Appendix B - Site Assessments

Assessment of sites triggered by Fluvial Risk

SITE ASSESSMENT - STADIUM RETAIL PARK AND FOUNTAIN STUDIOS - BSCA2

Address:	Stadium Retail Park and Fountain Studios, Wembley Park Drive, HA9 8TS
Area:	1.68 **Ha**
Site Reference:	1

Current Use	Proposed Use
Industrial / Retail Park	Residential-Led Mixed Use Development

Current Vulnerability Classification	Proposed Vulnerability Classification
Less Vulnerable	More Vulnerable / Less Vulnerable

Current Risk Summary

Fluvial / Tidal			Groundwater		
FZ2	49	% of Site	<25	100	% of Site
FZ3a	0	% of Site	25-50	0	% of Site
FZ3b	0	% of Site	50-75	0	% of Site
Surface Water			>75	0	% of Site
30yr	24	% of Site	**Artificial**		
100yr	37	% of Site	Reservoir	Yes	At risk?
1000yr	80	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents	1-20				

Flood Defences

N/A - the site is not in an area benefitting from flood defences.

FLUVIAL / TIDAL

Risk Assessment (Defended)

Parameter	FZ3b	FZ3a	*FZ3a+CC	Units
Speed of inundation	N/A	N/A	6.5	Hrs
Min. Depth	N/A	N/A	0	m
Max. Depth	N/A	N/A	0.5	m
Max. Velocity	N/A	N/A	0.6	m/s
Max Flood Level	N/A	N/A	32.53	m AOD
Max Ground Level	N/A	N/A	34.08	m AOD
Min Ground Level	N/A	N/A	32.04	m AOD
Flood Hazard	N/A	N/A	N/A	N/A
Duration of Flood	N/A	N/A	12+	Hrs

* The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)

Parameter	FZ3a	*FZ3a+CC	Units
Speed of inundation	N/A	6.5	Hrs
Min. Depth	N/A	0	m
Max. Depth	N/A	0.5	m
Max. Velocity	N/A	0.6	m/s
Max. Hazard	N/A	N/A	N/A
Duration of Flood	N/A	N/A	Hrs

Description of Flood Mechanism

- The site is within 50m of Wealdstone Brook, with the river located north of the site.
- Climate change factors place the site at risk of fluvial flooding. Fluvial flooding from the Brook inundates the site from the north-east, with water flowing along Olympic Way and into the site.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

- More than 50% lies outside of the Flood Zone 3a + CC extent. This is in the western extent of the site, providing safe routes within the development at ground floor level.
- The site borders Empire Way / Wembley Park Drive and Fulton Road to west and south respectively. Safe access and egress routes would need to be directed to the west and south-west of the site, where the risk is lowest.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

- Ground floor residential components of the development should be located outside of the Flood Zone 3a + CC extent in the western extent of the site.
- See SFRA - Level 2 Report Sections 4.1.2, 4.1.3 and 4.1.4 for further requirements.
- A Flood Emergency and Evacuation Plan is required.
- Site users should be signed up to EA's Flood Warning Service.

SURFACE WATER

Risk Assessment

Parameter	30yr	100yr	*1000yr	Units
Min. Depth	0 - 0.15	0 - 0.15	0 - 0.15	m
Max. Depth	>1.20	>1.20	>1.20	m
Max. Velocity	>2	>2	>2	m/s
Max. Hazard	>2	>2	>2	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

- Water enters the site from the west along Wembley Park Drive and Empire Way. The centre of the site is a slight topographical low point which results in the pooling of water. Runoff eventually flows on to the site towards the Wealdstone Brook.
- CC will increase the flood extent, but not the velocity, hazard or maximum depth of flooding.

Site Access / Egress

- Safe access and egress routes for the site should be directed towards the south western and north western extents of the site, on to Wembley Park Drive and Fulton Road. Safe refuge points should be designated on site for 1 in 1000 year events, ensuring the route to them is always available.

Figure 3 - RoFSW Flood Depth Map

Mitigation - Flood Risk Requirements

- See SFRA - Level 2 Report Sections 4.1.2, 4.1.3 and 4.1.4.
- Minimise flood storage lost by limiting development to the western and southern areas of the site.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Surface Water Drainage

- A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS.
- The site is underlain by London Clay - ground investigations are required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - STADIUM RETAIL PARK AND FOUNTAIN STUDIOS - BSCA2

SEWER

Risk Assessment

• The area is served by separate surface water and foul sewer networks.
• The site falls within a post code district where there are between 1 - 20 reported flood incidents from sewer flooding.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

• Thames Water must be consulted to confirm if the site has historically flooded.
• If the site has historically flooded, the development must reduce the runoff to sewers from the site to greenfield rates or as close as possible to greenfield rates.

GROUNDWATER

Risk Assessment

• The sites fall within a 'Permeable Superficial' area with regards to Increased Potential for Elevated Groundwater. This is due the site's proximity to the Wealdstone Brook, which is underlain by an alluvium (clay, silt, sand and gravel) superficial deposit geology.
• Both sites fall in an area that is classified as having <25% susceptibility to groundwater flooding. This is because the susceptibility data is based on a 1km² grid. Most of the area is underlain by clay bedrock geology only which has low permeability.

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

No mitigation measures required.

ARTIFICIAL

Risk Assessment

• There is risk of flooding from the Brent (Welsh Harp) Reservoir, northeast of Gabrielle Close.
• Where there is flood risk, the site is predicted to flood between 0-2m depth in result of reservoir failure.
• Reservoir failure flood speed would be between 0-2m/s for entire site.

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

Local Authority Emergency Planning Officers must be consulted to create a reservoir failure emergency and evacuation plan.

PLANNING CONSIDERATIONS

Safety of Development

Can the development be future proofed for climate change considerations?
• Yes. See SFRA - Level 2 Report Sections 4.1.2 and 4.1.3 for the required finished floor levels and flood resistant / resilient building requirements.
• For development that takes place outside of the Flood Zone 3a + CC and 1 in 1000 year surface water extent, floor levels should be set to 0.3m above general ground level. Alternatively flood resistance measures should be implemented.

Can the development be designed safe throughout its lifetime without increasing flood risk elsewhere?
• Yes - The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation.
• See SFRA - Level 2 Report Section 4.1.4 for compensatory flood storage requirements.

What is the cumulative impact of the development land use change and will flood risk increase?
• The development land use is changing to a more vulnerable classification, going from 'Less Vulnerable' to 'More Vulnerable' with the introduction of residential developments. Ground level development at the site should be a less vulnerable use.

How can the development reduce risk overall?
• Finished floor levels of at least 0.3m above predicted flood depths at that point should be implemented (See SFRA - Level 2 Report).
• The site means it is unlikely to control runoff from the site. New development can provide greater management of runoff through the introduction of SuDS (See Mitigation - Surface Water Drainage).
• An emergency evacuation plan must be created.
• No basement dwellings developments. Non-dwelling basements developments may be appropriate at some locations onsite, but a site-specific Flood Risk Assessment must be completed and the basement must not have any adverse impacts on flooding locally during a 1 in 100 year fluvial and surface water events. Basements must contain an egress route to a higher floor above the predicted Flood Zone 3a + CC fluvial and 1 in 1000 year surface water flood depths. Basements should be made flood resilient.

Will development require a flood risk activity permit / ordinary watercourse consent?
• No, the development will not require a flood risk activity permit.

Exception Test

Proposed developments can be made safe throughout their lifetime without increasing flood risk elsewhere (See Safety of Development box). Mitigation measures to protect proposed developments against deep maximum fluvial flood depths can be implemented (See Mitigation / FRA Requirements). The site could also reduce flood risk overall with appropriate SuDS and flood storage compensation measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
• Ground floor residential components of the development should be located outside of the Flood Zone 3a + CC extent in the western extent of the site.	• Flood Emergency and Evacuation Plan required. • Site users should be signed up to EA's Flood Warning Service.
Surface Water	
Developments within the 1 in 1000 year surface water extent require finished floor levels of at least 0.3m above the predicted flood level at that point. Floor level should be set to Flood Zone 3a + CC extent flood levels if predicted fluvial depths are higher.	• Flood plain compensation must be provided. • Limit development to the western and southern areas of the site, if possible.
Sewer	
Thames Water must be consulted to confirm if the site has historically flooded.	If the site has historically flooded, the development must reduce the runoff to sewers to greenfield rates.
Groundwater	
No mitigation measures required.	
Artificial	
Emergency planning officers must be consulted to create a reservoir failure emergency and evacuation plan.	

Figure 1 - Fluvial Flood Depth Map

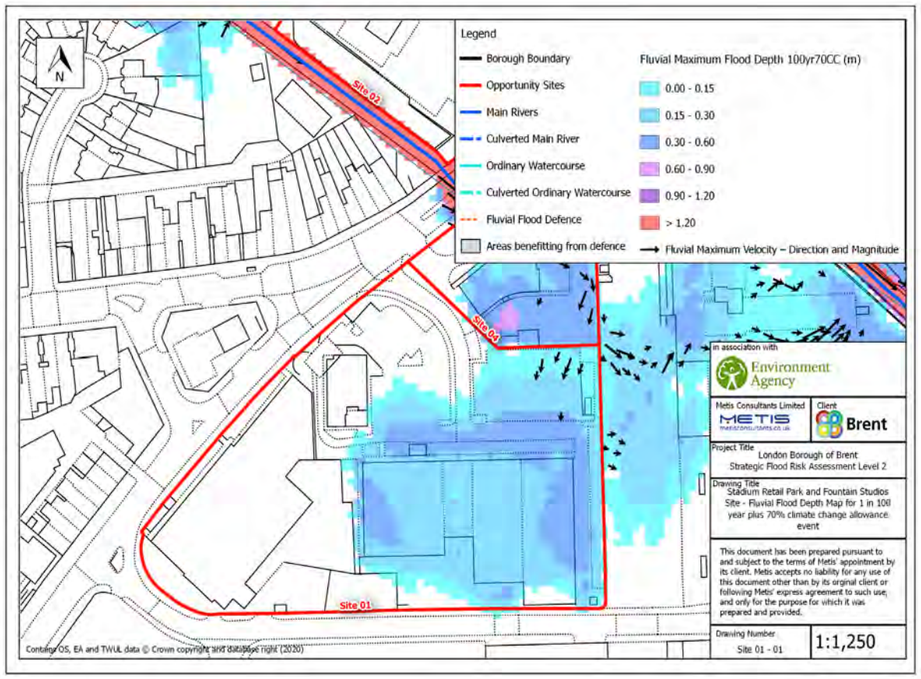


Figure 2 - Fluvial Flood Hazard Map

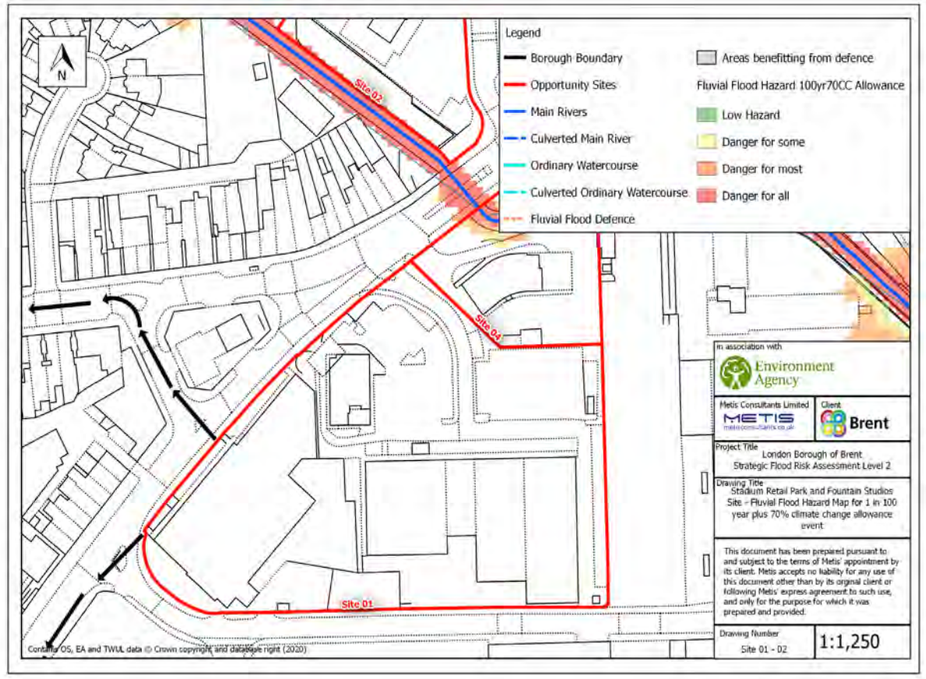


Figure 3 - RoFSW Flood Depth Map

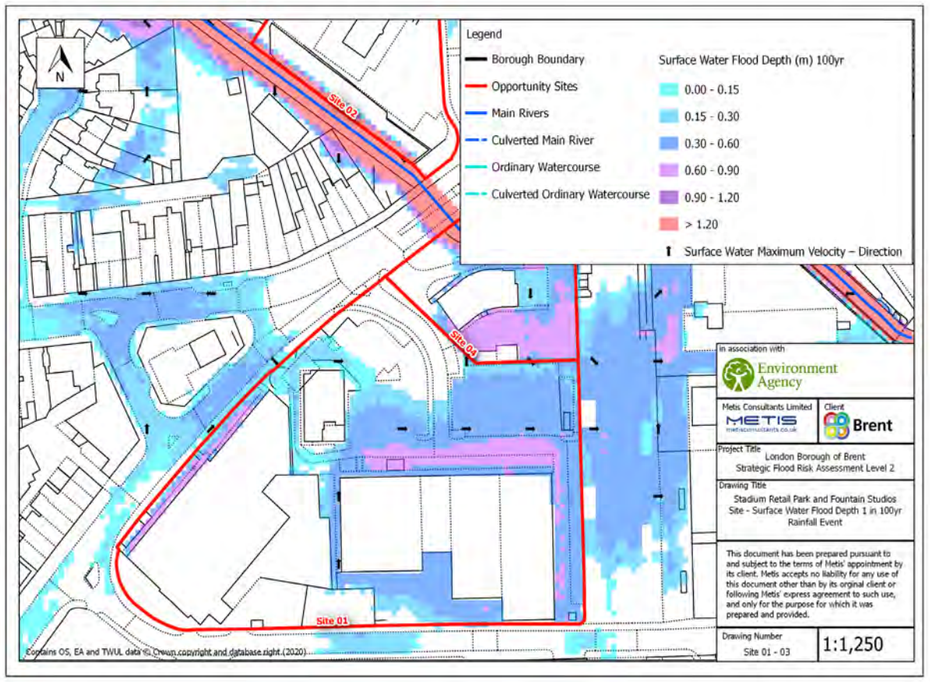


Figure 4 - RoFSW Flood Hazard Map

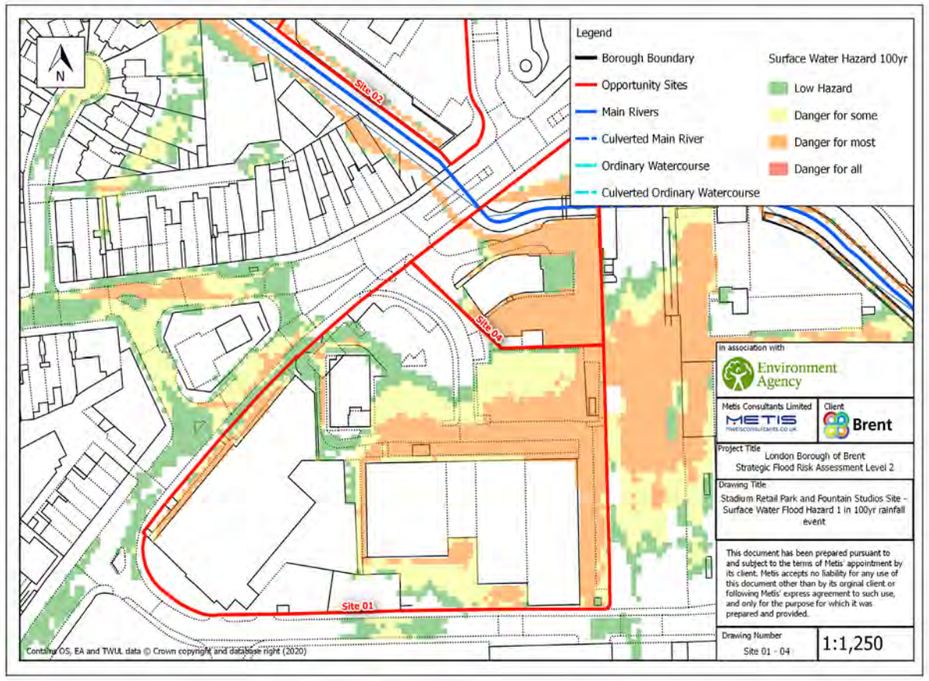


Figure 5 - Thames Water Sewer Flood Map

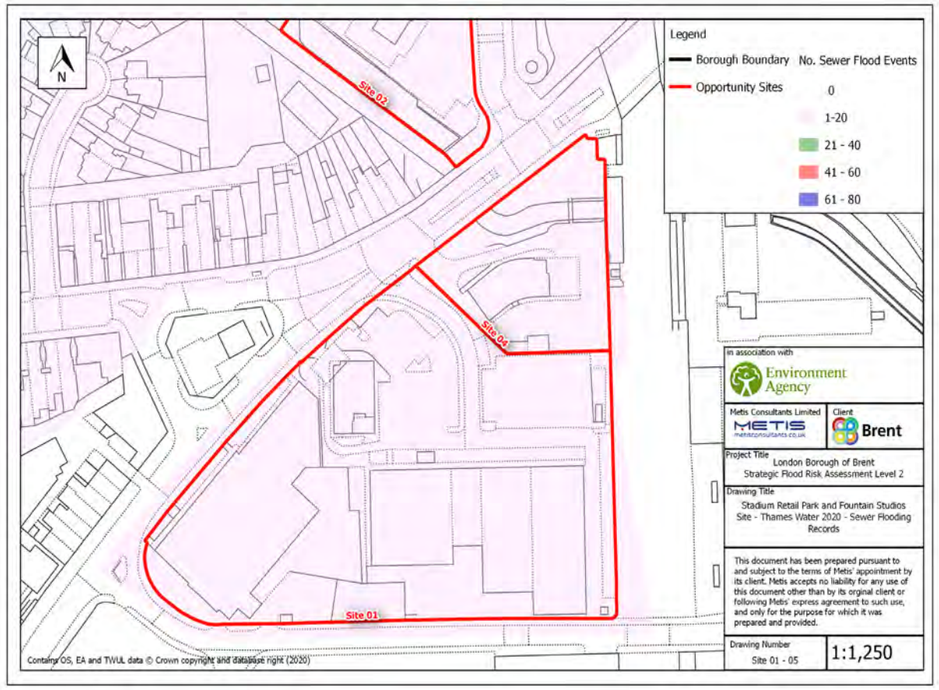


Figure 6 - Areas Susceptible to Groundwater Flooding Map

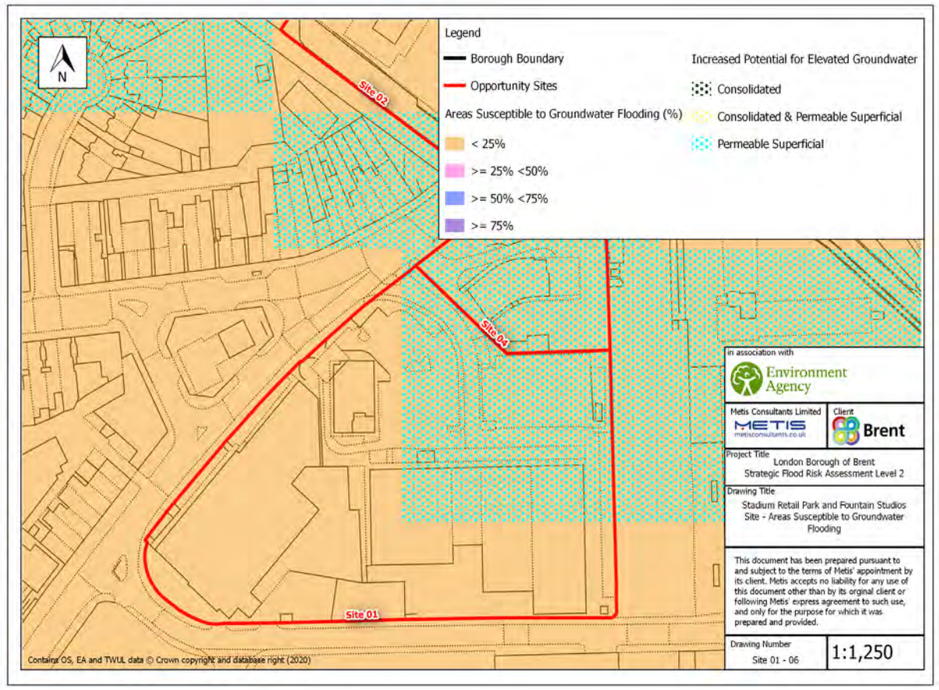
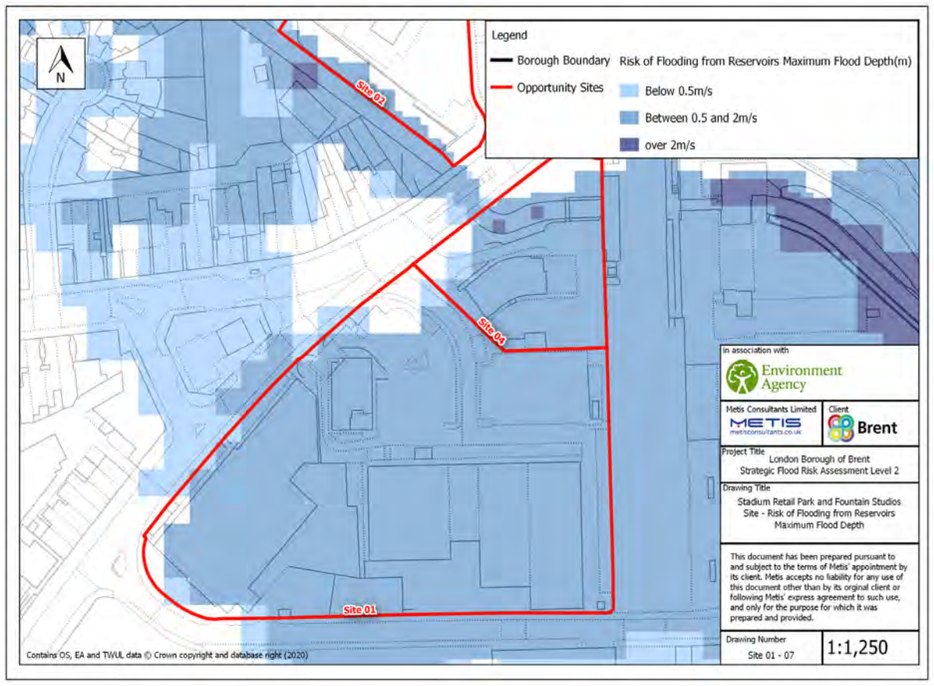


Figure 7 - Outline Reservoir Flood Map



SITE ASSESSMENT - BROOK AVENUE - BCSA3

Address:	Brook Avenue, Wembley, London, HA9 9AA
Area:	1.9 **Ha**
Site Reference:	2

Current Use	Proposed Use
Big Site - Residential buildings Small Site - Building used for dwellings (hotel)	Residential

Current Vulnerability Classification	Proposed Vulnerability Classification
More Vulnerable	More Vulnerable

Current Risk Summary					
Fluvial / Tidal			**Groundwater**		
FZ2	65	% of Site	<25	100	% of Site
FZ3a	54	% of Site	25-50	0	% of Site
FZ3b	5	% of Site	50-75	0	% of Site
Surface Water			>75	0	% of Site
30yr	21	% of Site	**Artificial**		
100yr	65	% of Site	Reservoir	Yes	At risk?
1000yr	71	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents	0				

Flood Defences

N/A - the site is not in an area benefitting from flood defences.

FLUVIAL / TIDAL

Risk Assessment (Defended)

Parameter	FZ3b	FZ3a	*FZ3a+CC	Units
Speed of inundation	6.5**	5**	4**	Hrs
Min. Depth	0	0	0	m
Max. Depth	1.9	2.8	3.7	m
Max. Velocity	1.4	1.3	1.2	m/s
Max Flood Level	31.46	23.3	33.03	m AOD
Max Ground Level	37.01	37.01	37.01	m AOD
Min Ground Level	29.71	29.71	29.71	m AOD
Flood Hazard	Danger for All	Danger for All	Danger for All	N/A
Duration of Flood	12+**	13.5+**	14.5**	Hrs

* The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)

Parameter	FZ3a	*FZ3a+CC	Units
Speed of inundation	5**	4**	Hrs
Min. Depth	0	0	m
Max. Depth	2.8	3.7	m
Max. Velocity	1.3	1.2	m/s
Max. Hazard	Danger for All	Danger for All	N/A
Duration of Flood	13.5+**	14.5**	Hrs

Description of Flood Mechanism

- Flooding originates from Wealdstone Brook, inundating sites from the south. The flooding extent covers the entirety of the big site bar north eastern segment of the site. The predicted extent only covers a small segment of the small site by the southern boundary.
- The flood risk extent for the climate change scenario is greater. The flooding extent covers a greater proportion of the big site compared to the current scenario. There is minimal predicted change in flood risk for the small site.

**The site boundary extends into the river channel, placing it by default into Flood Zone 3b (1 in 20 year), 3a (1 in 100 year), and 3a + CC (1 in 100 year + CC). However, as the site is at predicted risk of flooding, we have assessed the flood inundation and flood duration based on when flooding exceeds the river channel extent and further encroaches onto the site. All other data has been assessed based on the overlap of the Brook and site extents.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

- Less than 20% of the large site on Brook Avenue lies within Flood Zone 1. This is largely in the north eastern extent of the site, providing safe routes within the development at ground floor level.
- Almost 100% of the small site lies within Flood Zone 1. Safe routes within the development will be available at ground floor level to the north, east and west of the site.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

- See SFRA - Level 2 Report Sections 4.1.1, 4.1.2, 4.1.3 and 4.1.4 for further requirements.
- To mitigate against the deep maximum flood depths, proposed developments on the big site should only take place in the north eastern area of the site.
- See SFRA - Level 2 Report Section 4.1.6 for Main River requirements.
- Develop separate Flood Emergency and Evacuation Plans for both sites.
- Site users should be signed up to EA's Flood Warning Service.

SURFACE WATER

Risk Assessment

Parameter	30yr	100yr	*1000yr	Units
Min. Depth	0 - 0.15	0 - 0.15	0 - 0.15	m
Max. Depth	>1.20	>1.20	>1.20	m
Max. Velocity	>2	>2	>2	m/s
Max. Hazard	>2	>2	>2	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

- Water flows from the northwest (along Forty Avenue) towards the big site. The site is below Brook Avenue as water flows towards Wealdstone Brook. The small site is higher than the immediate area and is at a lower risk of surface water flooding.
- CC increases slightly increases the flood extent for both sites, but not the velocity, hazard or maximum depth of flooding.

Figure 3 - RoFSW Flood Depth Map

Site Access / Egress

- Safe access and egress routes for the large site should be directed towards the north eastern extent of the site, on to Brook Avenue.
- Safe access and egress routes for the small site should be directed towards the western area of the site, on to Brook Avenue.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Flood Risk Requirements

- See SFRA - Level 2 Report Sections 4.1.2, 4.1.3 and 4.1.4.
- Minimise flood storage lost by limiting development to the northeast of the site and to the small site.
- Basement developments limited to non-dwelling uses.

Mitigation - Surface Water Drainage

- A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS.
- The site is underlain by London Clay - ground investigations are required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - BROOK AVENUE - BCSA3

SEWER

Risk Assessment

• The area is served by separate surface water and foul sewer networks.
• Both sites fall within a post code district where there are no reported flood incidents from sewer flooding.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

No mitigation measures required.

GROUNDWATER

Risk Assessment

• Both sites fall in an area that is classified as having <25% susceptibility to groundwater flooding.
• The sites fall within a 'Permeable Superficial' area with regards to Increased Potential for Elevated Groundwater. The sites are in close proximity to the Wealdstone Brook, which is underlain by an alluvium (clay, silt, sand and gravel) superficial deposit geology.

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

No mitigation measures required.

ARTIFICIAL

Risk Assessment

• There is risk of flooding from the Brent (Welsh Harp) Reservoir.
• The big site is predicted to flood between 0.3-2m with some areas greater than 2m dept in result of reservoir failure. The small site is predicted to flood between 0.3-2m depth in the south of the site.
• Reservoir failure flood speeds would be below 0.5 m/s for the majority of the sites. Some locations in the south of the sites may have flood speeds between 0.5-2m/s.

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

Local Authority Emergency Planning Officers must be consulted to create a reservoir failure emergency and evacuation plan.

PLANNING CONSIDERATIONS

Safety of Development

Can the development be future proofed for climate change considerations?
• Yes. See SFRA - Level 2 Report Sections 4.1.2 and 4.1.3 for the required finished floor levels and flood resistant / resilient building requirements.

Can the development be designed safe throughout its lifetime without increasing flood risk elsewhere?
• Yes - The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation.
• See SFRA - Level 2 Report Section 4.1.4 for compensatory flood storage requirements.

What is the cumulative impact of the development land use change and will flood risk increase?
• The development land use is not changing.
• Both sites are currently brownfield sites. Developments are unlikely to increase flood risk unless there are changes to the site's greenfield spaces or if there are significant changes to the topography.

How can the development reduce risk overall?
• Directing development towards the north eastern area of the large site only. Alternatively, implement finished floor levels of at least 0.3m above predicted flood depths at that point should be implemented (See SFRA - Level 2 Report).
• The site is unlikely to control runoff from the site. New development can provide greater management of runoff through the introduction of SuDS (See Mitigation - Surface Water Drainage).
• An emergency evacuation plan must be created for the event of a reservoir failure.
• No basement dwelling developments. Non-dwelling basements developments may be appropriate at some locations onsite, but a site-specific Flood Risk Assessment must be completed and the basement must not have any adverse impacts on flooding locally during a 1 in 100 year fluvial and surface water events. Basements must contain an egress route to a higher floor above the predicted Flood Zone 3a + CC fluvial and 1 in 1000 year surface water flood depths. Basements should be made flood resilient.

Will development require a flood risk activity permit / ordinary watercourse consent?
• Yes - Site is within 8m of the Wealdstone Brook - See SFRA - Level 2 Report Section 4.1.6

Exception Test

Developments can be made safe throughout their lifetime across both sites without increasing flood risk elsewhere (See Safety of Development box). Mitigation measures to protect proposed developments against deep maximum fluvial flood depths can be implemented (See Mitigation / FRA Requirements). The site could also reduce flood risk overall with appropriate SuDS and flood storage compensation measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
• No developments in Flood Zone 3b extent. • Development should be directed towards the north eastern area of the large site. Finished floor levels must be at least 0.3m above predicted flood levels and flood plain compensation provided.	• Proposed developments should take place at least 8m away from the Wealdstone Brook. • Flood resistance and resilience construction of buildings is required. • Flood Emergency and Evacuation Plans for both sites.
Surface Water	
Developments within the 1 in 1000 year surface water extent require finished floor levels of at least 0.3m above the predicted flood level at that point. Floor level should be set to Flood Zone 3a + CC extent flood levels if predicted fluvial depths are higher.	• Flood plain compensation must be provided for events up to a 1 in 1000 year event. • Both sites should introduce SuDS to manage surface water runoff.
Sewer	
No mitigation measures required.	
Groundwater	
No mitigation measures required.	
Artificial	
Emergency planning officers must be consulted to create a reservoir failure emergency and evacuation plan.	

Figure 1 - Fluvial Flood Depth Map

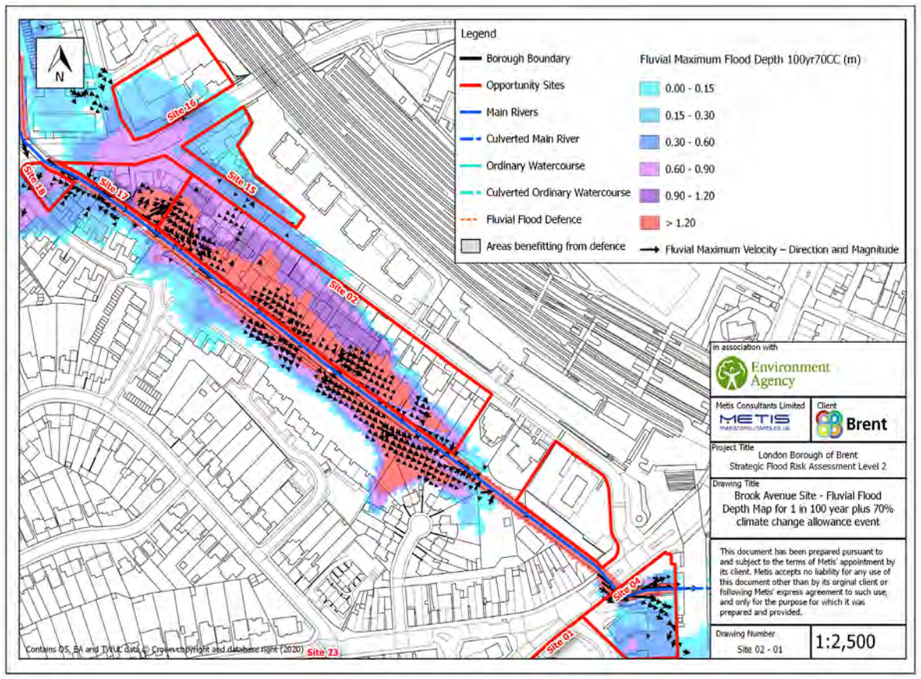


Figure 2 - Fluvial Flood Hazard Map

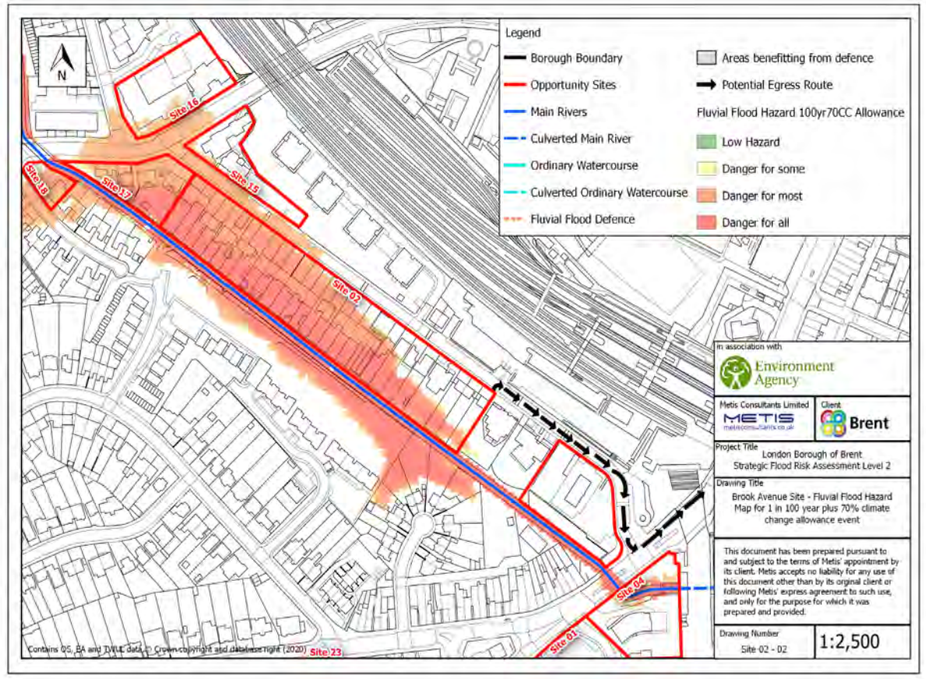


Figure 3 - RoFSW Flood Depth Map

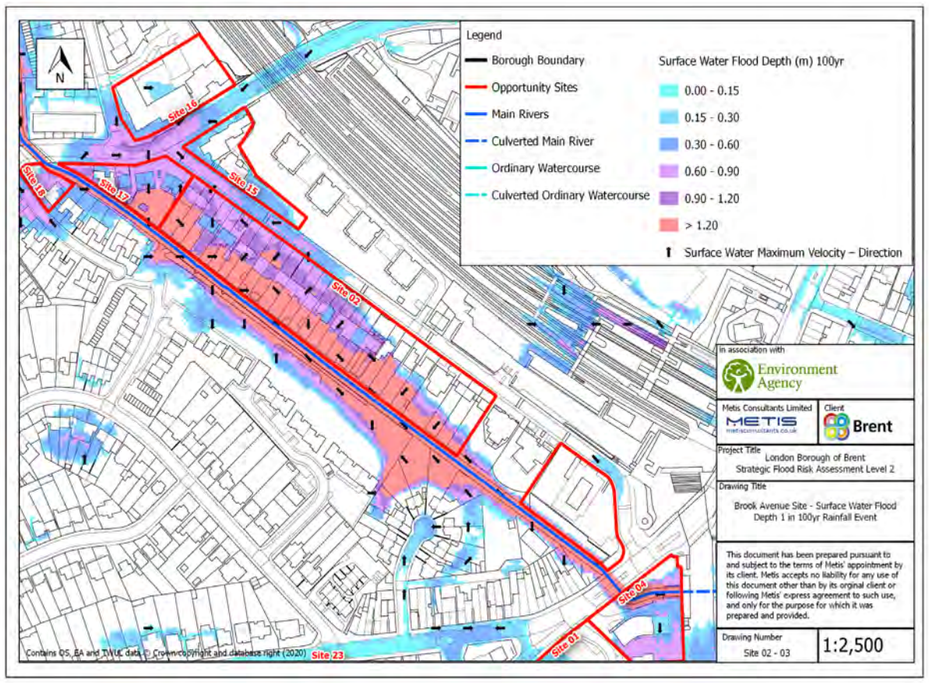


Figure 4 - RoFSW Flood Hazard Map

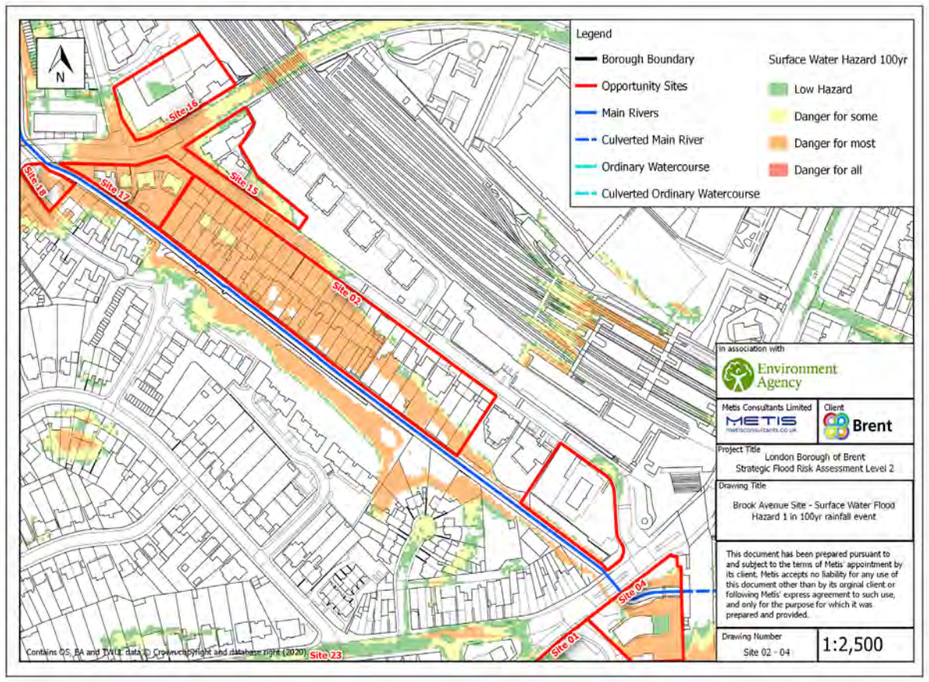


Figure 5 - Thames Water Sewer Flood Map

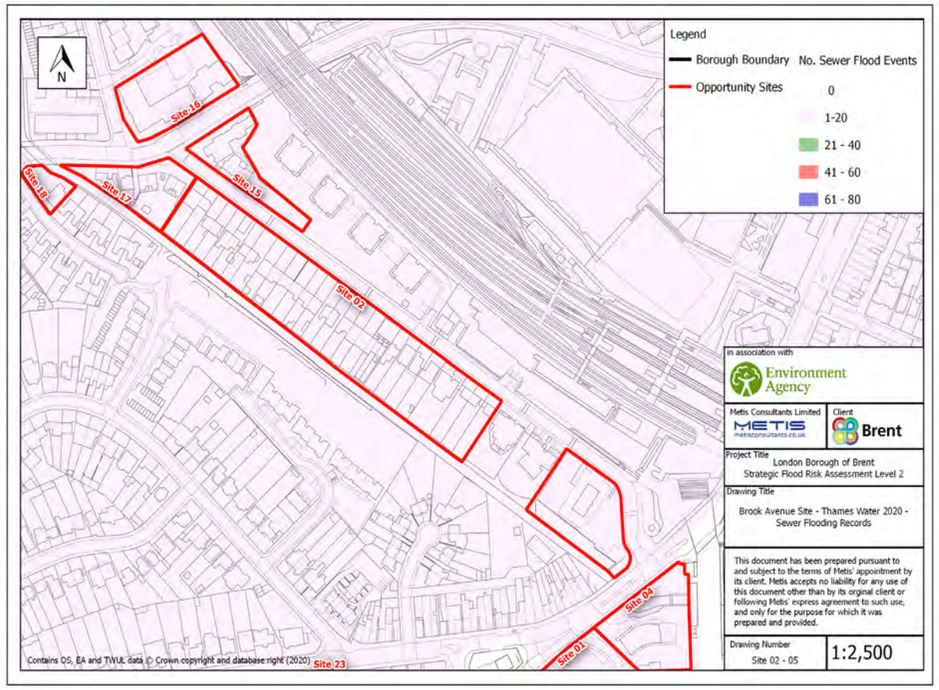


Figure 6 - Areas Susceptible to Groundwater Flooding Map

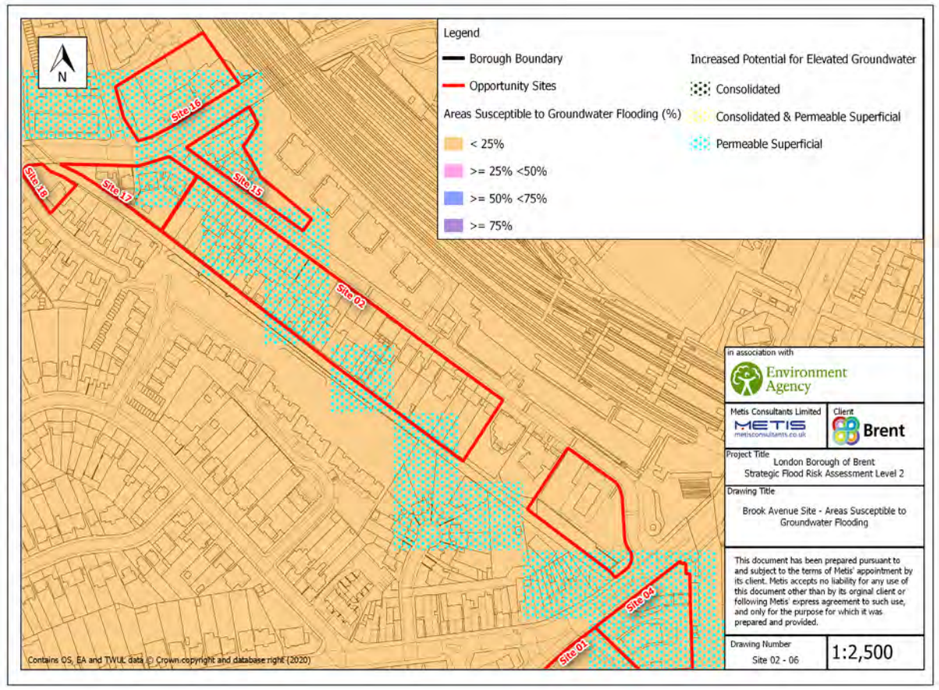
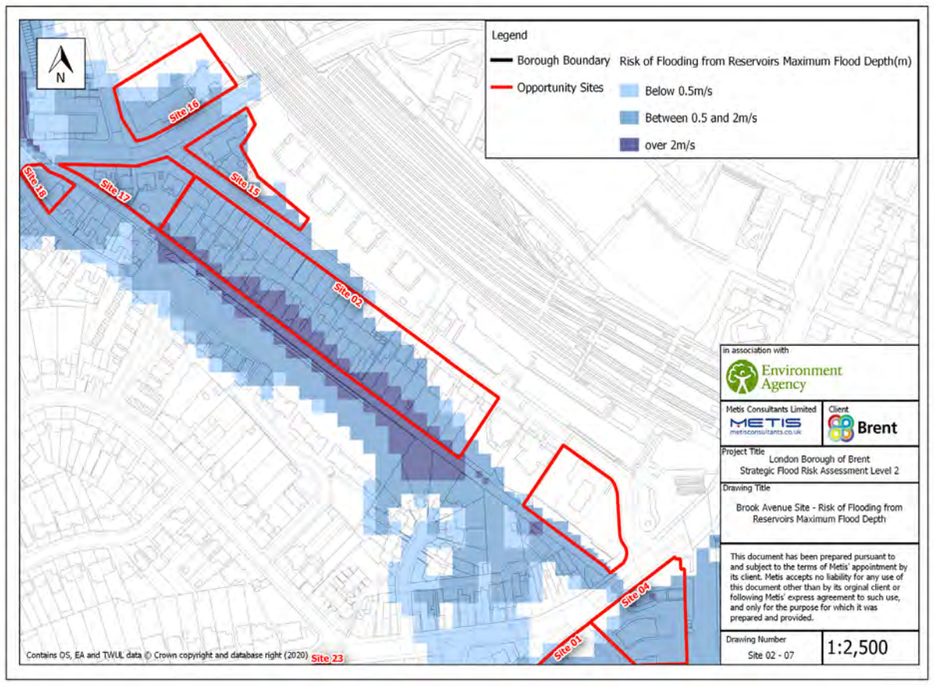


Figure 7 - Outline Reservoir Flood Map



SITE ASSESSMENT - WATKIN ROAD - BCSA6

Address:	Watkin Road, Wembley, HA9 0NL
Area:	1.41 **Ha**
Site Reference	3

Current Use	Proposed Use
Industrial Area	Residential and Industrial

Current Vulnerability Classification	Proposed Vulnerability Classification
Less Vulnerable	More Vulnerable / Less Vulnerable

Current Risk Summary					
Fluvial / Tidal			**Groundwater**		
FZ2	88	% of Site	<25%	100	% of Site
FZ3a	17	% of Site	25-50	0	% of Site
FZ3b	0	% of Site	50-75	0	% of Site
Surface Water			>75	0	% of Site
30yr	10	% of Site	**Artificial**		
100yr	18	% of Site	Reservoir	Yes	At risk?
1000yr	96	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents	0				

Flood Defences

N/A - the site is not in an area benefitting from flood defences.

