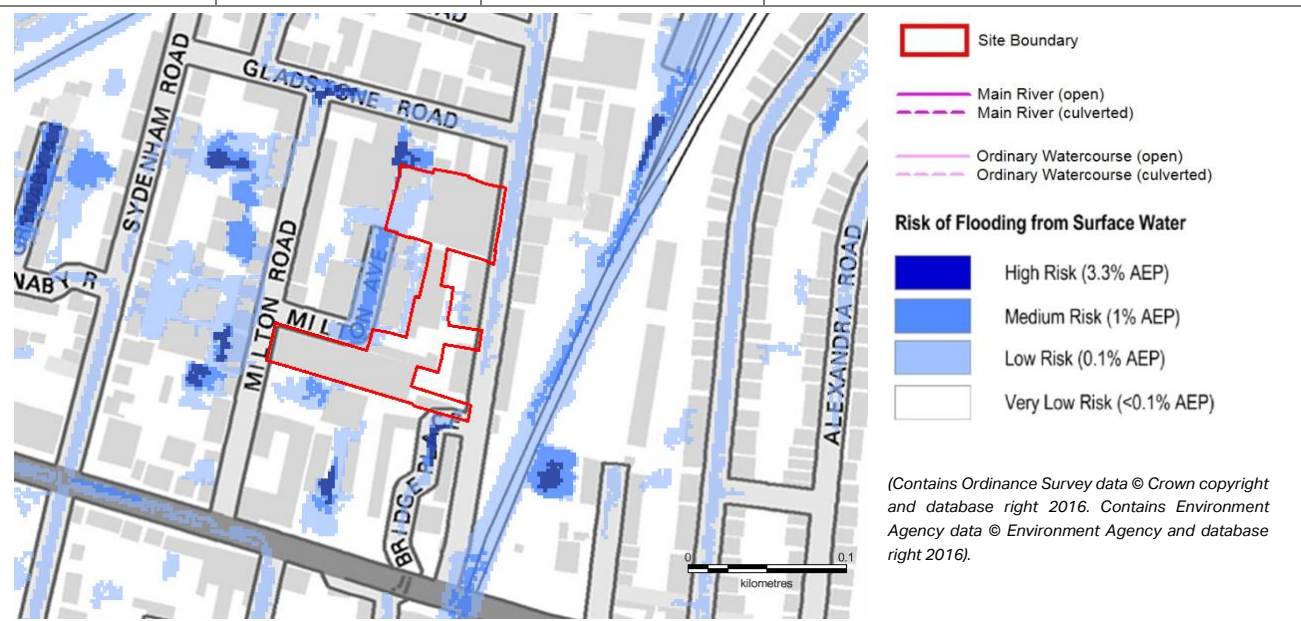
<b>Site ID</b>	517
<b>Site Address</b>	Milton House, 2-36 Milton Avenue
<b>Site Area</b>	0.789 ha
<b>Current Use</b>	Mostly vacant & semi derelict factory units in integrated industrial location surrounding Milton Avenue
<b>Allocated Use</b>	Residential and employment uses
<b>Vulnerability</b>	More Vulnerable

**2) SUMMARY OF LEVEL 1 FLOOD RISK**

**Flood risk from rivers**

The site is located approximately 1km south west of the Norbury Brook and is located in Flood Zone 1, low probability of flooding from rivers.

Flood risk from all other sources		Limitations	
<i>Risk of flooding to the potential development site and surrounding area</i>	Surface Water flooding: (uFMfSW)	<b>Medium Risk</b> 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: (BGS Susceptibility to Groundwater Flooding)	<b>Medium Risk</b> 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**

<i>Historic records of flooding from each source within a 100m radius of potential development site</i>	Fluvial records	Surface water records	Groundwater records	Sewer records	Multiple source records	Other
	0	1	0	0	0	1 (TW Internal)

**3) RECOMMENDATIONS**

In accordance with the NPPF, More Vulnerable development is considered compatible within Flood Zone 1 and does not require the application of the Exception Test. The following information and recommendations are provided for consideration.



<b>SITE 517 : Milton House, 2-36 Milton Avenue</b>		
<b>Development Layout and Sequential Approach</b>	An assessment of surface water flow paths should be made prior to site design, to encourage the location of buildings and more vulnerable aspects of the development away from those areas at risk of surface water ponding. 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
<b>Flow Routing</b>	Potential overland flow paths should be determined and appropriate solutions proposed to minimise the impact of the development, for example by configuring road and building layouts to preserve existing flow paths and improve flood routing, whilst ensuring that flows are not diverted towards other properties elsewhere.	Section 9.12
<b>Surface Water Management</b>	<p><b>Current risk of flooding</b></p> <p>The site is within Drainage Catchment 22, which is located at the north west part of the borough. The potential development must not increase flood risk to other areas in the Drainage Catchment.</p> <p>The uFMfSW shows that the site is predominantly at very low risk of surface water flooding with the exception of the north west corner of the site which is shown to be at medium risk. There is an area of high risk adjacent to the north west site boundary.</p>	
	<p><b>Indicative existing runoff rate:</b> 4.0 l/s (1 in 1 year), 15.1 l/s (1 in 100 year)</p> <p><b>Indicative Greenfield Runoff Rate:</b> 5.0 l/s</p>	Level 2 Appendix B
	<p><b>SuDS Suitability</b></p> <p>Reference to the SWMP Appendix C2 Figure 5 identifies that infiltration of surface water into the ground is potentially uncertain and requires further investigation 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.</p>	Section 10.3 and 10.9
	<p><b>Drainage Strategy and Approvals</b></p> <p>Croydon 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.</p> <p>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.</p> <p>Arrangements for the future maintenance of the drainage system must be made and detailed in the Drainage Strategy.</p> <p>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.</p>	Section 10.6
	<p><b>Indicative Unit Costs</b></p> <p>Green roofs ~ £90/m<sup>2</sup>.</p> <p>Filter strips £2-4m<sup>2</sup>.</p> <p>Detention basin £15-50m<sup>3</sup>.</p> <p>Permeable paving ~ £30-50/m<sup>2</sup>.</p> <p>Concrete storage tank £449-518/m<sup>3</sup>.</p>	Section 10.4

**SITE 522: Surface car park, Wandle Road**

**1) PROPOSED DEVELOPMENT**

<b>Site ID</b>	522
<b>Site Address</b>	Surface car park, Wandle Road
<b>Site Area</b>	0.651 ha
<b>Current Use</b>	Council Surface Car park
<b>Allocated Use</b>	Bus stand underneath the flyover and a district energy centre and residential development on the remainder of the car park
<b>Vulnerability</b>	More Vulnerable

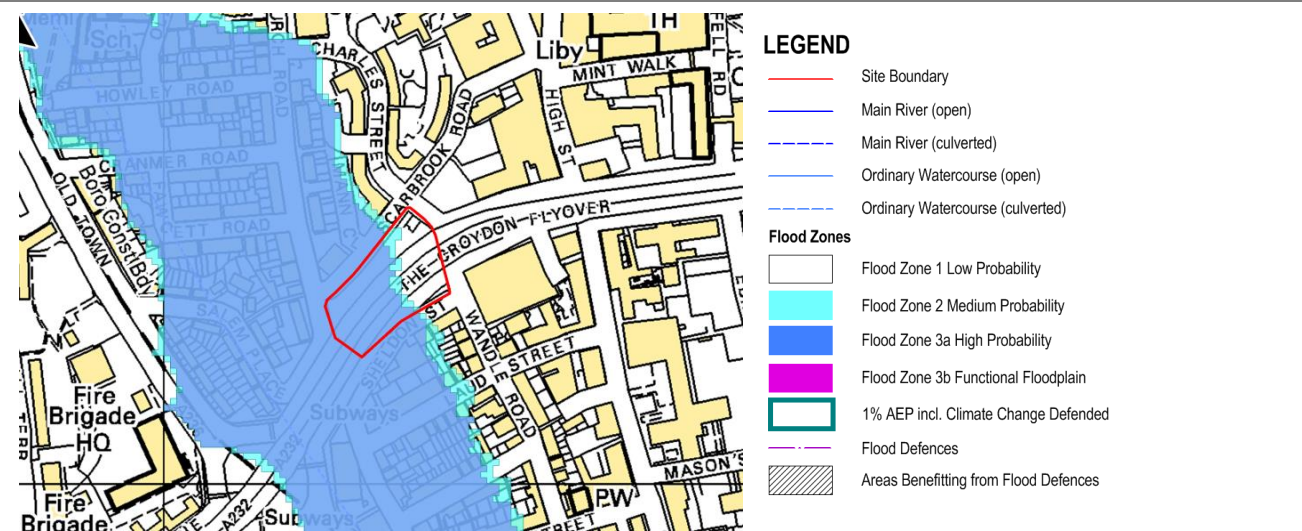
**2) SUMMARY OF LEVEL 1 FLOOD RISK**

**Flood risk from rivers**

The site is located in Flood Zone 3a associated with the culverted River Wandle. At this location, the culverted River Wandle has been incorporated into the surface water sewer system as it flows north.

The Environment Agency hydraulic model of the River Wandle prepared in 2015, does not extend upstream to include the culverted section of the River Wandle. As a result, flood depth and hazard information are not available from the revised modelling for this area.