FLUVIAL / TIDAL

Risk Assessment (Defended)

Parameter	FZ3b	FZ3a	*FZ3a+CC	Units
Speed of inundation	6.5	5	3.5	Hrs
Min. Depth	0	0	0	m
Max. Depth	0.1	0.8	1.8	m
Max. Velocity	0	0.7	1.1	m/s
Max Flood Level	29.84	30.69	31.77	m AOD
Max Ground Level	33.13	33.13	33.13	m AOD
Min Ground Level	27.47	27.47	27.47	m AOD
Flood Hazard	Low Hazard	Danger for Most	Danger for All	N/A
Duration of Flood	12+	13.5+	15+	Hrs

* The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)

Parameter	FZ3a	*FZ3a+CC	Units
Speed of inundation	5	3.5	Hrs
Min. Depth	0	0	m
Max. Depth	0.8	1.8	m
Max. Velocity	0.7	1.1	m/s
Max. Hazard	Danger for Most	Danger for All	N/A
Duration of Flood	13.5+	15+	Hrs

Description of Flood Mechanism

- The site is adjacent to the Wealdstone Brook. The flooding originates from the Brook, inundating the site from the north. The flooding extent covers the northern region of the site and flows towards the centre.
- The flood risk extent for the climate change scenario is significantly greater. The flooding extent covers a greater proportion of the site, with only the south eastern and south western areas of the site outside of the flood extent. The depths and flow velocities are also higher under climate change.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

- The entirety of the southern extent of the site is not at predicted risk of flooding for the 1 in 100 year event.
- The site borders Albion Road and Fulton Road to the west and south respectively. A safe access and egress route would need to be directed to the west and south of the site, where the risk is lowest.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

- See SFRA - Level 2 Report Sections 4.1.1, 4.1.2, 4.1.3 and 4.1.4 for further requirements.
- See SFRA - Level 2 Report Section 4.1.6 for Main River requirements.
- A Flood Emergency and Evacuation Plan is required.
- Site users should be signed up to EA's Flood Warning Service.

SURFACE WATER

Risk Assessment

Parameter	30yr	100yr	*1000yr	Units
Min. Depth	0 - 0.15	0 - 0.15	0 - 0.15	m
Max. Depth	0.3 - 0.6	>1.20	>1.20	m
Max. Velocity	0.5 - 1.0	>2	>2	m/s
Max. Hazard	1.25 - 2.00	>2	>2	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

- The site is at topographical low point, with the overland flow path towards the site coming from the east and west along Fulton road.
- The flood risk extent for the climate change scenario is significantly greater, placing a majority of the site at risk of surface water flooding. The depths and flow velocities do not increase under climate change.

Figure 3 - RoFSW Flood Depth Map

Site Access / Egress

- The flow path on to site comes from Fulton Road, making an exit on to Fulton Road potentially hazardous.
- If he site is at risk of surface water flooding, safe access and egress routes for the site should be directed towards the west of the site, on to Albion Road.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Flood Risk Requirements

- See SFRA - Level 2 Report Sections 4.1.2, 4.1.3 and 4.1.4 for further requirements.
- Basement developments limited to non-dwelling uses.

Mitigation - Surface Water Drainage

- A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS.
- The site is underlain by London Clay - ground investigations are required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - WATKIN ROAD - BCSA6

SEWER

Risk Assessment

• The area is served by separate surface water and foul sewer networks.
• The site falls within a post code area where there are no reported flood incidents from sewer flooding.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

No site specific requirements.

GROUNDWATER

Risk Assessment

• The site falls in an area that is classified as having <25% susceptibility to groundwater flooding.
• The site partially falls within a 'Permeable Superficial' area with regards to Increased Potential for Elevated Groundwater. The sites are in close proximity to the Wealdstone Brook, which is underlain by an alluvium (clay, silt, sand and gravel) superficial deposit geology.

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

No mitigation measures required.

ARTIFICIAL

Risk Assessment

• There is risk of flooding from the Brent (Welsh Harp) Reservoir.
• The site is predicted to flood over 2m depth in result of reservoir failure, for the majority of the site. Some locations are predicted to flood between 0.3-2m depth.
• Reservoir failure flood speeds would be between 0.5-2m/s for the majority of the site

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

Local Authority Emergency Planning Officers must be consulted to create a reservoir failure emergency and evacuation plan.

PLANNING CONSIDERATIONS

Safety of Development

Can the development be future proofed for climate change considerations?
• Yes. See SFRA - Level 2 Report Sections 4.1.2 and 4.1.3 for the required finished floor levels and flood resistant / resilient building requirements.

Can the development be designed safe throughout its lifetime without increasing flood risk elsewhere?
• Yes - The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation.
• See SFRA - Level 2 Report Section 4.1.4 for compensatory flood storage requirements.

What is the cumulative impact of the development land use change and will flood risk increase?
• The development land use is changing to a more vulnerable classification, going from 'Less Vulnerable' to 'More Vulnerable' with the introduction of residential developments.
• The site is currently a brownfield site. Development is unlikely to increase overall flood risk unless there are significant changes to the topography.

How can the development reduce risk overall?
• Directing development towards the southern extent of the site where maximum flood depths are lower. Finished floor levels of at least 0.3m above predicted flood depths at that point should be implemented (See SFRA - Level 2 Report Requirements).
• The age of the site means that it is unlikely to control runoff from the site. New development can provide greater management of runoff through the introduction of SuDS (See Mitigation - Surface Water Drainage).
• An emergency evacuation plan must be created
• No basement dwelling developments. Basements developments, that are not basement dwellings, may be appropriate at some locations onsite, but a site-specific Flood Risk Assessment must be completed and the basement must not have any adverse impacts on flooding locally during a 1 in 100 year fluvial and surface water events. Basements must contain an egress route to a higher floor above the predicted Flood Zone 3a + CC fluvial and 1 in 1000 year surface water flood depths. Basements should be made flood resilient.

Will development require a flood risk activity permit / ordinary watercourse consent?
• Yes - the site is within 8m of the Wealdstone Brook (main river). Refer Level 2 SFRA Section 4.1.6 for further reqirements

Exception Test

Proposed developments can be made safe throughout their lifetime without increasing flood risk elsewhere (See Safety of Development box). Mitigation measures to protect proposed developments against deep maximum fluvial flood depths can be implemented (See Mitigation / FRA Requirements). The site could also reduce flood risk overall with appropriate SuDS and flood storage compensation measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
Development should be directed towards the southern extent of the site where maximum flood depths are lower. Finished floor levels must be at least 0.3m above predicted flood levels and flood plain compensation provided.	• Flood resistance and resilience construction of buildings is required where flood levels are less than 0.3m and more than 0.3m respectively. • Flood Emergency and Evacuation Plan.
Surface Water	
Developments within the 1 in 1000 year surface water extent require finished floor levels of at least 0.3m above the predicted flood level at that point. Floor level should be set to Flood Zone 3a + CC extent flood levels if predicted fluvial depths are higher.	• Flood plain compensation must be provided. • Both sites should introduce SuDS to manage surface water runoff.
Sewer	
No mitigation measures are required.	
Groundwater	
No mitigation measures required.	
Artificial	
Emergency planning officers must be consulted to create a reservoir failure emergency and evacuation plan.	

Figure 1 - Fluvial Flood Depth Map

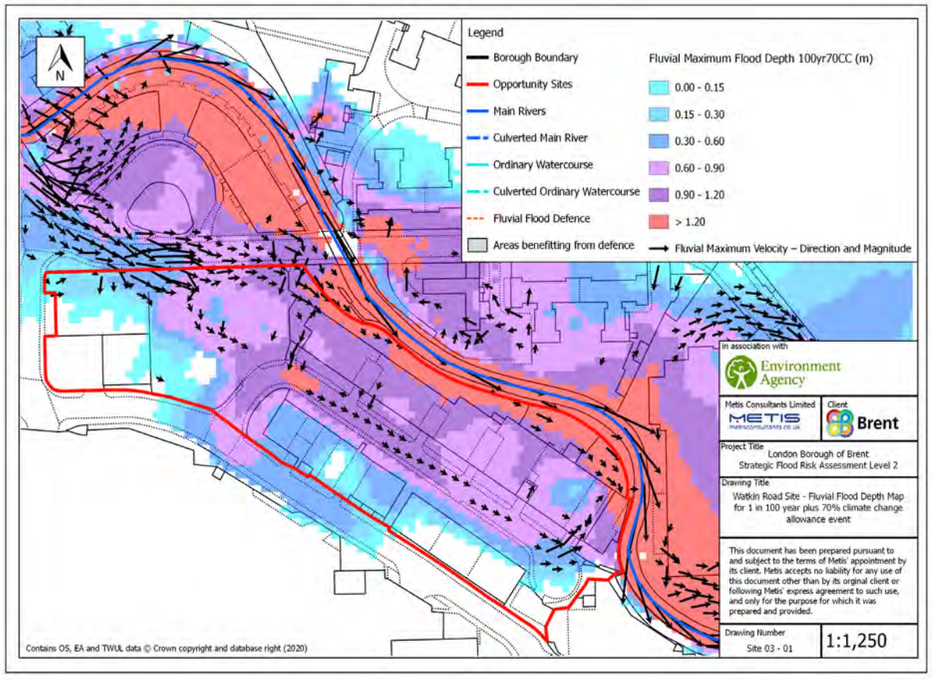


Figure 2 - Fluvial Flood Hazard Map

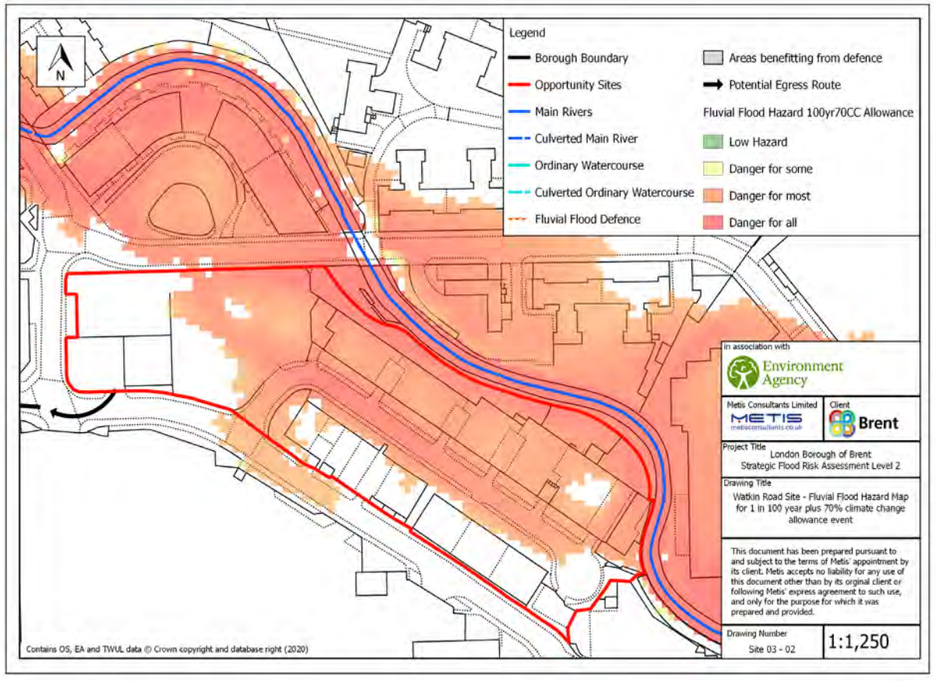


Figure 3 - RoFSW Flood Depth Map

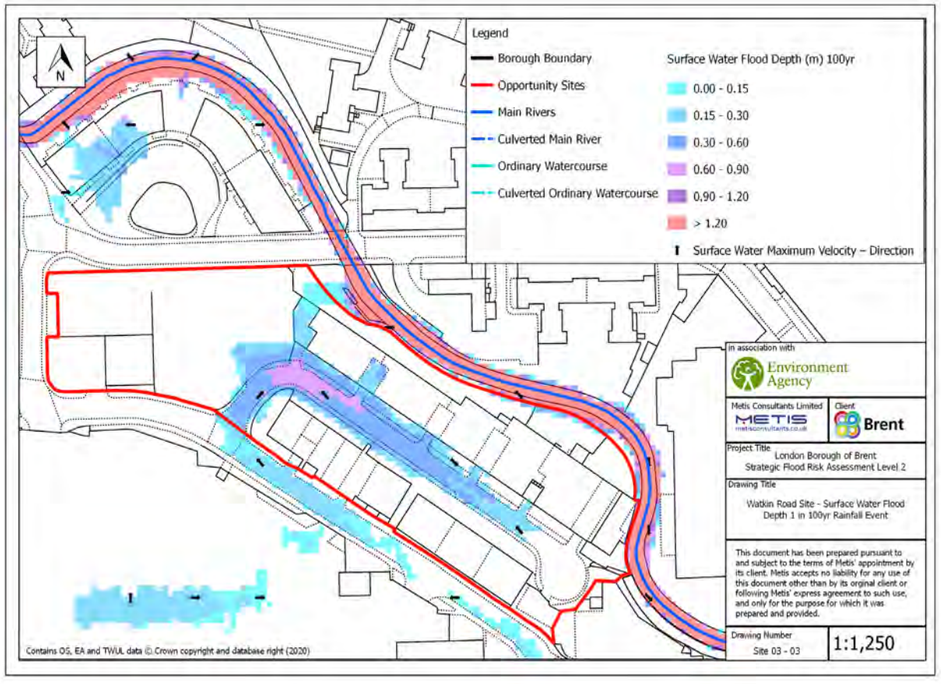


Figure 4 - RoFSW Flood Hazard Map

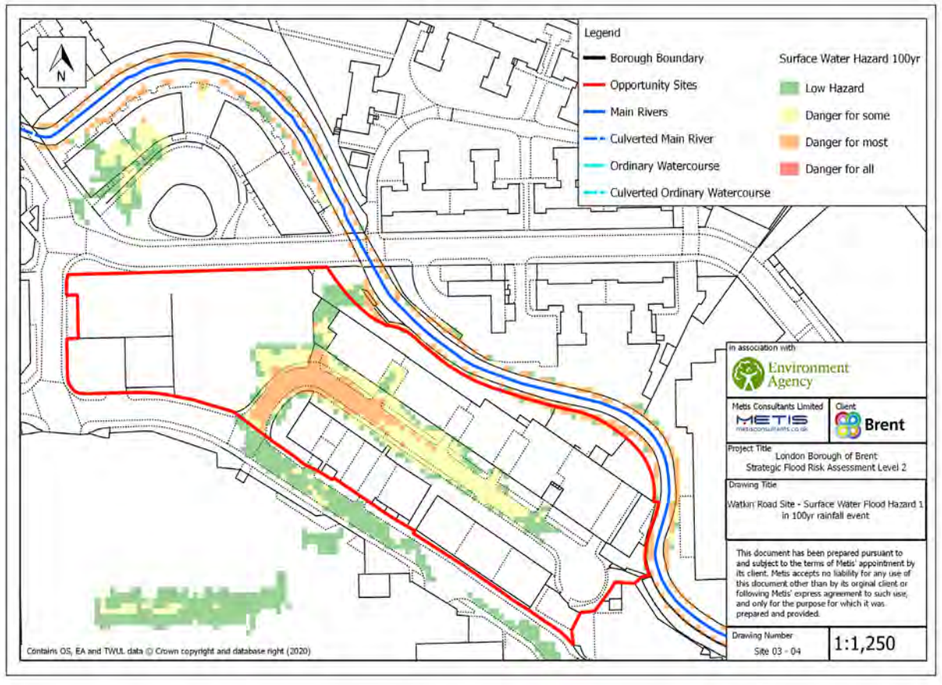


Figure 5 - Thames Water Sewer Flood Map

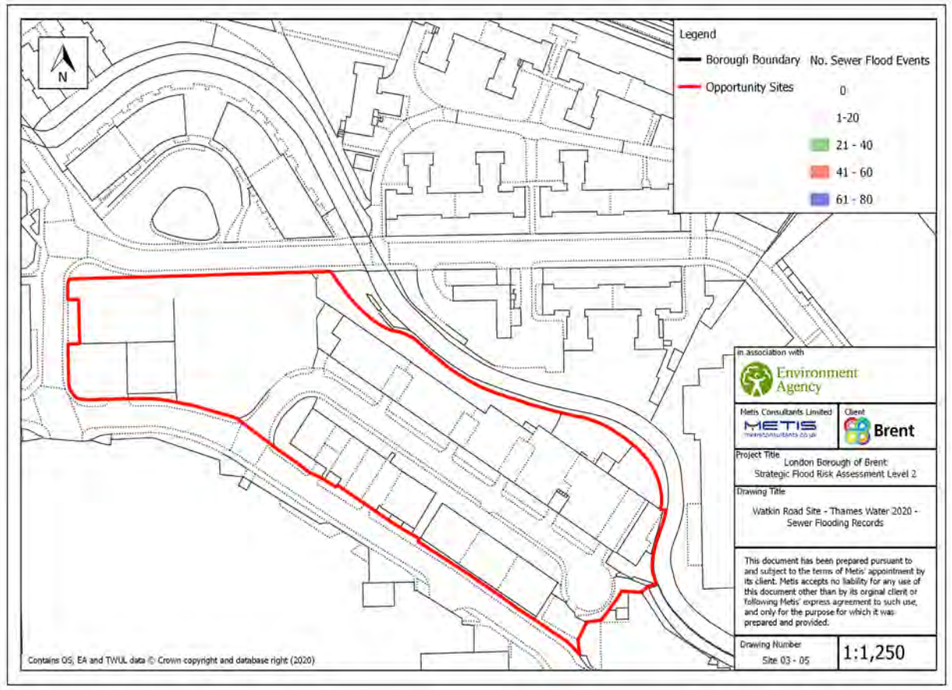


Figure 6 - Areas Susceptible to Groundwater Flooding Map

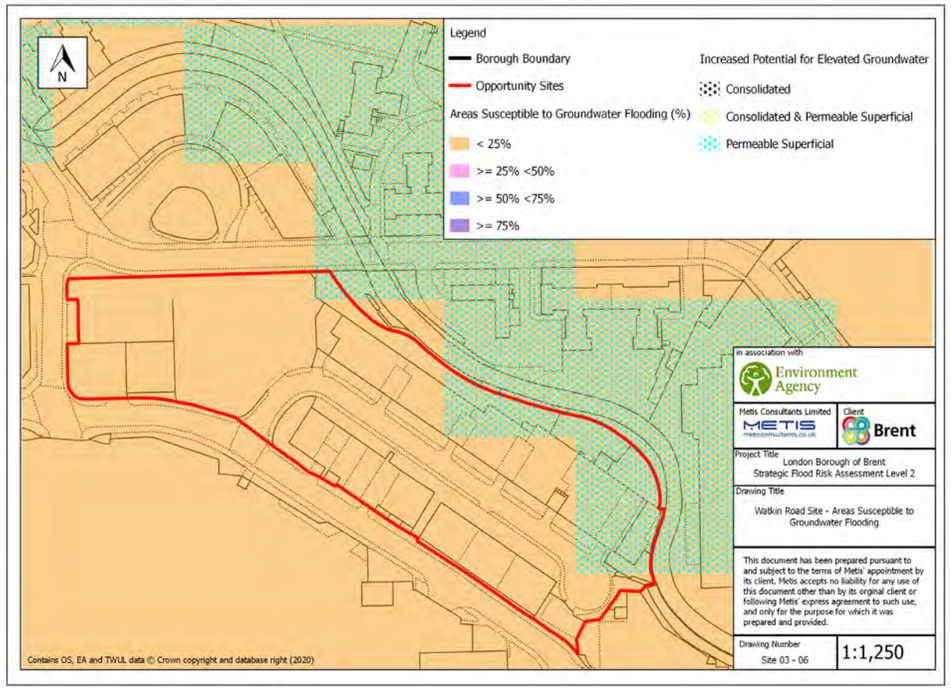
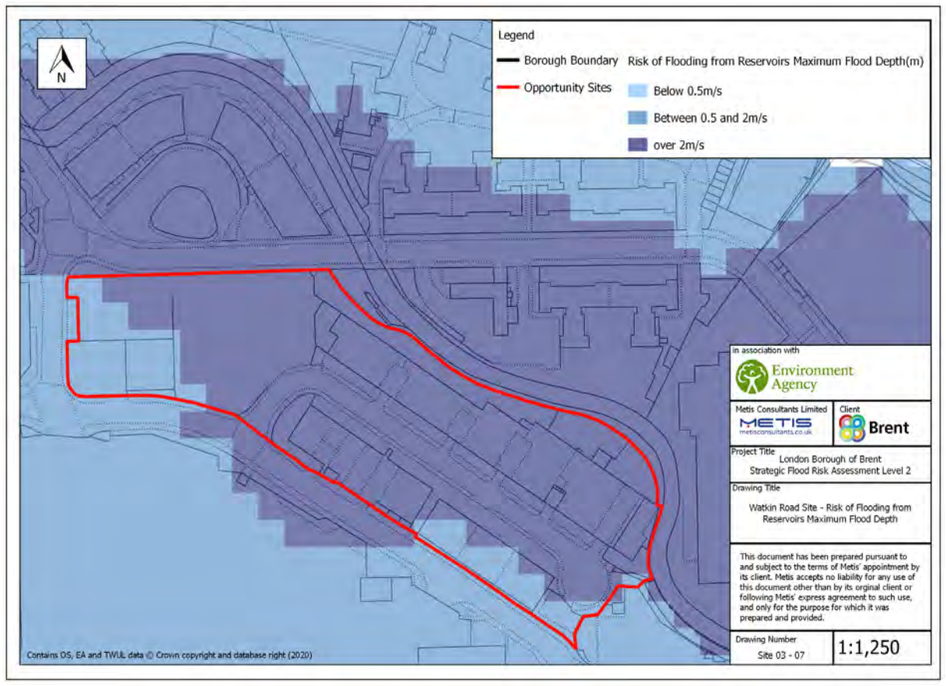


Figure 7 - Outline Reservoir Flood Map



SITE ASSESSMENT - COLLEGE OF NORTH WEST LONDON WEMBLEY - BSCA11

Address:	College of North West London Wembley, Wembley, HA9
Area:	0.37 **Ha**
Site Reference :	4

Current Use	Proposed Use
Non-residential use - educational establishment	Mixed-use

Current Vulnerability Classification	Proposed Vulnerability Classification
More Vulnerable	More Vulnerable

Current Risk Summary					
Fluvial / Tidal			**Groundwater**		
FZ2	79	% of Site	<25	100	% of Site
FZ3a	17	% of Site	25-50	0	% of Site
FZ3b	16	% of Site	50-75	0	% of Site
Surface Water			>75	0	% of Site
30yr	36	% of Site	**Artificial**		
100yr	68	% of Site	Reservoir	Yes	At risk?
1000yr	89	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents		1-20			

Flood Defences
N/A - the site is not in an area benefitting from flood defences.

FLUVIAL / TIDAL

Risk Assessment (Defended)				
Parameter	**FZ3b**	**FZ3a**	***FZ3a+CC**	**Units**
Speed of inundation	7	5.5	4	Hrs
Min. Depth	0	0	0	m
Max. Depth	2.9	3.9	4.6	m
Max. Velocity	2.3	2.1	2.5	m/s
Max Flood Level	30.98	31.92	32.67	m AOD
Max Ground Level	35.08	35.08	35.08	m AOD
Min Ground Level	29.32	29.32	29.32	m AOD
Flood Hazard	Danger for all	Danger for all	Danger for all	N/A
Duration of Flood	1	5	14.5+	Hrs

* The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)			
Parameter	**FZ3a**	***FZ3a+CC**	**Units**
Speed of inundation	5	4	Hrs
Min. Depth	0	0	m
Max. Depth	3.9	4.6	m
Max. Velocity	2.2	2.5	m/s
Max. Hazard	Danger for all	Danger for all	N/A
Duration of Flood	5.5	14.5+	Hrs

Description of Flood Mechanism
• The Wealdstone Brook flows from west to east through the northern half of the site. Flooding from the Wealdstone Brook inundates the site either side of the Brook. • Flooding is restricted to the immediate area either side of the Wealdstone Brook for the 1 in 100 year (Flood Zone 3a) event. • The flood risk extent for the climate change scenario is greater, with flooding predicted to impact a majority of the site. Flow velocities and maximum flood depths are also higher under climate change.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress
• Approximately 20% of the site lies outside of the Flood Zone 3a + CC extent. This is in the most westerly and most north-westerly extents of the site. • The site borders Wembley Park Drive to the west. Safe access and egress routes would need to be directed to the west in the area south of the Wealdstone Brook, and to the north-west in the area north of the Wealdstone Brook.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements
• Yes. See SFRA - Level 2 Report Sections 4.1.1, 4.1.2, 4.1.3 and 4.1.4 for further requirments. • See SFRA - Level 2 Report Section 4.1.6 for Main River requirements. • A Flood Emergency and Evacuation Plan is required. • Site users should be signed up to EA's Flood Warning Service.

SURFACE WATER

Risk Assessment				
Parameter	**30yr**	**100yr**	***1000yr**	**Units**
Min. Depth	0 - 0.15	0 - 0.15	0 - 0.15	m
Max. Depth	>1.20	>1.20	>1.20	m
Max. Velocity	>2	>2	>2	m/s
Max. Hazard	>2	>2	>2	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism
• Water enters the site from the Wealdstone Brook, which flows through the site. Water also enters the site from the east (along Olympic Way), and from the south (the Stadium Retail Park and Fountain Studios site). • CC will extensively increase the extent, depth, velocity and hazard of flooding.

Site Access / Egress
Safe access and egress routes for the site should be directed towards Wembley Park Drive, where the predicted risk is the lowest.

Figure 3 - RoFSW Flood Depth Map

Mitigation - Flood Risk Requirements
• Yes. See SFRA - Level 2 Report Sections 4.1.2, 4.1.3 and 4.1.4 for further requirments. • Development of the greenspace north of the Wealdstone Brook must be avoided.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Surface Water Drainage
• A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS. • The site is underlain by London Clay - ground investigations are required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - COLLEGE OF NORTH WEST LONDON WEMBLEY - BSCA11

SEWER

Risk Assessment

• The area is served by separate surface water and foul sewer networks.
• The site falls within a post code district where there are between 1 - 20 reported flood incidents from sewer flooding.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

• Thames Water must be consulted to confirm if the site has historically flooded.
• If the site has historically flooded, the development must reduce the runoff to sewers from the site to greenfield rates or as close as possible to greenfield rates.

GROUNDWATER

Risk Assessment

• The sites fall within a 'Permeable Superficial' area with regards to Increased Potential for Elevated Groundwater. This is due the site's proximity to the Weladstone Brook, which is underlain by an alluvium (clay, silt, sand and gravel) superficial deposit geology.
• The site falls in an area that is classified as having <25% susceptibility to groundwater flooding.

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

No mitigation measures required.

ARTIFICIAL

Risk Assessment

• There is risk of flooding from the Brent (Welsh Harp) Reservoir, northeast of Gabrielle Close.
• Where there is flood risk, the site is predicted to flood between 0-2m depth in result of reservoir failure.
• Reservoir failure flood speed would be between 0-2m/s for the entire site.

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

Local Authority Emergency Planning Officers must be consulted to create a reservoir failure emergency and evacuation plan.

PLANNING CONSIDERATIONS

Safety of Development

Can the development be future proofed for climate change considerations?
• Yes. See SFRA - Level 2 Report Sections 4.1.2 and 4.1.3 for the required finished floor levels and flood resistant / resilient building requirements.

Can the development be designed safe throughout its lifetime without increasing flood risk elsewhere?
• Yes - The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation.
• See SFRA - Level 2 Report Section 4.1.4 for compensatory flood storage requirements.

What is the cumulative impact of the development land use change and will flood risk increase?
• The development land use is not changing to include more vulnerable uses.
• The site is currently permeable / not developed in the area north of the Wealdstone Brook. This area should not be developed, if possible. If it must be developed, it must be with less vulnerable uses.
• The site currently contains impermeable and permeable space. Development must mitigate any increase in impermeable area with runoff storage to prevent any increase in flood risk.

How can the development reduce risk overall?
• Finished floor levels of at least 0.3m above predicted flood depths at that point should be implemented (See Mitigation / FRA Requirements).
• The age of the site means that it is unlikely to control runoff from the site. New development can provide greater management of runoff through the introduction of SuDS (See Mitigation - Surface Water Drainage).
• An emergency evacuation plan must be created
• No basement dwellings developments. Non-dwelling basements developments may be appropriate at some locations onsite, but a site-specific Flood Risk Assessment must be completed and the basement must not have any adverse impacts on flooding locally during a 1 in 100 year fluvial and surface water events. Basements must contain an egress route to a higher floor above the predicted Flood Zone 3a + CC fluvial and 1 in 1000 year surface water flood depths. Basements should be made flood resilient.

Will development require a flood risk activity permit / ordinary watercourse consent?
• Yes - Site is within 8m of the Wealdstone Brook - See SFRA - Level 2 Report Section 4.1.6

Exception Test

Proposed developments can be made safe throughout their lifetime without increasing flood risk elsewhere (See Safety of Development box). Mitigation measures to protect proposed developments against deep maximum fluvial flood depths can be implemented (See Mitigation / FRA Requirements). The site could also reduce flood risk overall with appropriate SuDS and flood storage compensation measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
• No developments within Flood Zone 3b. • The proposed development must be located south of the Wealdstone Brook and outside of the 1 in 100 year extent (Flood Zone 3a).	• Developments within the Flood Zone 3a + CC extent require flood plain compensation and finished floor levels at least 0.3m above predicted flood levels. • Flood Emergency and Evacuation Plan required. • Site users should be signed up to EA's Flood Warning Service.
Surface Water	
Developments within the 1 in 1000 year surface water extent require finished floor levels of at least 0.3m above the predicted flood level at that point. Floor level should be set to Flood Zone 3a + CC extent flood levels if predicted fluvial depths are higher.	• Flood plain compensation must be provided. • Flood resistance and resilience measures are required where flood levels are less than 0.3m and more than 0.3m respectively. • Development by the northern boundary of the site should be avoided, if possible.
Sewer	
Thames Water must be consulted to confirm if the site has historically flooded.	If the site has historically flooded, the development must reduce the runoff to sewers to greenfield rates.
Groundwater	
No mitigation measures required.	
Artificial	
Emergency planning officers must be consulted to create a reservoir failure emergency and evacuation plan.	

Figure 1 - Fluvial Flood Depth Map

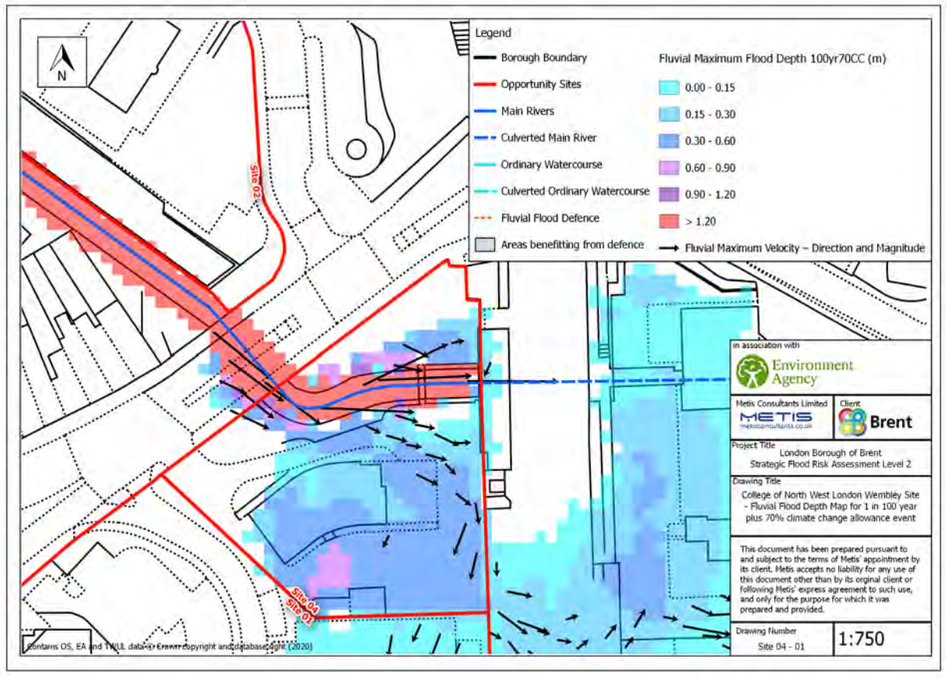


Figure 2 - Fluvial Flood Hazard Map

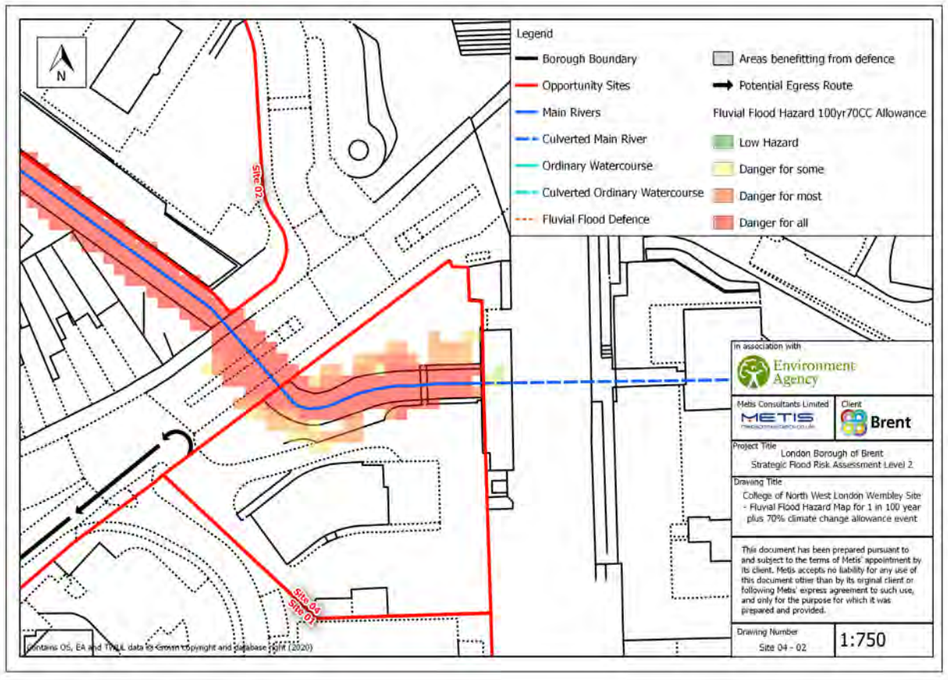


Figure 3 - RoFSW Flood Depth Map

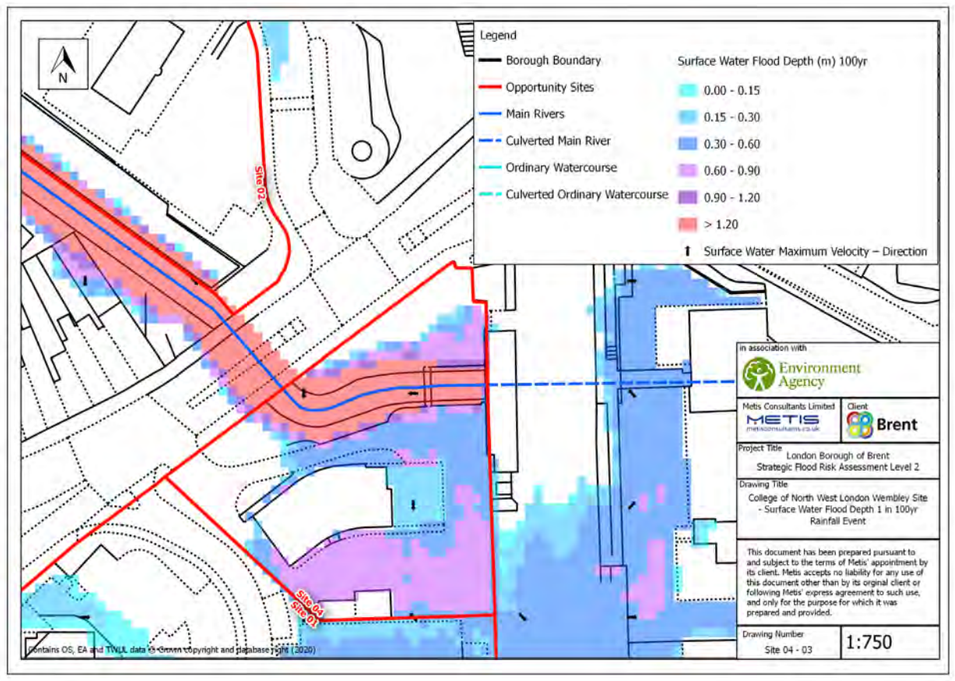


Figure 4 - RoFSW Flood Hazard Map

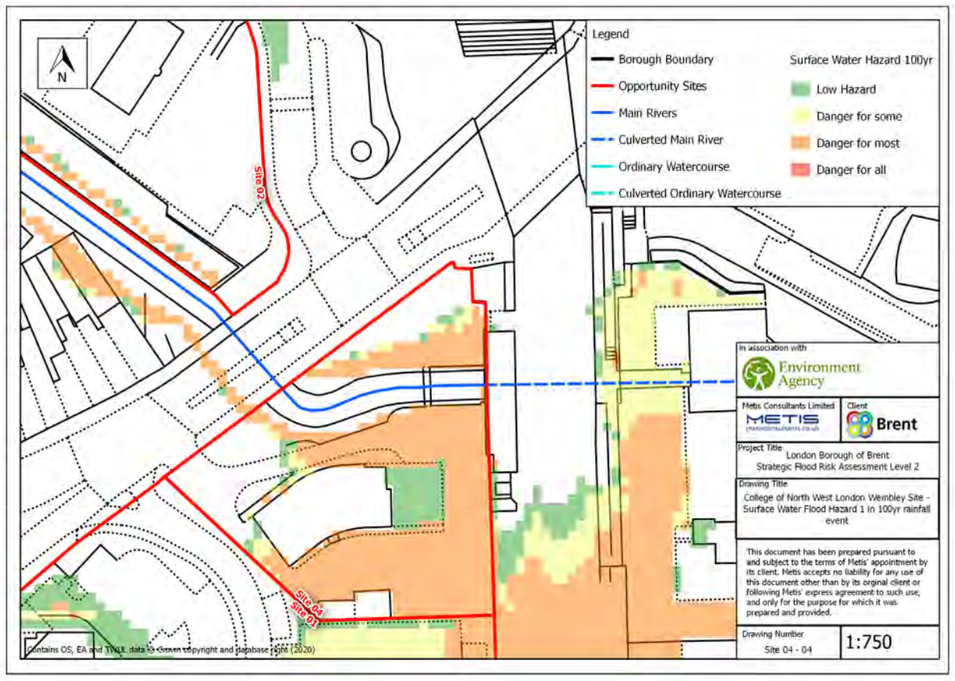


Figure 5 - Thames Water Sewer Flood Map

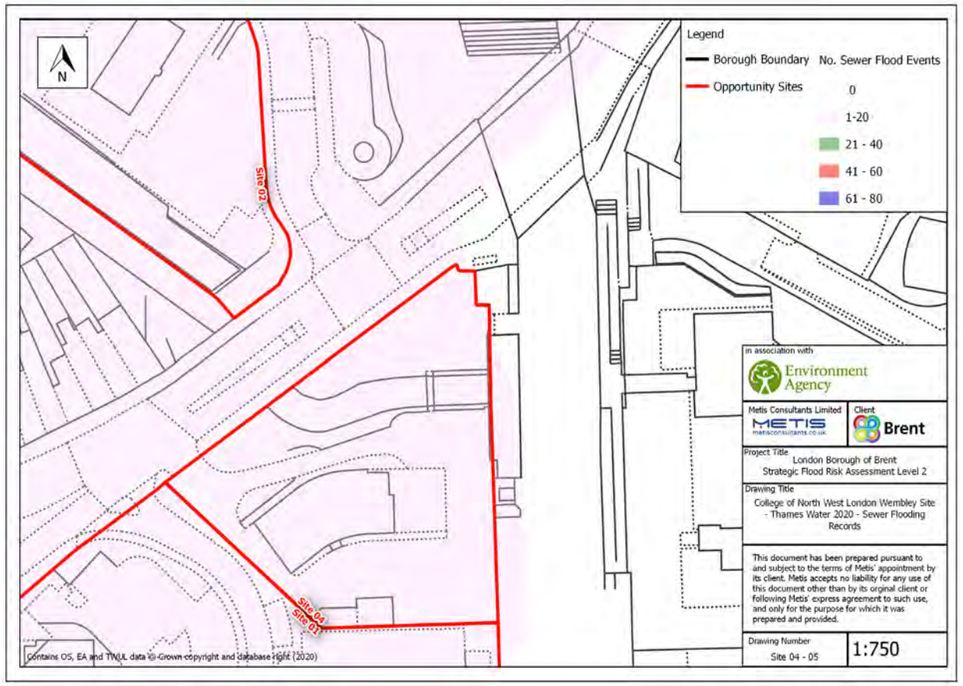


Figure 6 - Areas Susceptible to Groundwater Flooding Map

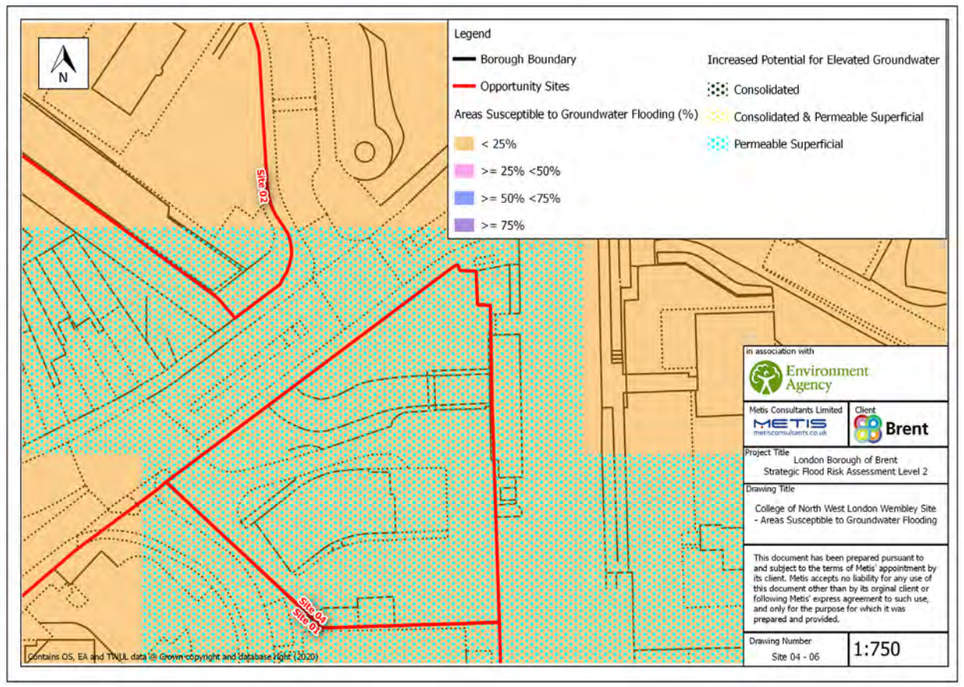
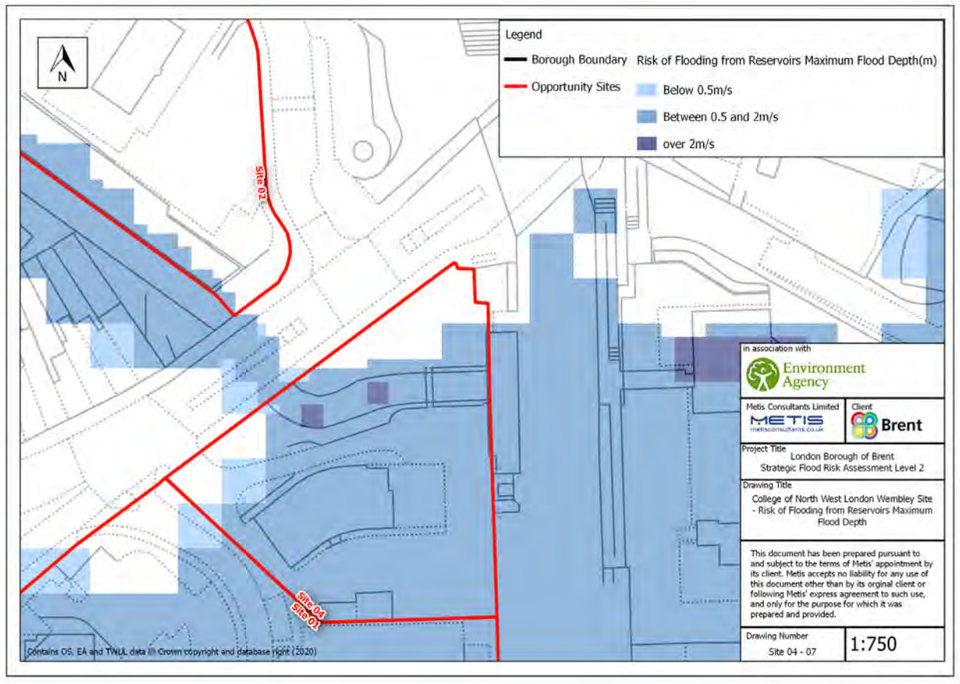


Figure 7 - Outline Reservoir Flood Map



SITE ASSESSMENT - COOMBE ROAD - BESA1

Address:	Coombe Road, Neasden, London, NW10 0EB

Area:	1.36 **Ha**
Site Reference	5

Current Use	Proposed Use
Commercial and Industrial Park	Industrial, Commercial and Residential

Current Vulnerability Classification	Proposed Vulnerability Classification
Less Vulnerable	More vulnerable / Less Vulnerable

Current Risk Summary					
Fluvial / Tidal			**Groundwater**		
FZ2	100	% of Site	<25	0	% of Site
FZ3a	26	% of Site	25-50	100	% of Site
FZ3b	0	% of Site	50-75	0	% of Site
Surface Water			>75	0	% of Site
30yr	0	% of Site	**Artificial**		
100yr	0	% of Site	Reservoir	Yes	At risk?
1000yr	44	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents		0			

Flood Defences

N/A - the area is not in an area benefitting from flood defences.

FLUVIAL / TIDAL

Risk Assessment (Defended)				
Parameter	**FZ3b**	**FZ3a**	***FZ3a+CC**	**Units**
Speed of inundation	N/A	8.5	6	Hrs
Min. Depth	N/A	0	0.3	m
Max. Depth	N/A	0.3	1.5	m
Max. Velocity	N/A	2.4	2.5	m/s
Max Flood Level	N/A	31.96	32.83	m AOD
Max Ground Level	N/A	30.59	30.59	m AOD
Min Ground Level	N/A	32.42	32.42	m AOD
Flood Hazard	N/A	Danger for most	Danger for all	N/A
Duration of Flood	N/A	10+	12.5+	Hrs

* The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)			
Parameter	**FZ3a**	***FZ3a+CC**	**Units**
Speed of inundation	8.5	6	Hrs
Min. Depth	0	0.3	m
Max. Depth	0.3	1.4	m
Max. Velocity	2.4	2.5	m/s
Max. Hazard	Danger for most	Danger for all	N/A
Duration of Flood	10+	12.5+	Hrs

Description of Flood Mechanism

- The site is adjacent to the River Brent, with the river located to the west of the site. Although the River Brent borders the site to west only, predicted fluvial flooding inundates the site from the east, west and south for the 1 in 100 year event. Flooding from the west is directly from the River Brent. Flooding from the south follows an overland flow route across Blackbird Hill from the south. Flooding from the east is linked to the River Brent and the Canal Feeder from the Brent Reservoir (Welsh Harp).
- The flood risk extent for the climate change scenario is significantly greater, covering the entirety of the site. Flood depths are significantly higher, with a minimum flood depth of 0.3m at any point on site. Flow velocities are also higher under climate change.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

- The east, west and southern borders of the site are flooded in the 1 in 100 year scenario. Although the northern border is not predicted to be at risk of flooding, the area immediately north is. In addition, the entire site is predicted to be at risk of flooding under the 1 in 100 year + climate change scenario.
- Safe routes should be directed south on to Blackbird Hill should be provided for scenarios less than a 1 in 100 year event. ensuring that evacuation takes place before the site is inundated from the River Brent.
- Safe refuge areas should also be provided on site.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

- See SFRA - Level 2 Report Sections 4.1.2, 4.1.3 and 4.1.4 for further requirements.
- See SFRA - Level 2 Report Section 4.1.6 for Main River requirements.
- A Flood Emergency and Evacuation Plan is required.
- Site users should be signed up to EA's Flood Warning Service.

SURFACE WATER

Risk Assessment				
Parameter	**30yr**	**100yr**	***1000yr**	**Units**
Min. Depth	N/A	N/A	0 - 0.15	m
Max. Depth	N/A	N/A	>1.20	m
Max. Velocity	N/A	N/A	>2	m/s
Max. Hazard	N/A	N/A	>2	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

- Climate change factors place the site at risk of surface water flooding.
- Main contributary overland flow path that places the site at predicted surface water flood risk is via the Canal Feeder from the Brent Reservoir (Welsh Harp, located to the east of the site.

Site Access / Egress

- The site, and the area immediately south of the site, is not at predicted risk of surface water flooding from 1 in 100 year event.
- Safe access and egress routes should be directed south on to Blackbird Hill.
- Safe refuge points should be provided on site to future proof the site against climate change.

Figure 3 - RoFSW Flood Depth Map

Mitigation - Flood Risk Requirements

- See SFRA - Level 2 Report Sections 4.1.2, 4.1.3 and 4.1.4.
- Developments should be located at least 5m away from the Canal Feeder located to the east of the site.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Surface Water Drainage

- A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS.
- The site is underlain by London Clay - ground investigations are required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - COOMBE ROAD - BESA1

SEWER

Risk Assessment

• The area is served by separate surface water and foul sewer networks.
• The site falls within a post code district where there are no reported flood incidents from sewer flooding.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

No site specific requirements.

GROUNDWATER

Risk Assessment

• The site falls in an area that is classified as having >=25% to 50% susceptibility to groundwater flooding.
• The site falls within a 'Permeable Superficial' area with regards to Increased Potential for Elevated Groundwater. This is due the site's proximity to the Weladstone Brook, which is underlain by an alluvium (clay, silt, sand and gravel) superficial deposit geology.

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

• No basement dwellings should be developed onsite.
• If non-dwelling basements are being considered, a screening assessment must be provided that addresses the risk of groundwater flooding at the site and advises the level of impact and associated mitigation measures.

ARTIFICIAL

Risk Assessment

• There is risk of flooding from the Brent (Welsh Harp) Reservoir, northeast of Gabrielle Close.
• Where there is flood risk, the site is predicted to flood over 2m depth in result of reservoir failure.
• Reservoir failure flood speed would be between 0.5-2m/s for the majority of the site.
• The site is adjacent to the Canal Feeder.

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

• Local Authority Emergency Planning Officers must be consulted to create a reservoir failure emergency and evacuation plan.
• Development within 5m of the Canal Feeder should be avoided.

PLANNING CONSIDERATIONS

Safety of Development

Can the development be future proofed for climate change considerations?
• Yes. See SFRA - Level 2 Report Sections 4.1.2 and 4.1.3 for the required finished floor levels and flood resistant / resilient building requirements.

Can the development be designed safe throughout its lifetime without increasing flood risk elsewhere?
• Yes - The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation.
• See SFRA - Level 2 Report Section 4.1.4 for compensatory flood storage requirements.

What is the cumulative impact of the development land use change and will flood risk increase?
• The development land use is changing to include less vulnerable uses. Ground level development at the site should be a less vulnerable use, if possible.
• The site is currently a brownfield site. Development is unlikely to increase overall flood risk unless there are significant changes to the topography.

How can the development reduce risk overall?
• The site is unlikely to control runoff from the site. New development can provide greater management of runoff through the introduction of SuDS (See Mitigation - Surface Water Drainage).
• An emergency evacuation plan must be created for the event of a reservoir failure. Plans must include safe refuge areas.
• No basement dwelling developments on site. If non-dwelling basements are being considered, a site-specific Flood Risk Assessment must be completed to demonstrate that the basement will not have any adverse impacts on flooding locally during a 1 in 100 year event. Basements must contain an egress route to a higher floor above the predicted Flood Zone 3a + CC fluvial and 1 in 1000 year surface water flood depths. Basements should be made flood resilient (See Groundwater assessment for groundwater related requirements).
• Locating developments at least 8m away from the River Brent and 5m from the Canal Feeder from the Brent Reservoir (Welsh Harp), if possible.

Will development require a flood risk activity permit / ordinary watercourse consent?
• Yes - the site is within 8m or a Main River and 5m of an ordinary watercourse. See SFRA - Level 2 Report Sections 4.1.6 and 4.2.5

Exception Test

Proposed developments can be made safe throughout their lifetime without increasing flood risk elsewhere (See Safety of Development box). Mitigation measures to protect proposed developments against deep fluvial flood depths can be implemented (See Mitigation / FRA Requirements). The site could also reduce flood risk overall with appropriate SuDS measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
See SFRA - Level 2 Report Sections 4.1.2 and 4.1.3 for the required finished floor levels and flood resistant / resilient building requirements. 1 in 100 year + CC (Flood Zone 3a + CC) scenario at that point. • A Flood Emergency and Evacuation Plan is required, including safe refuge area details.	• Proposed developments should be located at least 8m away from the River Brent, if possible. • Site users should be signed up to EA's Flood Warning Service.
Surface Water	
Developments within the 1 in 1000 year surface water extent require finished floor levels of at least 0.3m above the predicted flood level at that point. Floor level should be set to Flood Zone 3a + CC extent flood levels if predicted fluvial depths are higher.	• Proposed developments should be located at least 5m away from the Canal Feeder from the Brent Reservoir (Welsh Harp). • See Mitigation - Surface Water Drainage box.
Sewer	
No specific requirements.	
Groundwater	
No dwelling basement developments should take place at either site.	If basements are being considered onsite, a screening assessment must be provided (See Groundwater box).
Artificial	
Emergency planning officers must be consulted to create a reservoir failure emergency and evacuation plan.	Development within 5m of the Canal Feeder should be avoided.

Figure 1 - Fluvial Flood Depth Map

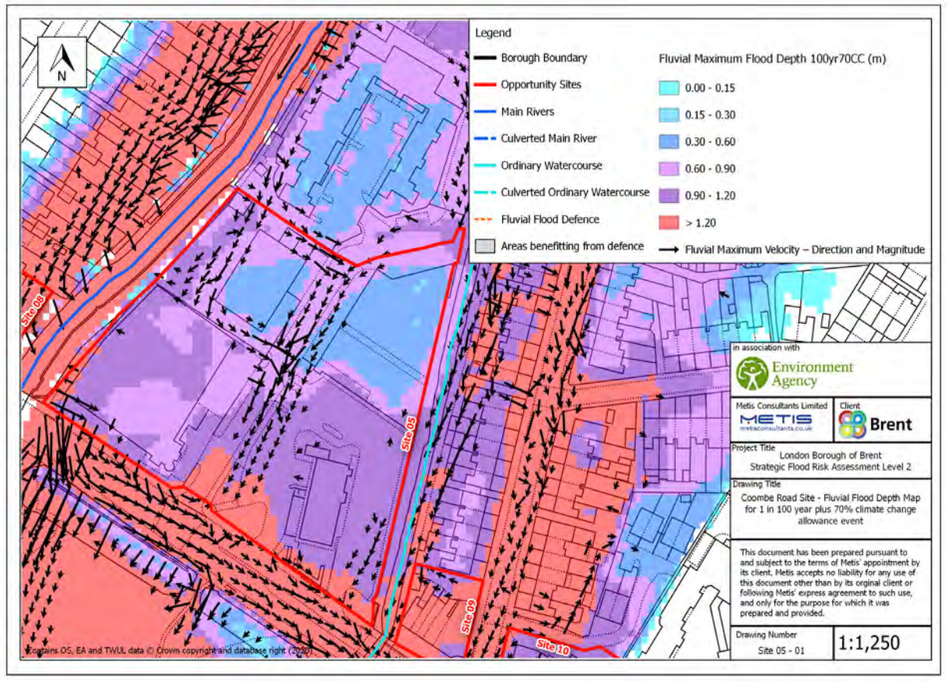


Figure 2 - Fluvial Flood Hazard Map

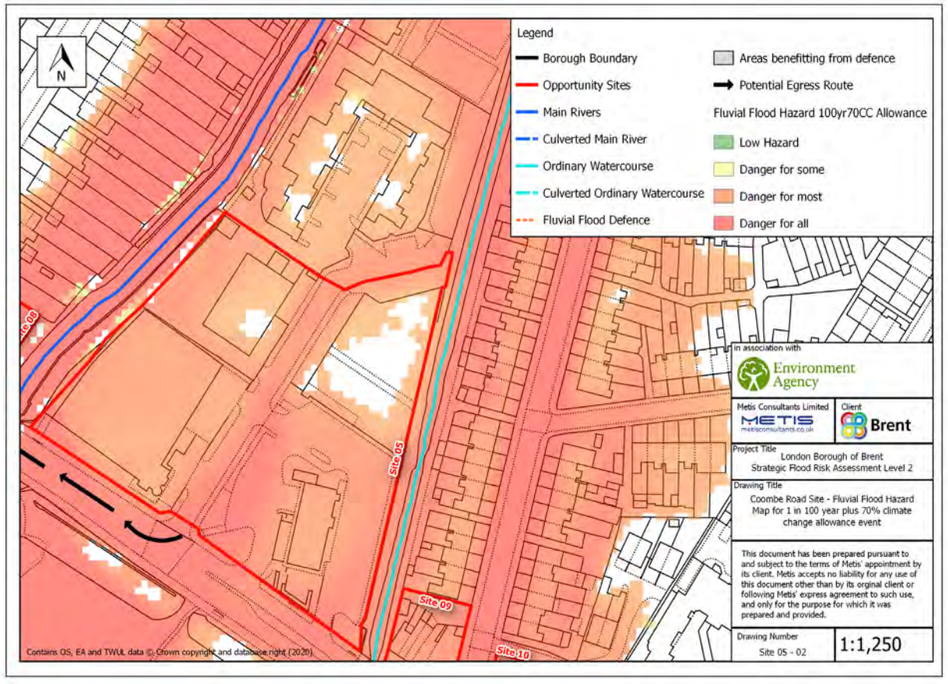


Figure 3 - RoFSW Flood Depth Map

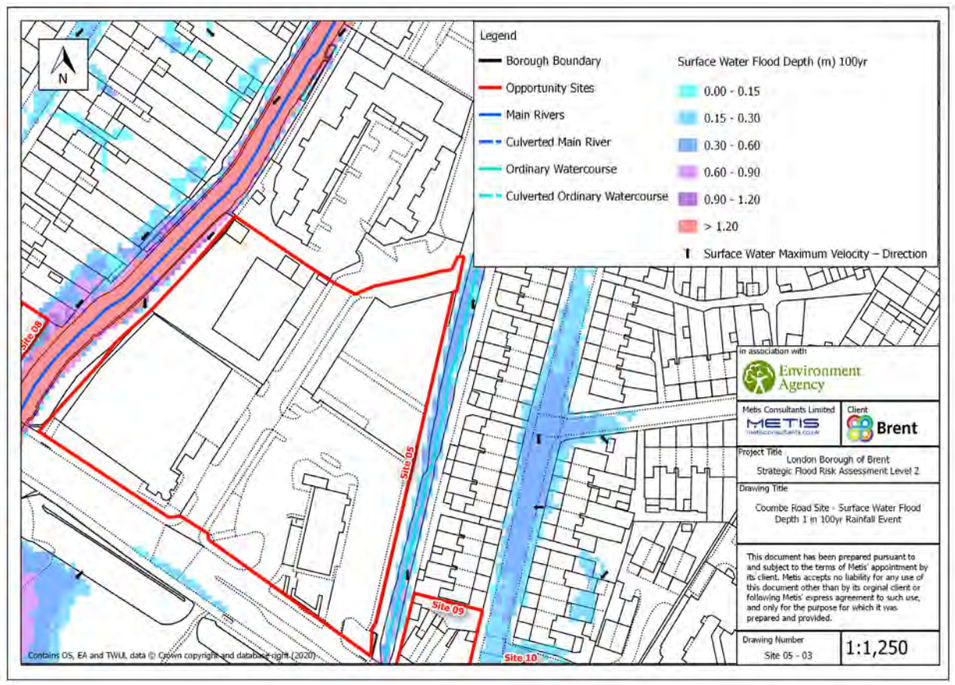


Figure 4 - RoFSW Flood Hazard Map

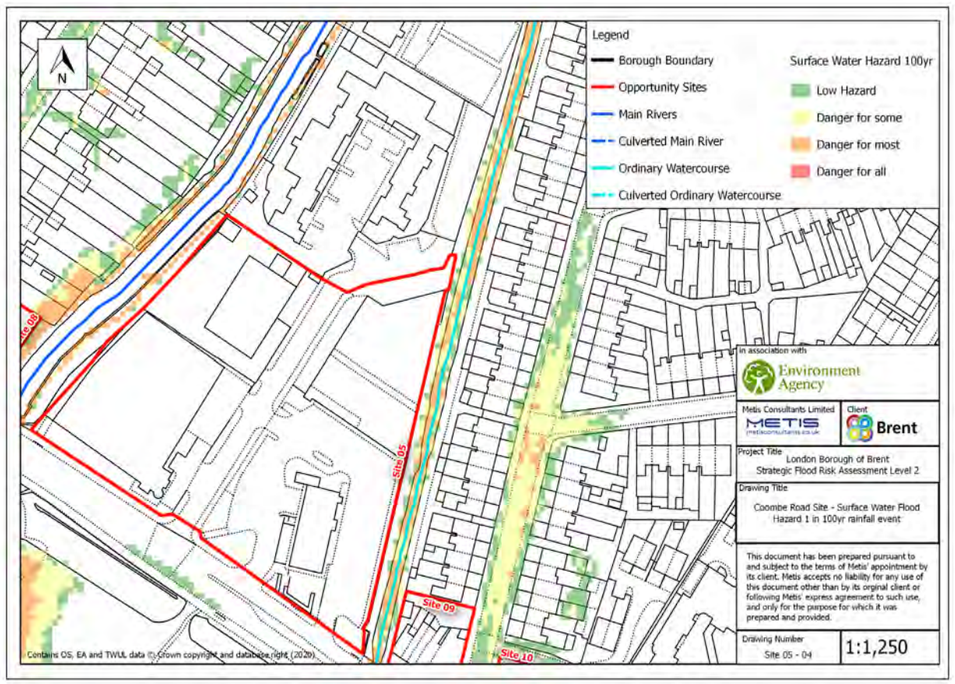


Figure 5 - Thames Water Sewer Flood Map

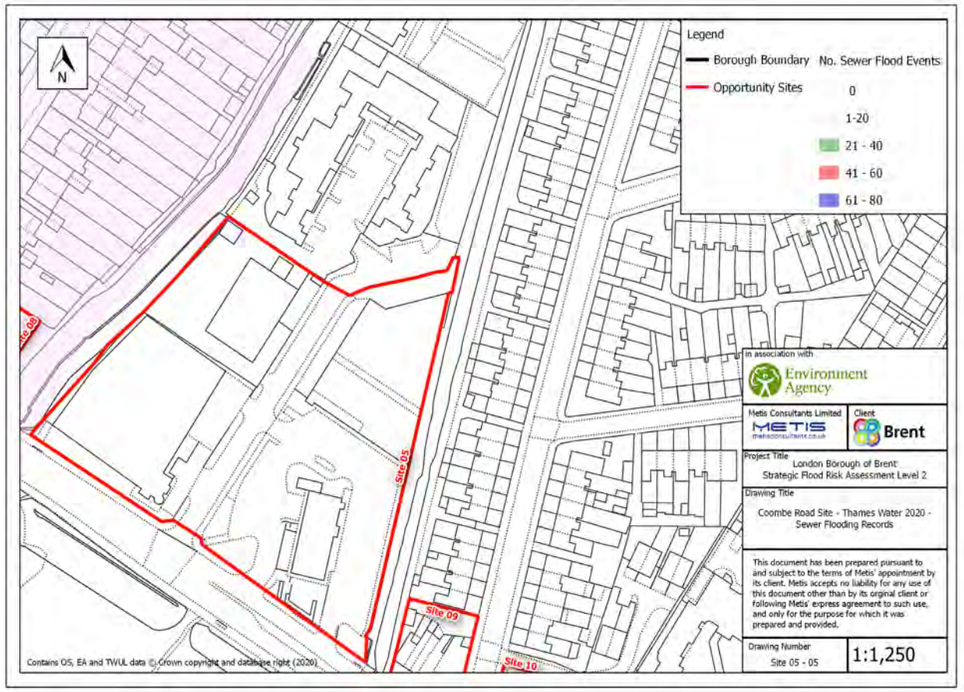


Figure 6 - Areas Susceptible to Groundwater Flooding Map

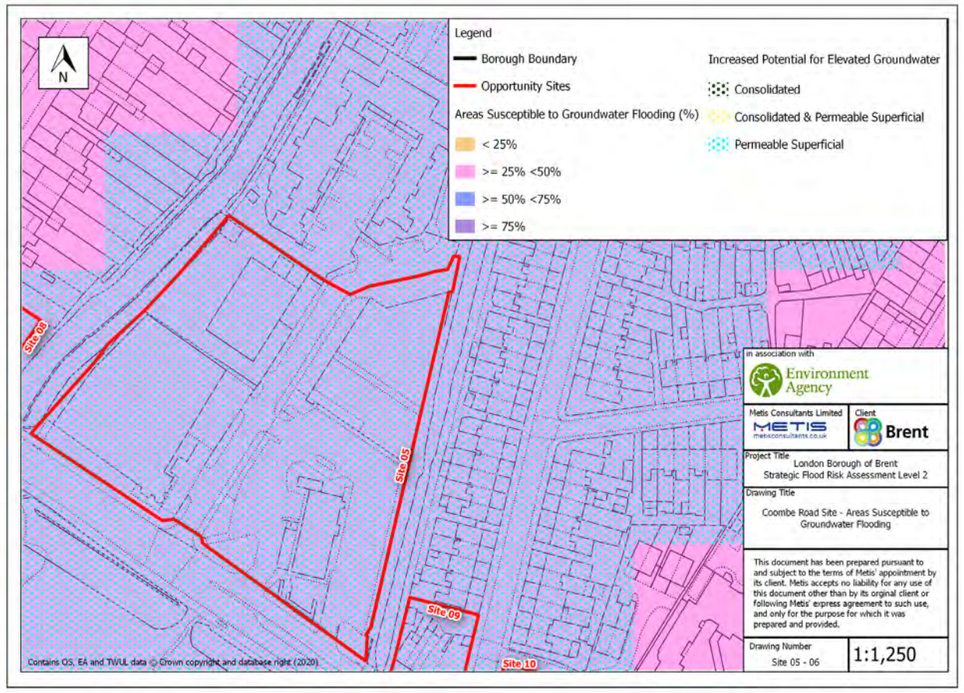


Figure 7 - Outline Reservoir Flood Map

SITE ASSESSMENT - Argenta House and Wembley Point - BSSA6

Address: Argenta Way, NW10 0AZ

Area: 1.22 **Ha**

Site Reference: 6

Current Use	Proposed Use
Commercial and car park	Residential and employment

Current Vulnerability Classification	Proposed Vulnerability Classification
Less Vulnerable	More Vulnerable / Less Vulnerable

Current Risk Summary					
Fluvial / Tidal **			**Groundwater**		
FZ2	100	% of Site	<25	0	% of Site
FZ3a	99	% of Site	25-50	100	% of Site
FZ3b	72	% of Site	50-75	0	% of Site
Surface Water			>75	0	% of Site
30yr	20	% of Site	**Artificial**		
100yr	37	% of Site	Reservoir	Yes	At risk?
1000yr	79	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents	1-20				

Flood Defences

Flood defence - N/A for site.
** The Risk Assessment (Defended) data is from the Argenta House hydraulic model data. The Risk Assessment (Undefended) and Current Risk percentage data is from the EA Flood Zone and River Brent hydraulic model data. The 1 in 20 year risk extent Flood Zone 3b extent do not match. The parameters used as part of the Argenta House hydraulic model are unknown. There is therefore uncertainty in the hydraulic modelling outputs used for this assessment.

FLUVIAL / TIDAL

Risk Assessment (Defended)

Parameter	FZ3b	FZ3a	*FZ3a+CC	Units
Speed of inundation	4.5	4	2.5	Hrs
Min. Depth	0	0	0	m
Max. Depth	4.8	5.3	6	m
Max. Velocity	1.8	2.8	3	m/s
Max Flood Level	-	-	-	m AOD
Max Ground Level	26.53	26.53	26.53	m AOD
Min Ground Level	21.68	21.68	21.68	m AOD
Flood Hazard	Danger for all	Danger for all	Danger for all	N/A
Duration of Flood	10.5+	11+	12.5+	Hrs

* The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)

Parameter	FZ3a	*FZ3a+CC	Units
Speed of inundation	4	2.5	Hrs
Min. Depth	0	0	m
Max. Depth	5	5.7	m
Max. Velocity	2.3	2.3	m/s
Max. Hazard	Danger for all	Danger for all	N/A
Duration of Flood	14.5+	16+	Hrs

Description of Flood Mechanism

•The River Brent and its tributary, the Wembley Brook, flow through the site. The River Brent flows from the north and the Wembley brook flows from the east. The point at which the Wembley Brook flows into the River Brent is at the site. Flooding originates from both of the watercourses, almost inundating the entire site for the 1 in 100 year scenario (Flood Zone 3a).
• The flood risk extent for the climate change scenario is greater, covering the whole site. Flow velocities are also higher under climate change.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

• The entirety of the site is at predicted risk of flooding for the 1 in 100 year + CC event. The flood extent is similar for the 1 in 100 year event except for the northern most extent. The western border of the site is one of the last areas to be inundated.
• The site borders the North Circular to the south-east. A safe access and egress route would need to be directed to the south-east, ensuring that evacuation takes place before the site is inundated from the River Brent.
• Safe refuge areas should also be provided on site.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

• See SFRA - Level 2 Report Sections 4.1.2, 4.1.3 and 4.1.4 for further requirements.
• See SFRA - Level 2 Report Section 4.1.6 for Main River requirements.
• New development cannot take place in Flood Zone 3b extent.
• If the 1 in 20 year outputs for the from the Argenta House hydraulic model is treated as Flood Zone 3b (which covers almost the entirety of the site), the undeveloped area in the southern area of the site should be protected as the undeveloped Functional Floodplain. New developments would not be permitted in the extent unless they are Essential Infrastructure or Water Compatible.
• Several sources of fluvial flood data exist for this site - the highest confidence data source needs to be reviewed and confirmed with the EA prior to master planning.
• No basement dwelling developments will be permitted.
• Develop a Flood Emergency and Evacuation Plans for the site.
• Site users should be signed up to EA's Flood Warning Service.

SURFACE WATER

Risk Assessment

Parameter	30yr	100yr	*1000yr	Units
Min. Depth	0	0	0	m
Max. Depth	>1.2	>1.2	>1.2	m
Max. Velocity	>2.0	>2.0	>2.0	m/s
Max. Hazard	>2.0	>2.0	>2.0	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

• Surface water enters the site from the Wembley Brook in the south, the River Brent in the east and Point Place Road in the north/west.
• CC will increase the extent of the maximum depth, velocity and hazard of flooding onsite.

Site Access / Egress

Safe access and egress routes should be directed towards the North Circular in the southeast of the site, where risk is lowest.

Figure 3 - RoFSW Flood Depth Map

Mitigation - Flood Risk Requirements

• See SFRA - Level 2 Report Sections 4.1.2, 4.1.3 and 4.1.4 for further requirements.
• Development should be avoided near the outcrops of the Wembley Brook and the River Brent, due to the high predicted flood depths.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Surface Water Drainage

• A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS.
• The site is underlain by London Clay - ground investigations are required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - Argenta House and Wembley Point - BSSA6

SEWER

Risk Assessment

- The area is served by separate surface water and foul sewer networks.
- The site falls within a post code district where there are 1 - 20 reported flood incidents from sewer flooding.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

- Thames Water must be consulted to confirm if the site has historically flooded.
- If the site has historically flooded, the development must implement SuDS to reduce the runoff to sewer to greenfield rates or as close as possible to greenfield rates.

GROUNDWATER

Risk Assessment

- The site falls in an area that is classified as having >= 25% < 50% susceptibility to groundwater flooding.
- The site falls within a 'Permeable Superficial' area with regards to Increased Potential for Elevated Groundwater. The site is in close proximity to the River Brent, which is underlain by an alluvium (clay, silt, sand and gravel) superficial deposit geology.

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

- No basement dwellings should be developed onsite.
- If non-dwelling basements are being considered, a screening assessment must be provided that addresses the risk of groundwater flooding at the site and advises the level of impact and associated mitigation measures.

ARTIFICIAL

Risk Assessment

- There is risk of flooding from the Brent (Welsh Harp) Reservoir.
- The whole site area is at risk from reservoir flooding.
- The site is predicted to flood between 0.3-2m depth with some locations flooding over 2m depth in result of reservoir failure.
- Reservoir failure flood speeds would be between 0.5-2m/s for the majority of the site.

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

Local Authority Emergency Planning Officers must be consulted to create a reservoir failure emergency and evacuation plan.

PLANNING CONSIDERATIONS

Safety of Development

Can the development be future proofed for climate change considerations?

- Partially. See SFRA - Level 2 Report Sections 4.1.2 and 4.1.3 for the required finished floor levels and flood resistant / resilient building requirements.
- Keep developments outside of Flood Zone 3b and towards the south / south-east area of the site, where max predicted flood depths are less than 2.5m. The modelled flood extents supplied conflict with each other and it is not clear which is the higher confidence data source. This must be reviewed and confirmed with the EA prior to site master planning.
- With high flood depths generally throughout the site, **land usage should be restricted to Less Vulnerable, and should not be increased to More Vulnerable**. If the **1 in 20 year fluvial extent** is to be treated as **Flood Zone 3b**, land usage should be restricted to **Essential Infrastructure** and **Water Compatible**. If a more vulnerable use development is desired within Flood Zones 3a, floor levels must be raised 0.3m above the predicted flood level of a fluvial Flood Zone 3a + CC and the 1 in 1000 year surface water event (whichever is higher). Less vulnerable use categories may be appropriate on lower floors, however, the development must consider safe refuge and / or access / egress as a key element, taking account of speed of inundation and create an evacuation plan for the development.

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

- Yes - The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation. See SFRA - Level 2 Report Section 4.1.4 for compensatory flood storage requirements.

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

- The proposed development land use is changing to a more vulnerable use category. It is recommended that a development that falls within a less vulnerable use category is developed instead (see above).

How can the development reduce risk overall?

- The undeveloped land within the extent defined as Flood Zone 3b should be protected as the undeveloped Functional Floodplain.
- Maintain space between development and the River Brent and Wembley Brook.
- There is little permeable area currently onsite, thus new development can increase the permeable area onsite to reduce flood risk onsite and reduce runoff rates on and off-site.
- The site is unlikely to control runoff from the site. New development can provide greater management of runoff through the introduction of SuDS (See Mitigation - Surface Water Drainage).
- An emergency evacuation plan must be created for the event of a reservoir failure.
- Basements developments, except for self-contained basement dwellings, may be appropriate onsite, but a site-specific Flood Risk Assessment must be completed and the basement must not have any adverse impacts on flooding locally during a 1 in 100yr surface water event. Basement dwellings within the 1 in 100yr surface water flood extent may only be permitted if an exceptions test is passed. Basements must contain an egress route to a higher floor above the predicted 1 in 1000yr surface water flood depth. Basements should be made flood resilient (see Groundwater assessment for groundwater related requirements).

Will development require a flood risk activity permit / ordinary watercourse consent?

- Yes - The site is within 8m of the River Brent (Main River) and Wembley Brook (ordinary watercourse). Refer Level 2 SFRA Sections 4.1.6 and 4.2.5 for detailed requirements.

Exception Test

Proposed developments can be made partially safe throughout their lifetime without increasing flood risk elsewhere (See Safety of Development box). Mitigation measures to protect proposed developments against deep fluvial flood depths can be implemented (See Mitigation / FRA Requirements). The site could also reduce flood risk overall with appropriate SuDS measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
Protect Functional Floodplain and restrict development to Essential Infrastructure and Water Compatible in the 1 in 20 year extent if the Argenta House hydraulic model outputs are treated as Flood Zone 3b.	• No new developments in Flood Zone 3b extent. • Updated site modelling may be required (flood data accuracy is uncertain). • See Mitigation / FRA Requirement box.
Surface Water	
Developments within the 1 in 1000 year surface water extent require finished floor levels of at least 0.3m above the predicted flood level at that point. Floor level should be set to relative to Flood Zone 3a + CC extent flood levels (as detailed above) if predicted depths are higher.	• Avoid development near River Brent and Wembley Brook. • See Mitigations - Surface Water Drainage box.
Sewer	
Thames Water must be consulted to confirm if the site has historically flooded.	If the site has historically flooded, the development must implement SuDS to reduce the runoff to sewer to greenfield rates.
Groundwater	
No self-contained basement dwelling developments.	If basements are being considered onsite, a screening assessment must be provided (See Groundwater box).
Artificial	
Emergency planning officers must be consulted to create a reservoir failure emergency and evacuation plan.	