<i>Proportion of potential development site within Flood Zone</i>	Flood Zone 3b	Flood Zone 3a	Flood Zone 2	Flood Zone 1	Area Benefiting of Defences
	<b>0%</b>	<b>55%</b>	<b>8%</b>	<b>37%</b>	<b>0%</b>



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<b>Flood risk from all other sources</b>			<b>Limitations</b>
<i>Risk of flooding to the potential development site and surrounding area</i>	Surface Water flooding: (uFMfSW)	<b>High Risk</b> 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.  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.
	Groundwater flooding: (BGS Susceptibility to Groundwater Flooding)	<b>Medium Risk</b> Potential for groundwater flooding to occur at surface, but no historic records of groundwater flooding	

<b>Historic records of flooding</b>						
<i>Historic records of flooding from each source within a 100m radius of potential development site</i>	Fluvial records	Surface water records	Groundwater records	Sewer records	Multiple source records	Other
	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**SITE 522: Surface car park, Wandle Road****3) LEVEL 2 ASSESSMENT**

Environment Agency hydraulic model of the River Wandle prepared in 2015, does not extend upstream to include the culverted section of the River Wandle. As a result, flood depth and hazard information are not available from the revised modelling for this area.

**4) RECOMMENDATIONS AND POLICIES**

<b>Development Layout and Sequential Approach</b>	<p>A sequential approach to site layout should be used. The majority of the site is within Flood Zone 3a to the south-west and the rest of the site are within Flood Zone 1.</p> <p>The proposed development is for mixed use. The More Vulnerable development (residential) should be preferably located in Flood Zone 1. If it is essential to build on Flood Zone 3a, then all residential uses should be located in the first floor level or above.</p> <p>An assessment of surface water flow paths should be made prior to site design, to encourage the location of buildings and more vulnerable aspects of the development away from those areas at risk of surface water ponding.</p> <p>Measures to manage surface water on the site should be considered early in the site masterplan to enable inclusion of attenuation SuDS where possible.</p> <p>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 car parking, must provide safe internal access to higher floors situated above ground level. Further ground investigations would be required at this site to confirm the likelihood of groundwater occurrence.</p>	Section 9.2
<b>Finished Floor Levels</b>	<p>For More Vulnerable development, a minimum freeboard of 300mm is required above the 1% AEP (1 in 100 year) peak fluvial flood level.</p> <p>In Flood Zones 2 and 3a, all new sleeping accommodation should be restricted to the first floor or above. Internal ground floors below this level could however be occupied by the Less Vulnerable garages, non-sleeping residential rooms (e.g. kitchen, study, lounge) or car parking.</p> <p>The site is at high risk of surface water flooding and it is considered that the finished floor level requirement for fluvial flood levels would also protect the property from a 1% AEP (1 in 100 year) surface water flood event.</p>	Section 9.3
<b>Flood Resistance</b>	<p>Where there may be a future risk of surface water flooding on the site, flood resistant construction measures may be employed, such as raising property thresholds, and the use of landscaping to manage surface water and fluvial floodwater.</p>	Section 9.4
<b>Safe Access/Egress</b>	<p>Dry access and egress will be essential during times of extreme floods to an area outside of the floodplain. Access/Egress to the site is provided via Wandle Road in the east or Carbrook Road in the northeast.</p>	Section 9.7
<b>Flow Routing</b>	<p>Any new development in Flood Zones 2 and 3a should not adversely affect flood routing and thereby increase flood risk elsewhere. Within these areas opportunities should be sought within the site design to make space for water, such as:</p> <ul style="list-style-type: none"> <li>• Removing boundary walls or replacing with other boundary treatments such as hedges, fences (with gaps).</li> <li>• Considering alternatives to solid wooden gates, or ensuring that there is a gap beneath the gates to allow the passage of floodwater.</li> </ul>	Section 9.12
<b>Flood Warning and Evacuation Plan</b>	<p>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.</p> <p><b>Flood Warning Areas</b></p> <p>The local area is covered by the Environment Agency Flood Warning Areas 'Groundwater Flooding in the Caterham Bourne Catchment including Caterham, Whyteleafe, Kenley, Purley, South Croydon, Beddington and Carshalton'. Residents of the site should ensure they are signed up to the Environment Agency Flood Warning system.</p> <p><b>Emergency Rest Centres</b></p> <p>The closest designated emergency rest centre for this site is The Salvation Army on Booth Street to the north of the development site.</p>	Section 9.14
<b>Surface Water Management</b>	<p><b>Current risk of flooding</b></p> <p>The site is located within Critical Drainage Area (CDA) Group8_042, which is an area with localised flooding issues. The potential development must not increase flood risk to other areas in the CDA. The site is within Drainage Catchment 39, which is located at the south west part of the borough. The uFMfSW indicates that the site lies within an area of high risk of surface water flooding.</p>	

**SITE 522: Surface car park, Wandle Road**

	<p><b>Indicative existing runoff rate:</b> 3.4 l/s (1 in 1 year), 12.6 l/s (1 in 100 year)</p> <p><b>Indicative Greenfield Runoff Rate:</b> 5.0 l/s</p>	Section 10
	<p><b>SuDS Suitability</b></p> <p>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 suitable for the site. Site investigations will be required prior to the development of a Drainage Strategy for the site.</p> <p><b>Groundwater Source Protection Zones (SPZs)</b></p> <p>The site is within a SPZ1 (inner protection zone). Where infiltration SuDS are to be used for surface runoff from roads, car parking and public or amenity areas, they should have a suitable series of treatment steps to prevent the pollution of groundwater.</p> <p>Where infiltration SuDS are proposed for anything other than clean roof drainage in a SPZ1, the Environment Agency require a risk assessment to demonstrate that the SuDS scheme will not pose an unacceptable risk to the drinking water abstraction.</p> <p>The design of infiltration SuDS schemes and their treatment stages needs to be appropriate to the sensitivity of the location and subject to a relevant risk assessment considering the types of pollutants likely to be discharged, design volumes and the dilution and attenuation properties of the aquifer.</p> <p>Techniques which should be considered include infiltration SUDS such as soakaways, green roofs, filter strips, detention basins and ponds, as well as permeable surfacing. Infiltration tests should be carried out on site to confirm SUDS suitability.</p>	Section 10.3 and 10.9
	<p><b>Drainage Strategy and Approvals</b></p> <p>Croydon 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.</p> <p>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.</p> <p>Arrangements for the future maintenance of the drainage system must be made and detailed in the Drainage Strategy.</p> <p>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.</p>	Section 10.6
	<p><b>Indicative Unit Costs</b></p> <p>Green roofs ~ £90/m<sup>2</sup>.</p> <p>Permeable paving ~ £30-50/m<sup>2</sup>.</p> <p>Filter strips £2-4m<sup>2</sup>.</p> <p>Detention basin £15-50m<sup>3</sup>.</p> <p>Concrete storage tank £449-518/m<sup>3</sup>.</p>	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 proposed development is for mixed use, including residential accommodation. The site is located in Flood Zone 3a of the culverted River Wandle, which is considered a surface water sewer system. It should be noted that the Environment Agency hydraulic model of the River Wandle prepared in 2015, does not extend upstream to include the culverted section of the River Wandle. Applicants considering development of this site may need to prepare a simple hydraulic model to enable a more accurate assessment of the probability of flooding associated with this culverted watercourse to inform the site specific FRA.

The More Vulnerable uses should be located in areas of lowest risk (Flood Zone 1 and areas at lower flood risk from surface water). If More Vulnerable development cannot be avoided within the 1% AEP (1 in 100 year) including an allowance for climate change, then finished floor levels must be raised accordingly and sleeping accommodation restricted the first floor or above. Depending on the modelled flood depth, flood resistant and resilient measures should be employed to mitigate the potential impacts of flooding. SuDS should be incorporated into the building design in order to reduce the risk of increasing flood risk elsewhere. There is potential that floodwaters will limit dry routes out of the local area, therefore it is necessary to prepare a FWEP for residents / occupants of the site detailing steps to evacuate the site prior to the onset of flooding.

Therefore, on the basis that these mitigation measures are in place, it is likely that this site would pass the Exception Test.