Figure 1 - Fluvial Flood Depth Map

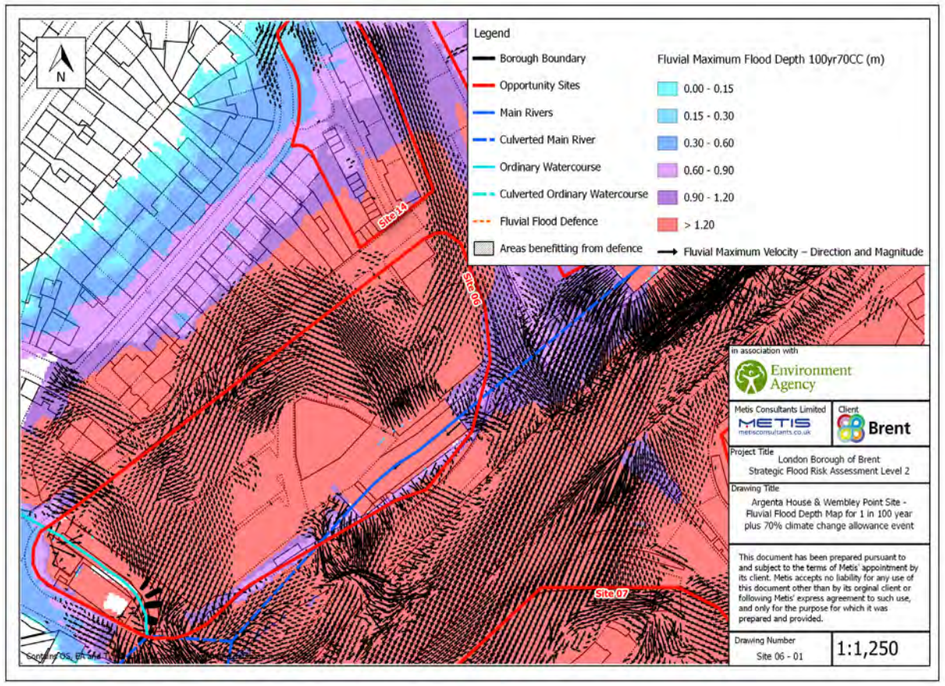


Figure 2 - Fluvial Flood Hazard Map

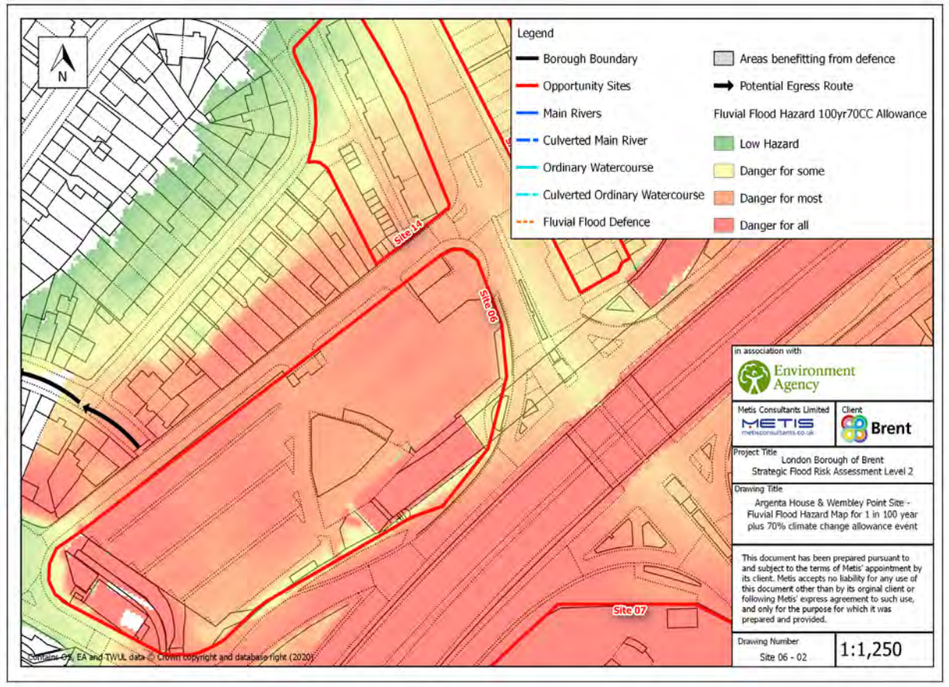


Figure 3 - RoFSW Flood Depth Map

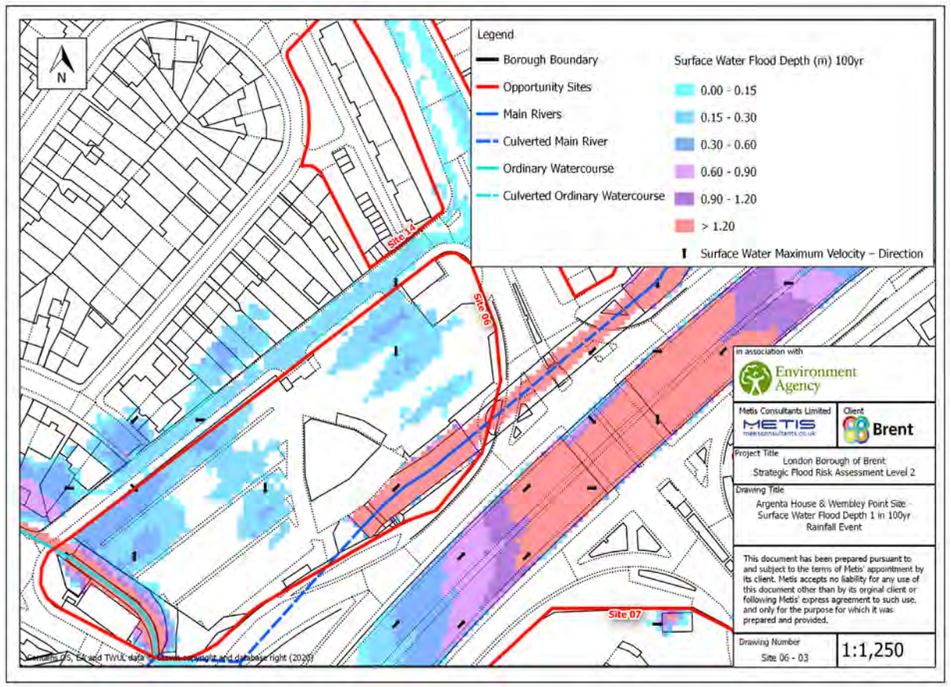


Figure 4 - RoFSW Flood Hazard Map

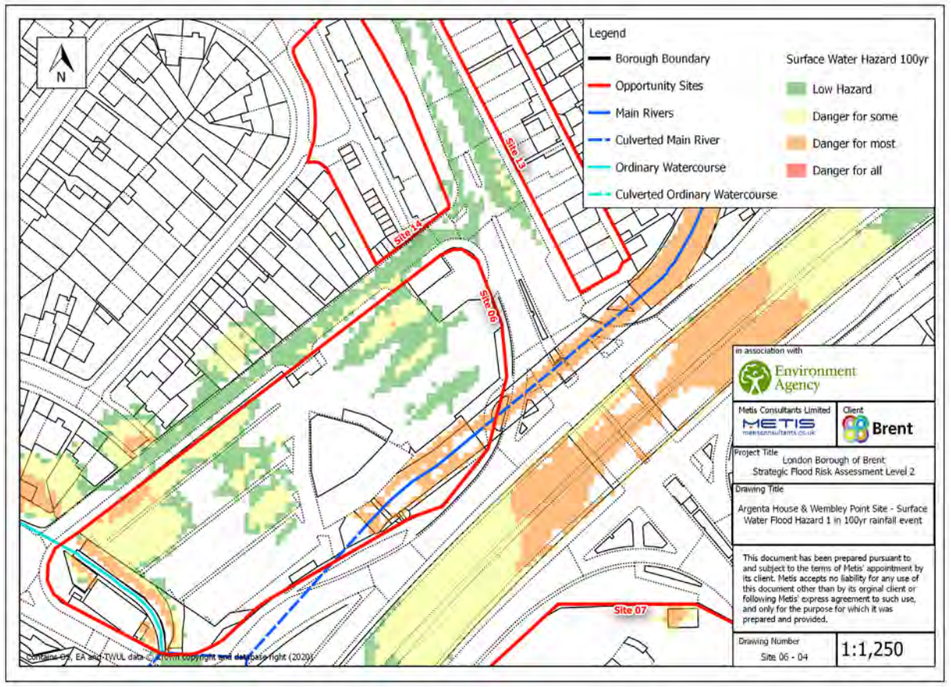


Figure 5 - Thames Water Sewer Flood Map

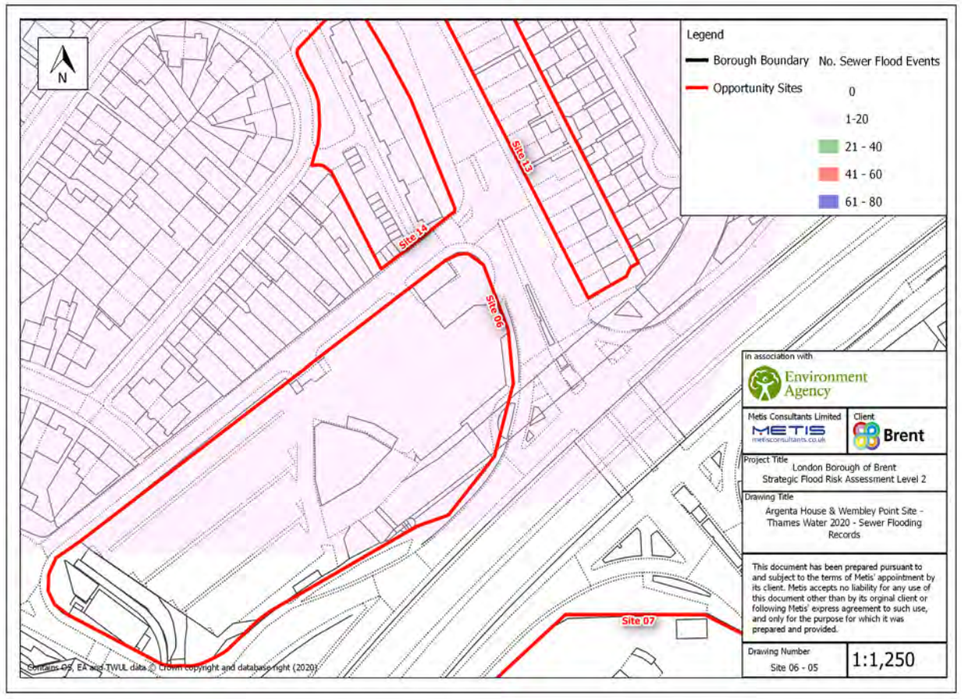


Figure 6 - Areas Susceptible to Groundwater Flooding Map

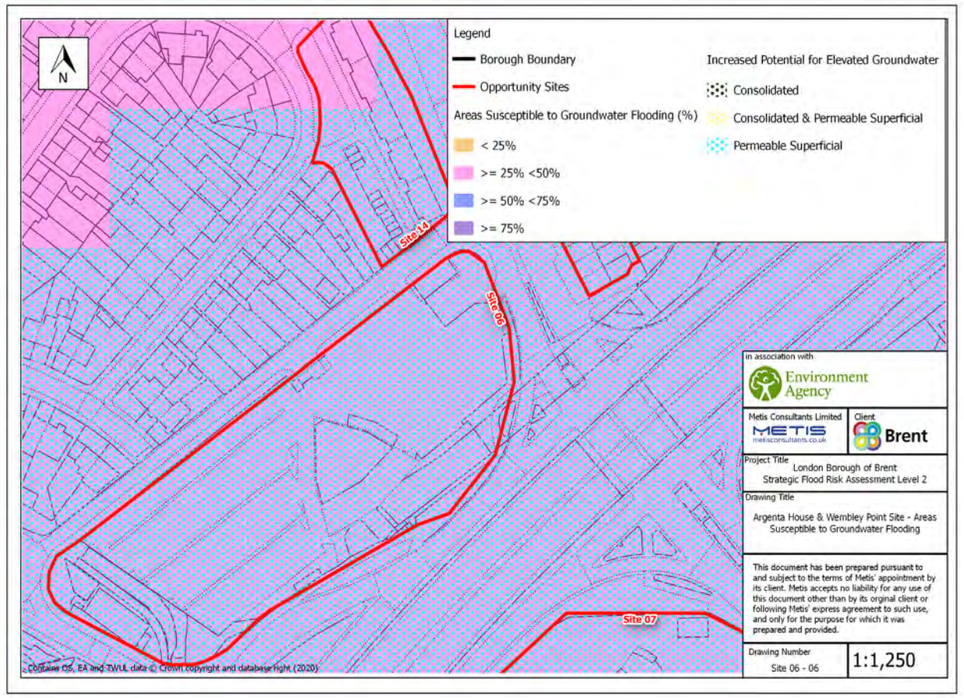
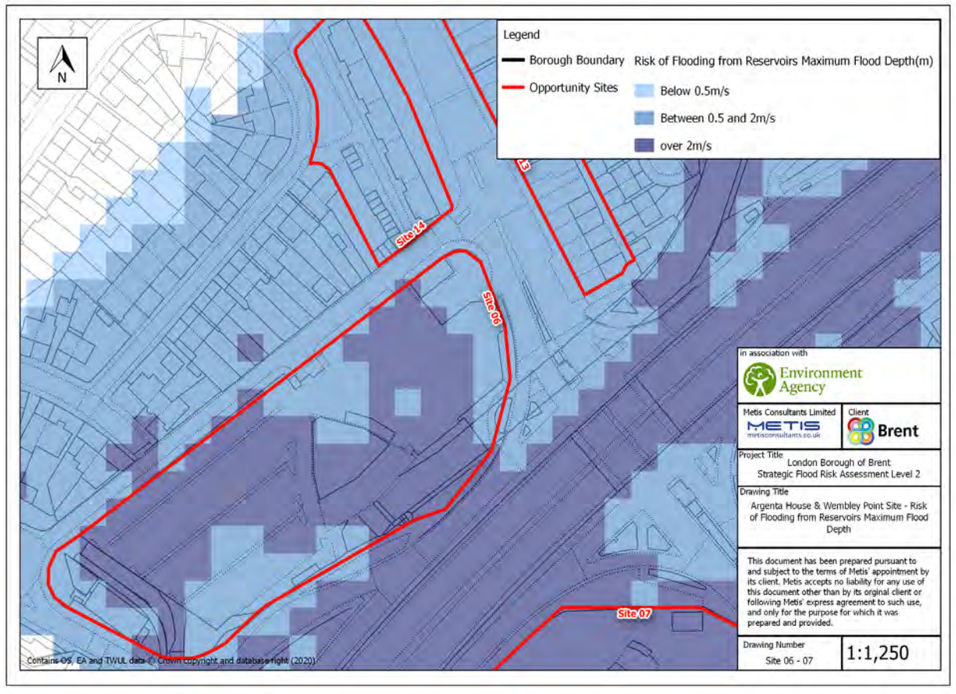


Figure 7 - Outline Reservoir Flood Map



SITE ASSESSMENT - Bridge Park and Unisys Building - BSSA7

Address: Argenta Way, NW10 0AZ

Area: 1.22 **Ha**

Site Reference: 7

Current Use	Proposed Use
Leisure Centre and commercial	Leisure centre, office and residential

Current Vulnerability Classification	Proposed Vulnerability Classification
Less Vulnerable	More Vulnerable / Less Vulnerable

Current Risk Summary					
Fluvial / Tidal **			**Groundwater**		
FZ2	100	% of Site	<25	0	% of Site
FZ3a	100	% of Site	25-50	100	% of Site
FZ3b	0	% of Site	50-75	0	% of Site
Surface Water			>75	0	% of Site
30yr	4	% of Site	**Artificial**		
100yr	16	% of Site	Reservoir	Yes	At risk?
1000yr	80	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents	0				

Flood Defences

Flood defence - N/A for site.
** The Risk Assessment (Defended) data is from the Argenta House hydraulic model data. The Risk Assessment (Undefended) and Current Risk percentage data is from the EA Flood Zone and River Brent hydraulic model data. The 1 in 20 year risk extent Flood Zone 3b extent do not match. The parameters used as part of the Argenta House hydraulic model are unknown. There is therefore uncertainty in the hydraulic modelling outputs used for this assessment.

FLUVIAL / TIDAL

Risk Assessment (Defended)

Parameter	FZ3b	FZ3a	*FZ3a+CC	Units
Speed of inundation	8.5	6	4.5	Hrs
Min. Depth	0	0	0.3	m
Max. Depth	2.1	3.1	3.9	m
Max. Velocity	2.1	2.5	2.6	m/s
Max Flood Level	-	-	-	m AOD
Max Ground Level	25.9	25.9	25.9	m AOD
Min Ground Level	23.06	23.06	23.06	m AOD
Flood Hazard	Danger for most	Danger for all	Danger for all	N/A
Duration of Flood	6.5+	9+	10.5+	Hrs

* The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)

Parameter	FZ3a	*FZ3a+CC	Units
Speed of inundation	6.5	5	Hrs
Min. Depth	0.1	0.4	m
Max. Depth	2.9	3.5	m
Max. Velocity	2.4	2.7	m/s
Max. Hazard	Danger for all	Danger for all	N/A
Duration of Flood	12+	13.5+	Hrs

Description of Flood Mechanism

•The site is within 80m of the River Brent, with the river located west of the site. Flooding originates from the Brent, flowing across the North Circular and inundating the site from the west. The entire site is within Flood Zone 3a, leaving it at risk of flooding for a 1 in 100 year event.
• The flood risk extent for the climate change scenario is similar, covering the whole site. However, flow velocities and maximum flood depths are higher under climate change.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

• The entirety of the site is at predicted risk of flooding for the 1 in 100 year and 1 in 100 year + CC event. The eastern extent of the site is the last area to be inundated.
• The site borders Brentfield (A404) to the north. A safe access and egress route would need to be directed to the north-east, ensuring that evacuation takes place before the site is inundated from the River Brent.
• Safe refuge areas should also be provided on site.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

• See SFRA - Level 2 Report Sections 4.1.2, 4.1.3 and 4.1.4 for further requirements.
• If the 1 in 20 year outputs from the Argenta House hydraulic model is treated as Flood Zone 3b (which covers the majority of the site), the undeveloped areas within the 1 in 20 year extent should be protected as the undeveloped Functional Floodplain. In addition, no development should be permitted in the extent if it results in intensification of use. Only Essential Infrastructure and Water Compatible new developments would be permitted.
• Several sources of fluvial flood data exist for this site - the highest confidence data source needs to be reviewed and confirmed with the EA prior to master planning.
• Develop a Flood Emergency and Evacuation Plans for the site.
• Site users should be signed up to EA's Flood Warning Service.

SURFACE WATER

Risk Assessment

Parameter	30yr	100yr	*1000yr	Units
Min. Depth	0	0	0	m
Max. Depth	0.3-0.6	>1.2	>1.2	m
Max. Velocity	0.5-1.0	1.0-2.0	1.0-2.0	m/s
Max. Hazard	0.75-1.25	1.25-2.0	>2.0	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

• Surface water enters the site from the A404, the southeast side of the site and pools north of the railway embankment.
• CC will increase the extent of the maximum depth, velocity and hazard of flooding onsite.

Site Access / Egress

Safe access and egress routes should be directed towards Brentfield (A404) in the northwest of the site.

Figure 3 - RoFSW Flood Depth Map

Mitigation - Flood Risk Requirements

• See SFRA - Level 2 Report Sections 4.1.2, 4.1.3 and 4.1.4 for flood risk requirements.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Surface Water Drainage

• A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS.
• The site is underlain by London Clay - ground investigations are required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - Bridge Park and Unisys Building - BSSA7

SEWER

Risk Assessment

• The area is served by separate surface water and foul sewer networks.
• The site falls within a post code district where there are no reported flood incidents from sewer flooding.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

No mitigation measures required.

GROUNDWATER

Risk Assessment

• The site falls in an area that is classified as having >= 25% < 50% susceptibility to groundwater flooding.
• The site falls within a 'Permeable Superficial' area with regards to Increased Potential for Elevated Groundwater. The site is in close proximity to the Wealdstone Brook, which is underlain by an alluvium (clay, silt, sand and gravel) superficial deposit geology.

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

• No basement dwellings should be developed onsite.
• If non-dwelling basements are being considered, a screening assessment must be provided that addresses the risk of groundwater flooding at the site and advises the level of impact and associated mitigation measures.

ARTIFICIAL

Risk Assessment

• There is risk of flooding from the Brent (Welsh Harp) Reservoir.
• The whole site area is at risk from reservoir flooding.
• The site is predicted to flood over 2m depth in result of reservoir failure.
• Reservoir failure flood speeds would be between 0.5-2m/s for the majority of the site.

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

Local Authority Emergency Planning Officers must be consulted to create a reservoir failure emergency and evacuation plan.

PLANNING CONSIDERATIONS

Safety of Development

Can the development be future proofed for climate change considerations?
• Partially. See SFRA - Level 2 Report Sections 4.1.2 and 4.1.3 for the required finished floor levels and flood resistant / resilient building requirements.
• Keep developments towards the east of the site, where max predicted flood depths are less than 2.6m. The modelled flood extents supplied conflict with each other and it is not clear which is the higher confidence data source. This must be reviewed and confirmed with the EA prior to site master planning.
• With high flood depths generally throughout the site, **land usage should be restricted to Less Vulnerable, and should not be increased to More Vulnerable**. If the **1 in 20 year fluvial extent** is to be treated as **Flood Zone 3b**, land usage should be restricted to **Essential Infrastructure** and **Water Compatible**. If a more vulnerable use development is desired within Flood Zones 3a, floor levels must be raised 0.3m above the predicted flood level of a fluvial Flood Zone 3a + CC and the 1 in 1000 year surface water event (whichever is higher). Less vulnerable use categories may be appropriate on lower floors, however, the development must consider safe refuge and / or access / egress as a key element, taking account of speed of inundation and create an evacuation plan for the development.

Can the development be designed safe throughout its lifetime without increasing flood risk elsewhere?
• Yes - The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation. See SFRA - Level 2 Report Section 4.1.4 for compensatory flood storage requirements.

What is the cumulative impact of the development land use change and will flood risk increase?
• The proposed development land use is changing to a more vulnerable use category. It is recommended that a development that falls within a less vulnerable use category is developed instead (see above).
• If permitted, less vulnerable uses must be prioritised for ground level development.

How can the development reduce risk overall?
• There is little permeable area currently onsite, thus new development can increase the permeable area onsite to reduce flood risk onsite and reduce runoff rates on and off-site.
• The site is unlikely to control runoff from the site. New development can provide greater management of runoff through the introduction of SuDS (See Mitigation - Surface Water Drainage).
• An emergency evacuation plan must be created for the event of a reservoir failure.
• Basements developments, except for self-contained basement dwellings, may be appropriate onsite, but a site-specific Flood Risk Assessment must be completed and the basement must not have any adverse impacts on flooding locally during a 1 in 100yr surface water event. Basement dwellings within the 1 in 100yr surface water flood extent may only be permitted if an exceptions test is passed. Basements must contain an egress route to a higher floor above the predicted 1 in 1000yr surface water flood depth. Basements should be made flood resilient (see Groundwater assessment for groundwater related requirements).

Will development require a flood risk activity permit / ordinary watercourse consent?
• No, the development will not require a flood risk activity permit.

Exception Test

Proposed developments can be made partially safe throughout their lifetime without increasing flood risk elsewhere (See Safety of Development box). Mitigation measures to protect proposed developments against deep fluvial flood depths can be implemented (See Mitigation / FRA Requirements). The site could also reduce flood risk overall with appropriate SuDS measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
Protect Functional Floodplain and restrict development to Essential Infrastructure and Water Compatible in the 1 in 20 year extent if the Argenta House hydraulic model outputs are treated as Flood Zone 3b.	• Updated site modelling may be required (flood data accuracy is uncertain). • See Mitigation / FRA Requirement box.
Surface Water	
Developments within the 1 in 1000 year surface water extent require finished floor levels of at least 0.3m above the predicted flood level at that point. Floor level should be set to relative to Flood Zone 3a + CC extent flood levels (as detailed above) if predicted depths are higher.	• Flood plain compensation must be provided for events up to a 1 in 100yr event. • See Mitigations - Surface Water Drainage box.
Sewer	
No mitigation measures required.	
Groundwater	
No self-contained basement dwelling developments.	If basements are being considered onsite, a screening assessment must be provided (See Groundwater box).
Artificial	
Emergency planning officers must be consulted to create a reservoir failure emergency and evacuation plan.	

Figure 1 - Fluvial Flood Depth Map

Figure 2 - Fluvial Flood Hazard Map

Figure 3 - RoFSW Flood Depth Map

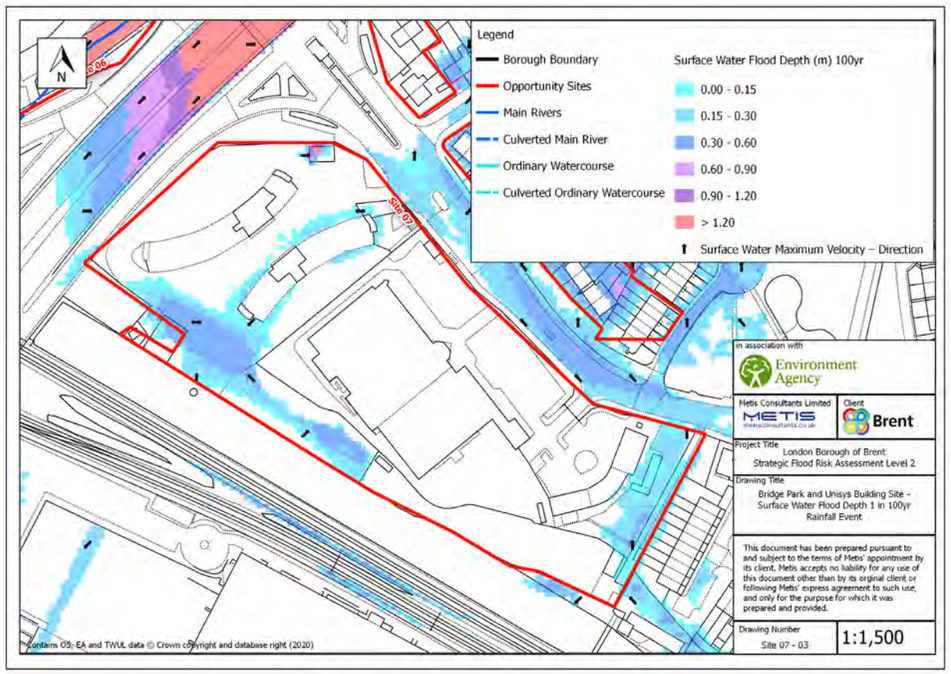


Figure 4 - RoFSW Flood Hazard Map

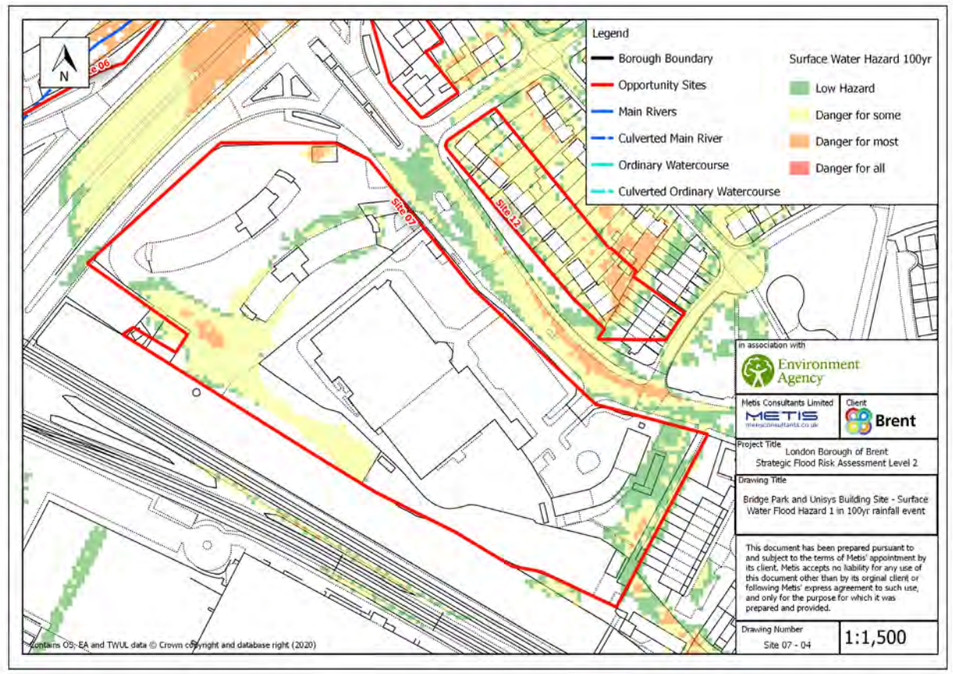


Figure 5 - Thames Water Sewer Flood Map

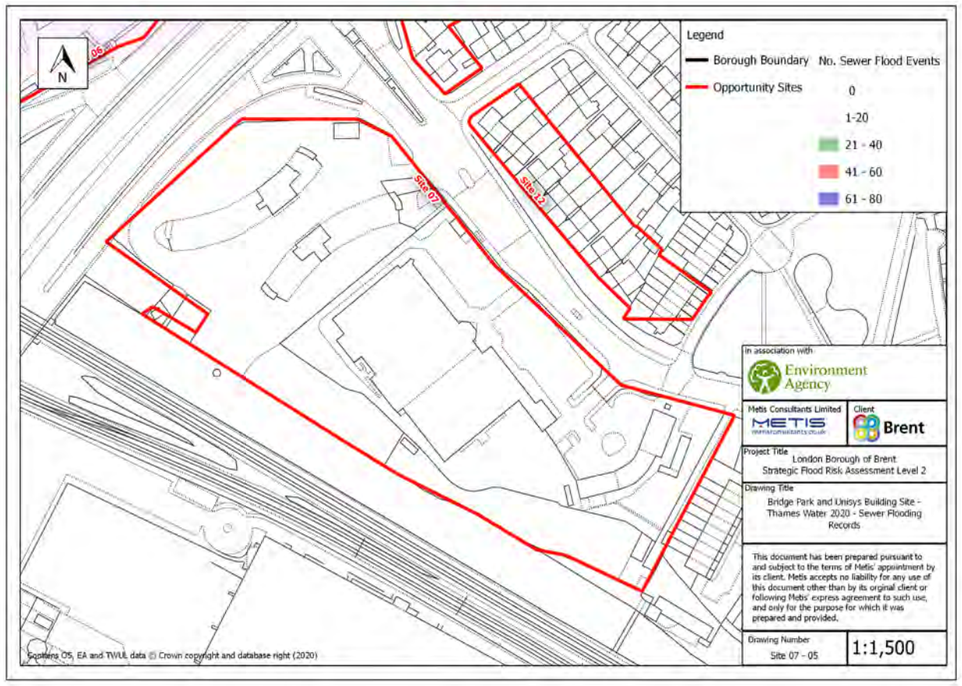


Figure 6 - Areas Susceptible to Groundwater Flooding Map

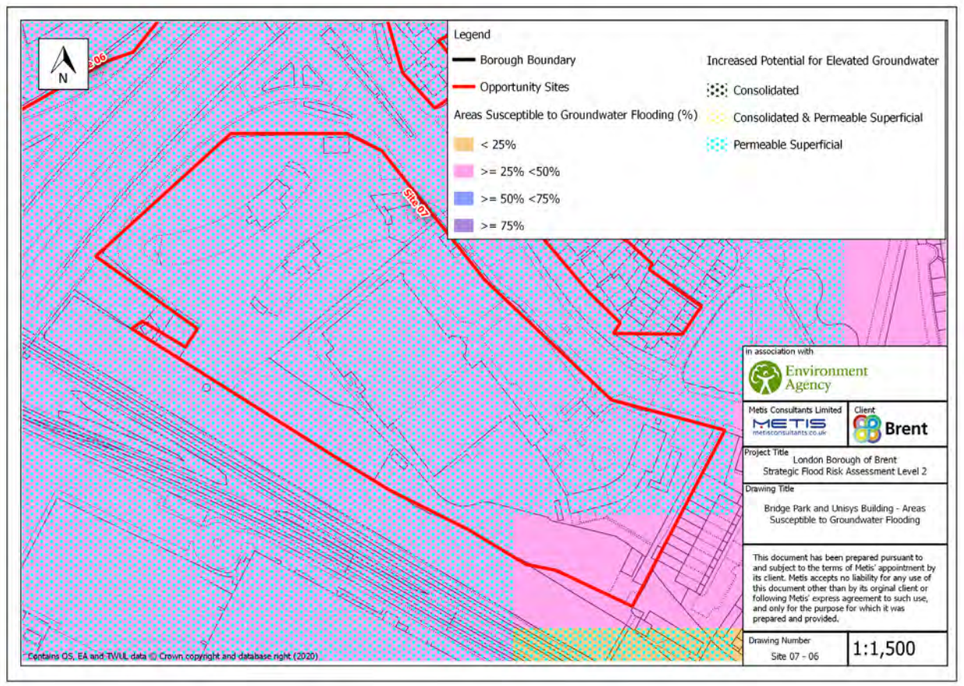
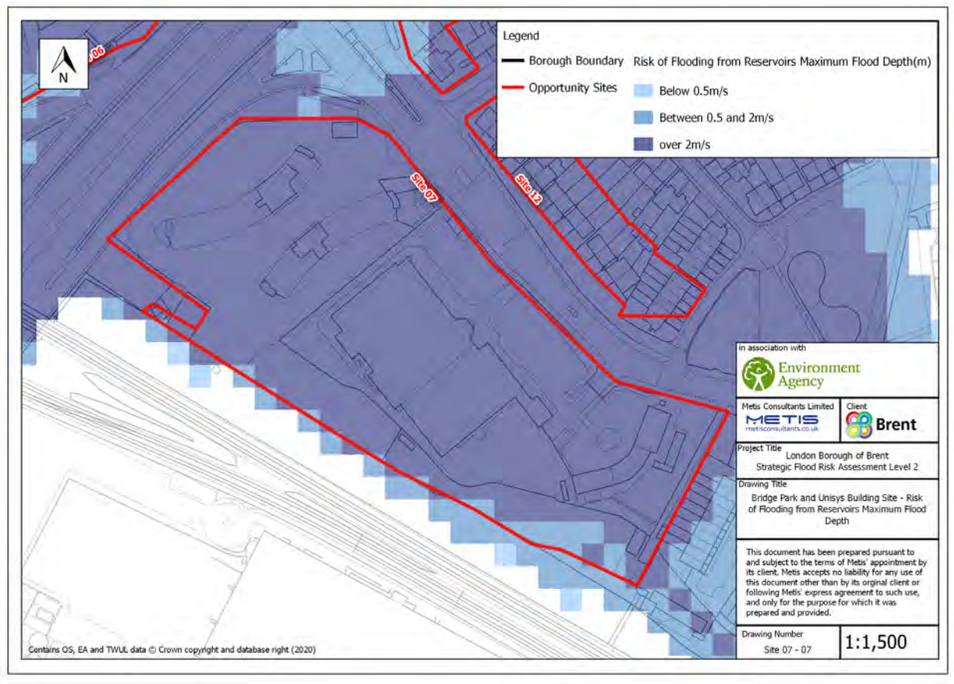


Figure 7 - Outline Reservoir Flood Map



SITE ASSESSMENT - 1-10 Blackbird Court, Blackbird Hill Intensification Corridor - BD2

Address:	1-10 Blackbird Court, Blackbird Hill, NW9 8SA
Area:	0.15 **Ha**
Site Reference:	8

Current Use	Proposed Use
Residential	Residential (100yr design life)

Current Vulnerability Classification	Proposed Vulnerability Classification
More Vulnerable	More Vulnerable

Current Risk Summary					
Fluvial / Tidal			**Groundwater**		
FZ2	90	% of Site	<25	0	% of Site
FZ3a	54	% of Site	25-50	100	% of Site
FZ3b	0	% of Site	50-75	0	% of Site
Surface Water			>75	0	% of Site
30yr	0	% of Site	**Artificial**		
100yr	1	% of Site	Reservoir	Yes	At risk?
1000yr	48	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents	1-20				

Flood Defences

N/A - the site is not in an area benefitting from flood defences.

FLUVIAL / TIDAL

Risk Assessment (Defended)

Parameter	FZ3b	FZ3a	*FZ3a+CC	Units
Speed of inundation	N/A	8.5	6	Hrs
Min. Depth	N/A	0	0	m
Max. Depth	N/A	1.5	2.4	m
Max. Velocity	N/A	1	1	m/s
Max Flood Level	N/A	31.93	32.83	m AOD
Max Ground Level	N/A	33.41	33.41	m AOD
Min Ground Level	N/A	29.18	29.18	m AOD
Flood Hazard	N/A	Danger for Most	Danger for All	N/A
Duration of Flood	N/A	10.0+	12.5+	Hrs

* The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)

Parameter	FZ3a	*FZ3a+CC	Units
Speed of inundation	8.5	6	Hrs
Min. Depth	0	0	m
Max. Depth	1.4	2.4	m
Max. Velocity	1	1	m/s
Max. Hazard	Danger for Most	Danger for All	N/A
Duration of Flood	10.0+	12.5+	Hrs

Description of Flood Mechanism

- The site is adjacent to the River Brent, with the river located east of the site. The flooding originates from the Brent, inundating the site from the north. The flooding extent covers the eastern half of the site for the 1 in 100 year event.
- The flood risk extent for the climate change scenario is significantly greater. The flooding extent covers the majority of the site, with only the western most extent of the site outside of the flood extent. Although the flow velocities are similar, the depths are also higher under climate change.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

- The western half of the site is not predicted to be at risk of flooding for the 1 in 100 year event.
- The site borders Birchen Grove and Blackbird Hill to the west and south respectively. A safe access and egress route would need to be directed to the west and south of the site, where the risk is lowest.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

- See SFRA - Level 2 Report Sections 4.1.2, 4.1.3 and 4.1.4 for further requirements.
- See SFRA - Level 2 Report Section 4.1.6 for Main River requirements.
- To mitigate against the deep maximum flood depths, proposed developments should place in the western extent of the site where maximum flood depths are lower (< 1.0m) and outside of the Flood Zone 3a extent.
- A Flood Emergency and Evacuation Plan is required.
- Site users should be signed up to EA's Flood Warning Service.

SURFACE WATER

Risk Assessment

Parameter	30yr	100yr	*1000yr	Units
Min. Depth	0	0	0	m
Max. Depth	0	0.3-0.6	>1.2	m
Max. Velocity	0	1.0-2.0	>2.0	m/s
Max. Hazard	0	0.75-1.25	>1.2	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

- Water enters the site from the River Brent to the east / southeast of the site.
- CC will increase the extent, depth, velocity and hazard.

Site Access / Egress

Safe access and egress routes should be directed towards Birchen Grove.

Figure 3 - RoFSW Flood Depth Map

Mitigation - Flood Risk Requirements

- See SFRA - Level 2 Report Sections 4.1.2, 4.1.3 and 4.1.4.
- Less than half of the site is at predicted risk of flooding from surface water for the 1 in 1000 year event, development should be prioritised in this location.
- More vulnerable use developments must be avoided near the River Brent (east of site).

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Surface Water Drainage

- A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS.
- The site is underlain by London Clay - ground investigations are required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - 1-10 Blackbird Court, Blackbird Hill Intensification Corridor - BD2

SEWER

Risk Assessment

- The area is served by a separate surface water and foul water sewer network.
- There have been 1-20 reported sewer flood incidents within the site's post code district.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

- Thames Water must be consulted to confirm if the site has historically flooded.
- If the site has historically flooded, the development must reduce the runoff to sewers from the site to greenfield rates or as close as possible to greenfield rates.

GROUNDWATER

Risk Assessment

- The site falls in an area that is classified as having >=25% to 50% susceptibility to groundwater flooding.
- Half of the site falls within a 'Permeable Superficial' area with regards to Increased Potential for Elevated Groundwater.

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

- No basement dwellings should be developed onsite.
- If non-dwelling basements are being considered, a screening assessment must be provided that addresses the risk of groundwater flooding at the site and advises the level of impact and associated mitigation measures.

ARTIFICIAL

Risk Assessment

- There is risk of flooding from the Brent (Welsh Harp) Reservoir.
- The majority of the site is predicted to flood over 2m depth in result of reservoir failure.
- Reservoir failure flood speed would be between 0.5-2 m/s for the majority of the site. A small portion of the site has flood speeds of over 2m/s.

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

Local Authority Emergency Planning Officers must be consulted to create a reservoir failure emergency and evacuation plan.

PLANNING CONSIDERATIONS

Safety of Development

Can the development be future proofed for climate change considerations?

- Yes. See SFRA - Level 2 Report Sections 4.1.2 and 4.1.3 for the required finished floor levels and flood resistant / resilient building requirements.

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

- Yes - The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation.
- See SFRA - Level 2 Report Section 4.1.4 for compensatory flood storage requirements.

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

- The development land use is not changing and will not increase flood risk on-site.
- The site is currently permeable / not developed next to the River Brent. This area should not be developed, if possible. If it must be developed, it must be with less vulnerable uses.
- The site currently contains impermeable and permeable space. Development must mitigate any increase in impermeable area with runoff storage to prevent any increase in flood risk.

How can the development reduce risk overall?

- Directing development towards the western half of the site where maximum flood depths are lower. Finished floor levels of at least 0.3m above predicted flood depths at that point should be implemented (See SFRA-Level 2 Report Requirements).
- The site is unlikely to control runoff from the site. New development can provide greater management of runoff through the introduction of SuDS (See Mitigation - Surface Water Drainage).
- An emergency evacuation plan must be created for the event of a reservoir failure.
- No basement dwellings. Non-dwelling basements require a screening assessment (See Groundwater assessment), a site-specific Flood Risk Assessment must be completed and the basement must not have any adverse impacts on flooding locally during a 1 in 100 year fluvial and surface water events. Basements must contain an egress route to a higher floor above the predicted Flood Zone 3a + CC fluvial and 1 in 1000 year surface water flood depths. Basements should be made flood resilient.

Will development require a flood risk activity permit / ordinary watercourse consent?

- Yes - Site is within 8m of the River Brent - See SFRA - Level 2 Report Section 4.1.6

Exception Test

Proposed developments can be made safe throughout their lifetime without increasing flood risk elsewhere (See Safety of Development box). Mitigation measures to protect proposed developments against deep maximum fluvial flood depths can be implemented (See Mitigation / FRA Requirements). The site could also reduce flood risk overall with appropriate SuDS and flood storage compensation measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
Development should be directed towards the western half of the site where maximum flood depths are lower. Finished floor levels must be at least 0.3m above predicted flood levels and flood plain compensation is required.	• Flood resistance and resilience construction of buildings is required where flood levels are less than 0.3m and more than 0.3m respectively. • Flood Emergency and Evacuation Plan required.
Surface Water	
Developments within the 1 in 1000 year surface water extent require finished floor levels of at least 0.3m above the predicted flood level at that point. Floor level should be set to relative to Flood Zone 3a + CC extent flood levels (as detailed above) if predicted depths are higher.	• Flood plain compensation must be provided. • Development by the River Brent should be avoided. • See Mitigation - Surface Water Drainage box.
Sewer	
Thames Water must be consulted to confirm if the site has historically flooded.	If the site has historically flooded, the development must reduce the runoff to sewers to greenfield rates.
Groundwater	
No dwelling basement developments should take place at either site.	If basements are being considered onsite, a screening assessment must be provided (See Groundwater box).
Artificial	
Emergency planning officers must be consulted to create a reservoir failure emergency and evacuation plan.	