**SITE 636 : Land west of Timebridge Community Centre, Lodge Lane**

**1) PROPOSED DEVELOPMENT**

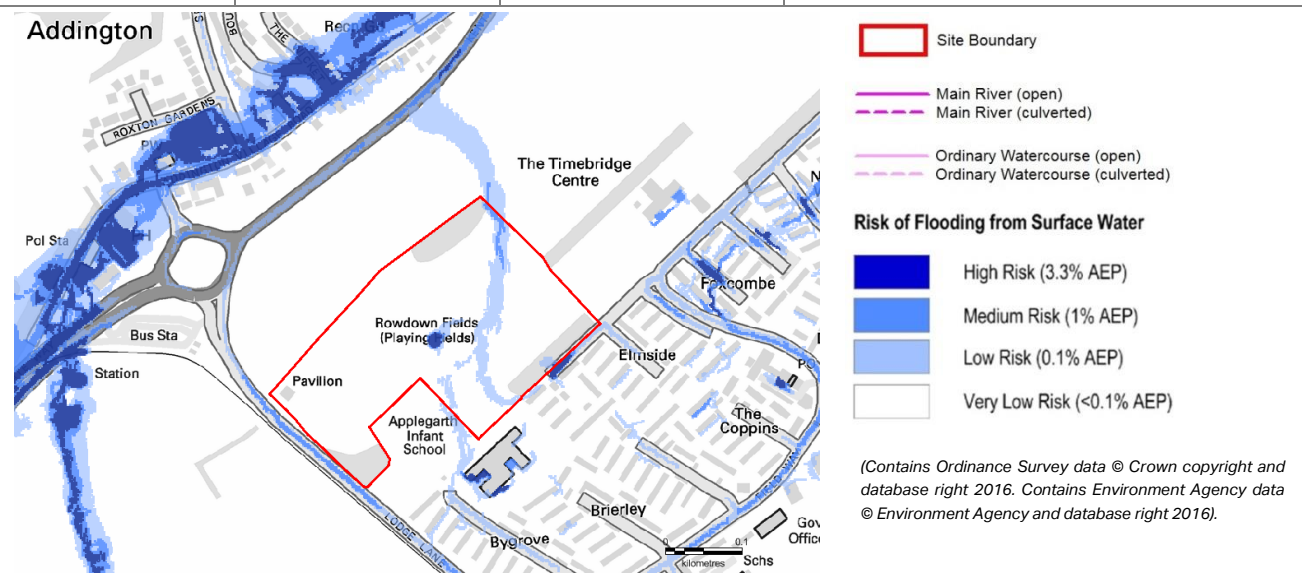
<b>Site ID</b>	636
<b>Site Address</b>	Land west of Timebridge Community Centre, Lodge Lane
<b>Site Area</b>	7.43 ha
<b>Current Use</b>	Amenity land
<b>Allocated Use</b>	Secondary school
<b>Vulnerability</b>	More Vulnerable

**2) SUMMARY OF LEVEL 1 FLOOD RISK**

**Flood risk from rivers**

The site is located approximately 1km south of the River Beck and is located in Flood Zone 1, low probability of flooding from rivers.

Flood risk from all other sources		Limitations
<i>Risk of flooding to the potential development site and surrounding area</i>	Surface Water flooding: (uFMfSW)	<b>High Risk</b> 1 in 30 year (3.3% annual probability)
	Groundwater flooding: (BGS Susceptibility to Groundwater Flooding)	<b>Medium Risk</b> Potential for groundwater flooding to occur at surface, but no historic records of groundwater flooding
		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.  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	0	0	3 (TW External)

**3) RECOMMENDATIONS**

In accordance with the NPPF, More Vulnerable development is considered compatible within Flood Zone 1 and does not require the application of the Exception Test. However, given the risk of 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.



## SITE 636 : Land west of Timebridge Community Centre, Lodge Lane

<b>Development Layout and Sequential Approach</b>	<p>The proposed development for a secondary school is classed as More Vulnerable. An assessment of surface water flow paths should be made prior to site design, to encourage the location of buildings and more vulnerable aspects of the development away from those areas at risk of surface water ponding.</p> <p>Measures to manage surface water on the site should be considered early in the site masterplan to enable inclusion of attenuation SuDS where possible.</p> <p>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 car parking, must provide safe internal access to higher floors situated above ground level. Further ground investigations would be required at this site to confirm the likelihood of groundwater occurrence.</p>	Section 9.2
<b>Flood Resistance</b>	Where there may be a future risk of surface water flooding on the site, flood resistant construction measures may be employed, such as raising property thresholds, and the use of landscaping to manage surface water and fluvial floodwater.	Section 9.4
<b>Flood Resilience</b>	Where parts of proposed buildings may be affected by surface water floodwaters, e.g. undercroft parking areas, flood resilient design techniques should be employed to minimise damage to buildings and structures. The use of concrete flooring and waterproof building materials could be considered.	Section 9.5
<b>Flow Routing</b>	Potential overland flow paths should be determined and appropriate solutions proposed to minimise the impact of the development, for example by configuring road and building layouts to preserve existing flow paths and improve flood routing, whilst ensuring that flows are not diverted towards other properties elsewhere.	Section 9.12
<b>Surface Water Management</b>	<p><b>Current risk of flooding</b></p> <p>The site falls within the Critical Drainage Catchment (CDA) Group 8_045, which is an area with localised flooding issues. The potential development must not increase flood risk to areas within the CDA. The site is within Drainage Catchment 42, which is located at the south east part of the borough.</p> <p>The uFMfSW indicates that the site lies within an area of high risk of surface water flooding, due to the small area of high risk likely to be as a result of the topography, most of the site is at low and very low risk of surface water with a flow path flowing through the site to the north. There are four historic records of surface water flooding held by Croydon Council in this location.</p>	
	<p><b>Indicative existing runoff rate:</b> 41.9 l/s (1 in 1 year), 157.3 l/s (1 in 100 year)</p> <p><b>Indicative Greenfield Runoff Rate:</b> 14.9 l/s</p>	Level 2 Appendix B
	<p><b>SuDS Suitability</b></p> <p>Reference to the SWMP Appendix C2 Figure 5 identifies that (prior to the completion of a site investigation to determine precise local conditions) infiltration of surface water into the ground is potentially suitable for the site. Site investigations will be required prior to the development of a Drainage Strategy for the site.</p> <p><b>Groundwater Source Protection Zones (SPZs)</b></p> <p>The site is within a SPZ1 (inner protection zone). Where infiltration SuDS are to be used for surface runoff from roads, car parking and public or amenity areas, they should have a suitable series of treatment steps to prevent the pollution of groundwater.</p> <p>Where infiltration SuDS are proposed for anything other than clean roof drainage in a SPZ1, the Environment Agency require a risk assessment to demonstrate that the SuDS scheme will not pose an unacceptable risk to the drinking water abstraction.</p> <p>The design of infiltration SuDS schemes and their treatment stages needs to be appropriate to the sensitivity of the location and subject to a relevant risk assessment considering the types of pollutants likely to be discharged, design volumes and the dilution and attenuation properties of the aquifer.</p> <p>Techniques which should be considered include infiltration SUDS such as soakaways, green roofs, filter strips, detention basins and ponds, as well as permeable surfacing. Infiltration tests should be carried out on site to confirm SUDS suitability.</p>	Section 10.3 and 10.9

### SITE 636 : Land west of Timebridge Community Centre, Lodge Lane

	<p><b>Drainage Strategy and Approvals</b></p> <p>Croydon 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.</p> <p>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.</p> <p>Arrangements for the future maintenance of the drainage system must be made and detailed in the Drainage Strategy.</p> <p>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.</p>	Section 10.6
	<p><b>Indicative Unit Costs</b></p> <p>Green roofs ~ £90/m<sup>2</sup>.</p> <p>Filter strips £2-4m<sup>2</sup>.</p> <p>Detention basin £15-50m<sup>3</sup>.</p> <p>Permeable paving ~ £30-50/m<sup>2</sup>.</p> <p>Concrete storage tank £449-518/m<sup>3</sup>.</p>	Section 10.4

## SITE 662 : Coombe Road Playing Fields, Coombe Road

### 1) PROPOSED DEVELOPMENT

<b>Site ID</b>	662
<b>Site Address</b>	Coombe Road Playing Fields, Coombe Road
<b>Site Area</b>	10.772 ha
<b>Current Use</b>	Playing fields
<b>Allocated Use</b>	Secondary school
<b>Vulnerability</b>	More Vulnerable

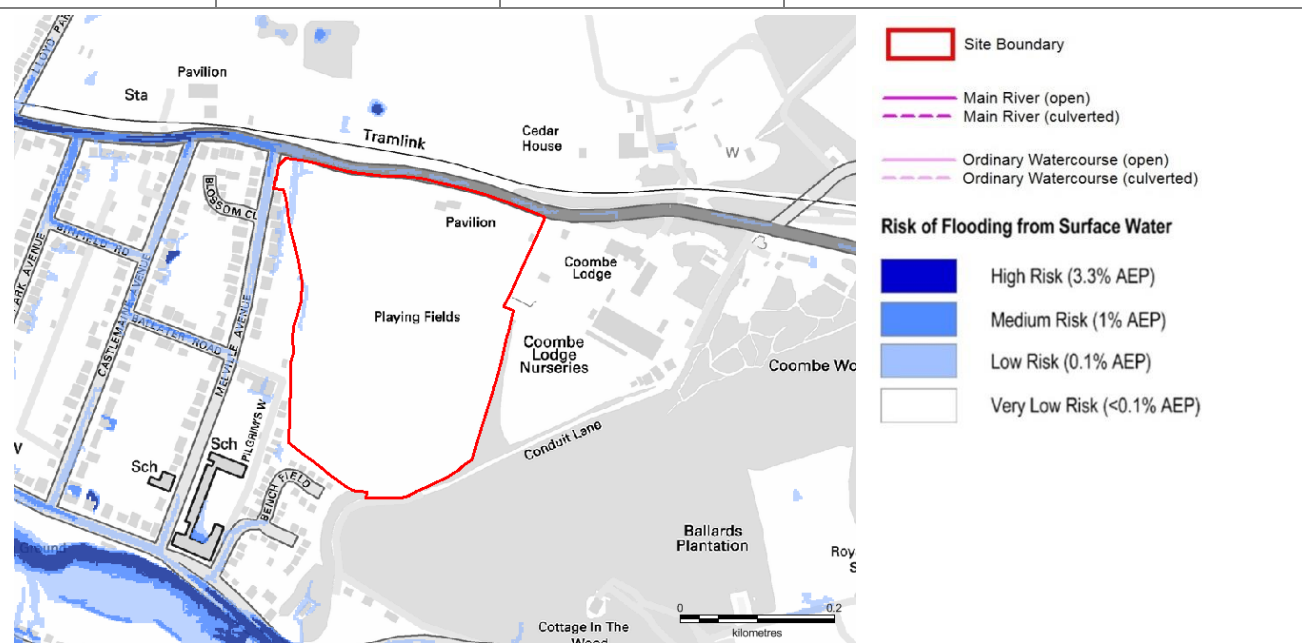
### 2) SUMMARY OF LEVEL 1 FLOOD RISK

#### Flood risk from rivers

The site is located approximately 2.5km south east of the River Wandle and is located in Flood Zone 1, low probability of flooding from rivers.