Figure 1 - Fluvial Flood Depth Map

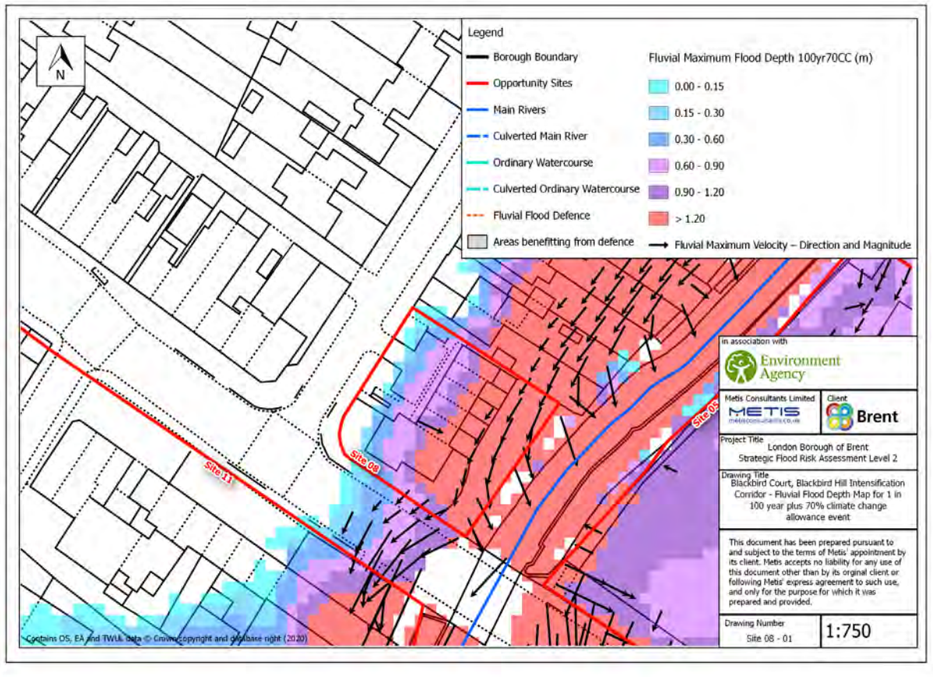


Figure 2 - Fluvial Flood Hazard Map

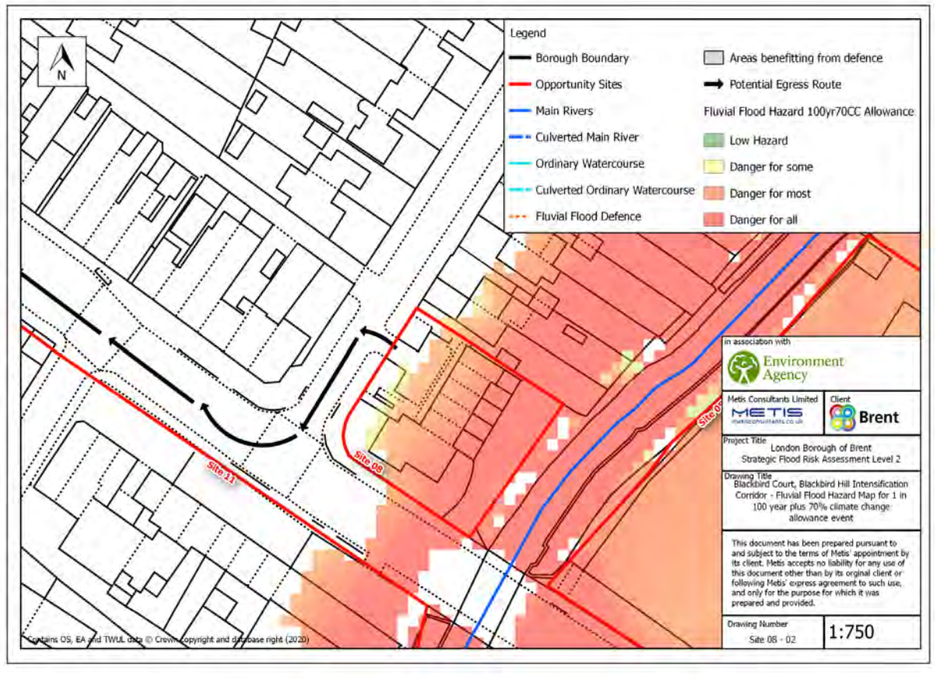


Figure 3 - RoFSW Flood Depth Map

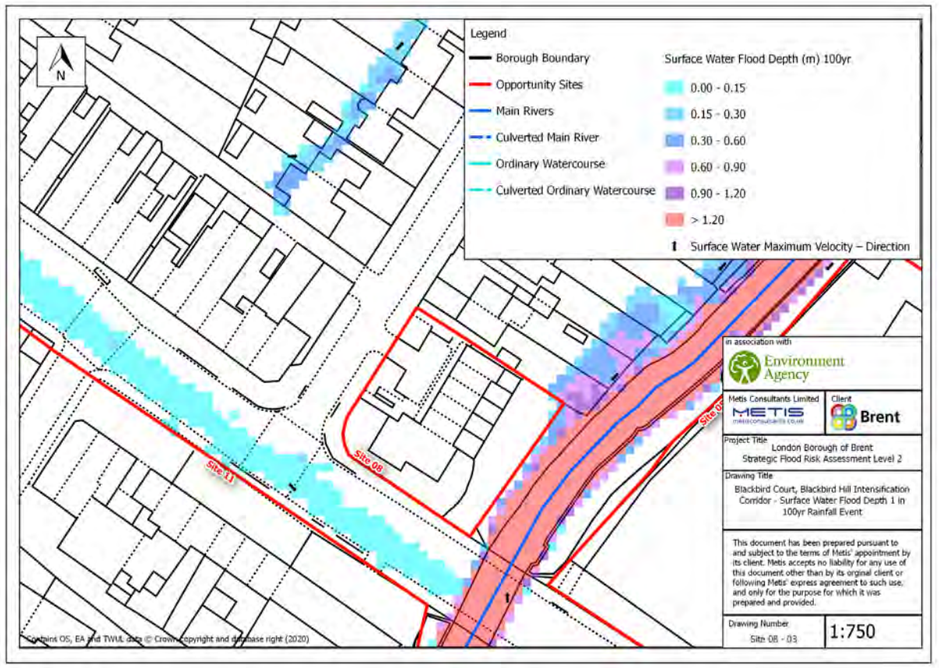


Figure 4 - RoFSW Flood Hazard Map

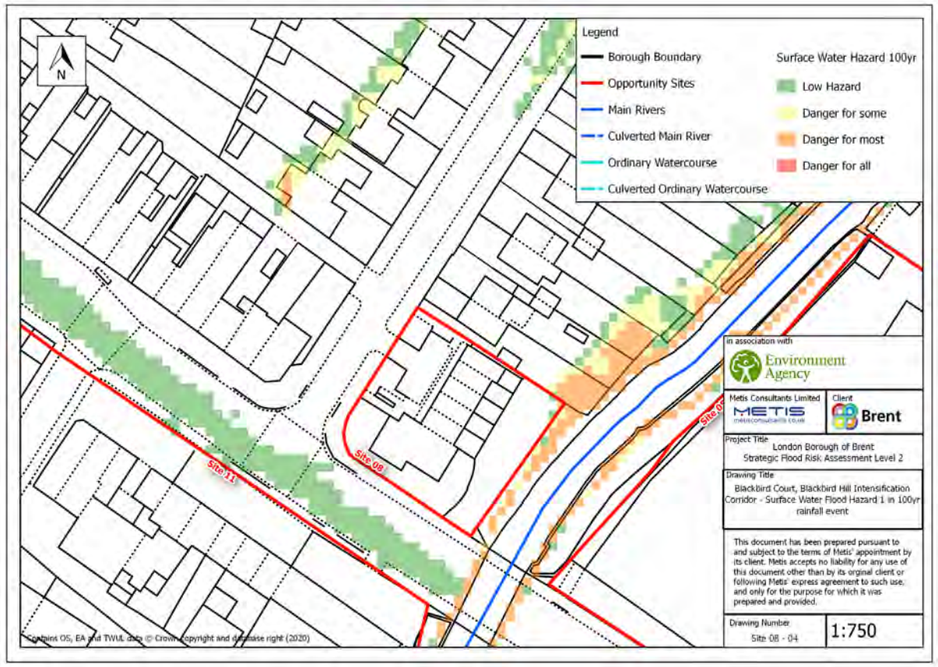


Figure 5 - Thames Water Sewer Flood Map

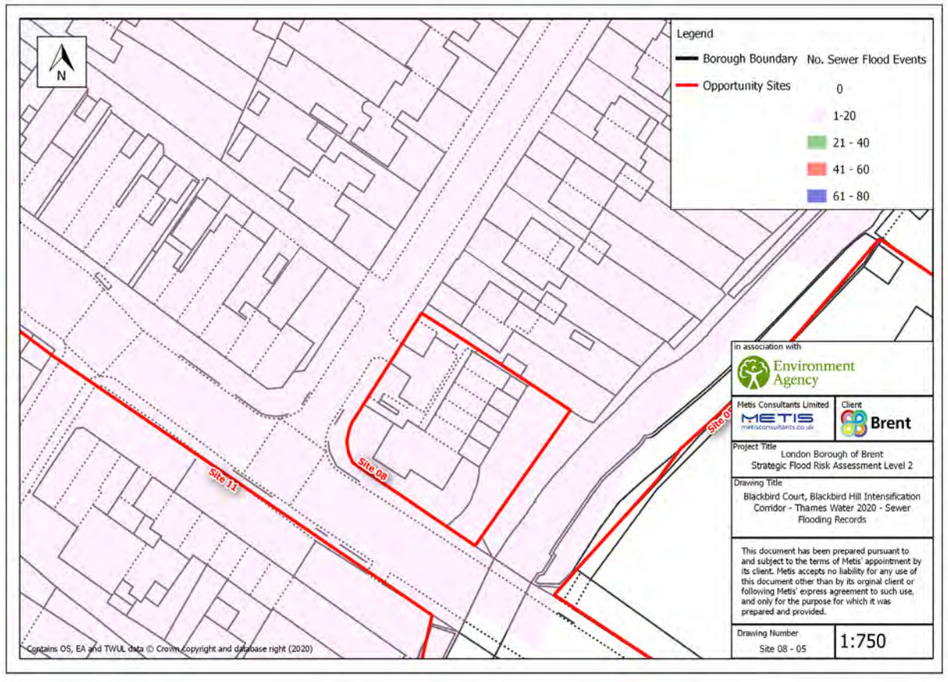


Figure 6 - Areas Susceptible to Groundwater Flooding Map

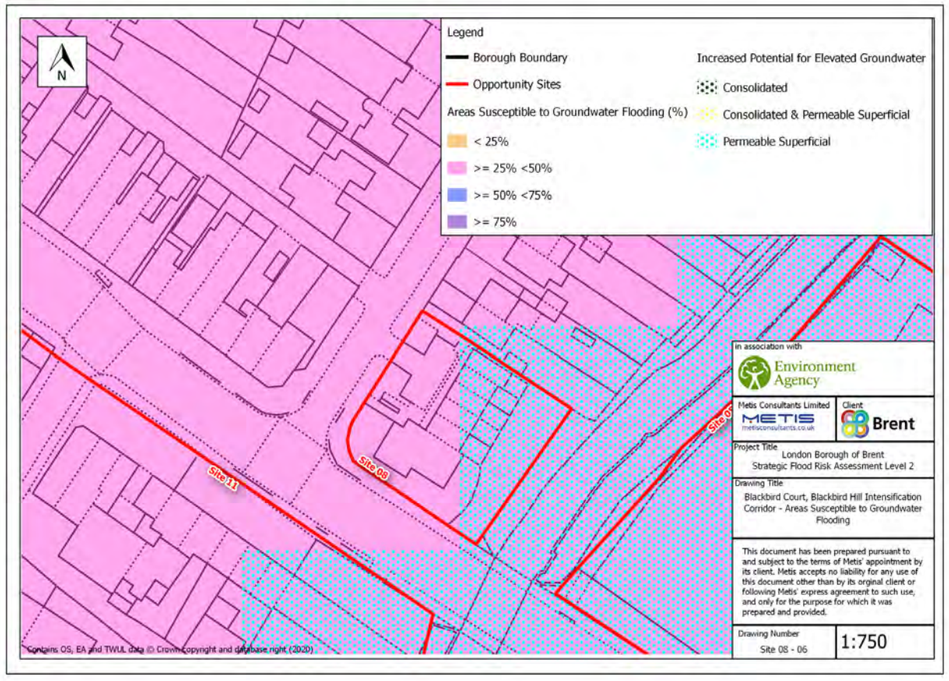
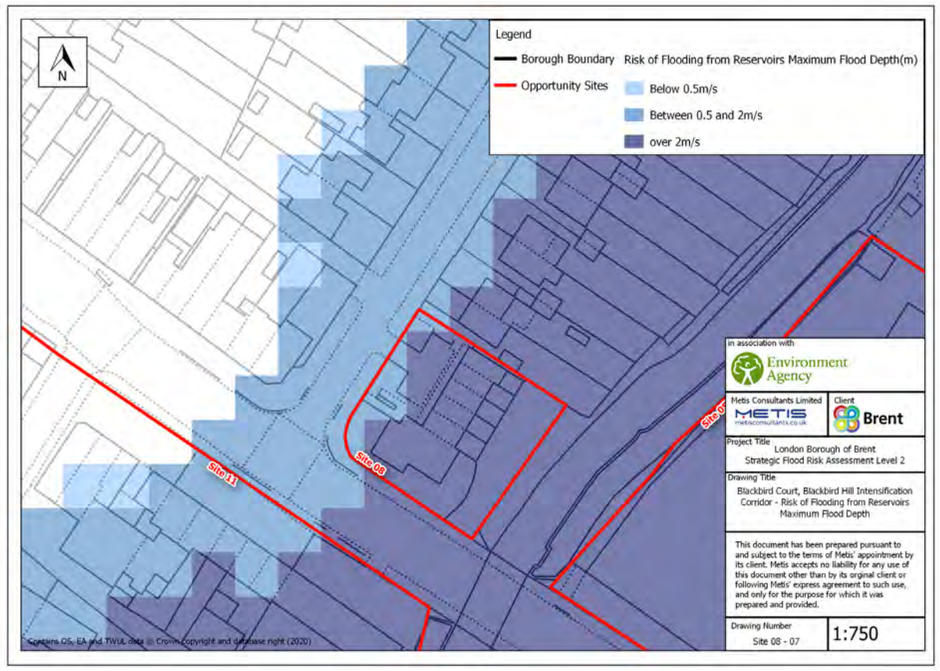


Figure 7 - Outline Reservoir Flood Map



SITE ASSESSMENT - 494-502 Neasden Lane Intensification Corridor - BD2

Address:	494-504 Neasden Lane, NW10 0EA
Area:	0.9 **Ha**
Site Reference:	9

Current Use	Proposed Use
Residential and commercial	Residential and commercial (100yr design life)

Current Vulnerability Classification	Proposed Vulnerability Classification
More Vulnerable / Less Vulnerable	More Vulnerable / Less Vulnerable

Current Risk Summary

Fluvial / Tidal			Groundwater		
FZ2	100	% of Site	<25	0	% of Site
FZ3a	96	% of Site	25-50	100	% of Site
FZ3b	0	% of Site	50-75	0	% of Site
Surface Water			>75	0	% of Site
30yr	0	% of Site	**Artificial**		
100yr	0	% of Site	Reservoir	Yes	At risk?
1000yr	100	% of Site	Canal	Yes	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents	0				

Flood Defences

N/A - the site is not in an area benefitting from flood defences.

FLUVIAL / TIDAL

Risk Assessment (Defended)

Parameter	FZ3b	FZ3a	*FZ3a+CC	Units
Speed of inundation	N/A	9	6.5	Hrs
Min. Depth	N/A	0	1	m
Max. Depth	N/A	0.2	1.3	m
Max. Velocity	N/A	0.3	0.6	m/s
Max Flood Level	N/A	31.67	32.77	m AOD
Max Ground Level	N/A	31.87	31.87	m AOD
Min Ground Level	N/A	31.02	31.02	m AOD
Flood Hazard	N/A	Low Hazard	Danger for Most	N/A
Duration of Flood	N/A	9.5+	12+	Hrs

* The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)

Parameter	FZ3a	*FZ3a+CC	Units
Speed of inundation	9	6.5	Hrs
Min. Depth	0	1	m
Max. Depth	0.2	1.3	m
Max. Velocity	0.4	0.4	m/s
Max. Hazard	Low Hazard	Danger for Most	N/A
Duration of Flood	9.5+	12+	Hrs

Description of Flood Mechanism

- The site is within 175m of the River Brent, with the river located west of the site. Fluvial flooding that originates from the Brent inundates the site from the south and the north. The flooding extent covers the majority of the site for the 1 in 100 year event, with only the northern most extent falling outside of Flood Zone 3a.
- The flood risk extent for the climate change scenario is greater, covering the entirety of the site. Flood depths are significantly higher, with a minimum flood depth of 1m at any point on site. Flow velocities are also higher under climate change.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

- The entirety of the site is at predicted risk of flooding for the 1 in 100 year event, except for the northern most extent. However, directing access and egress routes north is hazardous as the surrounding area is within the flood extent.
- Safe access and egress routes should be directed south on to Blackbird Hill, ensuring that evacuation takes place before the site is inundated from the River Brent.
- Safe refuge areas should also be provided on site.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

- See SFRA - Level 2 Report Sections 4.1.2, 4.1.3 and 4.1.4 for further requirements.
- A Flood Emergency and Evacuation Plan is required.
- Site users should be signed up to EA's Flood Warning Service.

SURFACE WATER

Risk Assessment

Parameter	30yr	100yr	*1000yr	Units
Min. Depth	0	0	0.15-0.3	m
Max. Depth	0	0.15-0.3	0.9-1.2	m
Max. Velocity	0	0-0.25	1.0-2.0	m/s
Max. Hazard	0	0.5-0.75	1.25-2.0	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

- Water enters the site from the A4088 (south), Braemar Ave (east) and the Canal Feeder (west).
- CC will extensively increase the extent, depth, velocity and hazard of flooding.

Figure 3 - RoFSW Flood Depth Map

Site Access / Egress

- Safe access and egress routes should be directed towards the south / southwest of the site, where the predicted risk is lowest.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Flood Risk Requirements

- See SFRA - Level 2 Report Sections 4.1.2, 4.1.3 and 4.1.4.
- Development next to the canal should be avoided.

Mitigation - Surface Water Drainage

- A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS.
- The site is underlain by London Clay - ground investigations are required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - 494-502 Neasden Lane Intensification Corridor - BD2

SEWER

Risk Assessment

- The area is served by a separate surface water and foul water sewer network.
- There have been no reported sewer flood incidents within the site's post code district.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

No mitigation measures required.

GROUNDWATER

Risk Assessment

- The site falls in an area that is classified as having >=25% to 50% susceptibility to groundwater flooding.
- The site falls within a 'Permeable Superficial' area with regards to Increased Potential for Elevated Groundwater.

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

- No basement dwellings should be developed onsite.
- If non-dwelling basements are being considered, a screening assessment must be provided that addresses the risk of groundwater flooding at the site and advises the level of impact and associated mitigation measures.

ARTIFICIAL

Risk Assessment

- There is risk of flooding from the Brent (Welsh Harp) Reservoir.
- The site is predicted to flood over 2m depth in result of reservoir failure.
- Reservoir failure flood speed would be between 0.5-2 m/s for the site.
- The site is adjacent to the Canal Feeder.

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

- Local Authority Emergency Planning Officers must be consulted to create a reservoir failure emergency and evacuation plan.
- Development should be avoided on the western edge of the site, next to the Canal Feeder.

PLANNING CONSIDERATIONS

Safety of Development

Can the development be future proofed for climate change considerations?

- Yes. See SFRA - Level 2 Report Sections 4.1.2 and 4.1.3 for the required finished floor levels and flood resistant / resilient building requirements.

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

- Yes - The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation.
- See SFRA - Level 2 Report Section 4.1.4 for compensatory flood storage requirements.

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

- The development land use is not changing, so flood risk will not increase. However, ground level development at the site should be a less vulnerable use if possible.
- Developments within the Flood Zone 3a + CC extents must provide compensatory flood storage that is equal to, or exceeds, the flood depths from this event.

How can the development reduce risk overall?

- The site is unlikely to control runoff from the site. New development can provide greater management of runoff through the introduction of SuDS (See Mitigation - Surface Water Drainage).
- An emergency evacuation plan must be created for the event of a reservoir failure. Plans must include safe refuge areas.
- No basement dwelling developments. If non-dwelling basements are being considered, a site-specific Flood Risk Assessment must be completed and the basement must not have any adverse impacts on flooding locally during a 1 in 100 year fluvial and surface water events. Basements must contain an egress route to a higher floor above the predicted Flood Zone 3a + CC fluvial and 1 in 1000 year surface water flood depths. Basements should be made flood resilient (See Groundwater assessment for groundwater related requirements).
- There is little green space / permeable area onsite. Development should increase permeable areas to reduce flood risk on and off-site.

Will development require a flood risk activity permit / ordinary watercourse consent?

- Site is within 5m of the Canal Feeder from the Brent Reservoir (Welsh Harp) - an ordinary watercourse. See SFRA - Level 2 Report Section 4.2.5

Exception Test

Proposed developments can be made safe throughout their lifetime without increasing flood risk elsewhere (See Safety of Development box). Mitigation measures to protect proposed developments against deep maximum fluvial flood depths can be implemented (See Mitigation / FRA Requirements). The site could also reduce flood risk overall with appropriate SuDS measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
Developments require finished floor levels of between 1.3m and 1.6m above ground level, depending on the predicted flood level at that point. Flood plain compensation will be required.	• Flood resilience construction of buildings is required. • Flood Emergency and Evacuation Plan required, including details of safe refuge points.
Surface Water	
Where the predicted flood levels for the surface water 1 in 1000 year event are higher than the Flood Zone 3a + CC depths, finished floor levels should be set to at least 0.3m above the predicted surface water depth.	See Mitigation - Surface Water Drainage box.
Sewer	
No mitigation measures required.	
Groundwater	
No dwelling basement developments should take place at either site.	If basements are being considered onsite, a screening assessment must be provided (See Groundwater box).
Artificial	
Emergency planning officers must be consulted to create a reservoir failure emergency and evacuation plan.	Development should be avoided on the western edge of the site, next to the canal.

Figure 1 - Fluvial Flood Depth Map

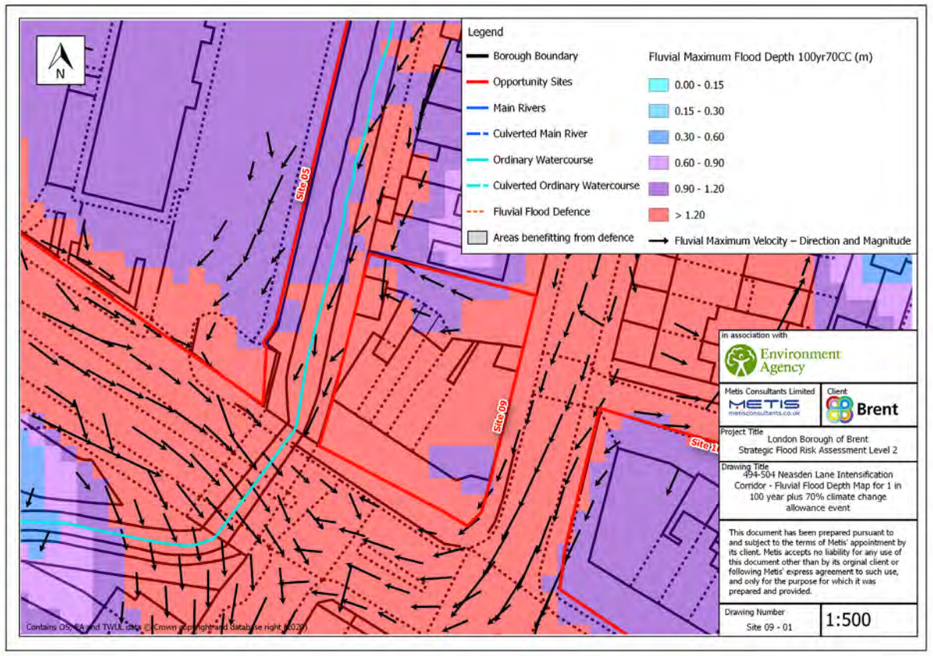


Figure 2 - Fluvial Flood Hazard Map

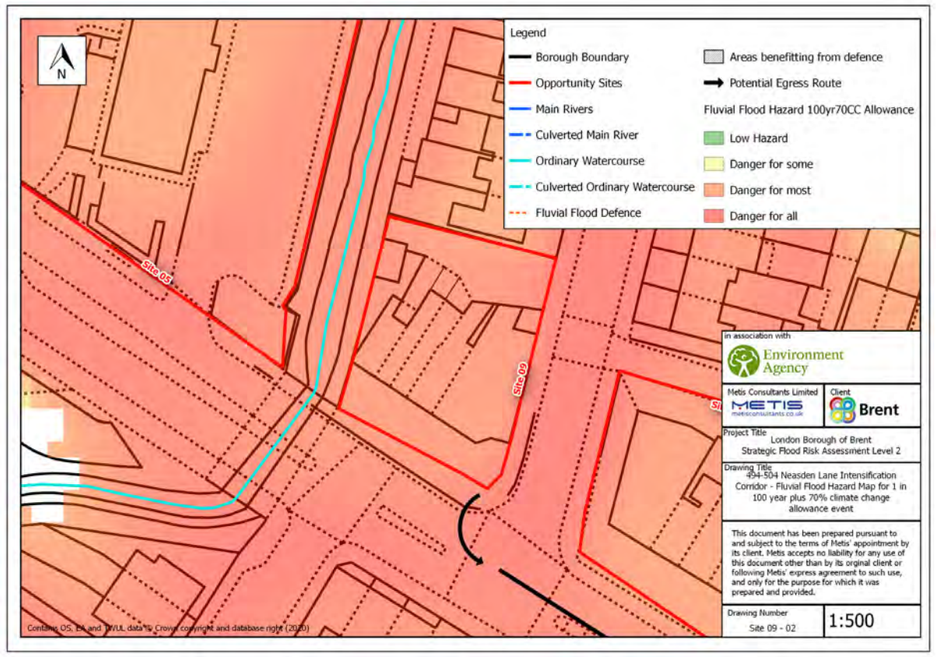


Figure 3 - RoFSW Flood Depth Map

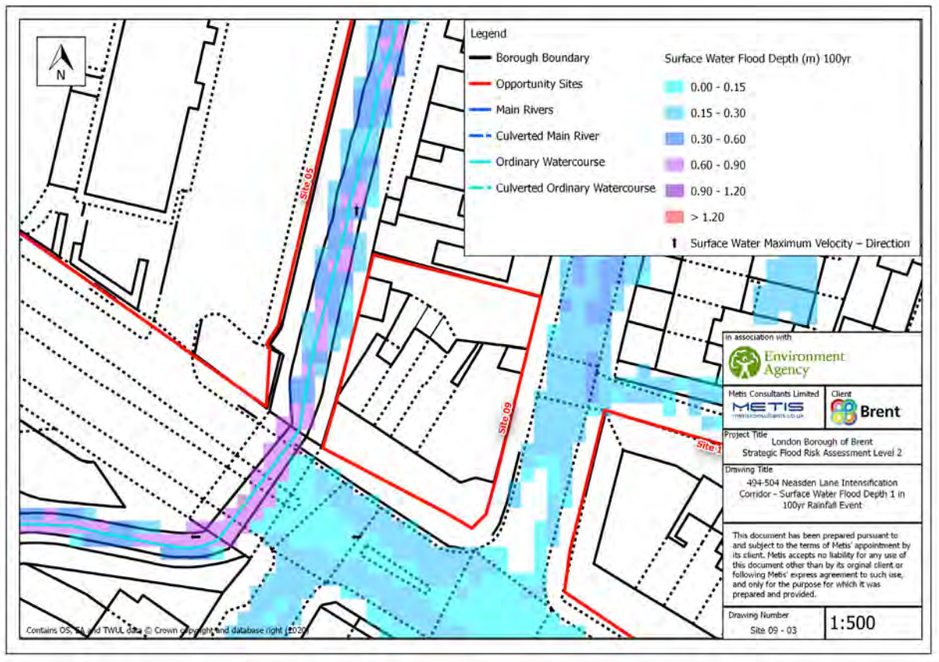


Figure 4 - RoFSW Flood Hazard Map

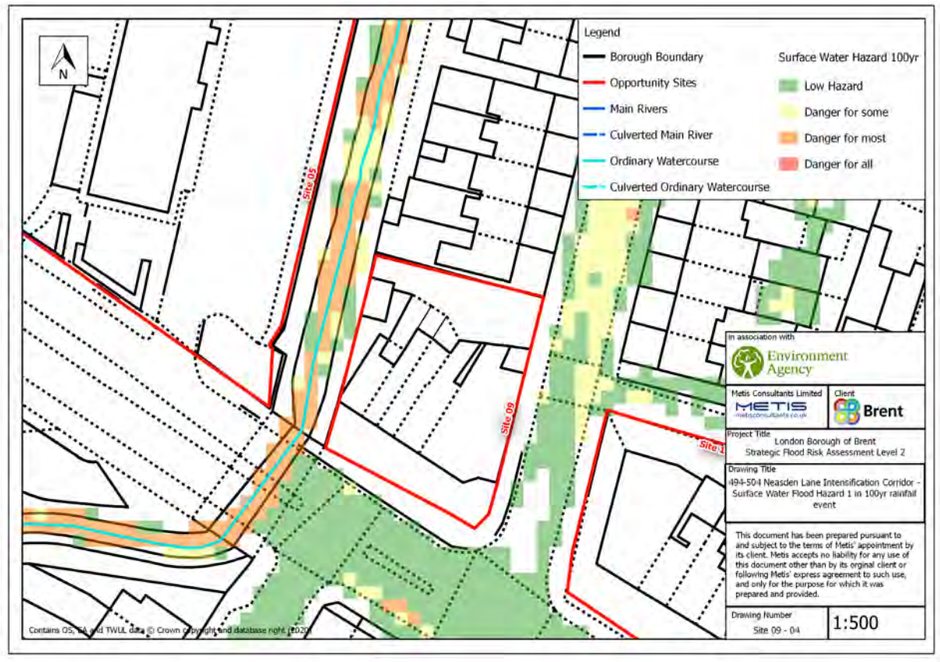


Figure 5 - Thames Water Sewer Flood Map

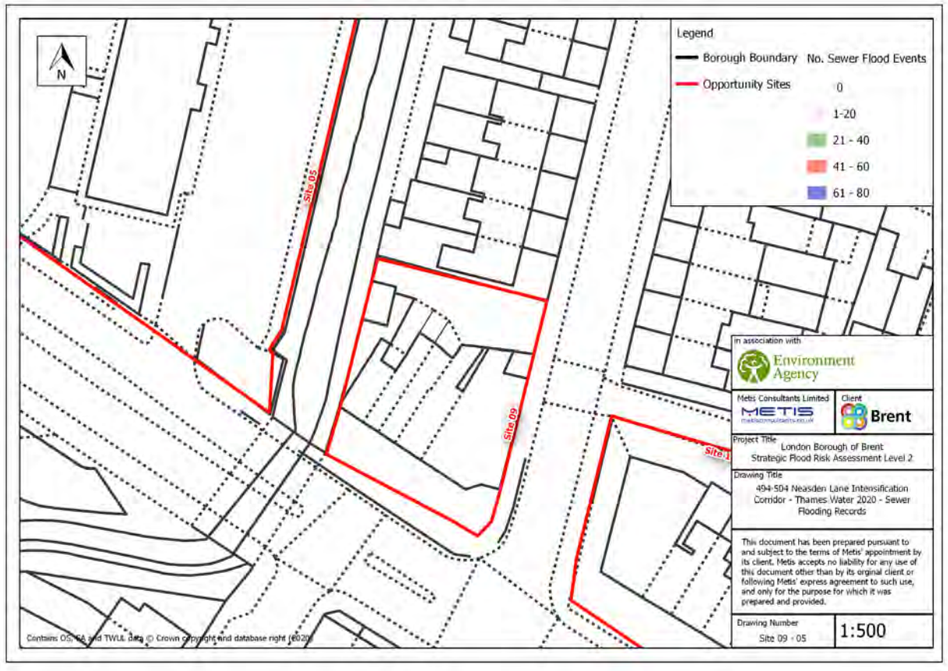


Figure 6 - Areas Susceptible to Groundwater Flooding Map

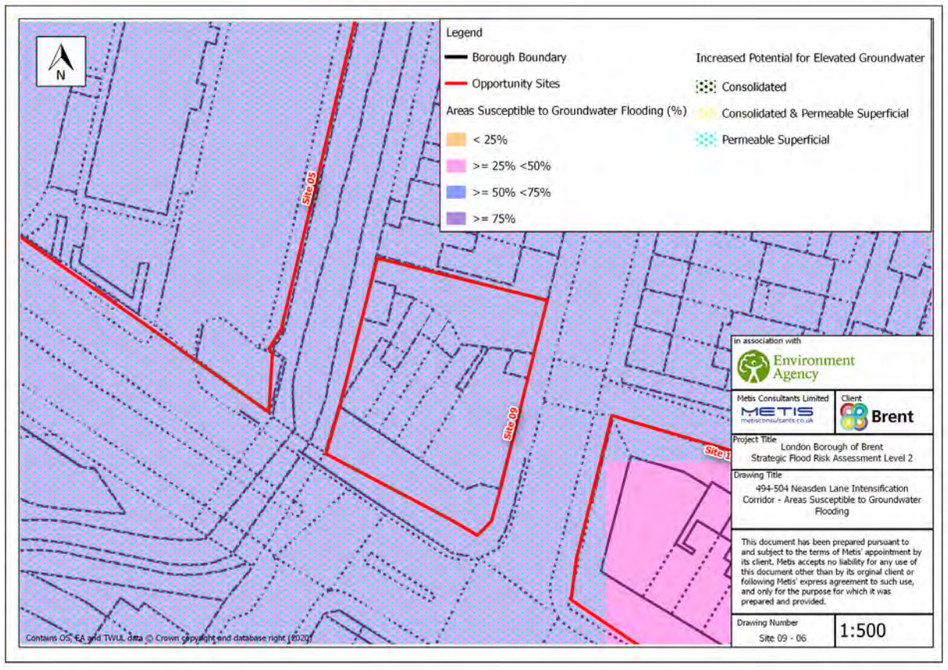


Figure 7 - Outline Reservoir Flood Map

SITE ASSESSMENT - 460-492 Neasden Lane Intensification Corridor - BD2

Address:	460-492 Neasden Lane, NW10 0EA
Area:	0.43 **Ha**
Site Reference:	10

Current Use	Proposed Use
Residential and commercial	Residential and commercial (100yr design life)

Current Vulnerability Classification	Proposed Vulnerability Classification
More Vulnerable / Less Vulnerable	More Vulnerable / Less Vulnerable

Current Risk Summary

Fluvial / Tidal			Groundwater		
FZ2	84	% of Site	<25	0	% of Site
FZ3a	3	% of Site	25-50	100	% of Site
FZ3b	0	% of Site	50-75	0	% of Site
Surface Water			>75	0	% of Site
30yr	3	% of Site	**Artificial**		
100yr	24	% of Site	Reservoir	Yes	At risk?
1000yr	68	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents	0				

Flood Defences

N/A - the site is not in an area benefitting from flood defences.

FLUVIAL / TIDAL

Risk Assessment (Defended)

Parameter	FZ3b	FZ3a	*FZ3a+CC	Units
Speed of inundation	N/A	9.5	6.5	Hrs
Min. Depth	N/A	0	0	m
Max. Depth	N/A	0.2	1.3	m
Max. Velocity	N/A	0.6	1	m/s
Max Flood Level	N/A	31.67	32.77	m AOD
Max Ground Level	N/A	33.01	33.01	m AOD
Min Ground Level	N/A	31.53	31.53	m AOD
Flood Hazard	N/A	Low Hazard	Danger for Most	N/A
Duration of Flood	N/A	9+	12+	Hrs

* The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)

Parameter	FZ3a	*FZ3a+CC	Units
Speed of inundation	9.5	6.5	Hrs
Min. Depth	0	0	m
Max. Depth	0.2	1.3	m
Max. Velocity	0.6	1	m/s
Max. Hazard	Low Hazard	Danger for Most	N/A
Duration of Flood	9+	12+	Hrs

Description of Flood Mechanism

- The site is within 200m of the River Brent, with the river located west of the site. Fluvial flooding that originates from the Brent inundates the site from the north and east. The flooding extent covers the most eastern extent of the site for the 1 in 100 year event, with a majority of the site falling outside of Flood Zone 3a.
- The flood risk extent for the climate change scenario is significantly greater, covering most of the site. The north eastern area of the site is outside the Flood Zone 3a + CC extent. Flood depths and flow velocities are also higher under climate change.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

- Though more than 80% of the site lies outside Flood Zone 3a, less than 20% of the site falls within Flood Zone 1. This is largely in the north eastern extent of the site which borders Press Road.
- A safe access and egress route would need to be directed towards the east onto Press Road where the risk is the lowest.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

- See SFRA - Level 2 Report Sections 4.1.2, 4.1.3 and 4.1.4 for further requirements.
- To mitigate against the deep maximum flood depths, proposed developments should place in the western half of the site where maximum flood depths are lower (< 0.8m).
- A Flood Emergency and Evacuation Plan is required.
- Site users should be signed up to EA's Flood Warning Service.

SURFACE WATER

Risk Assessment

Parameter	30yr	100yr	*1000yr	Units
Min. Depth	0	0	0	m
Max. Depth	0.3-0.6	0.6-0.9	0.6-0.9	m
Max. Velocity	0.25-0.5	0.5-1.0	>2.0	m/s
Max. Hazard	0.5-0.75	1.25-2.0	1.25-2.0	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

- Water enters the site from Press Road (southeast) and pools in local depressions throughout the site.
- CC will increase the extent and velocity, but will not increase the maximum depth and hazard of flooding.

Site Access / Egress

- Safe access and egress routes should be directed towards the northwest and southwest of the site, where predicted flood risk is lowest.
- As surface water runoff and fluvial flooding inundates the site from the east and west / north respectively, Safe refuge points should also be provided on site.

Figure 3 - Roofs' Flood Depth Map

Mitigation - Flood Risk Requirements

- See SFRA - Level 2 Report Sections 4.1.2, 4.1.3 and 4.1.4.
- Minimise flood storage lost by limiting development to the northwest of the site.

Figure 4 - Roofs' Flood Hazard Map

Mitigation - Surface Water Drainage

- A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS.
- The site is underlain by London Clay - ground investigations are required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - 460-492 Neasden Lane Intensification Corridor - BD2

SEWER

Risk Assessment

• The area is served by a separate surface water and foul water sewer network.
• There have been no reported sewer flood incidents within the site's post code district.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

No mitigation measures required.

GROUNDWATER

Risk Assessment

• The site falls in an area that is classified as having >=25% to 50% susceptibility to groundwater flooding.
• A small portion located in the western-most corner of the site falls within a 'Permeable Superficial' area with regards to Increased Potential for Elevated Groundwater.

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

• No basement dwellings should be developed onsite.
• If non-dwelling basements are being considered, a screening assessment must be provided that addresses the risk of groundwater flooding at the site and advises the level of impact and associated mitigation measures.

ARTIFICIAL

Risk Assessment

• There is risk of flooding from the Brent (Welsh Harp) Reservoir.
• The majority of the site is predicted to flood over 2m depth in result of reservoir failure.
• Reservoir failure flood speed would be between 0.5-2 m/s for the majority of the site.

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

Local Authority Emergency Planning Officers must be consulted to create a reservoir failure emergency and evacuation plan.

PLANNING CONSIDERATIONS

Safety of Development

Can the development be future proofed for climate change considerations?
• Yes. See SFRA - Level 2 Report Sections 4.1.2 and 4.1.3 for the required finished floor levels and flood resistant / resilient building requirements.

Can the development be designed safe throughout its lifetime without increasing flood risk elsewhere?
• Yes - The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation.
• See SFRA - Level 2 Report Section 4.1.4 for compensatory flood storage requirements.

What is the cumulative impact of the development land use change and will flood risk increase?
• The development land use is not changing. However, ground level development at the site should be a less vulnerable use, if possible.
• The site currently contains impermeable and permeable space. Development must mitigate any increase in impermeable area with runoff storage to prevent any increase in flood risk.

How can the development reduce risk overall?
• Directing development towards the western half of the site where maximum flood depths are lower. Finished floor levels of at least 0.3m above predicted flood depths at that point should be implemented (See SFRA - Level 2 Report).
• The site is unlikely to control runoff from the site. New development can provide greater management of runoff through the introduction of SuDS (See Mitigation - Surface Water Drainage).
• An emergency evacuation plan must be created for the event of a reservoir failure. Plans must include safe refuge areas.
• No basement dwelling developments. If non-dwelling basements are being considered, a site-specific Flood Risk Assessment must be completed and the basement must not have any adverse impacts on flooding locally during a 1 in 100 year fluvial and surface water events. Basements must contain an egress route to a higher floor above the predicted Flood Zone 3a + CC fluvial and 1 in 1000 year surface water flood depths. Basements should be made flood resilient.. Basements should be made flood resilient (See Groundwater assessment for groundwater related requirements).

Will development require a flood risk activity permit / ordinary watercourse consent?
• No, the development will not require a flood risk activity permit.

Exception Test

Proposed developments can be made safe throughout their lifetime without increasing flood risk elsewhere (See Safety of Development box). Mitigation measures to protect proposed developments against deep maximum fluvial flood depths can be implemented (See Mitigation / FRA Requirements). The site could also reduce flood risk overall with appropriate SuDS and flood compensation measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
Development should be directed towards the western half of the site where maximum flood depths are lower. Finished floor levels must be at least 0.3m above predicted flood levels and flood plain compensation is required.	• Flood resistance and resilience construction of developments is required where flood levels are less than 0.3m and more than 0.3m respectively. • Flood Emergency and Evacuation Plan required.
Surface Water	
Developments within the 1 in 1000 year surface water extent require finished floor levels of at least 0.3m above the predicted flood level at that point. Floor level should be set to Flood Zone 3a + CC extent flood levels if predicted fluvial depths are higher.	• Flood plain compensation must be provided for events up to a 1 in 1000 year event. • See Mitigation - Surface Water Drainage box.
Sewer	
No mitigation measures required.	
Groundwater	
No dwelling basement developments should take place at either site.	If basements are being considered onsite, a screening assessment must be provided (See Groundwater box).
Artificial	
Emergency planning officers must be consulted to create a reservoir failure emergency and evacuation plan.	

Figure 1 - Fluvial Flood Depth Map

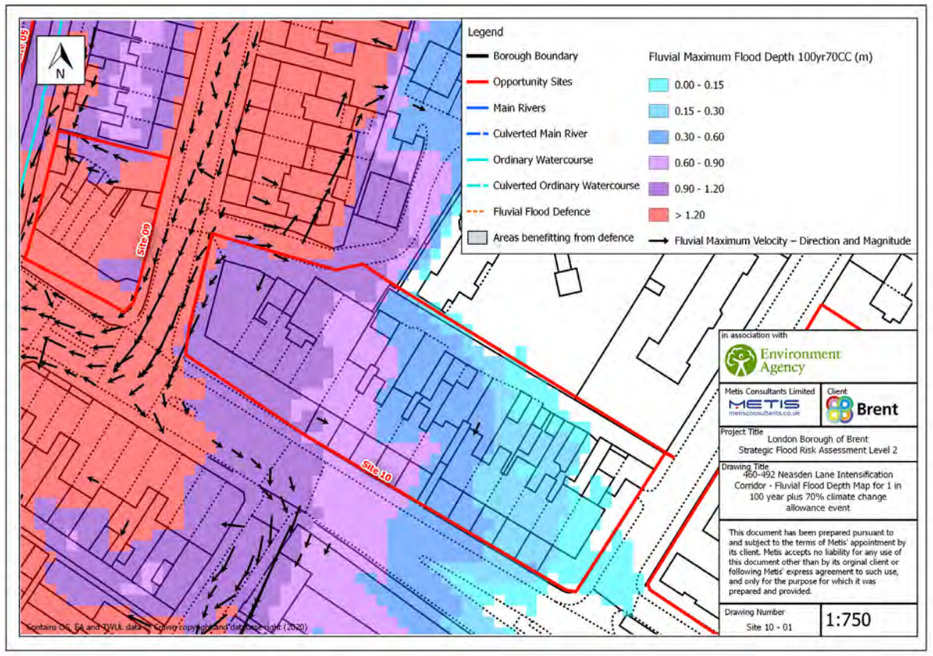


Figure 2 - Fluvial Flood Hazard Map

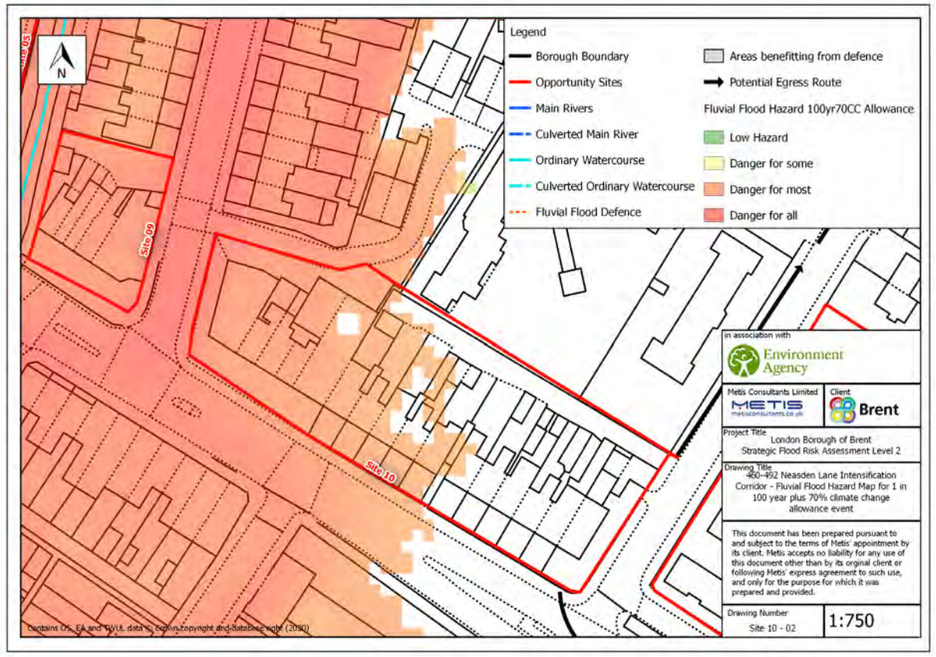


Figure 3 - RoFSW Flood Depth Map

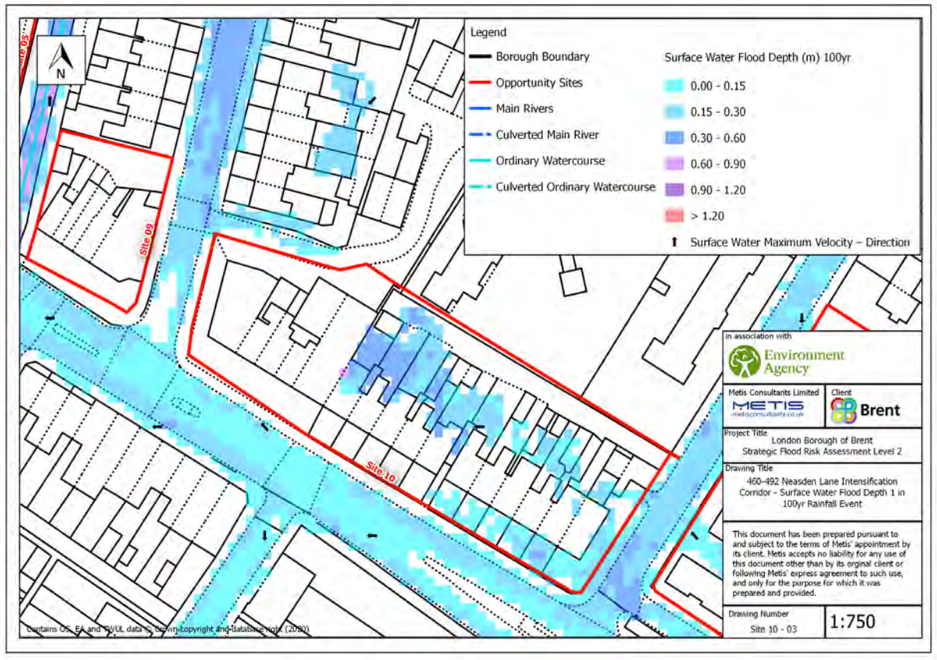


Figure 4 - RoFSW Flood Hazard Map

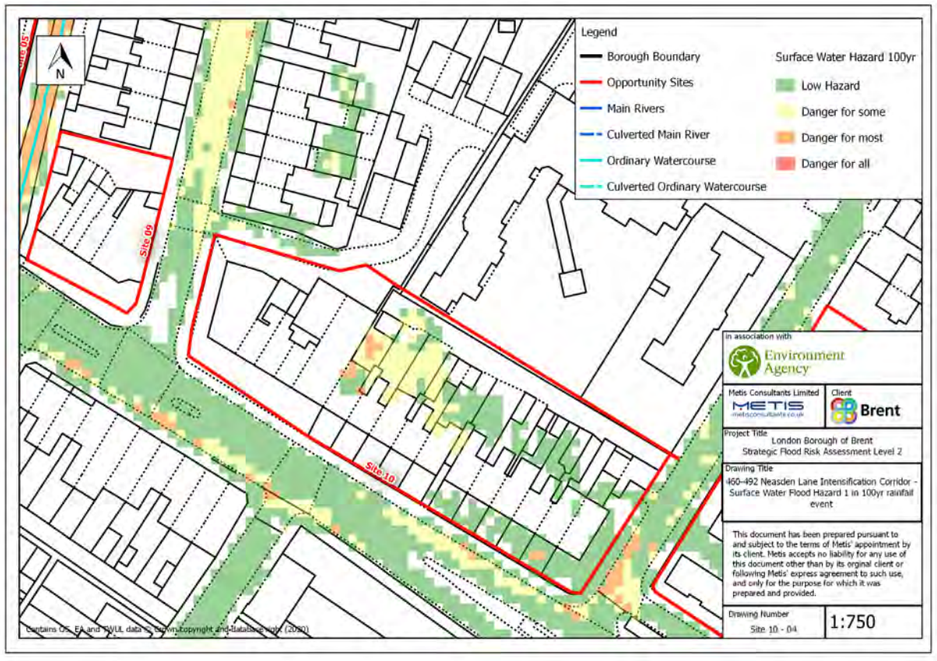


Figure 5 - Thames Water Sewer Flood Map

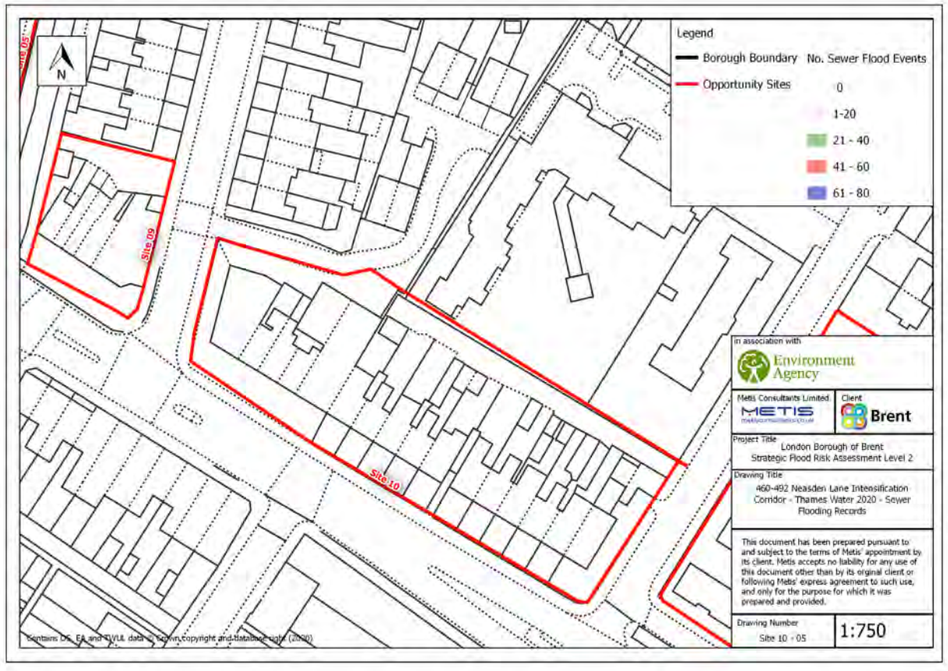


Figure 6 - Areas Susceptible to Groundwater Flooding Map

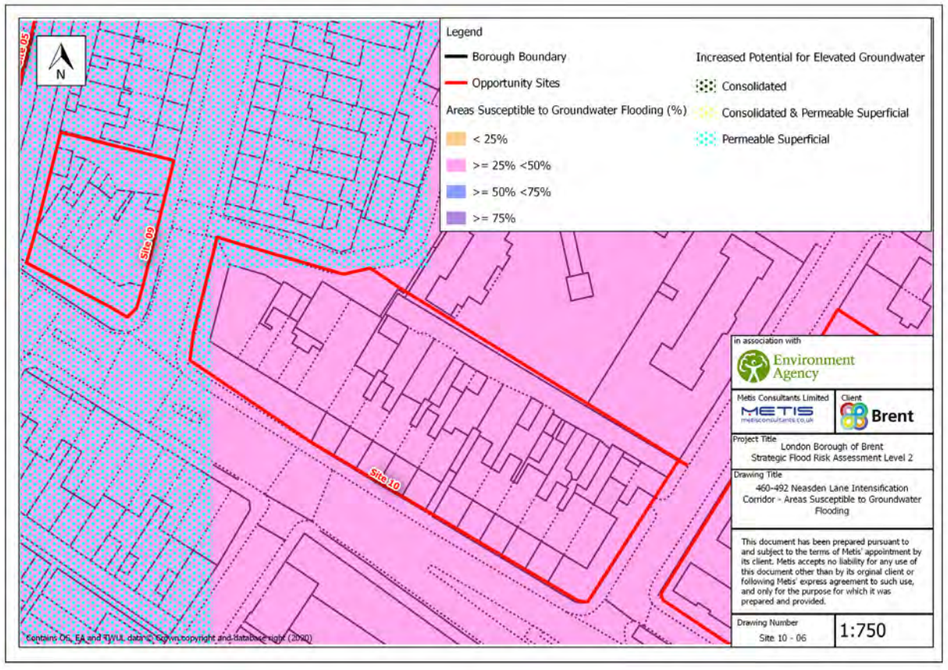
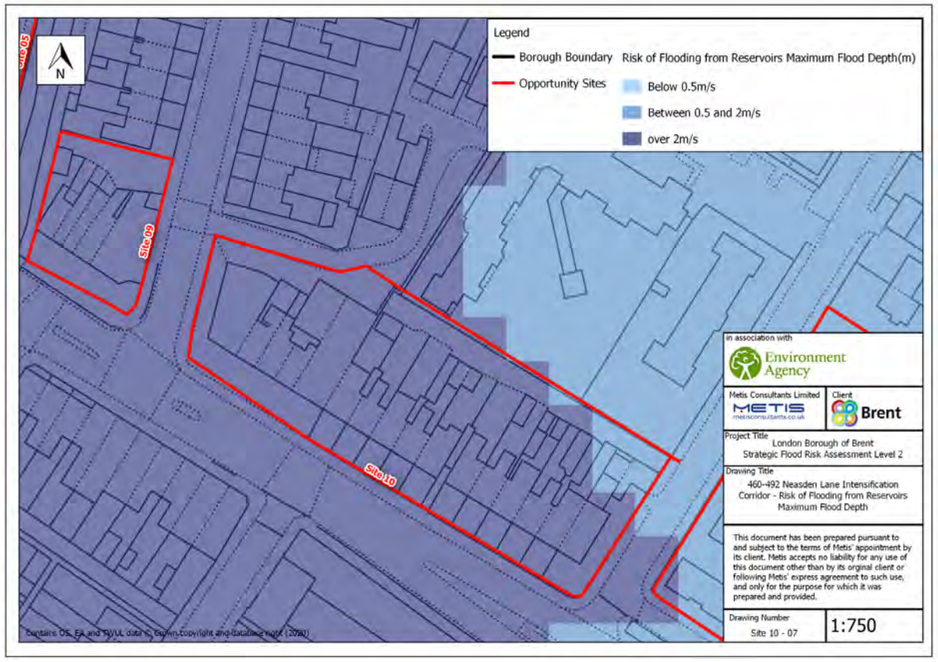


Figure 7 - Outline Reservoir Flood Map



SITE ASSESSMENT - Talbot Court to English Martyrs RC Church Blackbird Hill Intensification Corridor - BD2

Address:	Blackbird Hill, NW9 8SD
Area:	2.15 **Ha**
Site Reference:	11

Current Use	Proposed Use
Residential, commercial and church site	Residential and commercial (100yr design life)

Current Vulnerability Classification	Proposed Vulnerability Classification
More Vulnerable / Less Vulnerable	More Vulnerable / Less Vulnerable

Current Risk Summary					
Fluvial / Tidal			**Groundwater**		
FZ2	31	% of Site	<25	0	% of Site
FZ3a	7	% of Site	25-50	100	% of Site
FZ3b	2	% of Site	50-75	0	% of Site
Surface Water			>75	0	% of Site
30yr	0.008	% of Site	**Artificial**		
100yr	0.1	% of Site	Reservoir	Yes	At risk?
1000yr	22	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents	1-20				

Flood Defences

N/A - the site is not in an area benefitting from flood defences.

FLUVIAL / TIDAL

Risk Assessment (Defended)

Parameter	FZ3b	FZ3a	*FZ3a+CC	Units
Speed of inundation	8**	6.5**	5**	Hrs
Min. Depth	0	0	0	m
Max. Depth	1.8	3.1	4.6	m
Max. Velocity	1.1	1.3	1.3	m/s
Max Flood Level	30.01	31.44	32.8	m AOD
Max Ground Level	46.18	46.18	46.18	m AOD
Min Ground Level	29.16	29.16	29.16	m AOD
Flood Hazard	Danger for all	Danger for all	Danger for all	N/A
Duration of Flood	4.5**	12+**	13.5+**	Hrs

* The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)

Parameter	FZ3a	*FZ3a+CC	Units
Speed of inundation	6.5**	5**	Hrs
Min. Depth	0	0	m
Max. Depth	3.1	4.6	m
Max. Velocity	1.4	1.3	m/s
Max. Hazard	Danger for all	Danger for all	N/A
Duration of Flood	12+**	13.5+**	Hrs

Description of Flood Mechanism

- Flooding originates from the Brent, inundating the site from the east. The flood risk extent for the climate change scenario is greater, with flooding predicted to impact a greater proportion of the eastern area of the site. Although the flow velocities are similar, the depths are also higher under climate change.

**The site boundary extends into the river channel, placing it by default into Flood Zone 3b (1 in 20 year), 3a (1 in 100 year), and 3a + CC (1 in 100 year + CC). As the site is at predicted risk of flooding, we have assessed the flood inundation and flood duration based on when flooding exceeds the river channel extent and encroaches onto the site. All other data has been assessed based on the overlap of the River Brent and site extents.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

- A large proportion of the site is not predicted to be at risk of flooding for the 1 in 100 year event. This area is located towards the west of the site.
- The site borders Blackbird Hill to the north, Chalkhill Road to the west, and Ken Way to the south. A safe access and egress route would need to be directed to the north, west and south of the site, where the risk is lowest. A safe route can also be directed to Barnhill Road, which falls within the site area.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

- See SFRA - Level 2 Report Sections 4.1.1, 4.1.2, 4.1.3 and 4.1.4 for further requirements.
- See SFRA - Level 2 Report Section 4.1.6 for Main River requirements.
- To mitigate against fluvial flooding, proposed developments should be directed away from the eastern extent of the site. These areas are outside of the Flood Zone 3a + CC extent. Predicted flood depths are up to 3m within the Flood Zone 3a + CC extent.
- A Flood Emergency and Evacuation Plan is required.
- Site users should be signed up to EA's Flood Warning Service.

SURFACE WATER

Risk Assessment

Parameter	30yr	100yr	*1000yr	Units
Min. Depth	0	0	0	m
Max. Depth	0.15-0.3	0.15-0.3	>1.2	m
Max. Velocity	0-0.25	0.25-0.5	1.0-2.0	m/s
Max. Hazard	0.5-0.75	0.75-1.25	>2.0	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

- Water enters the site from River Brent in the southeast and from the A4088.
- CC will extensively increase the extent, depth, velocity and hazard of flooding.

Site Access / Egress

Safe access and egress routes should be directed towards Chalkhill Road, Ken Way and Barnhill Road, where the predicted risk is lowest.

Figure 3 - RoFSW Flood Depth Map

Mitigation - Flood Risk Requirements

- See SFRA - Level 2 Report Sections 4.1.2, 4.1.3 and 4.1.4.
- The eastern extent of the entire site is predicted to flood in a 1 in 1000 event, development here should be avoided here if possible.
- Flood resilient building required near the River Brent.
- Development of the greenspace next to the River Brent must be avoided.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Surface Water Drainage

- A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS.
- The site is underlain by London Clay - ground investigations are required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - Talbot Court to English Martyrs RC Church Blackbird Hill Intensification Corridor - BD2

SEWER

Risk Assessment

• The area is served by a separate surface water and foul water sewer network.
• There have been between 1-20 sewer flood incidents reported within the site's post code district.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

• Thames Water must be consulted to confirm if the site has historically flooded.
• If the site has historically flooded, the development must reduce the runoff to sewers from the site to greenfield rates or as close as possible to greenfield rates.

GROUNDWATER

Risk Assessment

• The site falls in an area that is classified as having >=25% to 50% susceptibility to groundwater flooding.
• The most eastern part of the site falls within a 'Permeable Superficial' area with regards to Increased Potential for Elevated Groundwater.

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

• No basement dwellings should be developed onsite.
• If non-dwelling basements are being considered, a screening assessment must be provided that addresses the risk of groundwater flooding at the site and advises the level of impact and associated mitigation measures.

ARTIFICIAL

Risk Assessment

• There is risk of flooding from the Brent (Welsh Harp) Reservoir east of Barnhill Road.
• Where there is risk, the site will flood between 0.3-2m near Barnhill Road and over 2m depth closer to the River Brent in result of reservoir failure.
• Reservoir failure flood speed would be below 0.5m/s near Barnhill Road, between 0.5-2 m/s for the majority of the site that is at risk and over 2m/s for a small part of the site nearest the River Brent.

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

Local Authority Emergency Planning Officers must be consulted to create a reservoir failure emergency and evacuation plan.

PLANNING CONSIDERATIONS

Safety of Development

Can the development be future proofed for climate change considerations?
• Yes - A majority of the site is outside of the predicted Flood Zone 3a + CC extent and 1 in 1000 year event extent for surface water flooding. Development can be directed out of the predicted flood risk areas.
• See SFRA - Level 2 Report Sections 4.1.2 and 4.1.3 for the required finished floor levels and flood resistant / resilient building requirements.

Can the development be designed safe throughout its lifetime without increasing flood risk elsewhere?
• Yes - The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation.
• See SFRA - Level 2 Report Section 4.1.4 for compensatory flood storage requirements.

What is the cumulative impact of the development land use change and will flood risk increase?
• The development land use is not changing.
• Development must mitigate any increase in impermeable area to the site with flood plain compensation and runoff storage to prevent any increase in flood risk.

How can the development reduce risk overall?
• The site is unlikely to control runoff from the site. New development can provide greater management of runoff through the introduction of SuDS (See Mitigation - Surface Water Drainage).
• An emergency evacuation plan must be created for the event of a reservoir failure.
• There is little green space / permeable area onsite. Development should increase permeable to reduce flood risk on and off-site.
• Directing development towards the western half of the site where the risk is lowest.
• Finished floor levels of at least 0.3m above predicted flood depths should be implemented for development within areas of predicted flood risk (See SFRA - Level 2 Report).
• No basement dwelling developments. Basements developments, that are not basement dwellings, may be appropriate at some locations onsite, but a site-specific Flood Risk Assessment must be completed and the basement must not have any adverse impacts on flooding locally during a 1 in 100 year fluvial and surface water events. Basements must contain an egress route to a higher floor above the predicted Flood Zone 3a + CC fluvial and 1 in 1000 year surface water flood depths. Basements should be made flood resilient. (See Groundwater assessment for groundwater related requirements).

Will development require a flood risk activity permit / ordinary watercourse consent?
• Yes - Site is within 8m of the River Brent - See SFRA - Level 2 Report Section 4.1.6

Exception Test

Proposed developments can be made safe throughout their lifetime without increasing flood risk elsewhere (See Safety of Development box). Mitigation measures to protect proposed developments against fluvial flooding can be implemented (See Mitigation / FRA Requirements). The site could also reduce flood risk overall with appropriate SuDS and flood storage compensation measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
• Developments cannot take place in Flood Zone 3b extent. • Development should be directed away from the eastern extent of the site. These areas are outside of the Flood Zone 3a + CC extent.	• Finished floor levels of at least 0.3m above predicted flood depths and flood plain compensation must be provided • Flood resistance and resilience construction of buildings is required.
Surface Water	
Developments within the 1 in 1000 year surface water extent require finished floor levels of at least 0.3m above the predicted flood level at that point. Floor level should be set to Flood Zone 3a + CC extent flood levels if predicted fluvial depths are higher.	• Flood plain compensation must be provided for events up to a 1 in 1000 year event. • Development near River Brent should be avoided. •See Mitigation - Surface Water Drainage box.
Sewer	
Thames Water must be consulted to confirm if the site has historically flooded.	If the site has historically flooded, the development must reduce the runoff to sewers to greenfield rates.
Groundwater	
No dwelling basement developments should take place at either site.	If basements are being considered onsite, a screening assessment must be provided (See Groundwater box).
Artificial	
Emergency planning officers must be consulted to create a reservoir failure emergency and evacuation plan.	

Figure 1 - Fluvial Flood Depth Map

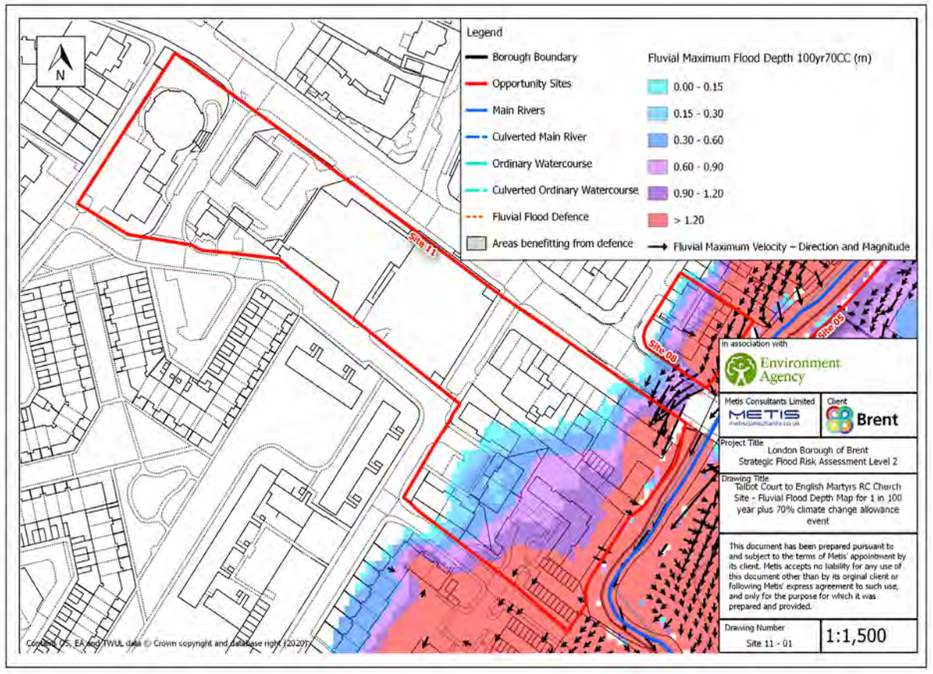


Figure 2 - Fluvial Flood Hazard Map

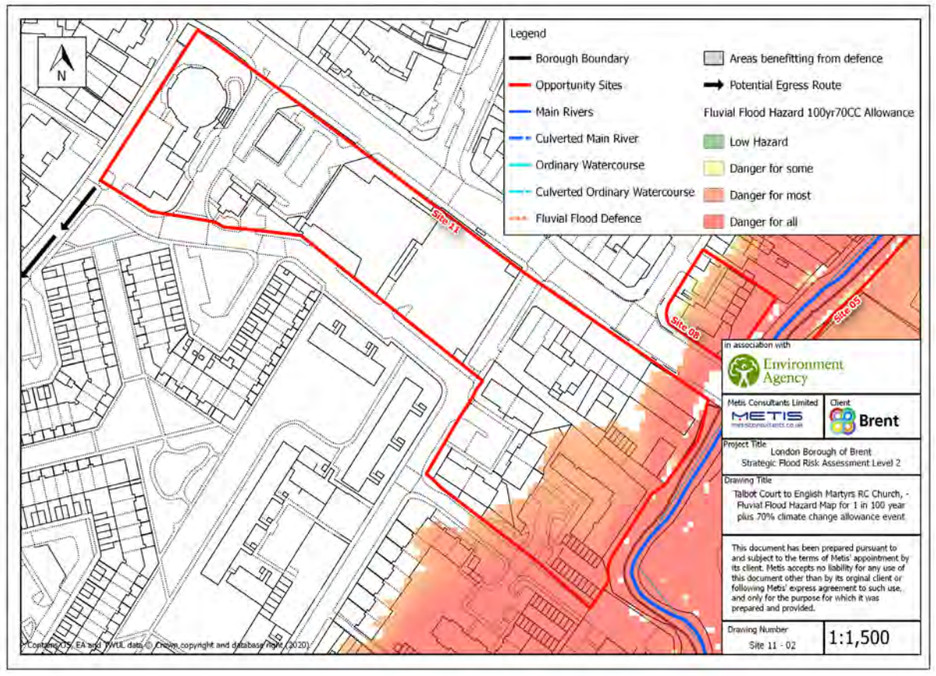


Figure 3 - RoFSW Flood Depth Map

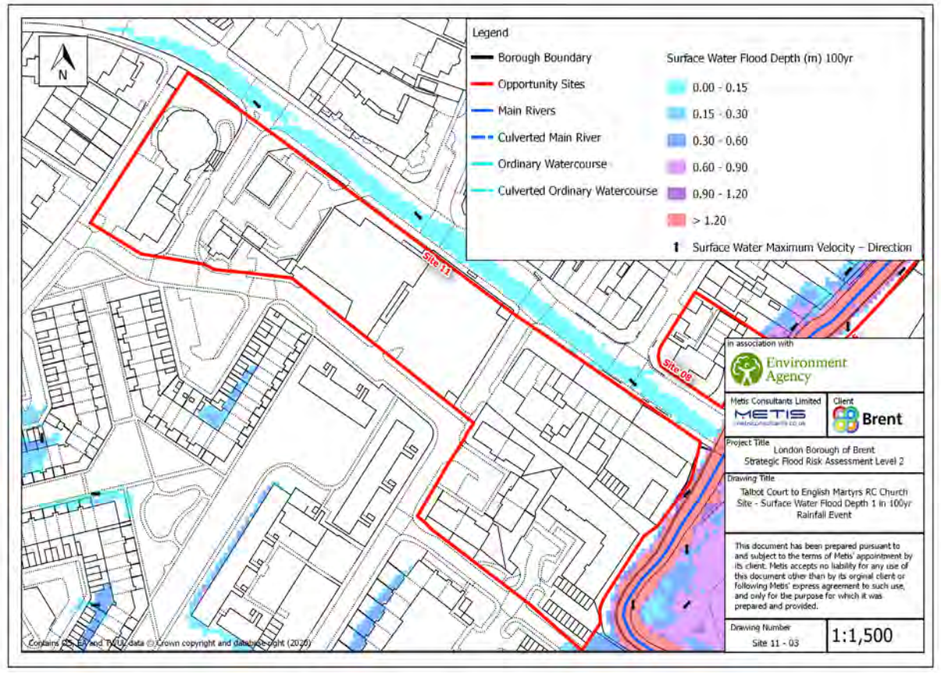


Figure 4 - RoFSW Flood Hazard Map

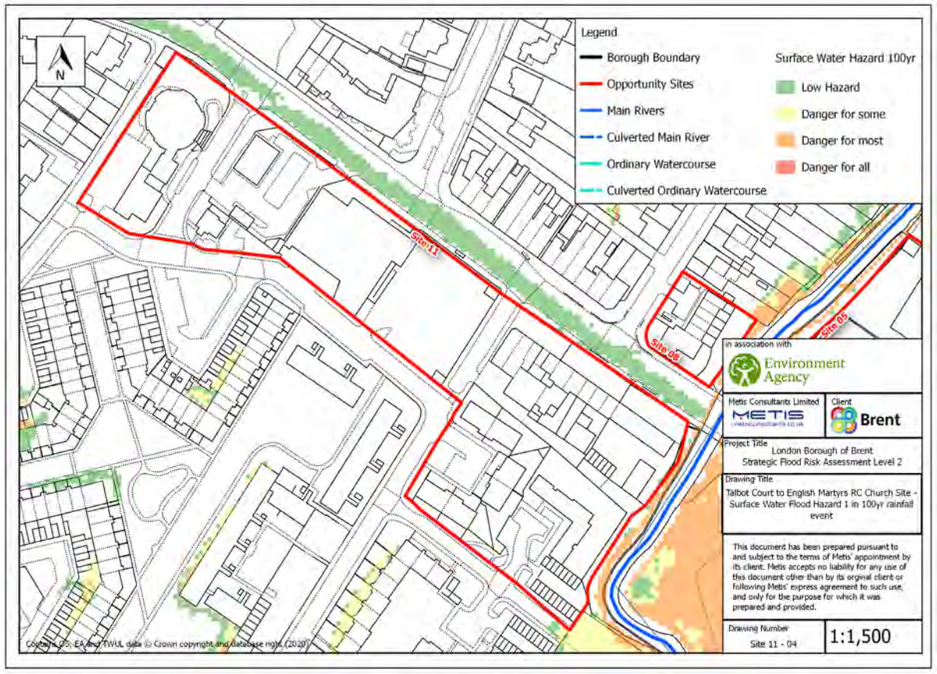


Figure 5 - Thames Water Sewer Flood Map

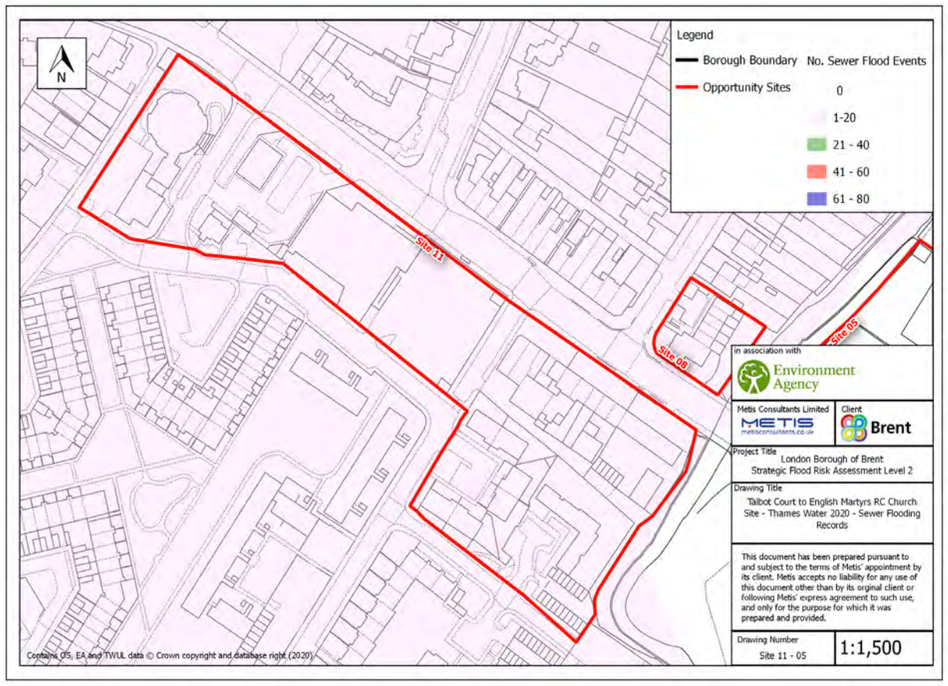


Figure 6 - Areas Susceptible to Groundwater Flooding Map

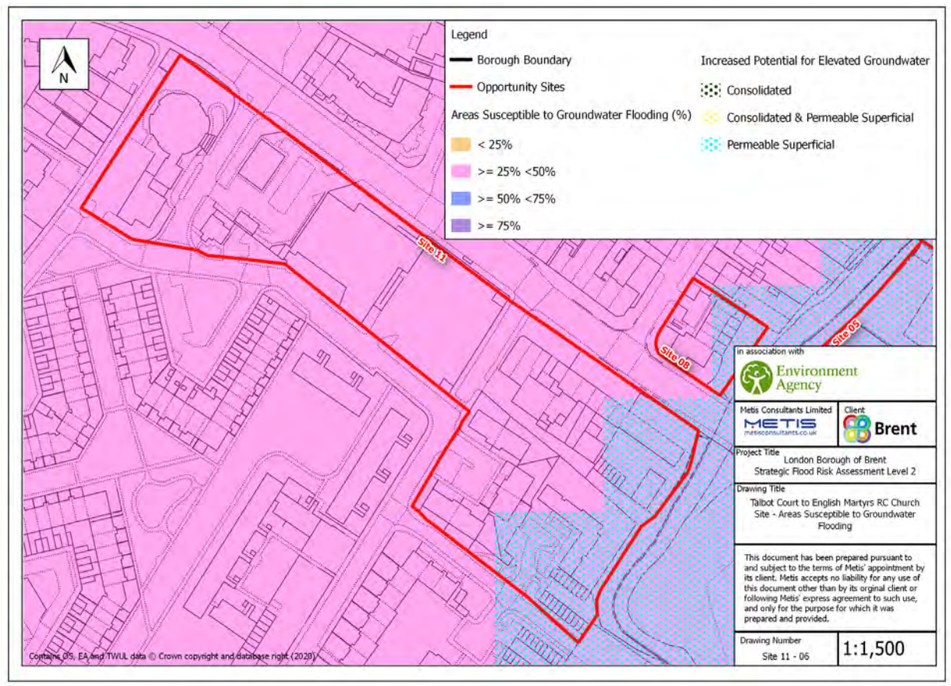
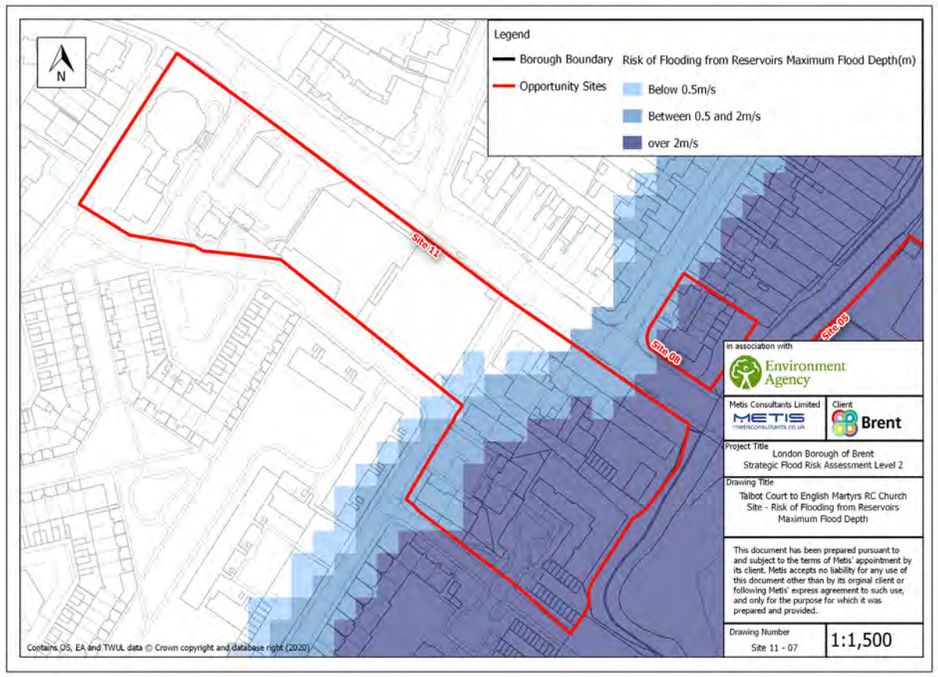


Figure 7 - Outline Reservoir Flood Map



SITE ASSESSMENT - 2-4 North Circular Road, 2-32 Brentfield and 1-3a Sunny Crescent - BD2

Address:	2-4 North Circular Road, 2-32 Brentfield and 1-3a Sunny Crescent (NW10 0RG)

Area:	0.48 **Ha**
Site Reference:	12

Current Use	Proposed Use
Residential	Residential

Current Vulnerability Classification	Proposed Vulnerability Classification
More Vulnerable	More Vulnerable

Current Risk Summary					
Fluvial / Tidal **			**Groundwater**		
FZ2	100	% of Site	<25	0	% of Site
FZ3a	100	% of Site	25-50	100	% of Site
FZ3b	0	% of Site	50-75	0	% of Site
Surface Water			>75	0	% of Site
30yr	25	% of Site	**Artificial**		
100yr	47	% of Site	Reservoir	Yes	At risk?
1000yr	83	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents	0				

Flood Defences

Flood defence - N/A for site.
** The Risk Assessment (Defended) data is from the Argenta House hydraulic model data. The Risk Assessment (Undefended) and Current Risk percentage data is from the EA Flood Zone and River Brent hydraulic model data. The 1 in 20 year risk extent Flood Zone 3b extent do not match. The parameters used as part of the Argenta House hydraulic model are unknown, so there is uncertainty in the hydraulic modelling outputs used for this assessment.

FLUVIAL / TIDAL

Risk Assessment (Defended)

Parameter	FZ3b	FZ3a	*FZ3a+CC	Units
Speed of inundation	9	6.5	5	Hrs
Min. Depth	0	0.1	1	m
Max. Depth	0.9	1.9	2.8	m
Max. Velocity	1.2	1.2	1.3	m/s
Max Flood Level	N/A	N/A	N/A	m AOD
Max Ground Level	25.92	25.92	25.92	m AOD
Min Ground Level	24.29	32.05	32.05	m AOD
Flood Hazard	Danger for most	Danger for most	Danger for all	N/A
Duration of Flood	6+	8.5+	10+	Hrs

* The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)

Parameter	FZ3a	*FZ3a+CC	Units
Speed of inundation	6.5	5.5	Hrs
Min. Depth	0.3	1	m
Max. Depth	1.9	2.6	m
Max. Velocity	1	1.4	m/s
Max. Hazard	Danger for most	Danger for most	N/A
Duration of Flood	12+	13+	Hrs

Description of Flood Mechanism

• The small site is within 80m of the River Brent, the large site is within 140m. The river located west of both sites. Flooding originates from the Brent, flowing across the North Circular to the south of the sites, then across the Bridge Park and Unisys Building site, and inundating both sites from the south. The entirety of both sites are within Flood Zone 3a, leaving them at risk of flooding for a 1 in 100 year event.
• The flood risk extent for the climate change scenario is similar, covering the entirety of both sites. However, flow velocities and maximum flood depths are higher under climate change.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

• The entirety of both sites are at predicted risk of flooding for the 1 in 100 year and 1 in 100 year + CC event. The western extent of the site is the last area to be inundated.
• The small site borders North Circular Road to the west. The large site borders Sunny Crescent to the east. Safe access and egress routes would need to be directed to the west for the small site, and to the east for the large site.
• Safe refuge areas should also be provided on both sites.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

• See SFRA - Level 2 Report Sections 4.1.2, 4.1.3 and 4.1.4 for further requirements.
• If the 1 in 20 year outputs from the Argenta House hydraulic model is treated as Flood Zone 3b (which covers the majority of the two sites), the undeveloped areas within the 1 in 20 year extent should be protected as the undeveloped Functional Floodplain. In addition, no development should be permitted in the extent if it results in intensification of use. Only Essential Infrastructure and Water Compatible new developments would be permitted.
• Several sources of fluvial flood data exist for this site - the highest confidence data source needs to be reviewed and confirmed with the EA prior to master planning.
• No basement dwelling developments will be permitted.
• Develop separate Flood Emergency and Evacuation Plans for both sites.
• Site users should be signed up to EA's Flood Warning Service.

SURFACE WATER

Risk Assessment

Parameter	30yr	100yr	*1000yr	Units
Min. Depth	0	0	0	m
Max. Depth	0.3-0.6	0.6-0.9	0.9-1.2	m
Max. Velocity	0.5-1.0	0.5-1.0	1.0-2.0	m/s
Max. Hazard	1.25-2.0	1.25-2.0	1.25-2.0	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

• Surface water enters the small site from Conduit Way and the A404 in the south. Water enters the large site from the A404 in the south and pools in back gardens.
• CC will increase the extent, depth, and velocity, but won't increase the maximum hazard of flooding onsite.

Site Access / Egress

• For the small site, safe access and egress routes should be directed towards the north and west of the site, towards the A404 and A406.
• For the large site, safe access and egress routes should be directed towards conduit way, where predicted flood risk is lowest. Where safe access is not possible, development must provide safe refuge via raised floor levels above predicted flood depths.

Figure 3 - RoFSW Flood Depth Map

Mitigation - Flood Risk Requirements

• See SFRA - Level 2 Report Sections 4.1.2, 4.1.3 and 4.1.4 for flood risk requirements.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Surface Water Drainage

• A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS.
• The site is underlain by London Clay - ground investigations are required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - 2-4 North Circular Road, 2-32 Brentfield and 1-3a Sunny Crescent - BD2

SEWER

Risk Assessment

• The area is served by separate surface water and foul sewer networks.
• The site falls within a post code district where there are no reported flood incidents from sewer flooding.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

No mitigation measures required.

GROUNDWATER

Risk Assessment

• The site falls in an area that is classified as having >= 25% < 50% susceptibility to groundwater flooding.
• The site falls within a 'Permeable Superficial' area with regards to Increased Potential for Elevated Groundwater. The site is in close proximity to the Wealdstone Brook, which is underlain by an alluvium (clay, silt, sand and gravel) superficial deposit geology.

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

• No basement dwellings should be developed onsite.
• If non-dwelling basements are being considered, a screening assessment must be provided that addresses the risk of groundwater flooding at the site and advises the level of impact and associated mitigation measures.

ARTIFICIAL

Risk Assessment

• There is risk of flooding from the Brent (Welsh Harp) Reservoir.
• The whole site area is at risk from reservoir flooding.
• The site is predicted to flood over 2m depth in result of reservoir failure for the majority of both sites. The northern section of the small site is predicted to flood between 0.3-2m depth.
• Reservoir failure flood speeds would be between 0.5-2m/s.

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

Local Authority Emergency Planning Officers must be consulted to create a reservoir failure emergency and evacuation plan.

PLANNING CONSIDERATIONS

Safety of Development

Can the development be future proofed for climate change considerations?
• Yes. See SFRA - Level 2 Report Sections 4.1.2 and 4.1.3 for the required finished floor levels and flood resistant / resilient building requirements.
• Developments should take place in the western area of the site for the small site, and the eastern area of the large site where the predicted flood depths are lower. The modelled flood extents supplied conflict with each other and it is not clear which is the higher confidence data source. This must be reviewed and confirmed with the EA prior to site master planning.
• If the **1 in 20 year fluvial extent** is to be treated as **Flood Zone 3b**, **land usage should be restricted to Essential Infrastructure** and **Water Compatible**.

Can the development be designed safe throughout its lifetime without increasing flood risk elsewhere?
• Yes - The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation.
• See SFRA - Level 2 Report Section 4.1.4 for compensatory flood storage requirements.

What is the cumulative impact of the development land use change and will flood risk increase?
• The proposed development land use is not changing. If the 1 in 20 year fluvial extent is to be treated as Flood Zone 3b, it is recommended that a development that falls within a less vulnerable use category is developed instead (see above).

How can the development reduce risk overall?
• The undeveloped land within the extent defined as Flood Zone 3b should be protected as the undeveloped Functional Floodplain.
• There is green space / permeable area currently onsite, thus new development should maintain or increase the permeable area onsite to reduce flood risk onsite and reduce runoff rates on and off-site.
• The site is unlikely to control runoff from the site. New development can provide greater management of runoff through the introduction of SuDS (See Mitigation - Surface Water Drainage).
• Separate emergency evacuation plans, with safe refuge area details, must be created for both sites for the event of a reservoir failure.
• Basements developments, except for self-contained basement dwellings, may be appropriate onsite, but a site-specific Flood Risk Assessment must be completed and the basement must not have any adverse impacts on flooding locally during a 1 in 100yr surface water event. Basement dwellings within the 1 in 100yr surface water flood extent may only be permitted if an exceptions test is passed. Basements must contain an egress route to a higher floor above the predicted 1 in 1000yr surface water flood depth. Basements should be made flood resilient (see Groundwater assessment for groundwater related requirements).

Will development require a flood risk activity permit / ordinary watercourse consent?
• No, the development will not require a flood risk activity permit or ordinary watercourse consent.

Exception Test

Proposed developments can be made safe throughout their lifetime without increasing flood risk elsewhere (See Safety of Development box). Mitigation measures to protect proposed developments against deep fluvial flood depths can be implemented (See Mitigation / FRA Requirements). The site could also reduce flood risk overall with appropriate SuDS and compensatory flood storage measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
• Protect Functional Floodplain and restrict development to Essential Infrastructure and Water Compatible in the 1 in 20 year extent if the Argenta House hydraulic model outputs are treated as Flood Zone 3b.	• Updated site modelling may be required (flood data accuracy is uncertain). • See Mitigation / FRA Requirement box.
Surface Water	
Developments within the 1 in 1000 year surface water extent require finished floor levels of at least 0.3m above the predicted flood level at that point. Floor level should be set to relative to Flood Zone 3a + CC extent flood levels (as detailed above) if predicted depths are higher.	• Flood plain compensation must be provided for events up to a 1 in 100yr event. • See Mitigations - Surface Water Drainage box.
Sewer	
No mitigation measures required.	
Groundwater	
No self-contained basement dwelling developments.	If basements are being considered onsite, a screening assessment must be provided (See Groundwater box).
Artificial	
Emergency planning officers must be consulted to create a reservoir failure emergency and evacuation plan.	