#### Flood risk from all other sources

			Limitations
<i>Risk of flooding to the potential development site and surrounding area</i>	Surface Water flooding: (uFMfSW)	<b>Low Risk</b> 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: (BGS Susceptibility to Groundwater Flooding)	<b>Medium Risk</b> 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.



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#### Historic records of flooding

<i>Historic records of flooding from each source within a 100m radius of potential development site</i>	Fluvial records	Surface water records	Groundwater records	Sewer records	Multiple source records	Other
	0	1	0	0	0	2 (TW External)

### 3) RECOMMENDATIONS

In accordance with the NPPF, More Vulnerable development is considered compatible within Flood Zone 1 and does not require the application of the Exception Test. The following information and recommendations are therefore provided for consideration.

<b>SITE 662 : Coombe Road Playing Fields, Coombe Road</b>		
<b>Development Layout and Sequential Approach</b>	<p>An assessment of surface water flow paths should be made prior to site design, to encourage the location of buildings and more vulnerable aspects of the development away from those areas at risk of surface water ponding.</p> <p>Measures to manage surface water on the site should be considered early in the site masterplan to enable inclusion of attenuation SuDS where possible.</p> <p>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 car parking, must provide safe internal access to higher floors situated above ground level. Further ground investigations would be required at this site to confirm the likelihood of groundwater occurrence.</p>	Section 9.2
<b>Flow Routing</b>	<p>Potential overland flow paths should be determined and appropriate solutions proposed to minimise the impact of the development, for example by configuring road and building layouts to preserve existing flow paths and improve flood routing, whilst ensuring that flows are not diverted towards other properties elsewhere.</p>	Section 9.12
<b>Surface Water Management</b>	<p><b>Current risk of flooding</b> The site is not located within a Critical Drainage Area (CDA). The site is within Drainage Catchment 44, which is located in the centre of the borough. The uFMfSW shows that the site is predominantly at very low risk of surface water flooding with the exception of the north west corner of the site which is shown to be at low risk.</p>	
	<p><b>Indicative existing runoff rate:</b> 57.4 l/s (1 in 1 year), 215.3 l/s (1 in 100 year) <b>Indicative Greenfield Runoff Rate:</b> 21.5 l/s</p>	Level 2 Appendix B
	<p><b>SuDS Suitability</b> Reference to the SWMP Appendix C2 Figure 5 identifies that (prior to the completion of a site investigation to determine precise local conditions) infiltration of surface water into the ground is potentially suitable for the site. Site investigations will be required prior to the development of a Drainage Strategy for the site.</p> <p><b>Groundwater Source Protection Zones (SPZs)</b> The site is within a SPZ2 (outer protection zone). Where infiltration SuDS are to be used for surface runoff from roads, car parking and public or amenity areas, they should have a suitable series of treatment steps to prevent the pollution of groundwater.</p> <p>The design of infiltration SuDS schemes and their treatment stages needs to be appropriate to the sensitivity of the location and subject to a relevant risk assessment considering the types of pollutants likely to be discharged, design volumes and the dilution and attenuation properties of the aquifer.</p> <p>Techniques which should be considered include infiltration SUDS such as soakaways, green roofs, filter strips, detention basins and ponds, as well as permeable surfacing. Infiltration tests should be carried out on site to confirm SUDS suitability.</p>	Section 10.3 and 10.9
	<p><b>Drainage Strategy and Approvals</b> Croydon 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.</p> <p>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.</p> <p>Arrangements for the future maintenance of the drainage system must be made and detailed in the Drainage Strategy.</p> <p>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.</p>	Section 10.6
	<p><b>Indicative Unit Costs</b> Green roofs ~ £90/m<sup>2</sup>. Filter strips £2-4m<sup>2</sup>. Detention basin £15-50m<sup>3</sup>. Permeable paving ~ £30-50/m<sup>2</sup>. Concrete storage tank £449-518/m<sup>3</sup>.</p>	Section 10.4

**SITE 683 : Purley Back Lanes, 16-28 Pampisford Road**

**1) PROPOSED DEVELOPMENT**

<b>Site ID</b>	683
<b>Site Address</b>	Purley Back Lanes, 16-28 Pampisford Road
<b>Site Area</b>	0.622 ha
<b>Current Use</b>	Playing fields
<b>Allocated Use</b>	Residential development and public car park including new industrial units to replace those currently on the site
<b>Vulnerability</b>	More Vulnerable

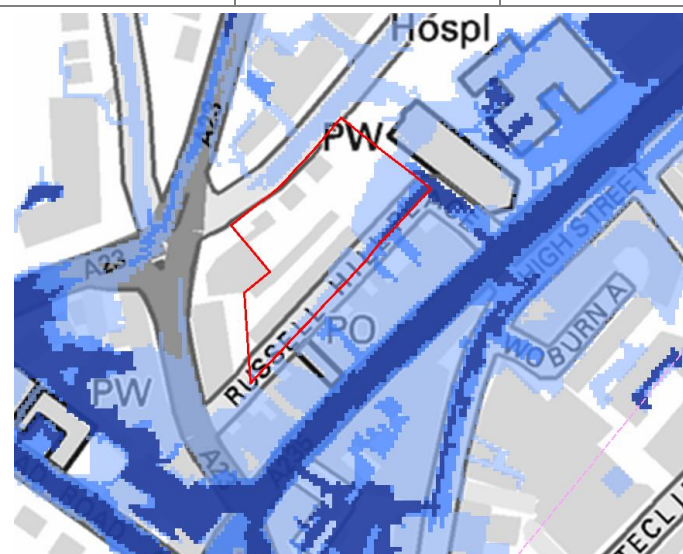
**2) SUMMARY OF LEVEL 1 FLOOD RISK**

**Flood risk from rivers**

The site is located approximately 150m north west of the culverted River Wandle and is predominantly located in Flood Zone 1, low probability of flooding from rivers. The south eastern boundary of the site is bordered by Flood Zone 3a.

**Flood risk from all other sources**

Flood risk from all other sources		Limitations
<i>Risk of flooding to the potential development site and surrounding area</i>	Surface Water flooding: (uFMfSW)	<b>High Risk</b> 1 in 30 year (3.3% annual probability)
	Groundwater flooding: (BGS Susceptibility to Groundwater Flooding)	<b>Medium Risk</b> Potential for groundwater flooding to occur at surface, but no historic records of groundwater flooding
		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.  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.



**Legend**

- Site Boundary
- Main River (open)
- Main River (culverted)
- Ordinary Watercourse (open)
- Ordinary Watercourse (culverted)

**Risk of Flooding from Surface Water**

- High Risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)
- Very Low Risk (<0.1% AEP)

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**Historic records of flooding**

<i>Historic records of flooding from each source within a 100m radius of potential development site</i>	Fluvial records	Surface water records	Groundwater records	Sewer records	Multiple source records	Other
	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2 (TW External)</b>

**3) RECOMMENDATIONS**

In accordance with the NPPF, More Vulnerable development is considered compatible within Flood Zone 1 and does not require the application of the Exception Test. However, given the risk of 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.