Figure 1 - Fluvial Flood Depth Map

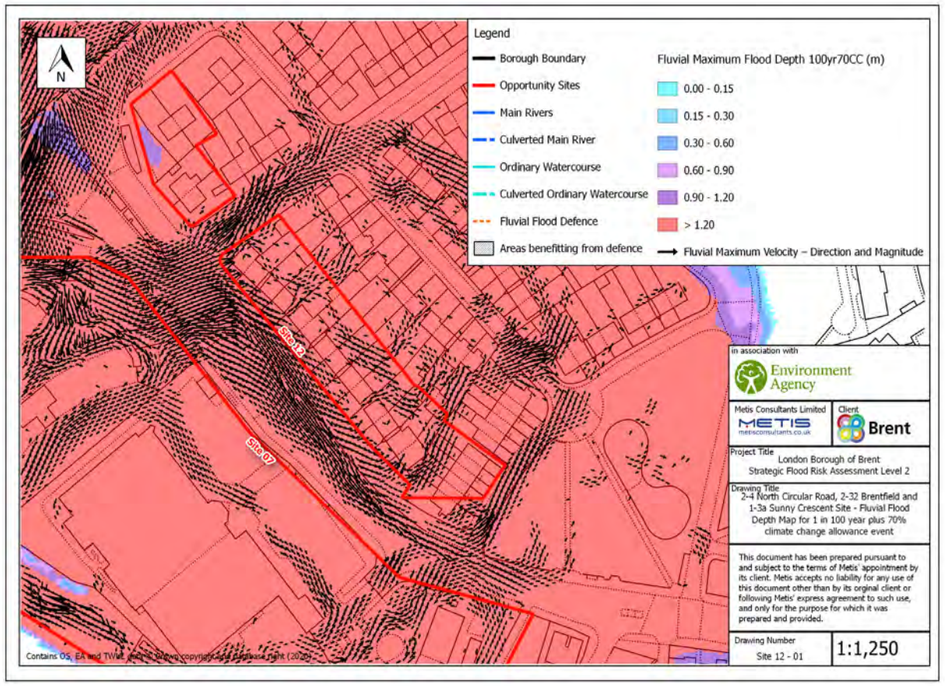


Figure 2 - Fluvial Flood Hazard Map

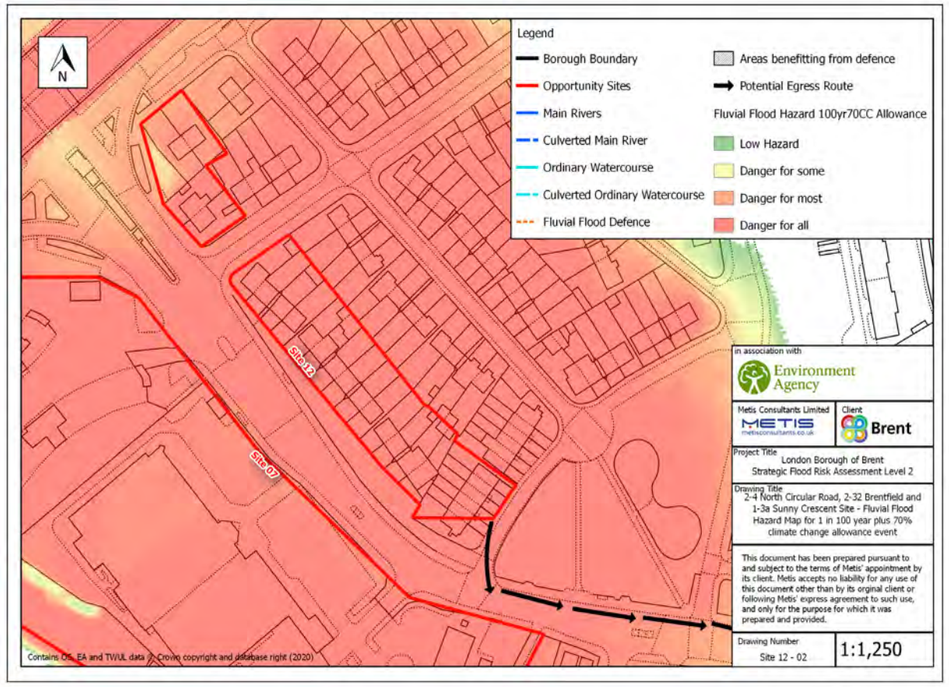


Figure 3 - RoFSW Flood Depth Map

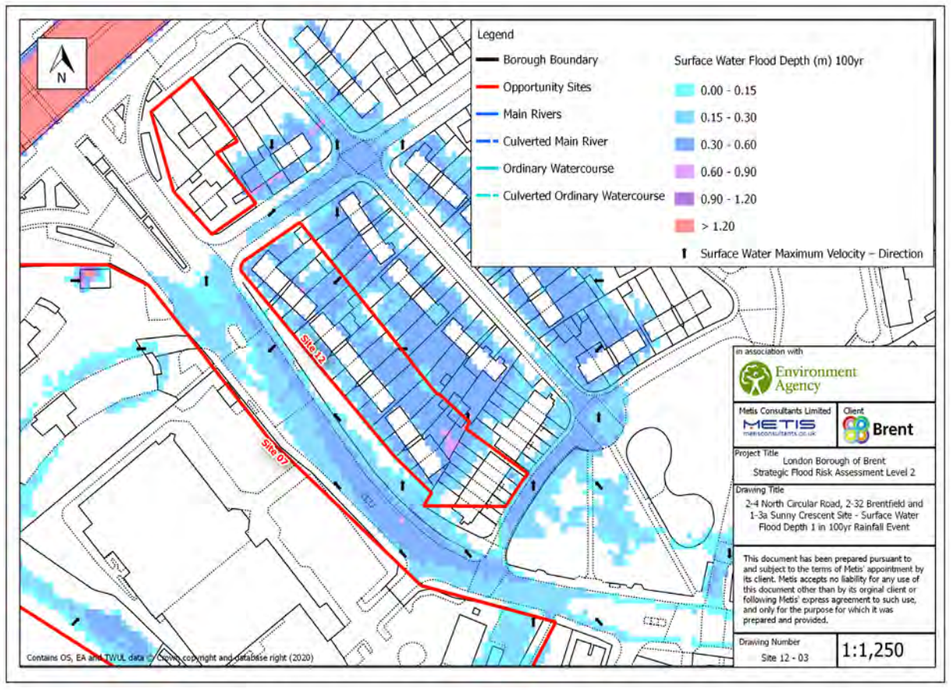


Figure 4 - RoFSW Flood Hazard Map

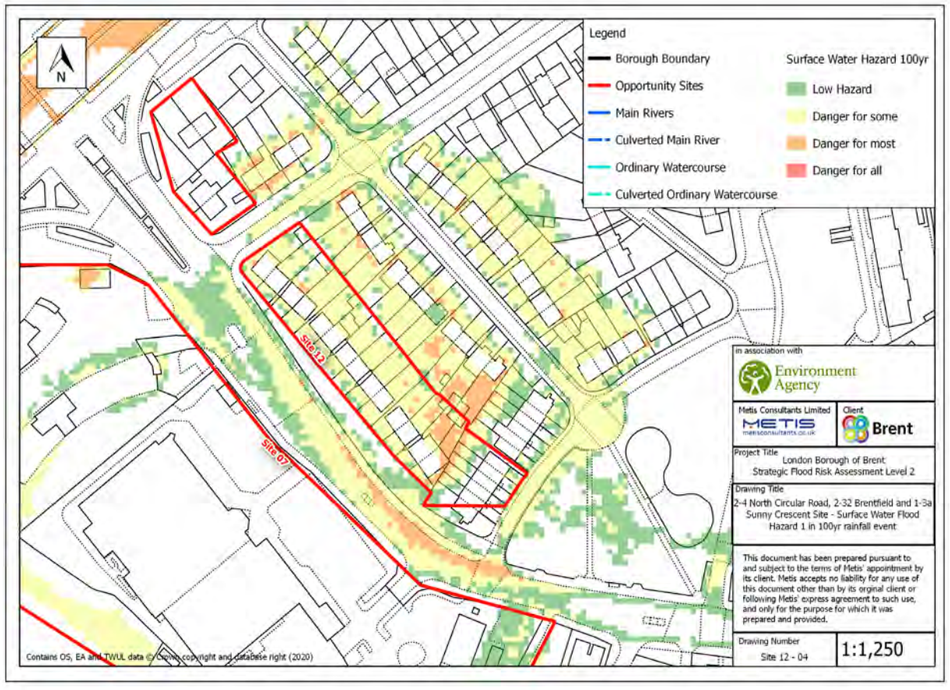


Figure 5 - Thames Water Sewer Flood Map

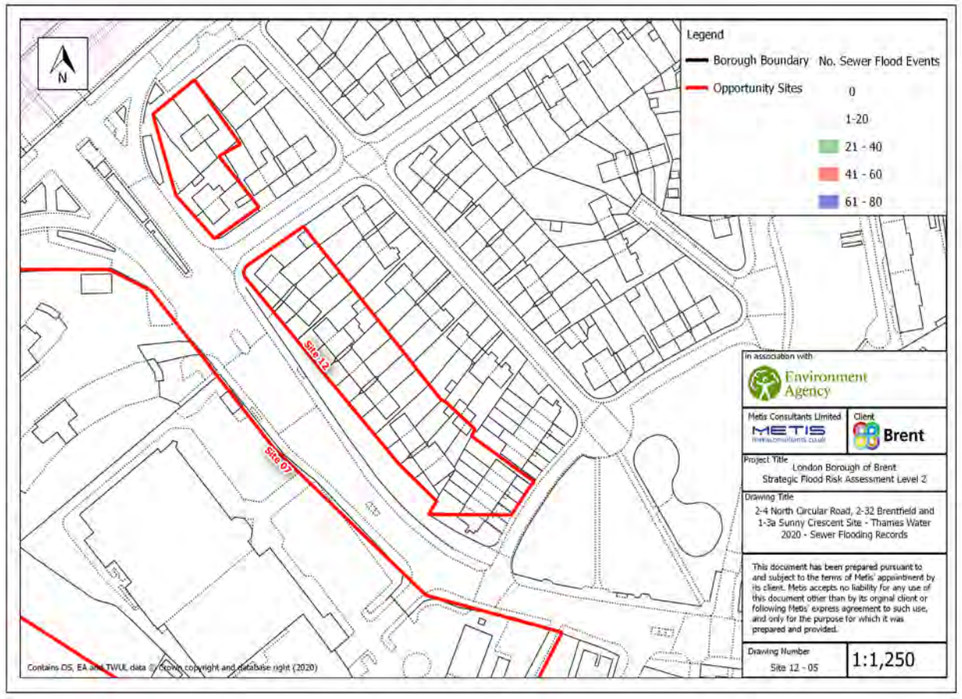


Figure 6 - Areas Susceptible to Groundwater Flooding Map

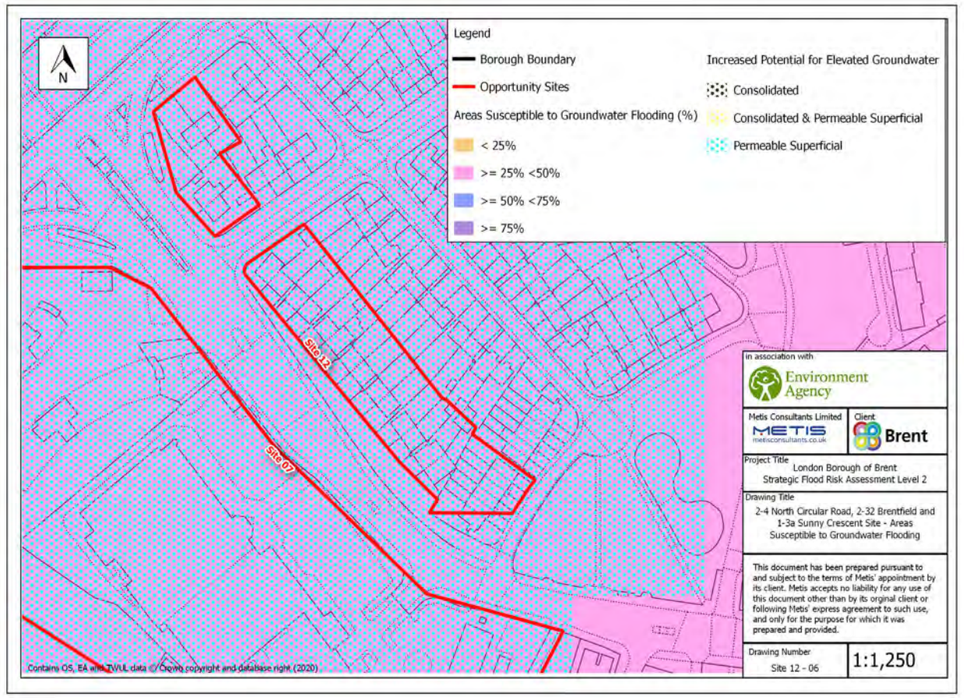
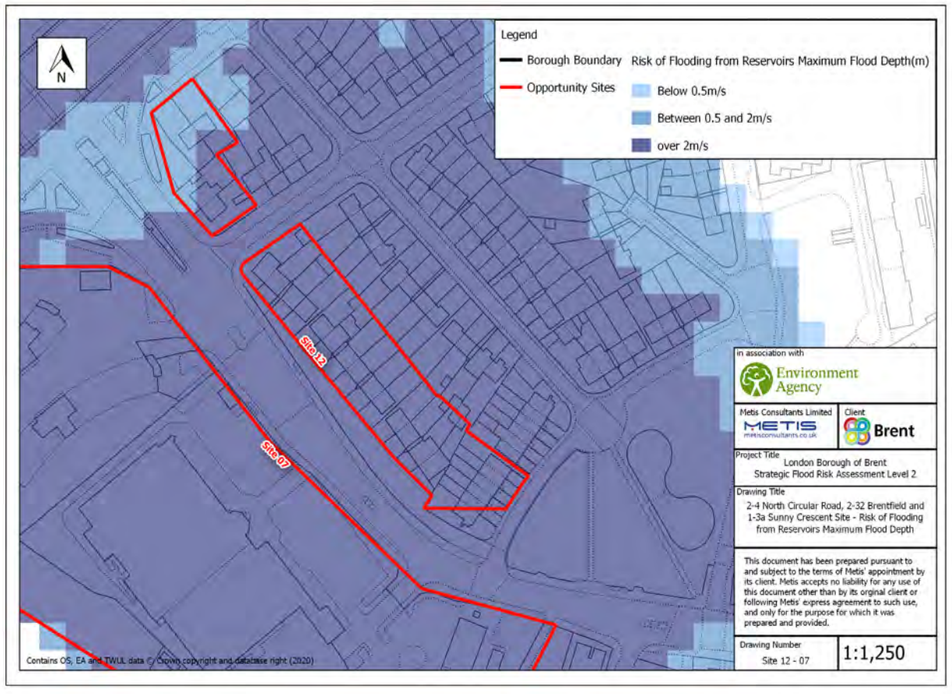


Figure 7 - Outline Reservoir Flood Map



SITE ASSESSMENT - 2-44a Harrow Road - BD2

Address:	HA9 6PG

Area:	0.36 **Ha**
Site Reference:	13

Current Use	Proposed Use
Residential and commercial	Residential and commercial

Current Vulnerability Classification	Proposed Vulnerability Classification
More Vulnerable / Less Vulnerable	More Vulnerable / Less Vulnerable

Current Risk Summary

Fluvial / Tidal			Groundwater		
FZ2	100	% of Site	<25	0	% of Site
FZ3a	100	% of Site	25-50	100	% of Site
FZ3b	0	% of Site	50-75	0	% of Site
Surface Water			>75	0	% of Site
30yr	0	% of Site	**Artificial**		
100yr	0	% of Site	Reservoir	Yes	At risk?
1000yr	15	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents		1-20			

Flood Defences

N/A - the site is not in an area benefitting from flood defences.

FLUVIAL / TIDAL

Risk Assessment (Defended)

Parameter	FZ3b	FZ3a	*FZ3a+CC	Units
Speed of inundation	N/A	6	5	Hrs
Min. Depth	N/A	0	0.2	m
Max. Depth	N/A	0.5	1.1	m
Max. Velocity	N/A	0.5	1.3	m/s
Max Flood Level	N/A	26.67	26.99	m AOD
Max Ground Level	26.77	26.77	26.77	m AOD
Min Ground Level	25.69	25.69	25.69	m AOD
Flood Hazard	N/A	Danger for Most	Danger for Most	N/A
Duration of Flood	N/A	12.5+	13.5+	Hrs

* The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)

Parameter	FZ3a	*FZ3a+CC	Units
Speed of inundation	6.5	5	Hrs
Min. Depth	0	0.2	m
Max. Depth	0.5	1.1	m
Max. Velocity	0.5	1.3	m/s
Max. Hazard	Danger for Most	Danger for Most	N/A
Duration of Flood	12+	13.5+	Hrs

Description of Flood Mechanism

•The site is adjacent to the River Brent. The flooding originates from the River, inundating the site from the south. The Flood Zone 3a extent covers the entire site.
• The flood risk extent for the climate change scenario is similar, covering the whole site area. Flood depths and flow velocities are higher under climate change.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

• The whole site area is at predicted risk of flooding for the 1 in 100 year event.
• The site borders Harrow Road to the west. A safe access and egress route would need to be directed to Harrow Road, through the north western side of the site, where the flood depths are lower.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

• See SFRA - Level 2 Report Sections 4.1.1, 4.1.2, 4.1.3 and 4.1.4 for further requirements.
• See SFRA - Level 2 Report Section 4.1.6 for Main River requirements.
• To mitigate against the maximum flood depths, proposed developments on the site should not take place in the south eastern part of the site.
• No basement dwellings. Non-dwelling basements require a screening assessment.
• Develop a Flood Emergency and Evacuation Plans for the site.
• Site users should be signed up to EA's Flood Warning Service.

SURFACE WATER

Risk Assessment

Parameter	30yr	100yr	*1000yr	Units
Min. Depth	0	0	0	m
Max. Depth	0	0	0.3-0.6	m
Max. Velocity	0	0	0.5-1.0	m/s
Max. Hazard	0	0	0.75-1.25	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

• Surface water does not enter the site up to and including a 1 in 100yr event. For a 1 in 1000yr event, water pools in the southeast of the site, behind the shops on the A404 due to a local depression.
• CC will increase the extent, depth, velocity and hazard of flooding onsite.

Site Access / Egress

Safe access and egress routes should be directed towards the northwest of the site, towards the A404 and Monks Park, were offsite flood risk is lowest.

Figure 3 - RoFSW Flood Depth Map

Mitigation - Flood Risk Requirements

• See SFRA - Level 2 Report Sections 4.1.2, 4,1,3 and 4.1.4 for further requirements.
• Flood resistant buildings may be required in the southeast of the site.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Surface Water Drainage

• A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS.
• The site is underlain by London Clay - ground investigations are required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - 2-44a Harrow Road - BD2

SEWER

Risk Assessment

- The area is served by separate surface water and foul sewer networks.
- The site falls within a post code district where there are 1 - 20 reported flood incidents from sewer flooding.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

- Thames Water must be consulted to confirm if the site has historically flooded.
- If the site has historically flooded, the development must implement SuDS to reduce the runoff to sewer to greenfield rates or as close as possible to greenfield rates.

GROUNDWATER

Risk Assessment

- The site falls in an area that is classified as having >= 25% < 50% susceptibility to groundwater flooding.
- The site falls within a 'Permeable Superficial' area with regards to Increased Potential for Elevated Groundwater. The site is in close proximity to the Wealdstone Brook, which is underlain by an alluvium (clay, silt, sand and gravel) superficial deposit geology.

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

- No basement dwelling developments should take place.
- If non-dwelling basements are being considered, a screening assessment must be provided that addresses the risk of groundwater flooding at the site and advises the level of impact and associated mitigation measures.

ARTIFICIAL

Risk Assessment

- There is risk of flooding from the Brent (Welsh Harp) Reservoir.
- The whole site area is at risk from reservoir flooding.
- The site is predicted to flood between 0.3-2m depth in result of reservoir failure.
- Reservoir failure flood speeds would be between 0.5-2m/s for the majority of the site.

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

Local Authority Emergency Planning Officers must be consulted to create a reservoir failure emergency and evacuation plan.

PLANNING CONSIDERATIONS

Safety of Development

Can the development be future proofed for climate change considerations?

- Yes. See SFRA - Level 2 Report Sections 4.1.2 and 4.1.3 for the required finished floor levels and flood resistant / resilient building requirements.

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

- Yes - The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation.
- See SFRA - Level 2 Report Section 4.1.4 for compensatory flood storage requirements

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

- The development land use is not changing.

How can the development reduce risk overall?

- There is little green space / permeable area currently onsite, thus new development should increase the permeable area onsite to reduce flood risk onsite and reduce runoff rates on and off-site.
- The site is unlikely to control runoff from the site. New development can provide greater management of runoff through the introduction of SuDS (See Mitigation - Surface Water Drainage).
- An emergency evacuation plan must be created for the event of a reservoir failure.
- No basement dwellings will be permitted. Non-dwelling basements require a screening assessment (See Groundwater assessment).

Will development require a flood risk activity permit / ordinary watercourse consent?

- Yes - Site is within 8m of the River Brent - See SFRA - Level 2 Report Section 4.1.6

Exception Test

Development can be made safe throughout its lifetime across the site without increasing flood risk elsewhere (See Safety of Development box). Mitigation measures to protect proposed developments against deep maximum fluvial flood depths can be implemented (See Mitigation / FRA Requirements). The site could also reduce flood risk overall with appropriate SuDS and flood storage compensation measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
Development should be directed towards the north western area of the site. Finished floor levels must be at least 0.3m above predicted flood levels.	• Flood resistance and resilience construction of buildings is required where flood levels are less than 0.3m and more than 0.3m respectively. • Flood Emergency and Evacuation Plan.
Surface Water	
Developments within the 1 in 1000 year surface water extent require finished floor levels of at least 0.3m above the predicted flood level at that point. Floor level should be set to Flood Zone 3a + CC extent flood levels if predicted fluvial depths are higher.	• Flood resistant buildings may be required. • See Mitigations - Surface Water Drainage box.
Sewer	
Thames Water must be consulted to confirm if the site has historically flooded.	If the site has historically flooded, the development must implement SuDS to reduce the runoff to sewer to greenfield rates.
Groundwater	
No dwelling basement developments should take place.	If basements are being considered onsite, a screening assessment must be provided (See Groundwater box).
Artificial	
Emergency planning officers must be consulted to create a reservoir failure emergency and evacuation plan.	

Figure 1 - Fluvial Flood Depth Map

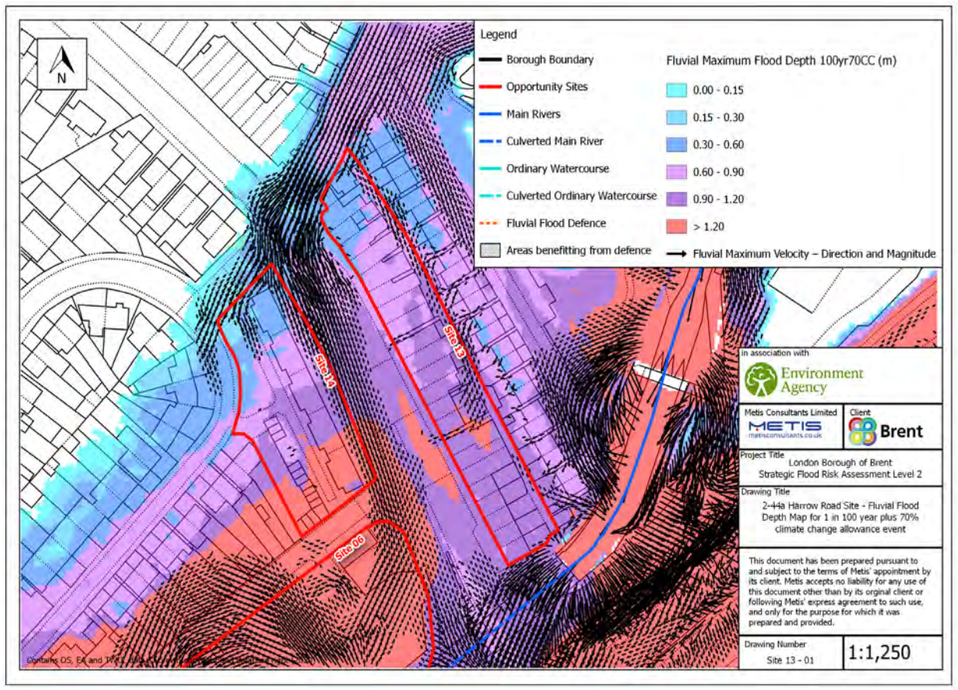


Figure 2 - Fluvial Flood Hazard Map

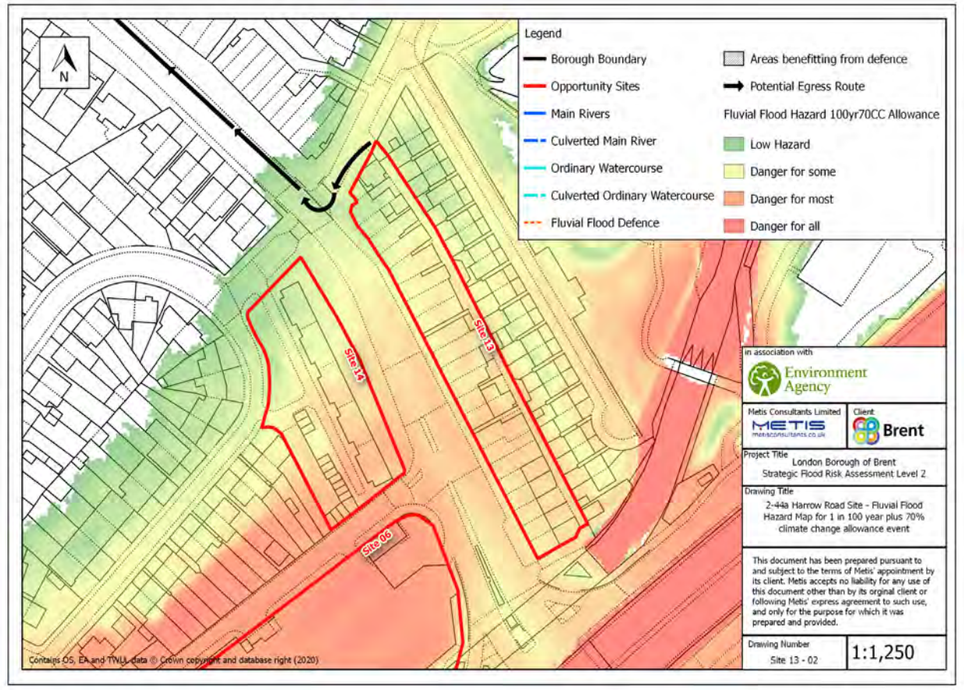


Figure 3 - RoFSW Flood Depth Map

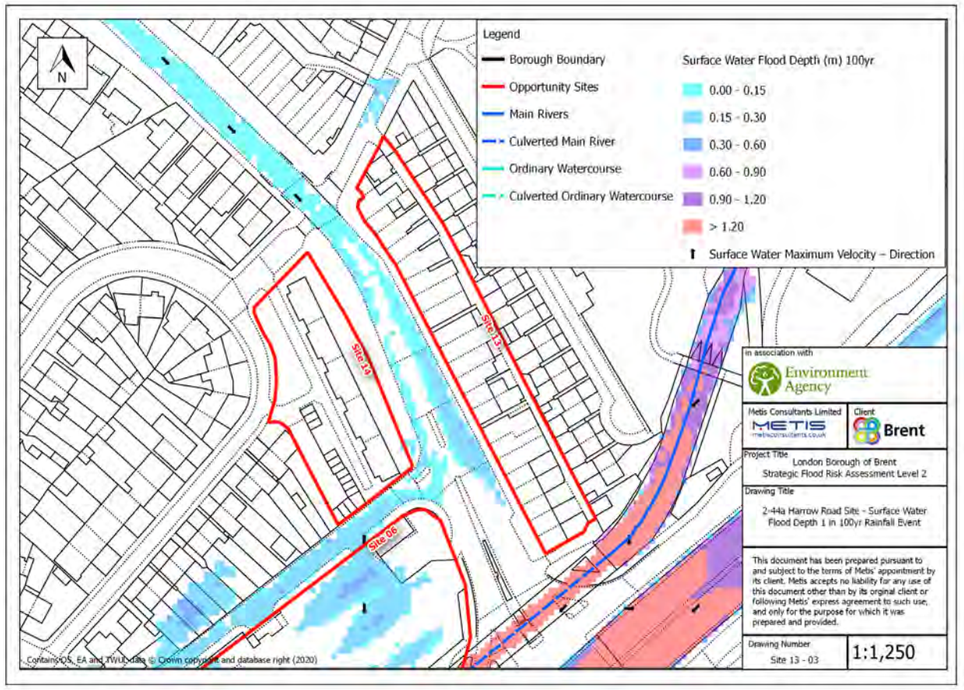


Figure 4 - RoFSW Flood Hazard Map

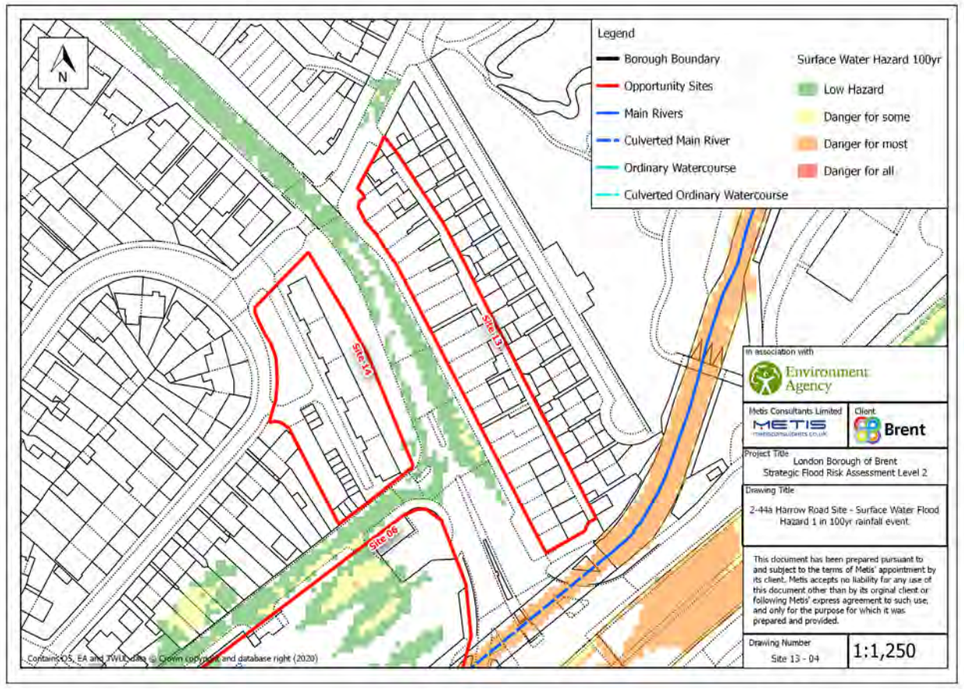


Figure 5 - Thames Water Sewer Flood Map

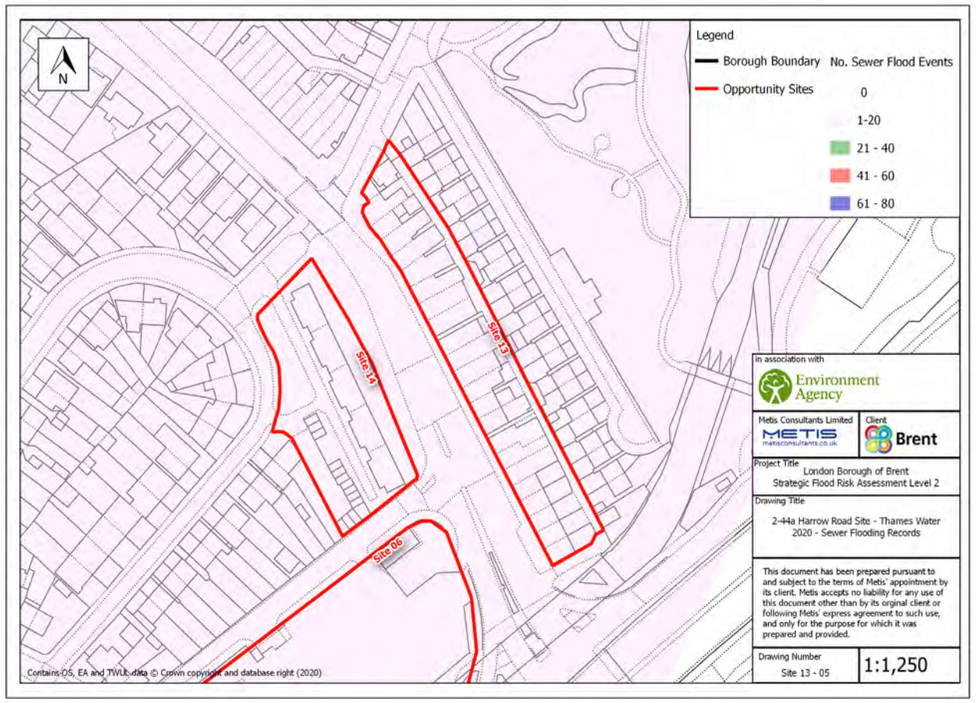


Figure 6 - Areas Susceptible to Groundwater Flooding Map

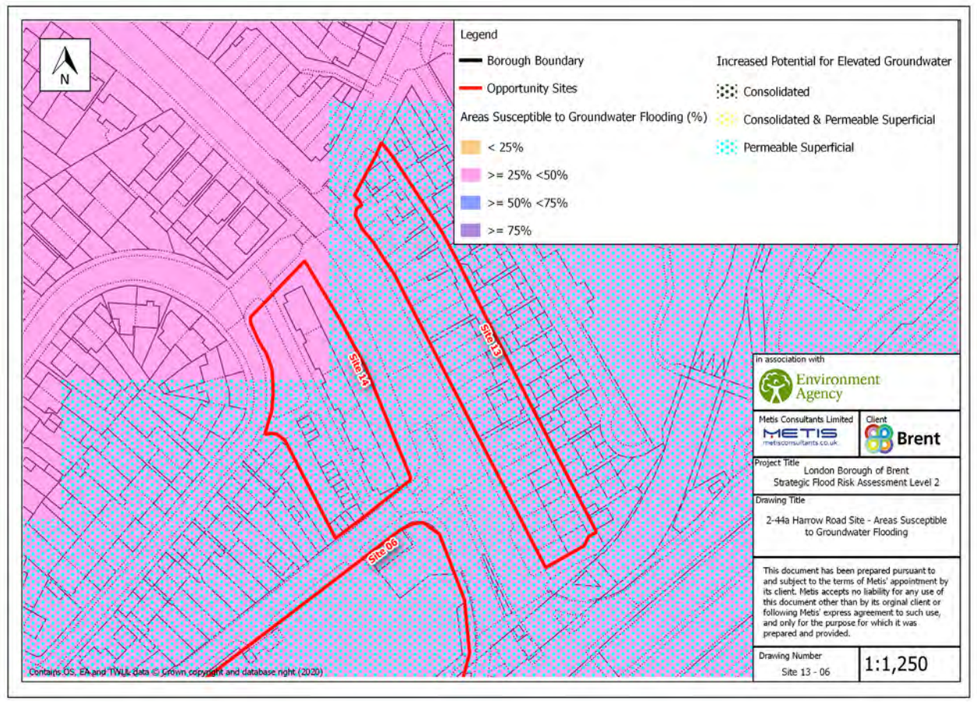
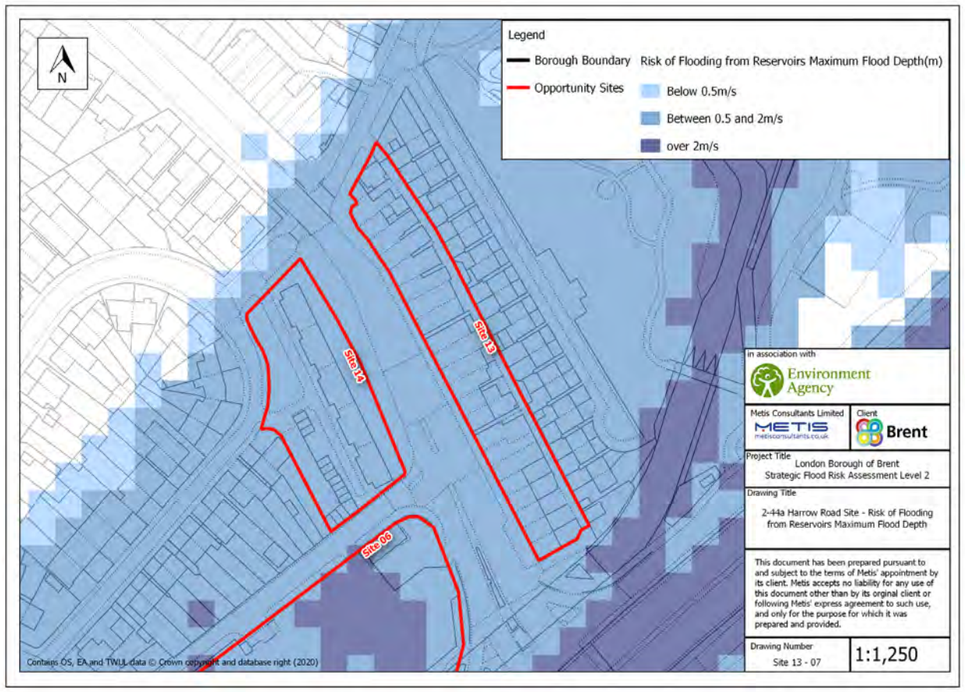


Figure 7 - Outline Reservoir Flood Map



SITE ASSESSMENT - Sylvia Court Harrow Road - BD2

Address:	Sylvia Court, Harrow Road, Wembley, HA9 6PG
Area:	0.3 **Ha**
Site Reference:	14

Current Use	Proposed Use
Residential	Residential

Current Vulnerability Classification	Proposed Vulnerability Classification
More Vulnerable	More Vulnerable

Current Risk Summary

Fluvial / Tidal **			Groundwater		
FZ2	100	% of Site	<25	0	% of Site
FZ3a	62	% of Site	25-50	100	% of Site
FZ3b	1	% of Site	50-75	0	% of Site
Surface Water			>75	0	% of Site
30yr	0	% of Site	**Artificial**		
100yr	0.2	% of Site	Reservoir	Yes	At risk?
1000yr	10	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents		1-20			

Flood Defences

Flood defence - N/A for site.
** The Risk Assessment (Defended) data is from the Argenta House hydraulic model data. The Risk Assessment (Undefended) and Current Risk percentage data is from the EA Flood Zone and River Brent hydraulic model data. The 1 in 20 year risk extent Flood Zone 3b extent do not match. The parameters used as part of the Argenta House hydraulic model are unknown. There is therefore uncertainty in the hydraulic modelling outputs used for this assessment.

FLUVIAL / TIDAL

Risk Assessment (Defended)

Parameter	FZ3b	FZ3a	*FZ3a+CC	Units
Speed of inundation	6.5	5.5	4	Hrs
Min. Depth	0	0	0.2	m
Max. Depth	0.4	0.8	1.5	m
Max. Velocity	0.2	0.3	1.2	m/s
Max Flood Level	-	-	-	m AOD
Max Ground Level	26.81	26.81	26.81	m AOD
Min Ground Level	25.38	25.38	25.38	m AOD
Flood Hazard	Danger for some	Danger for most	Danger for all	N/A
Duration of Flood	8.5+	9.5+	11+	Hrs

* The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)

Parameter	FZ3a	*FZ3a+CC	Units
Speed of inundation	5.5	4	Hrs
Min. Depth	0	0	m
Max. Depth	0.8	1.4	m
Max. Velocity	0.2	0.7	m/s
Max. Hazard	Danger for most	Danger for most	N/A
Duration of Flood	13+	12.5+	Hrs

Description of Flood Mechanism

•The site is within 80m of the River Brent, with the river located south-east of the site. Flooding originates from the Brent, flowing across Point Place and inundating the site from the south-east.
• The flood risk extent for the climate change scenario is significantly greater, placing the entire site at predicted risk of flooding. Flow velocities and maximum flood depths are also significantly higher under climate change.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

• The entire site is at risk of flooding for the 1 in 100 year + CC scenario, whilst a majority of the site is at predicted risk of flooding for the 1 in 100 year event. The extent outside of the 1 in 100 year fluvial flood extent is in the north-west area of the site.
• The site borders Derek Avenue and Sylvia Gardens to the north-west. A safe access and egress route would need to be directed to the north-west, where the risk is lower.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

• See SFRA - Level 2 Report Sections 4.1.2, 4.1.3 and 4.1.4 for further requirements.
• Development cannot take place in Flood Zone 3b extent.
• If the 1 in 20 year outputs for the from the Argenta House hydraulic model is treated as Flood Zone 3b (which covers the eastern extent of the site), the undeveloped land within the 1 in 20 year extent should be protected as the undeveloped Functional Floodplain. New development would not be permitted in the extent.
• Several sources of fluvial flood data exist for this site - the highest confidence data source needs to be reviewed and confirmed with the EA prior to master planning.
• No basement dwelling developments will be permitted.
• Develop a Flood Emergency and Evacuation Plans for the site.
• Site users should be signed up to EA's Flood Warning Service.

SURFACE WATER

Risk Assessment

Parameter	30yr	100yr	*1000yr	Units
Min. Depth	0	0	0	m
Max. Depth	0	0.15-0.3	0.15-0.3	m
Max. Velocity	0	0-0.25	1.0-2.0	m/s
Max. Hazard	0	0.5-0.75	0.75-1.25	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

• Surface water enters the site from the south-east, from the A404. In higher return periods water also enters from Point Place and Derek Avenue in the southwest.
• CC will increase the extent, velocity and hazard of flooding onsite, but does not increase the max depth onsite.

Site Access / Egress

Safe access and egress routes should be directed towards the northwest and west of the site, towards Derek Avenue and Sylvia Gardens.

Figure 3 - RoFSW Flood Depth Map

Mitigation - Flood Risk Requirements

• See SFRA - Level 2 Report Sections 4.1.2, 4.1.3 and 4.1.4 for further requirements.
• Development should be prioritised in the northern section of the site, away from Point Place Road.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Surface Water Drainage

• A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS.
• The site is underlain by London Clay - ground investigations are required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - Sylvia Court Harrow Road - BD2

SEWER

Risk Assessment

- The area is served by separate surface water and foul sewer networks.
- The site falls within a post code district where there are 1 - 20 reported flood incidents from sewer flooding.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

- Thames Water must be consulted to confirm if the site has historically flooded.
- If the site has historically flooded, the development must implement SuDS to reduce the runoff to sewer to greenfield rates or as close as possible to greenfield rates.

GROUNDWATER

Risk Assessment

- The site falls in an area that is classified as having >= 25% < 50% susceptibility to groundwater flooding.
- The site falls within a 'Permeable Superficial' area with regards to Increased Potential for Elevated Groundwater. The site is in close proximity to the Wealdstone Brook, which is underlain by an alluvium (clay, silt, sand and gravel) superficial deposit geology.

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

- No basement dwellings should be developed onsite.
- If non-dwelling basements are being considered, a screening assessment must be provided that addresses the risk of groundwater flooding at the site and advises the level of impact and associated mitigation measures.

ARTIFICIAL

Risk Assessment

- There is risk of flooding from the Brent (Welsh Harp) Reservoir.
- The whole site area is at risk from reservoir flooding.
- The site is predicted to flood between 0.3-2m depth in result of reservoir failure.
- Reservoir failure flood speeds would be between 0.5-2m/s for the majority of the site ant below 0.5m/s in the northwest of the site.

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

Local Authority Emergency Planning Officers must be consulted to create a reservoir failure emergency and evacuation plan.

PLANNING CONSIDERATIONS

Safety of Development

Can the development be future proofed for climate change considerations?

- Yes. See SFRA - Level 2 Report Sections 4.1.2 and 4.1.3 for the required finished floor levels and flood resistant / resilient building requirements.
- Developments should take place towards the west and north-western areas of the site where the predicted flood depths are lower. The modelled flood extents supplied conflict with each other and it is not clear which is the higher confidence data source. This must be reviewed and confirmed with the EA prior to site master planning.
- If the **1 in 20 year fluvial extent** is to be treated as **Flood Zone 3b**, the land available for a **More Vulnerable** development **decreases**.
- Flood resilience measures further future proofs developments for climate change considerations.

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

- Yes - The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation.
- See SFRA - Level 2 Report Section 4.1.4 for compensatory flood storage requirements.

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

- The development land use is not changing.

How can the development reduce risk overall?

- The undeveloped land within the extent defined as Flood Zone 3b should be protected as the undeveloped Functional Floodplain.
- There is currently green space / permeable area onsite, thus new development should maintain or increase the permeable area onsite to reduce flood risk onsite and reduce runoff rates on and off-site.
- The site is unlikely to control runoff from the site. New development can provide greater management of runoff through the introduction of SuDS (See Mitigation - Surface Water Drainage).
- An emergency evacuation plan must be created for the event of a reservoir failure.
- Basements developments, except for self-contained basement dwellings, may be appropriate onsite, but a site-specific Flood Risk Assessment must be completed and the basement must not have any adverse impacts on flooding locally during a 1 in 100yr surface water event. Basement dwellings within the 1 in 100yr surface water flood extent may only be permitted if an exceptions test is passed. Basements must contain an egress route to a higher floor above the predicted 1 in 1000yr surface water flood depth. Basements should be made flood resilient (see Groundwater assessment for groundwater related requirements).

Will development require a flood risk activity permit / ordinary watercourse consent?

- No, the development will not require a flood risk activity permit.

Exception Test

Proposed developments can be made safe throughout their lifetime without increasing flood risk elsewhere (See Safety of Development box). Mitigation measures to protect proposed developments against deep fluvial flood depths can be implemented (See Mitigation / FRA Requirements). The site could also reduce flood risk overall with appropriate SuDS measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
• Protect Functional Floodplain and avoid development in the 1 in 20 year extent if the Argenta House hydraulic model outputs are treated as Flood Zone 3b.	• Updated site modelling may be required (flood data accuracy is uncertain). • See Mitigation / FRA Requirement box.
Surface Water	
Developments within the 1 in 1000 year surface water extent require finished floor levels of at least 0.3m above the predicted flood level at that point. Floor level should be set to relative to Flood Zone 3a + CC extent flood levels (as detailed above) if predicted depths are higher.	See Mitigations - Surface Water Drainage box.
Sewer	
Thames Water must be consulted to confirm if the site has historically flooded.	If the site has historically flooded, the development must implement SuDS to reduce the runoff to sewer to greenfield rates.
Groundwater	
No self-contained basement dwelling developments.	If basements are being considered onsite, a screening assessment must be provided (See Groundwater box).
Artificial	
Emergency planning officers must be consulted to create a reservoir failure emergency and evacuation plan.	