## SITE 683 : Purley Back Lanes, 16-28 Pampisford Road

<b>Development Layout and Sequential Approach</b>	<p>The proposed development is for mixed use. More Vulnerable aspects of the development should be located in areas at lowest risk from surface water flooding. Less Vulnerable aspects (e.g. car parks and industrial uses) can be located at ground level. An assessment of surface water flow paths should be made prior to site design, to encourage the location of buildings and more vulnerable aspects of the development away from those areas at risk of surface water ponding.</p> <p>Measures to manage surface water on the site should be considered early in the site masterplan to enable inclusion of attenuation SuDS where possible.</p> <p>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 car parking, must provide safe internal access to higher floors situated above ground level. Further ground investigations would be required at this site to confirm the likelihood of groundwater occurrence.</p>	Section 9.2
<b>Flood Resistance</b>	<p>Where there may be a future risk of surface water flooding on the site, flood resistant construction measures may be employed, such as raising property thresholds, and the use of landscaping to manage surface water and fluvial floodwater.</p>	Section 9.4
<b>Flood Resilience</b>	<p>Where parts of proposed buildings may be affected by surface water floodwaters, e.g. undercroft parking areas, flood resilient design techniques should be employed to minimise damage to buildings and structures. The use of concrete flooring and waterproof building materials could be considered.</p>	Section 9.5
<b>Flow Routing</b>	<p>Potential overland flow paths should be determined and appropriate solutions proposed to minimise the impact of the development, for example by configuring road and building layouts to preserve existing flow paths and improve flood routing, whilst ensuring that flows are not diverted towards other properties elsewhere.</p>	Section 9.12
<b>Surface Water Management</b>	<p><b>Current risk of flooding</b></p> <p>The site falls within the Critical Drainage Catchment (CDA) Group 8_041, which is an area with localised flooding issues. The potential development must not increase flood risk to areas within the CDA. The site is within Drainage Catchment 39, which is located at the west part of the borough.</p> <p>The uFMfSW indicates that the site lies within an area of high risk of surface water flooding, due to the small area of high risk likely to be as a result of the topography in the eastern corner of the site, and surrounding areas of low risk. There is one historic record of surface water flooding held by Croydon Council in this location.</p> <p><b>Indicative existing runoff rate:</b> 3.5 l/s (1 in 1 year), 13.3l/s (1 in 100 year)  <b>Indicative Greenfield Runoff Rate:</b> 5.0 l/s</p> <p><b>SuDS Suitability</b></p> <p>Reference to the SWMP Appendix C2 Figure 5 identifies that (prior to the completion of a site investigation to determine precise local conditions) infiltration of surface water into the ground is potentially suitable for the site. Site investigations will be required prior to the development of a Drainage Strategy for the site.</p> <p><b>Groundwater Source Protection Zones (SPZs)</b></p> <p>The site is within a SPZ1 (inner protection zone). Where infiltration SuDS are to be used for surface runoff from roads, car parking and public or amenity areas, they should have a suitable series of treatment steps to prevent the pollution of groundwater.</p> <p>Where infiltration SuDS are proposed for anything other than clean roof drainage in a SPZ1, the Environment Agency require a risk assessment to demonstrate that the SuDS scheme will not pose an unacceptable risk to the drinking water abstraction.</p> <p>The design of infiltration SuDS schemes and their treatment stages needs to be appropriate to the sensitivity of the location and subject to a relevant risk assessment considering the types of pollutants likely to be discharged, design volumes and the dilution and attenuation properties of the aquifer.</p> <p>Techniques which should be considered include infiltration SUDS such as soakaways, green roofs, filter strips, detention basins and ponds, as well as permeable surfacing. Infiltration tests should be carried out on site to confirm SUDS suitability.</p>	<p>Level 2 Appendix B</p> <p>Section 10.3 and 10.9</p>

### SITE 683 : Purley Back Lanes, 16-28 Pampisford Road

	<p><b>Drainage Strategy and Approvals</b></p> <p>Croydon 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.</p> <p>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.</p> <p>Arrangements for the future maintenance of the drainage system must be made and detailed in the Drainage Strategy.</p> <p>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.</p>	Section 10.6
	<p><b>Indicative Unit Costs</b></p> <p>Green roofs ~ £90/m<sup>2</sup>.</p> <p>Filter strips £2-4m<sup>2</sup>.</p> <p>Detention basin £15-50m<sup>3</sup>.</p> <p>Permeable paving ~ £30-50/m<sup>2</sup>.</p> <p>Concrete storage tank £449-518/m<sup>3</sup>.</p>	Section 10.4

**SITE 764 : Land to the east of Portnalls Road, Portnalls Road**

**1) PROPOSED DEVELOPMENT**

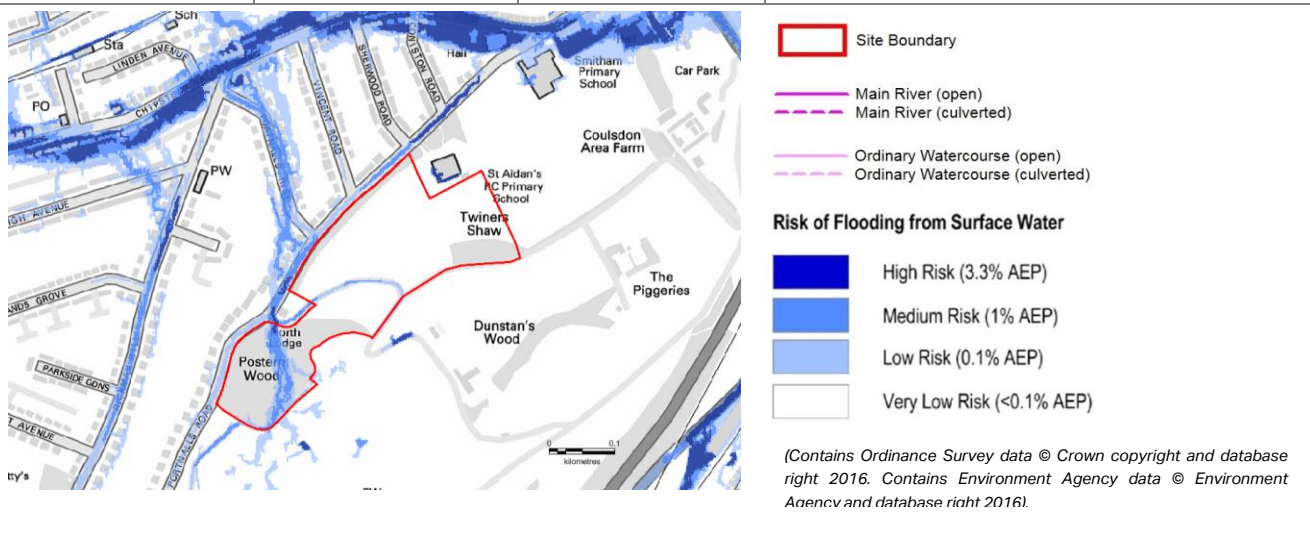
<b>Site ID</b>	764
<b>Site Address</b>	Land to the east of Portnalls Road, Portnalls Road
<b>Site Area</b>	6.795 ha
<b>Current Use</b>	Green Infrastructure; Planned estates of semi detached houses
<b>Allocated Use</b>	Secondary school
<b>Vulnerability</b>	More Vulnerable

**2) SUMMARY OF LEVEL 1 FLOOD RISK**

**Flood risk from rivers**

The site is located approximately 2.8km south-west of Caterham Bourne and lies within Flood Zone 1, low probability of flooding from rivers.

Flood risk from all other sources			Limitations
<i>Risk of flooding to the potential development site and surrounding area</i>	Surface Water flooding: (uFMfSW)	<b>High Risk</b> 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: (BGS Susceptibility to Groundwater Flooding)	<b>Low Risk</b> Limited potential for groundwater flooding to occur.	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	0	0	<b>4 TW Internal</b> <b>9 TW External</b>

**3) RECOMMENDATIONS**

In accordance with the NPPF, More Vulnerable development is considered compatible within Flood Zone 1 and does not require the application of the Exception Test. However, given the risk of 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.

<b>SITE 764 : Land to the east of Portnalls Road, Portnalls Road</b>		
<b>Development Layout and Sequential Approach</b>	The proposed development for a secondary school is classed as More Vulnerable. A detailed assessment of surface water flow paths should be made prior to site design, to encourage the location of buildings and more vulnerable aspects of the development away from those areas at risk of surface water ponding. 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
<b>Flood Resistance</b>	Where there may be a future risk of surface water flooding on the site, flood resistant construction measures may be employed, such as raising property thresholds, and the use of landscaping to manage surface water and fluvial floodwater.	Section 9.4
<b>Flood Resilience</b>	Where parts of proposed buildings may be affected by surface water floodwaters, e.g. undercroft parking areas, flood resilient design techniques should be employed to minimise damage to buildings and structures. The use of concrete flooring and waterproof building materials could be considered.	Section 9.5
<b>Flow Routing</b>	Potential overland flow paths should be determined and appropriate solutions proposed to minimise the impact of the development, for example by configuring road and building layouts to preserve existing flow paths and improve flood routing, whilst ensuring that flows are not diverted towards other properties elsewhere.	Section 9.12
<b>Surface Water Management</b>	<p><b>Current risk of flooding</b></p> <p>The site falls within a Critical Drainage Area (CDA-Group8_039) , which is located in the west of the borough. The potential development must not increase flood risk to areas within the CDA. The site is within Drainage Catchment 39, which is located at the southwestern part of the borough.</p> <p>The uFMfSW shows a pathway of medium risk, as well as a small part of high risk from surface water, in the middle of the site.</p>	
	<p><b>Indicative existing runoff rate:</b> 40.7 l/s (1 in 1 year), 152.7 l/s (1 in 100 year)</p> <p><b>Indicative Greenfield Runoff Rate:</b> 13.6 l/s</p>	Level 2 Appendix B
	<p><b>SuDS Suitability</b></p> <p>Reference to the SWMP Appendix C2 Figure 5 identifies that (prior to the completion of a site investigation to determine precise local conditions) infiltration of surface water into the ground is potentially suitable. Site investigations will be required prior to the development of a Drainage Strategy for the site.</p> <p><b>Groundwater Source Protection Zones (SPZs)</b></p> <p>The site is within a SPZ1 (inner protection zone). Where infiltration SuDS are to be used for surface runoff from roads, car parking and public or amenity areas, they should have a suitable series of treatment steps to prevent the pollution of groundwater.</p> <p>Where infiltration SuDS are proposed for anything other than clean roof drainage in a SPZ1, the Environment Agency require a risk assessment to demonstrate that the SuDS scheme will not pose an unacceptable risk to the drinking water abstraction.</p> <p>The design of infiltration SuDS schemes and their treatment stages needs to be appropriate to the sensitivity of the location and subject to a relevant risk assessment considering the types of pollutants likely to be discharged, design volumes and the dilution and attenuation properties of the aquifer. Techniques which should be considered include infiltration SUDS such as soakaways, green roofs, filter strips, detention basins and ponds, as well as permeable surfacing. Infiltration tests should be carried out on site to confirm SUDS suitability.</p>	Section 10.3 and 10.9
	<p><b>Drainage Strategy and Approvals</b></p> <p>Croydon 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, the mayor's Design and construction SPG and Croydon's Local Plan policies.</p> <p>Where it is not possible to achieve greenfield runoff rates in accordance with the London Plan policy 5.13 and Design and Construction SPG (April 2014), then justification must be provided.</p> <p>Arrangements for the future maintenance of the drainage system must be made and detailed in the Drainage Strategy.</p> <p>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.</p>	Section 10.6
	<p><b>Indicative Unit Costs</b></p> <p>Green roofs ~ £90/m<sup>2</sup>.</p> <p>Filter strips £2-4m<sup>2</sup>.</p> <p>Detention basin £15-50m<sup>3</sup>.</p> <p>Permeable paving ~ £30-50/m<sup>2</sup>.</p> <p>Concrete storage tank £449-518/m<sup>3</sup>.</p>	Section 10.4

**SITE 945 : Waitrose, 110-112 Brighton Road**

**1) PROPOSED DEVELOPMENT**

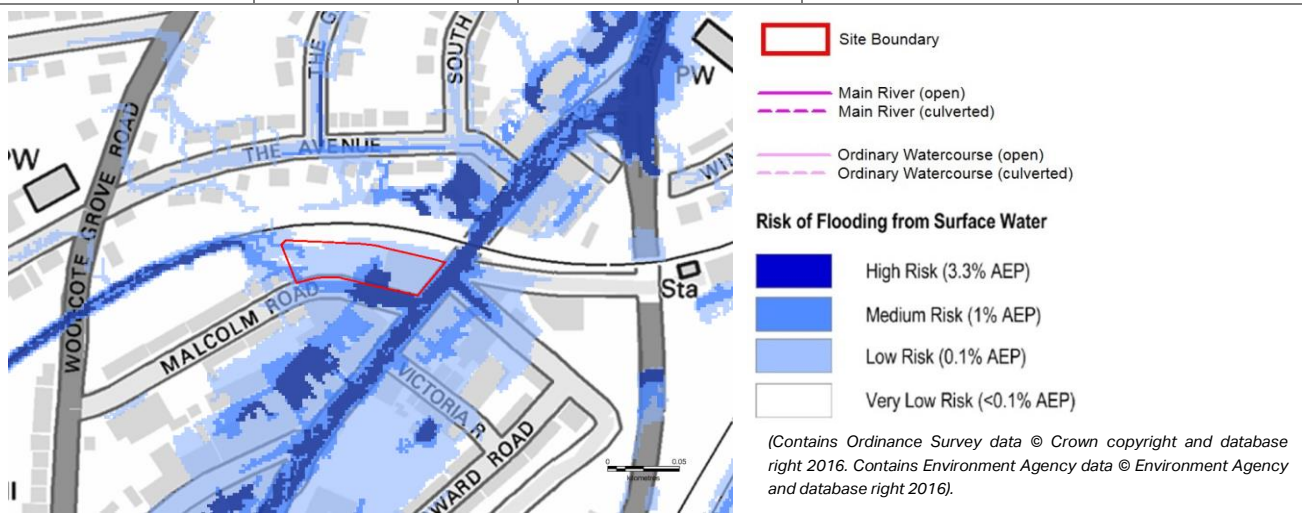
<b>Site ID</b>	945
<b>Site Address</b>	Waitrose, 110-112 Brighton Road
<b>Site Area</b>	0.269 ha
<b>Current Use</b>	Waitrose supermarket
<b>Allocated Use</b>	Residential and healthcare facilities
<b>Vulnerability</b>	More Vulnerable

**2) SUMMARY OF LEVEL 1 FLOOD RISK**

**Flood risk from rivers**

The site is located approximately 2km south-west of Caterham Bourne, an ephemeral groundwater-fed river, and lies within Flood Zone 1, low probability of flooding from rivers.

Flood risk from all other sources		Limitations
<i>Risk of flooding to the potential development site and surrounding area</i>	Surface Water flooding: (uFMfSW)	<b>High Risk</b> 1 in 30 year (3.3% annual probability)
	Groundwater flooding: (BGS Susceptibility to Groundwater Flooding)	<b>Medium Risk</b> Potential for groundwater flooding to occur at surface, but no historic records of groundwater flooding
		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.
		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	<b>3 TW Internal 2 TW External</b>

**3) RECOMMENDATIONS**

In accordance with the NPPF, More Vulnerable development is considered compatible within Flood Zone 1 and does not require the application of the Exception Test. However, given the risk of 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.



<b>SITE 945 : Waitrose, 110-112 Brighton Road</b>		
<b>Development Layout and Sequential Approach</b>	<p>The proposed development is classed as More Vulnerable. A detailed assessment of surface water flow paths should be made prior to site design, to encourage the location of buildings and more vulnerable aspects of the development away from those areas at risk of surface water ponding.</p> <p>Measures to manage surface water on the site should be considered early in the site masterplan to enable inclusion of attenuation SuDS where possible.</p> <p>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 car parking, must provide safe internal access to higher floors situated above ground level. Further ground investigations would be required at this site to confirm the likelihood of groundwater occurrence.</p>	Section 9.2
<b>Flood Resistance</b>	Where there may be a future risk of surface water flooding on the site, flood resistant construction measures may be employed, such as raising property thresholds, and the use of landscaping to manage surface water and fluvial floodwater.	Section 9.4
<b>Flood Resilience</b>	Where parts of proposed buildings may be affected by surface water floodwaters, e.g. undercroft parking areas, flood resilient design techniques should be employed to minimise damage to buildings and structures. The use of concrete flooring and waterproof building materials could be considered.	Section 9.5
<b>Flow Routing</b>	Potential overland flow paths should be determined and appropriate solutions proposed to minimise the impact of the development, for example by configuring road and building layouts to preserve existing flow paths and improve flood routing, whilst ensuring that flows are not diverted towards other properties elsewhere.	Section 9.12
<b>Surface Water Management</b>	<p><b>Current risk of flooding</b></p> <p>The site falls within a Critical Drainage Area (CDA-Group8_039). The potential development must not increase flood risk to areas within the CDA. The site is within Drainage Catchment 39, which is located at the southwestern part of the borough.</p> <p>The uFMfSW shows that part of the site in the middle lies within an area of high risk of surface water flooding and that the majority of the site lies within an area of low risk of surface water flooding. There are three historic records of surface water flooding held by Croydon Council in this location.</p>	
	<p><b>Indicative existing runoff rate:</b> 1.6 l/s (1 in 1 year), 5.9 l/s (1 in 100 year)</p> <p><b>Indicative Greenfield Runoff Rate:</b> 5.0 l/s</p>	Level 2 Appendix B
	<p><b>SuDS Suitability</b></p> <p>Reference to the SWMP Appendix C2 Figure 5 identifies that infiltration of surface water into the ground is potentially uncertain and requires further investigation prior to the development of a Drainage Strategy for the site.</p> <p><b>Groundwater Source Protection Zones (SPZs)</b></p> <p>The site is within a SPZ2 (outer protection zone). Where infiltration SuDS are to be used for surface runoff from roads, car parking and public or amenity areas, they should have a suitable series of treatment steps to prevent the pollution of groundwater.</p> <p>The design of infiltration SuDS schemes and their treatment stages needs to be appropriate to the sensitivity of the location and subject to a relevant risk assessment considering the types of pollutants likely to be discharged, design volumes and the dilution and attenuation properties of the aquifer.</p> <p>Techniques which should be considered include green roofs, filter strips, detention basins and ponds, as well as permeable surfacing in combination with tanked systems.</p>	Section 10.3 and 10.9
	<p><b>Drainage Strategy and Approvals</b></p> <p>Croydon 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, the mayor's Design and construction SPG and Croydon's Local Plan policies.</p> <p>Where it is not possible to achieve greenfield runoff rates in accordance with the London Plan policy 5.13 and Design and Construction SPG (April 2014), then justification must be provided.</p> <p>Arrangements for the future maintenance of the drainage system must be made and detailed in the Drainage Strategy.</p> <p>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.</p>	Section 10.6

**SITE 945 : Waitrose, 110-112 Brighton Road**

	<b>Indicative Unit Costs</b> Green roofs ~ £90/m <sup>2</sup> . Filter strips £2-4m <sup>2</sup> . Detention basin £15-50m <sup>3</sup> . Permeable paving ~ £30-50/m <sup>2</sup> . Concrete storage tank £449-518/m <sup>3</sup> .	Section 10.4
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**SITE 946: Stubbs Mead Depot, Factory Lane**

**1) PROPOSED DEVELOPMENT**

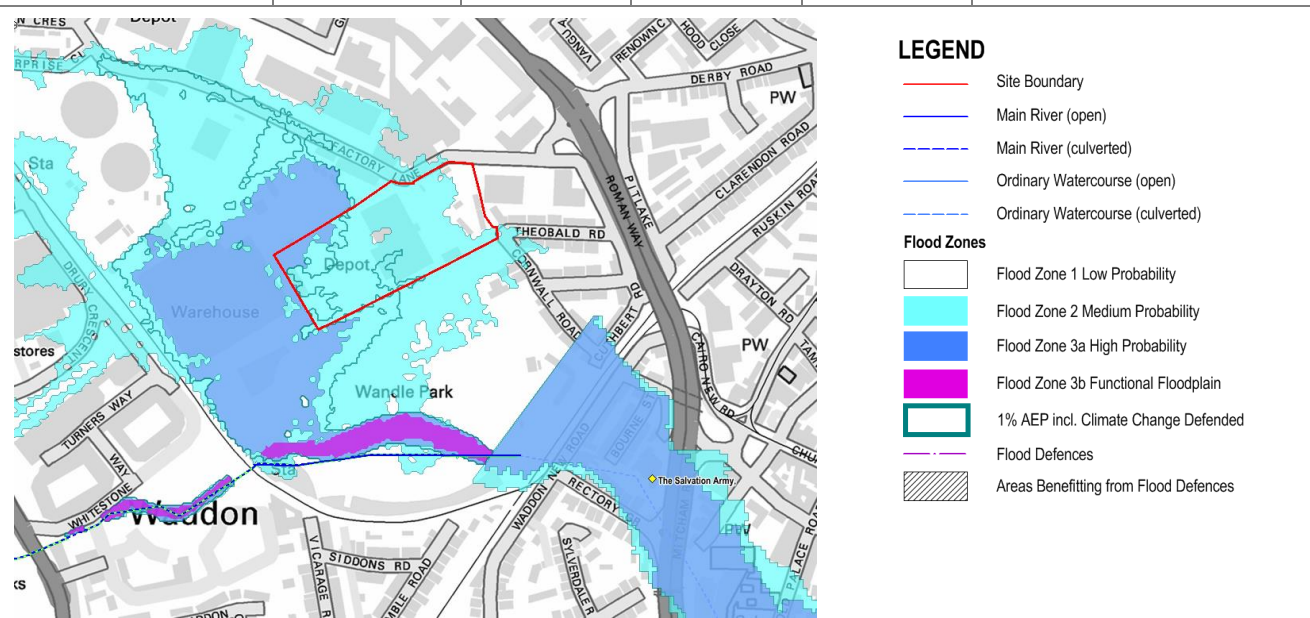
<b>Site ID</b>	946
<b>Site Address</b>	Stubbs Mead Depot, Factory Lane
<b>Site Area</b>	2.708 ha
<b>Current Use</b>	Council Depot with parking area, and six buildings and one bay of fuel pumps.
<b>Allocated Use</b>	Mixed residential and employment (industry and warehousing)
<b>Vulnerability</b>	More Vulnerable

**2) SUMMARY OF LEVEL 1 FLOOD RISK**

**Flood risk from rivers**

The site is located within Flood Zone 3a at its western part associated with River Wandle, which is designated as a main river. The majority of the rest of the site to the centre and east is located within Flood Zone 2. The site lies approximately 170m north of River Wandle. No hazard or depth grids are available for the site from the River Wandle modelling.

<i>Proportion of potential development site within Flood Zone</i>	Flood Zone 3b	Flood Zone 3a	Flood Zone 2	Flood Zone 1	Area Benefiting of Defences
	<b>0%</b>	<b>6%</b>	<b>81%</b>	<b>13%</b>	<b>0%</b>



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**Flood risk from all other sources** **Limitations**

<i>Risk of flooding to the potential development site and surrounding area</i>	Surface Water flooding: (uFMfSW)	<b>Medium Risk</b> 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.  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.
	Groundwater flooding: (BGS Susceptibility to Groundwater Flooding)	<b>Medium Risk</b> Potential for groundwater flooding to occur at surface, but no historic records of groundwater flooding	

**Historic records of flooding**

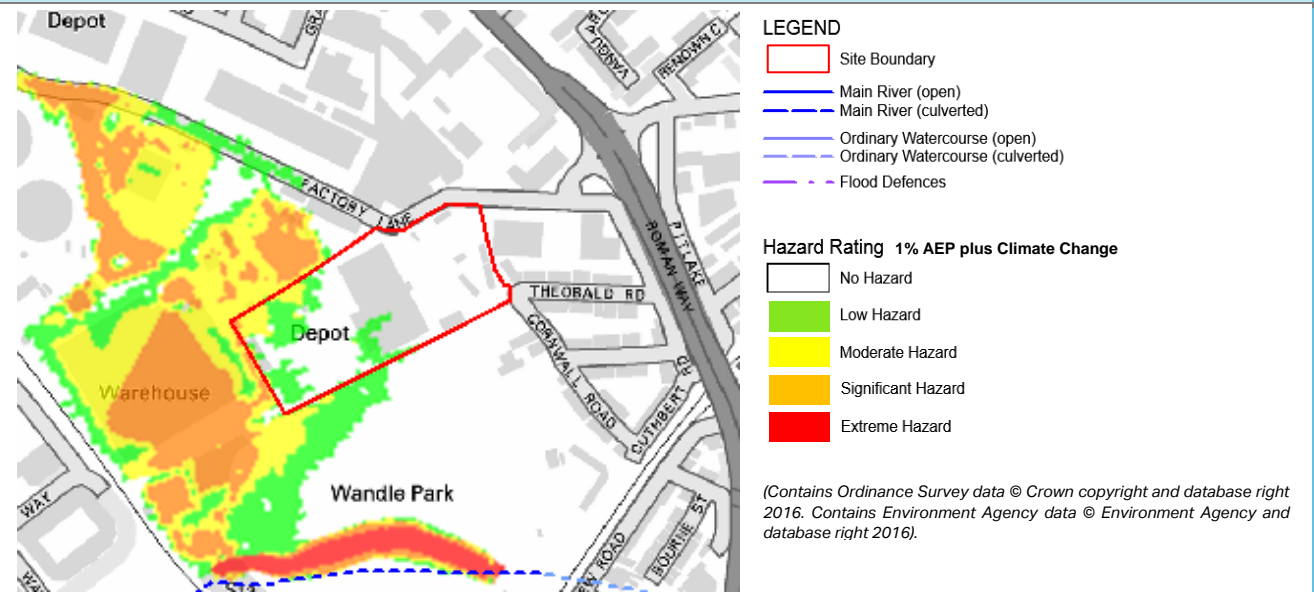
<i>Historic records of flooding from each source within a 100m radius of potential development site</i>	Fluvial records	Surface water records	Groundwater records	Sewer records	Multiple source records	Other
	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**SITE 946: Stubbs Mead Depot, Factory Lane**

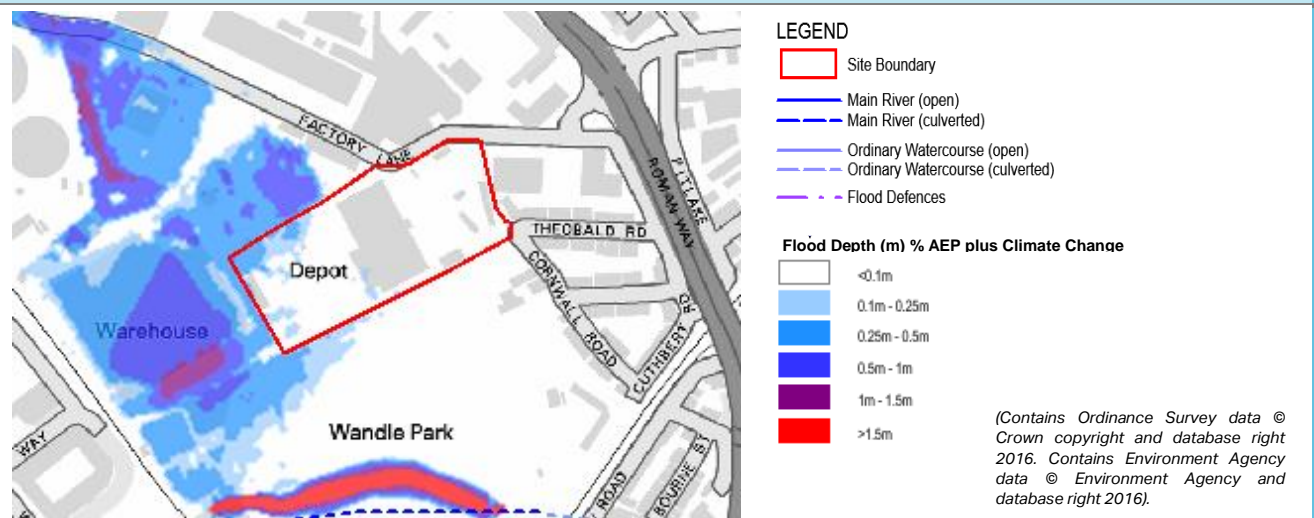
**3) LEVEL 2 ASSESSMENT**

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.

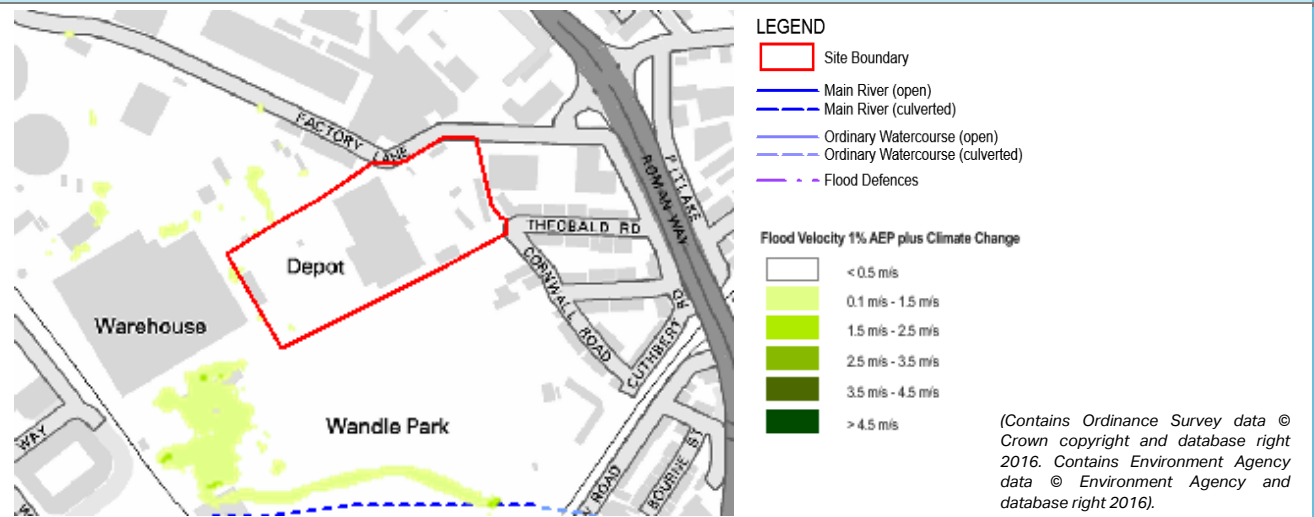
**Flood Hazard Rating**



**Maximum Flood Depth**



**Maximum Velocity**



## SITE 946: Stubbs Mead Depot, Factory Lane

### 4) RECOMMENDATIONS AND POLICIES

<b>Development Layout and Sequential Approach</b>	<p>A sequential approach to site layout should be used. The majority of the site is within Flood Zone 2 and a smaller part is within Flood Zone 1. A minor part of the site is also located within Flood Zone 3a.</p> <p>The proposed development is for mixed use. The More Vulnerable development should be located preferably in Flood Zone 1. If it is essential to build on Flood Zones 2 or 3a, then all residential uses should be located in the first floor level or above.</p> <p>An assessment of surface water flow paths should be made prior to site design, to encourage the location of buildings and more vulnerable aspects of the development away from those areas at risk of surface water ponding.</p> <p>Measures to manage surface water on the site should be considered early in the site masterplan to enable inclusion of attenuation SuDS where possible.</p> <p>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 car parking, must provide safe internal access to higher floors situated above ground level. Further ground investigations would be required at this site to confirm the likelihood of groundwater occurrence.</p>	Section 9.2
<b>Finished Floor Levels</b>	<p>For More Vulnerable development, a minimum freeboard of 300mm is required above the 1% AEP (1 in 100 year) peak fluvial flood level.</p> <p>In Flood Zones 2 and 3a, all new sleeping accommodation should be restricted to the first floor or above. Internal ground floors below this level could however be occupied by the Less Vulnerable garages, non-sleeping residential rooms (e.g. kitchen, study, lounge) or car parking.</p> <p>The site is at a medium risk of surface water flooding and it is considered that the finished floor level requirement for fluvial flood levels would also protect the property from a 1% AEP (1 in 100 year) surface water flood event.</p>	Section 9.3
<b>Flood Resistance</b>	<p>Where there may be a future risk of surface water flooding on the site, flood resistant construction measures may be employed, such as raising property thresholds, and the use of landscaping to manage surface water and fluvial floodwater.</p>	Section 9.4
<b>Safe Access/Egress</b>	<p>Current access to the site is provided via Roman Way to the east of the site.</p>	Section 9.7
<b>Flow Routing</b>	<p>Any new development in Flood Zones 2 and 3a should not adversely affect flood routing and thereby increase flood risk elsewhere. Within these areas opportunities should be sought within the site design to make space for water, such as:</p> <ul style="list-style-type: none"> <li>• Removing boundary walls or replacing with other boundary treatments such as hedges, fences (with gaps).</li> <li>• Considering alternatives to solid wooden gates, or ensuring that there is a gap beneath the gates to allow the passage of floodwater.</li> </ul>	Section 9.12
<b>Flood Warning and Evacuation Plan</b>	<p>It is recommended that a Flood Warning and Evacuation Plan (FWEP) is 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.</p> <p><b>Flood Warning Areas</b></p> <p>The local area is not fully covered by the Environment Agency Flood Warning Area for 'River Wandle at Beddington Park Catchment'. Residents of the site should ensure they are signed up to the Environment Agency Flood Warning system.</p> <p><b>Emergency Rest Centres</b></p> <p>The closest emergency rest centre for this site is 'Salvation Army; at Booth Road, approximately 350m south-east of the proposed development site.</p>	Section 9.14
<b>Surface Water Management</b>	<p><b>Current risk of flooding</b></p> <p>The site is located within Critical Drainage Area (CDA) Group8_042, which is an area with the highest number of surface water flooding issues within the borough. The potential development must not increase flood risk to other areas in the CDA.</p> <p>The site is within Drainage Catchment 38, which is located at the west part of the borough. The uFMFSW indicates that the site lies within an area of medium risk of surface water flooding.</p>	
	<p><b>Indicative existing runoff rate:</b> 13.8 l/s (1 in 1 year), 51.8 l/s (1 in 100 year)</p> <p><b>Indicative Greenfield Runoff Rate:</b> 5.4 l/s</p>	Section 10



**SITE 946: Stubbs Mead Depot, Factory Lane**

	<p><b>SuDS Suitability</b></p> <p>Reference to the SWMP Appendix C2 Figure 5 infiltration of surface water into the ground is potentially uncertain and requires further investigation prior to the development of a Drainage Strategy for the site.</p> <p><b>Groundwater Source Protection Zones (SPZs)</b></p> <p>The site is within a SPZ2 (outer protection zone). Where infiltration SuDS are to be used for surface runoff from roads, car parking and public or amenity areas, they should have a suitable series of treatment steps to prevent the pollution of groundwater.</p> <p>The design of infiltration SuDS schemes and their treatment stages needs to be appropriate to the sensitivity of the location and subject to a relevant risk assessment considering the types of pollutants likely to be discharged, design volumes and the dilution and attenuation properties of the aquifer.</p> <p>Techniques which should be considered include green roofs, filter strips, detention basins and ponds, as well as permeable surfacing in combination with tanked systems</p>	Section 10.3 and 10.9
	<p><b>Drainage Strategy and Approvals</b></p> <p>Croydon 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.</p> <p>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.</p> <p>Arrangements for the future maintenance of the drainage system must be made and detailed in the Drainage Strategy.</p> <p>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.</p>	Section 10.6
	<p><b>Indicative Unit Costs</b></p> <p>Green roofs ~ £90/m<sup>2</sup>.</p> <p>Permeable paving ~ £30-50/m<sup>2</sup>.</p> <p>Filter strips £2-4m<sup>2</sup>.</p> <p>Detention basin £15-50m<sup>3</sup>.</p> <p>Concrete storage tank £449-518/m<sup>3</sup>.</p>	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 proposed development is for mixed use, residential and employment. The More Vulnerable uses should be located in Flood Zone 1 or areas of low hazard. If More Vulnerable development cannot be avoided within the 1% AEP (1 in 100 year) including an allowance for climate change, then finished floor levels must be raised accordingly and sleeping accommodation restricted the first floor or above. Employment uses can be located on the ground floor. To ensure occupants/residents evacuate the site safely in the event of a flood it is necessary to prepare a FWEPP 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 and resilient construction techniques. SuDS should be incorporated into the building design in order to reduce the risk of increasing flood risk elsewhere.

Therefore, on the basis that these mitigation measures are in place, it is likely that this site would pass the Exception Test.