Figure 1 - Fluvial Flood Depth Map

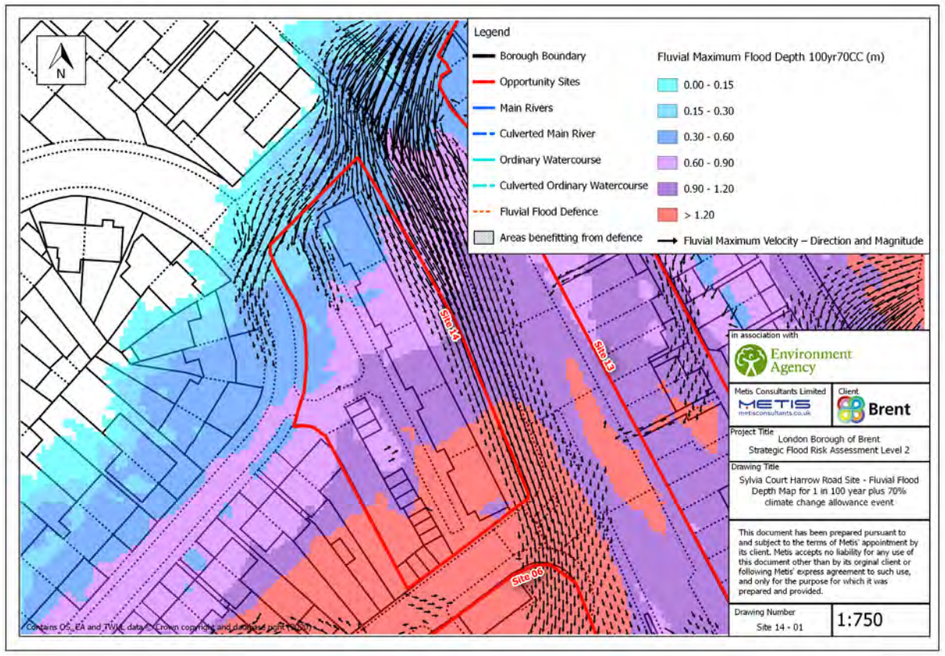


Figure 2 - Fluvial Flood Hazard Map

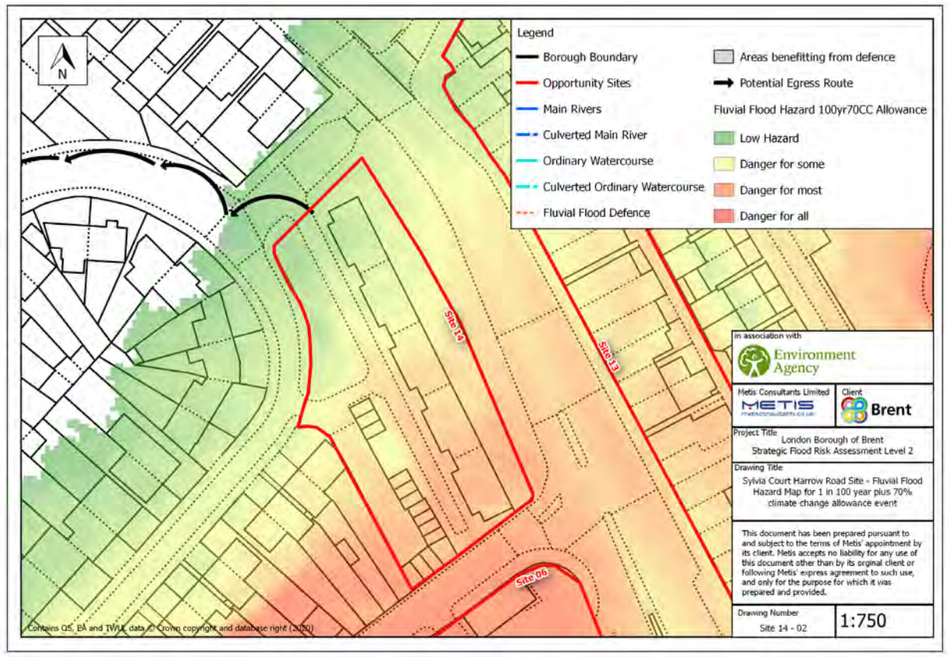


Figure 3 - RoFSW Flood Depth Map

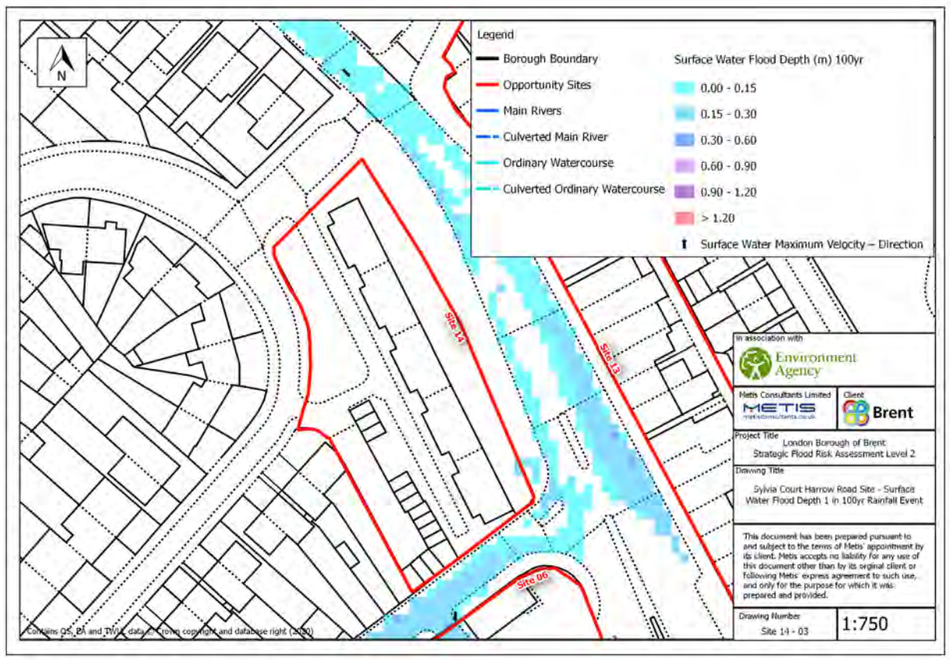


Figure 4 - RoFSW Flood Hazard Map

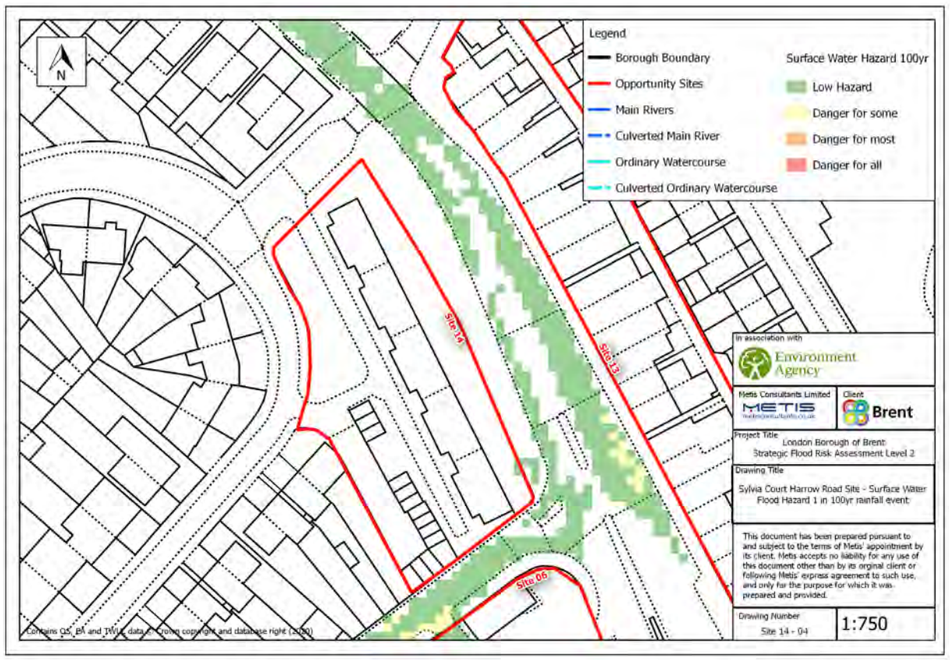


Figure 5 - Thames Water Sewer Flood Map

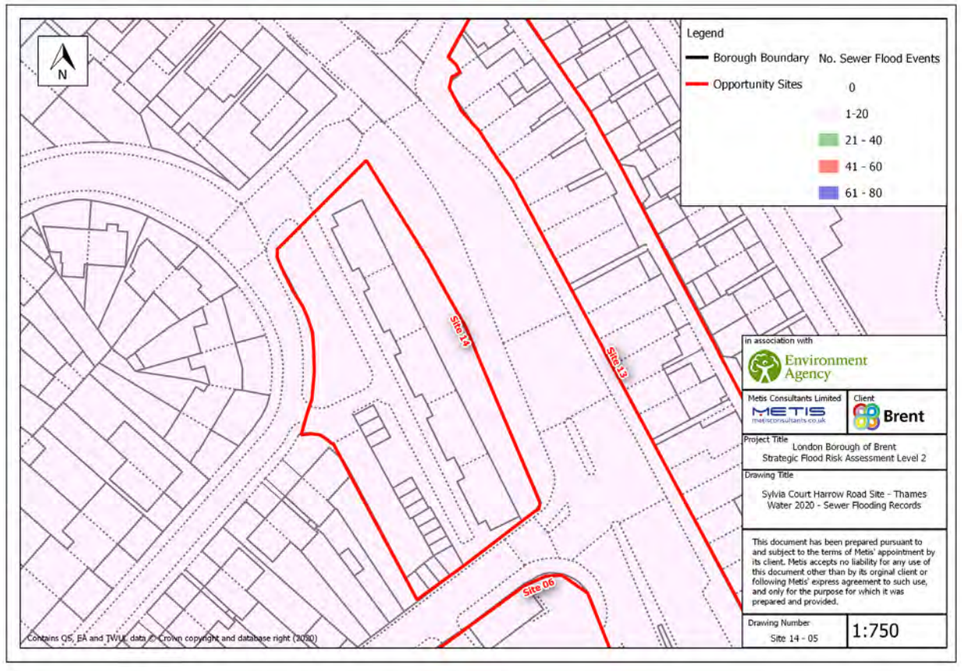


Figure 6 - Areas Susceptible to Groundwater Flooding Map

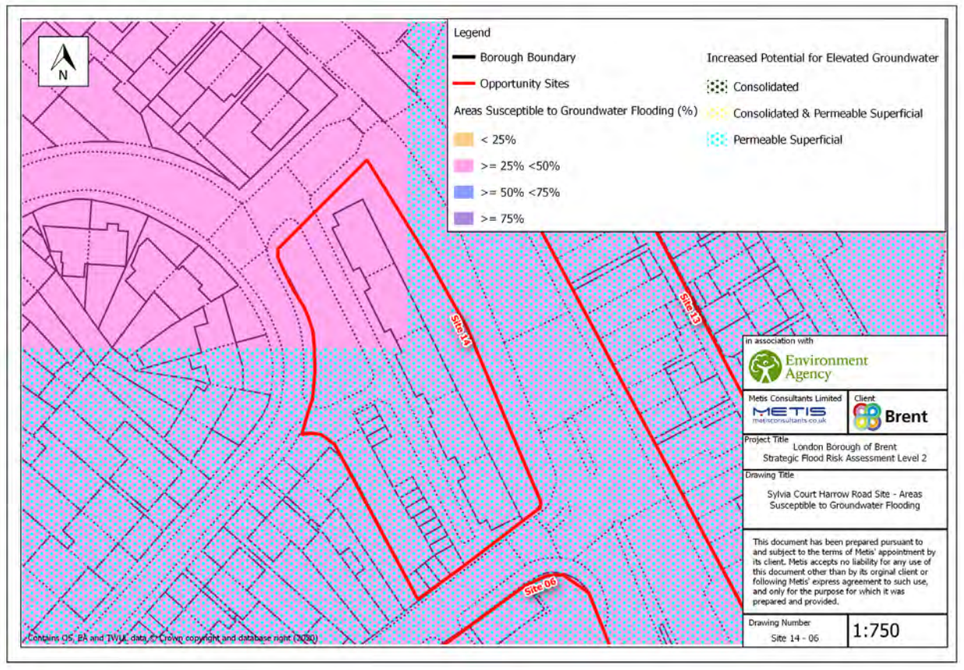
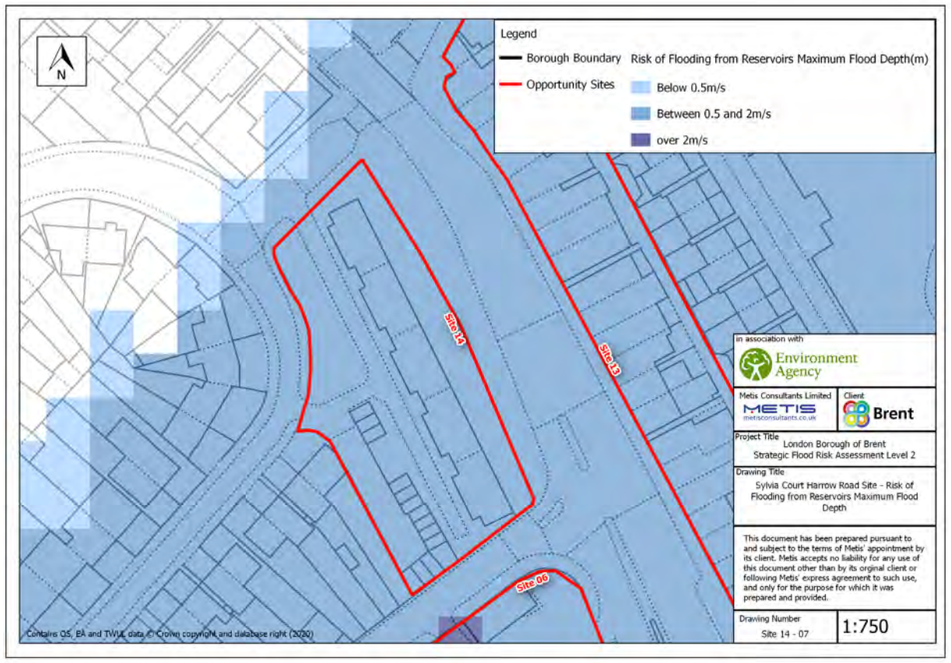


Figure 7 - Outline Reservoir Flood Map



SITE ASSESSMENT - Pargreaves Court, 70 Brooke Avenue - BD2

Address:	Wembley, HA9 8PG

Area:	0.23 **Ha**
Site Reference :	15

Current Use	Proposed Use
Residential and car park	Residential

Current Vulnerability Classification	Proposed Vulnerability Classification
More Vulnerable / Less Vulnerable	More Vulnerable

Current Risk Summary					
Fluvial / Tidal			**Groundwater**		
FZ2	93	% of Site	<25	100	% of Site
FZ3a	0	% of Site	25-50	0	% of Site
FZ3b	0	% of Site	50-75	0	% of Site
Surface Water			>75	0	% of Site
30yr	0	% of Site	**Artificial**		
100yr	49	% of Site	Reservoir	Yes	At risk?
1000yr	99	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents	1-20				

Flood Defences
N/A - the site is not in an area benefitting from flood defences.

FLUVIAL / TIDAL

Risk Assessment (Defended)

Parameter	FZ3b	FZ3a	*FZ3a+CC	Units
Speed of inundation	N/A	N/A	5.5	Hrs
Min. Depth	N/A	N/A	0	m
Max. Depth	N/A	N/A	0.6	m
Max. Velocity	N/A	N/A	0.4	m/s
Max Flood Level	N/A	N/A	33.03	m AOD
Max Ground Level	35.48	35.48	35.48	m AOD
Min Ground Level	32.41	32.41	32.41	m AOD
Flood Hazard	N/A	N/A	Danger for Most	N/A
Duration of Flood	N/A	N/A	13+	Hrs

* The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)

Parameter	FZ3a	*FZ3a+CC	Units
Speed of inundation	N/A	5.5	Hrs
Min. Depth	N/A	0	m
Max. Depth	N/A	0.6	m
Max. Velocity	N/A	0.4	m/s
Max. Hazard	N/A	Danger for Most	N/A
Duration of Flood	N/A	13+	Hrs

Description of Flood Mechanism

•The site is adjacent to the Wealdstone Brook. The flooding originates from the Brook, inundating the site from the south. The site is not at risk of flooding for the 1 in 100 year event, while the majority of the site falls within Flood Zone 2.
• The flood risk extent for the climate change scenario is much greater. The Flood Zone 3a extent covers almost the entire site are, excluding a very small part of it in its northern side.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

• The site is not at predicted risk of flooding for the 1 in 100 year event, but the majority of it is in Flood Zone 2.
• The site borders Forty Avenue to the north. A safe access and egress route would need to be directed to Forty Avenue, through the north eastern side of the site, where the flood depths are lower.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

• See SFRA - Level 2 Report Sections 4.1.1, 4.1.2, 4.1.3 and 4.1.4 for further requirements.
• No basement dwellings.
• Develop a Flood Emergency and Evacuation Plans for the site.
• Site users should be signed up to EA's Flood Warning Service.

SURFACE WATER

Risk Assessment

Parameter	30yr	100yr	*1000yr	Units
Min. Depth	0	0	0	m
Max. Depth	0	0.6-0.9	>1.2	m
Max. Velocity	0	0.5-1.0	1.0-2.0	m/s
Max. Hazard	0	1.25-2.0	>2.0	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

• Surface water enters the site from Brook Avenue in the south and the A4088 in the west.
• CC will increase the extent, depth, velocity and hazard of flooding onsite.

Site Access / Egress

• There is no safe access route to the carriageway onsite. Development must provide safe refuge via raised floor levels above predicted flood depths.

Figure 3 - RoFSW Flood Depth Map

Mitigation - Flood Risk Requirements

• See SFRA - Level 2 Report Sections 4.1.2, 4.1.3 and 4.1.4 for further requirements.
• Minimise flood storage lost by implementing more permeable area.
• Flood resilient buildings required.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Surface Water Drainage

• A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS.
• The site is underlain by London Clay - ground investigations are required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - Pargreaves Court, 70 Brooke Avenue - BD2

SEWER

Risk Assessment

• The area is served by separate surface water and foul sewer networks.
• The site falls within a post code district where there are 1 - 20 reported flood incidents from sewer flooding.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

• Thames Water must be consulted to confirm if the site has historically flooded.
• If the site has historically flooded, the development must implement SuDS to reduce the runoff to sewer to greenfield rates or as close as possible to greenfield rates.

GROUNDWATER

Risk Assessment

• The site falls in an area that is classified as having <25% susceptibility to groundwater flooding.
• The site falls within a 'Permeable Superficial' area with regards to Increased Potential for Elevated Groundwater. The site is in close proximity to the Wealdstone Brook, which is underlain by an alluvium (clay, silt, sand and gravel) superficial deposit geology.

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

No mitigation measures required.

ARTIFICIAL

Risk Assessment

• There is risk of flooding from the Brent (Welsh Harp) Reservoir.
• The whole site area is at risk from reservoir flooding.
• The site is predicted to flood between 0.3-2m depth for the majority of the site in result of reservoir failure.
• Reservoir failure flood speeds would be below 0.5 m/s for the entirety of the site.

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

Local Authority Emergency Planning Officers must be consulted to create a reservoir failure emergency and evacuation plan.

PLANNING CONSIDERATIONS

Safety of Development

Can the development be future proofed for climate change considerations?
• Yes. See SFRA - Level 2 Report Sections 4.1.2 and 4.1.3 for the required finished floor levels and flood resistant / resilient building requirements.

Can the development be designed safe throughout its lifetime without increasing flood risk elsewhere?
• Yes - The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation.
• See SFRA - Level 2 Report Section 4.1.4 for compensatory flood storage requirements.

What is the cumulative impact of the development land use change and will flood risk increase?
• The development land use is not changing to a more vulnerable use category and unlikely to increase flood risk onsite. Also, there is little permeable space currently onsite, thus new development would not likely increase surface water runoff from the site.

How can the development reduce risk overall?
• Directing development towards the northern part of the site where maximum flood depths are lower. Finished floor levels of at least 0.3m above predicted flood depths at that point should be implemented (See SFRA - Level 2 Report Requirements).
• Maintain permeable space between development and the A4088 and Brook Avenue.
• The site is unlikely to control runoff from the site. New development can provide greater management of runoff through the introduction of SuDS (See Mitigation - Surface Water Drainage).
• An emergency evacuation plan must be created for the event of a reservoir failure.
• No basement dwelling developments. Basements developments, that are not basement dwellings, may be appropriate at some locations onsite, but a site-specific Flood Risk Assessment must be completed and the basement must not have any adverse impacts on flooding locally during a 1 in 100 year fluvial and surface water events. Basements must contain an egress route to a higher floor above the predicted Flood Zone 3a + CC fluvial and 1 in 1000 year surface water flood depths. Basements should be made flood resilient.

Will development require a flood risk activity permit / ordinary watercourse consent?
• No

Exception Test

Development can be made safe throughout its lifetime across the site without increasing flood risk elsewhere (See Safety of Development box). Mitigation measures to protect proposed developments against deep maximum fluvial flood depths can be implemented (See Mitigation / FRA Requirements). The site could also reduce flood risk overall with appropriate SuDS and flood storage compensation measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
Development should be directed towards the northern area of the site. Finished floor levels must be at least 0.3m above predicted flood levels and provide flood plain compensation.	• Flood resistance and resilience construction of buildings is required where flood levels are less than 0.3m and more than 0.3m respectively. • Flood Emergency and Evacuation Plan.
Surface Water	
Developments within the 1 in 1000 year surface water extent require finished floor levels of at least 0.3m above the predicted flood level at that point. Floor level should be set to Flood Zone 3a + CC extent flood levels if predicted fluvial depths are higher.	• Flood plain compensation must be provided for events up to a 1 in 1000 year +event. • Flood resilient buildings required. • See Mitigations - Surface Water Drainage box.
Sewer	
Thames Water must be consulted to confirm if the site has historically flooded.	If the site has historically flooded, the development must implement SuDS to reduce the runoff to sewer to greenfield rates.
Groundwater	
No mitigation measures required.	
Artificial	
Emergency planning officers must be consulted to create a reservoir failure emergency and evacuation plan.	

Figure 1 - Fluvial Flood Depth Map

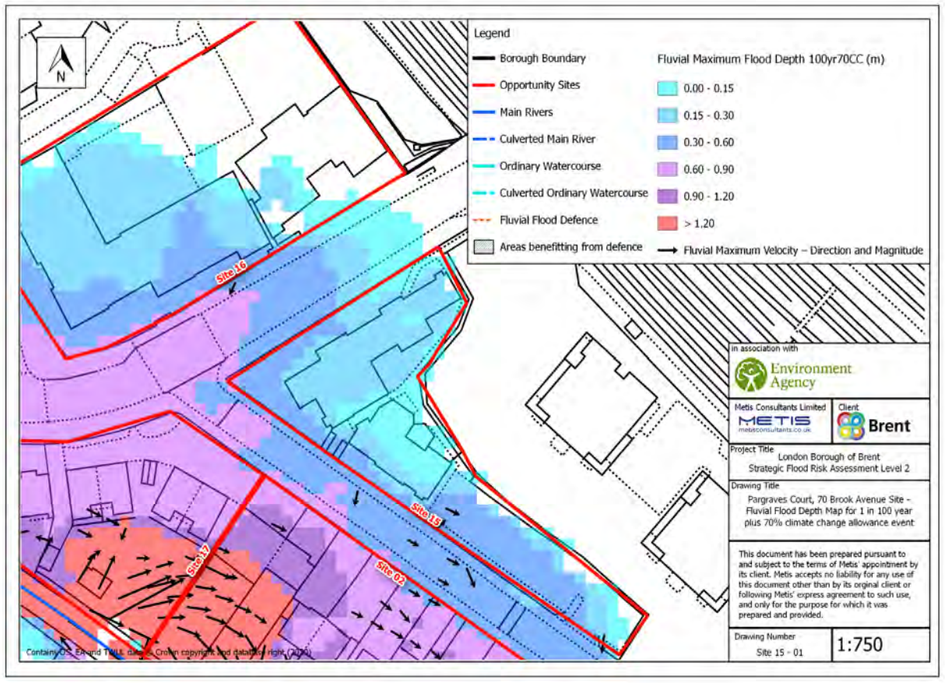


Figure 2 - Fluvial Flood Hazard Map

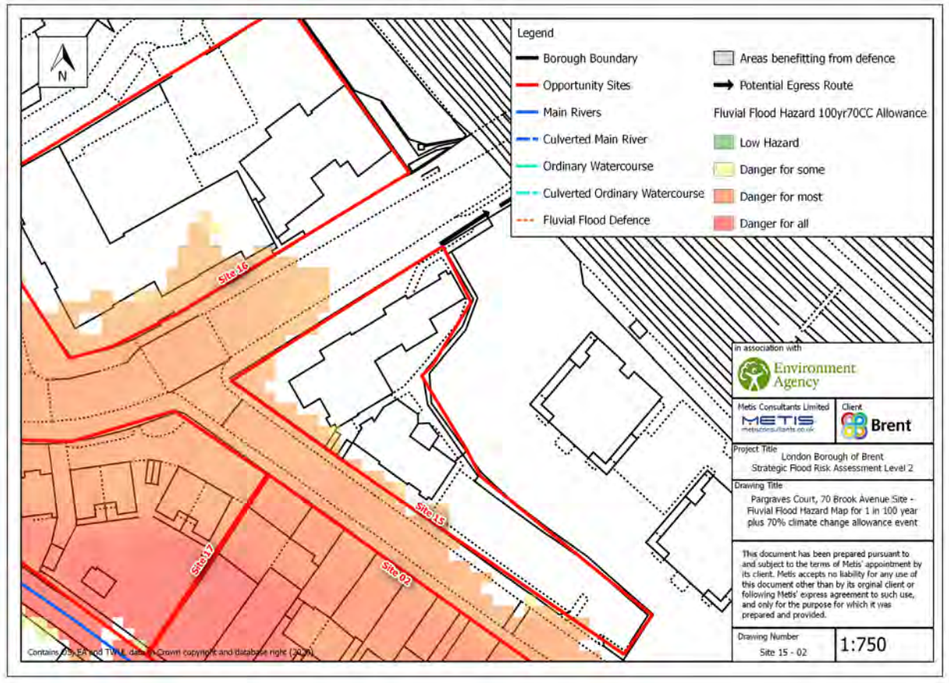


Figure 3 - RoFSW Flood Depth Map

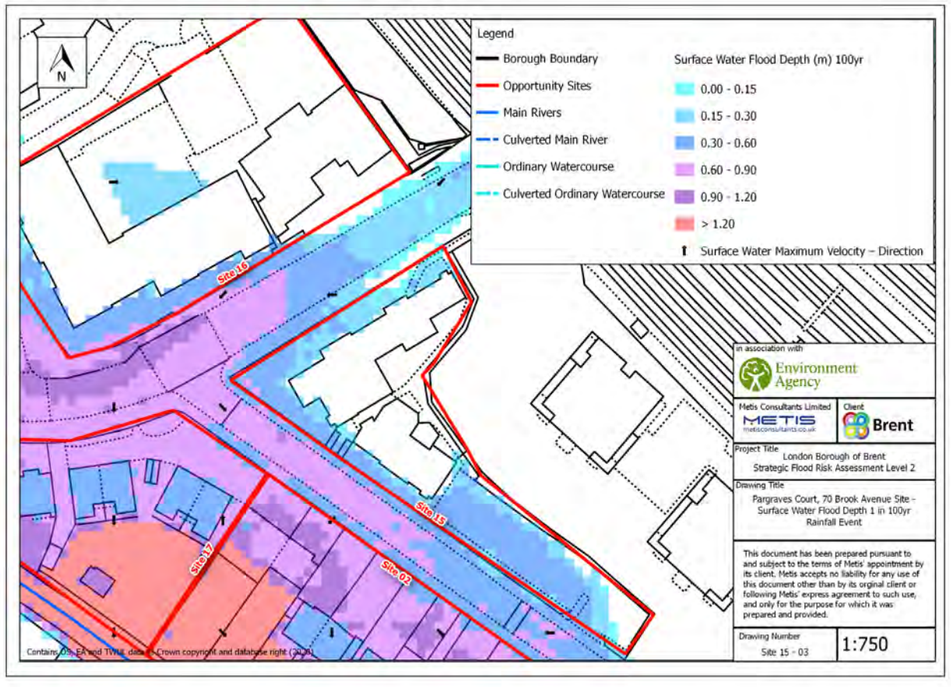


Figure 4 - RoFSW Flood Hazard Map

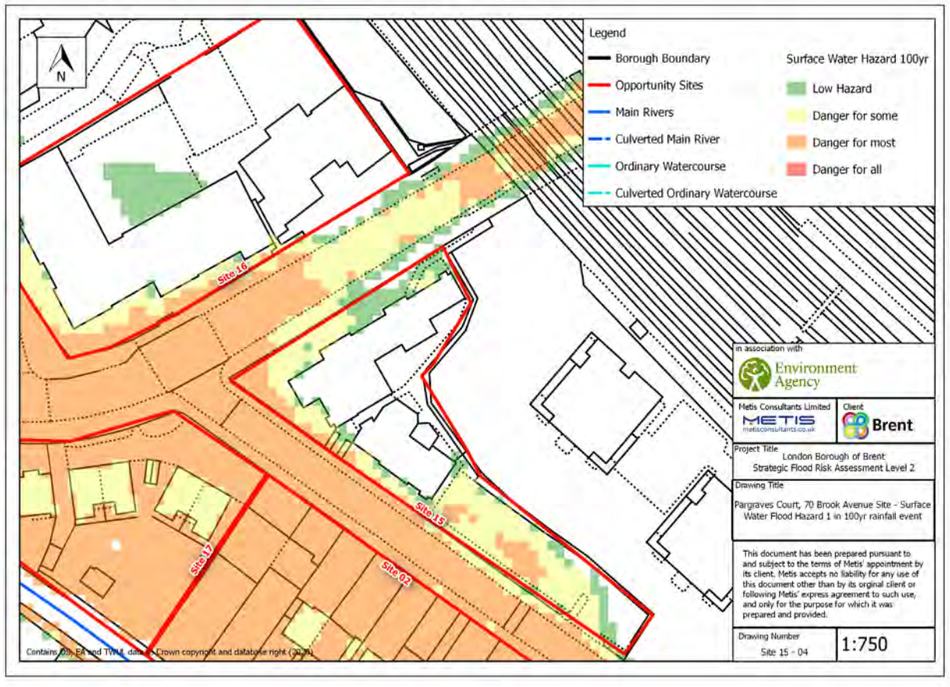


Figure 5 - Thames Water Sewer Flood Map

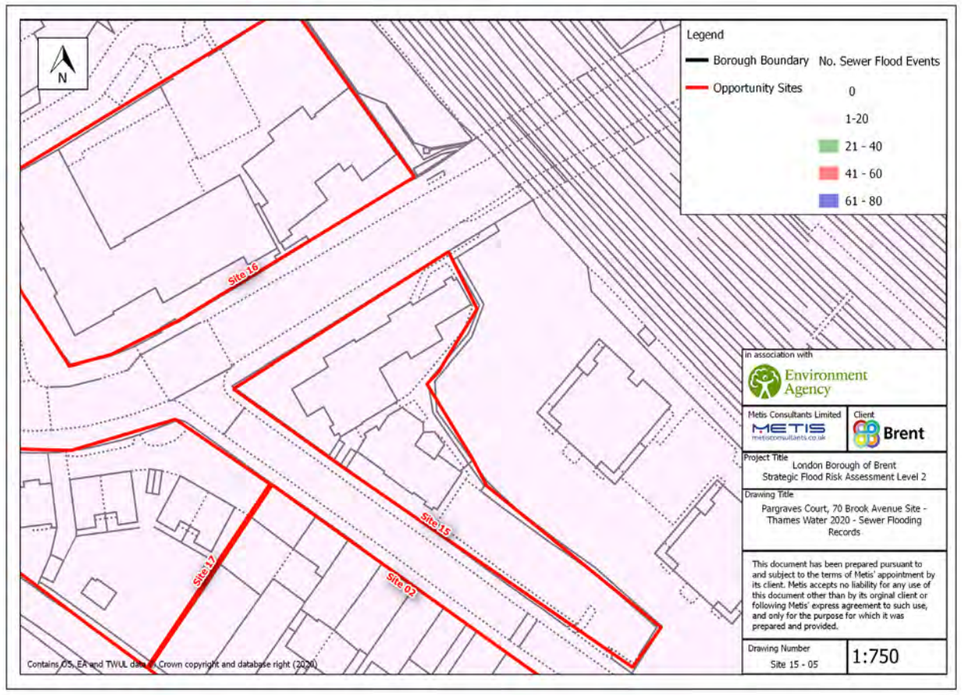


Figure 6 - Areas Susceptible to Groundwater Flooding Map

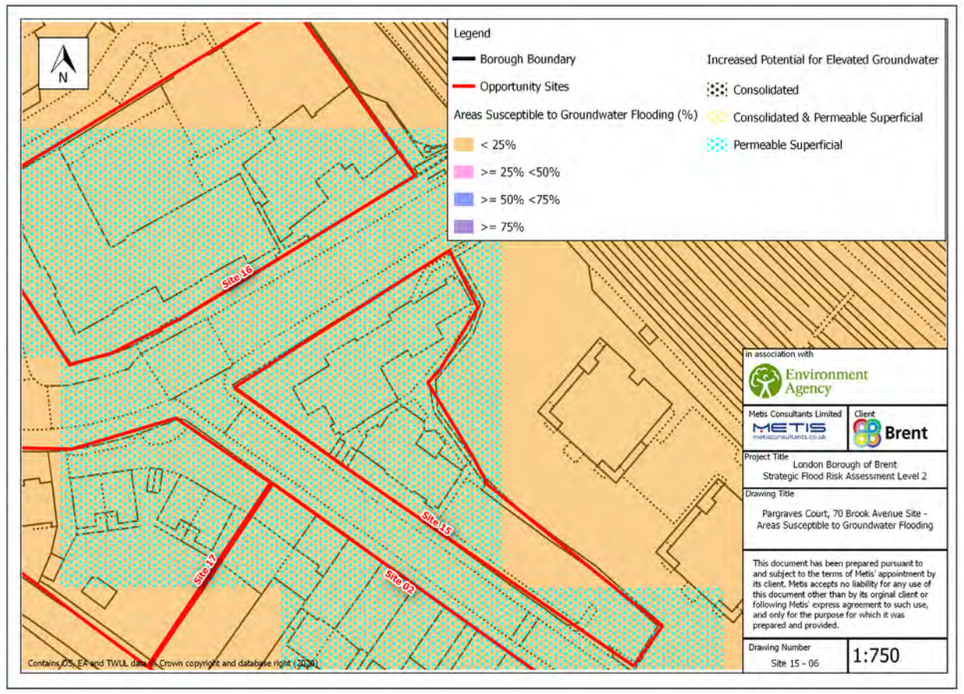
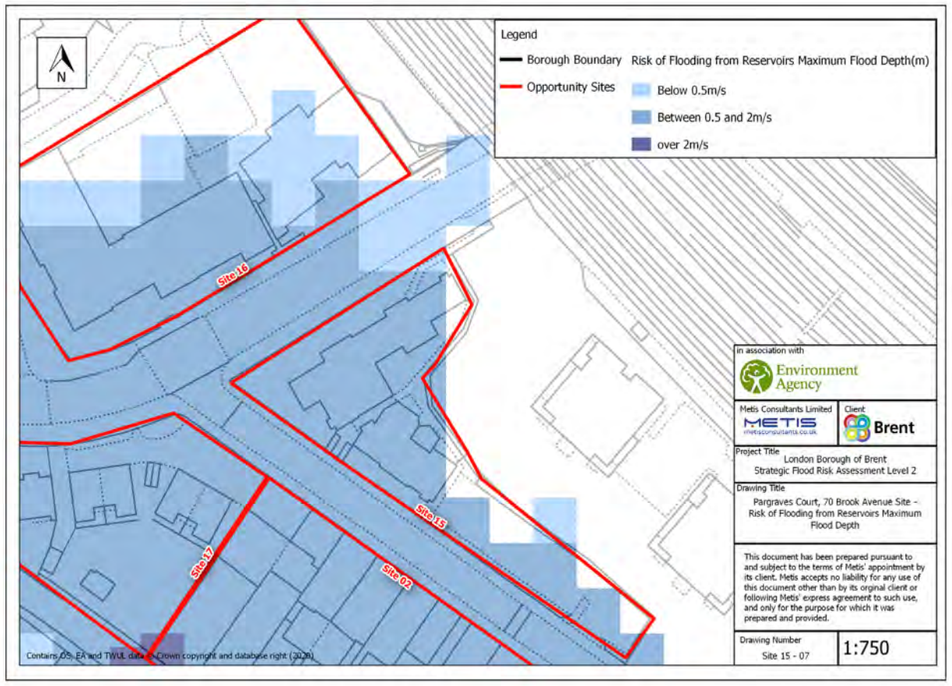


Figure 7 - Outline Reservoir Flood Map



SITE ASSESSMENT - CENTURY HOUSE AND TAVERNERS COURT, FORTY AVENUE - BD2

Address:	Century House and Taverners Court, Forty Avenue, Wembley, HA9 8RU

Area:	0.39 **Ha**
Site Reference:	16

Current Use	Proposed Use
Residential	Residential

Current Vulnerability Classification	Proposed Vulnerability Classification
More Vulnerable	More Vulnerable

Current Risk Summary					
Fluvial / Tidal			**Groundwater**		
FZ2	62	% of Site	<25	100	% of Site
FZ3a	1	% of Site	25-50	0	% of Site
FZ3b	0	% of Site	50-75	0	% of Site
Surface Water			>75	0	% of Site
30yr	1	% of Site	**Artificial**		
100yr	17	% of Site	Reservoir	Yes	At risk?
1000yr	87	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents	1-20				

Flood Defences
N/A - the site is not in an area benefitting from flood defences.

FLUVIAL / TIDAL

Risk Assessment (Defended)

Parameter	FZ3b	FZ3a	*FZ3a+CC	Units
Speed of inundation	N/A	7.5	5.5	Hrs
Min. Depth	N/A	0	0	m
Max. Depth	N/A	0.1	0.8	m
Max. Velocity	N/A	0.02	0.3	m/s
Max Flood Level	N/A	32.32	33.03	m AOD
Max Ground Level	34.99	34.99	34.99	m AOD
Min Ground Level	32.25	32.25	32.25	m AOD
Flood Hazard	N/A	Low Hazard	Danger for Most	N/A
Duration of Flood	N/A	11+	13+	Hrs

* The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)

Parameter	FZ3a	*FZ3a+CC	Units
Speed of inundation	7.5	5.5	Hrs
Min. Depth	0	0	m
Max. Depth	0.1	0.8	m
Max. Velocity	0.02	0.3	m/s
Max. Hazard	Low Hazard	Danger for Most	N/A
Duration of Flood	11+	13+	Hrs

Description of Flood Mechanism

•The site is located to the north of the Wealdstone Brook. The flooding originates from the Brook, inundating the site from the south. The Flood Zone 3a extent covers a small area in the southern part of the site while Flood Zone 2 covers more than half of the site area.
• The flood risk extent for the climate change scenario is greater, covering more than half of the site area. Flood depths and flow velocities are higher under climate change.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

• The majority of the site is not at predicted risk of flooding for the 1 in 100 year event, but is in Flood Zone 2.
• The site borders Bowling Green Court and Elmstead Avenue to the north and west respectively. A safe access and egress route would need to be directed to Elmstead Avenue, through Bowling Green Court, which is located in Flood Zone 1.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

• See SFRA - Level 2 Report Sections 4.1.1, 4.1.2, 4.1.3 and 4.1.4 for further requirements.
• No basement dwellings within Flood Zone 3a + CC extent.
• Develop a Flood Emergency and Evacuation Plans for the site.
• Site users should be signed up to EA's Flood Warning Service.

SURFACE WATER

Risk Assessment

Parameter	30yr	100yr	*1000yr	Units
Min. Depth	0	0	0	m
Max. Depth	0-0.15	0.6-0.9	>1.2	m
Max. Velocity	0.25-0.5	0.5-1.0	1.0-2.0	m/s
Max. Hazard	0.5-0.75	1.25-2.0	>2	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

• Water enters the site in the southwest from the A4088 and the intersection of the A4088 and Elmstead Avenue.
• Climate change will increase the predicted extent, depths, velocities and hazard of the site.

Site Access / Egress

Safe access and egress routes should be directed to the north to Bowling Green Circuit.

Figure 3 - RoFSW Flood Depth Map

Mitigation - Flood Risk Requirements

• See SFRA - Level 2 Report Sections 4.1.2, 4.1.3 and 4.1.4.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Surface Water Drainage

• A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS.
• The site is underlain by London Clay - ground investigations are required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - CENTURY HOUSE AND TAVERNERS COURT, FORTY AVENUE - BD2

SEWER

Risk Assessment

- The area is served by separate surface water and foul sewer networks.
- The site falls within a post code district where there are 1 - 20 reported flood incidents from sewer flooding.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

- Thames Water must be consulted to confirm if the site has historically flooded.
- If the site has historically flooded, the development must implement SuDS to reduce the runoff to sewer to greenfield rates or as close as possible to greenfield rates.

GROUNDWATER

Risk Assessment

- The site falls in an area that is classified as having <25% susceptibility to groundwater flooding.
- The site falls within a 'Permeable Superficial' area with regards to Increased Potential for Elevated Groundwater. The site is in close proximity to the Wealdstone Brook, which is underlain by an alluvium (clay, silt, sand and gravel) superficial deposit geology.

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

No mitigation measures required.

ARTIFICIAL

Risk Assessment

- There is risk of flooding from the Brent (Welsh Harp) Reservoir.
- More than half of the site area is at risk from reservoir flooding.
- The southern section of the site is predicted to flood between 0.3-2m depth in result of reservoir failure.
- Reservoir failure flood speeds would be below 0.5 m/s for the majority of the site.

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

Local Authority Emergency Planning Officers must be consulted to create a reservoir failure emergency and evacuation plan.

PLANNING CONSIDERATIONS

Safety of Development

Can the development be future proofed for climate change considerations?

- Yes. See SFRA - Level 2 Report Sections 4.1.2 and 4.1.3 for the required finished floor levels and flood resistant / resilient building requirements.

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

- Yes - The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation.
- See SFRA - Level 2 Report Section 4.1.4 for compensatory flood storage requirements.

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

- The development land use is not changing.
- The site is currently brownfield sites. Development is unlikely to increase flood risk unless there are changes to the site's greenfield spaces or if there are significant changes to the topography.

How can the development reduce risk overall?

- Directing developments towards the northern area of the site
- Additional surface water modelling may be appropriate to include railroad culverts not represented in the RoFSW modelling. The detailed modelling may provide better insight as to what requirements are needed to make development safe from flood risk.
- The site is unlikely to control runoff from the site. New development can provide greater management of runoff through the introduction of SuDS (See Mitigation - Surface Water Drainage).
- An emergency evacuation plan must be created for the event of a reservoir failure.
- No basement dwelling developments. Basements developments, that are not basement dwellings, may be appropriate at some locations onsite, but a site-specific Flood Risk Assessment must be completed and the basement must not have any adverse impacts on flooding locally during a 1 in 100 year fluvial and surface water events. Basements must contain an egress route to a higher floor above the predicted Flood Zone 3a + CC fluvial and 1 in 1000 year surface water flood depths. Basements should be made flood resilient..

Will development require a flood risk activity permit / ordinary watercourse consent?

- No.

Exception Test

Development can be made safe throughout its lifetime across the site without increasing flood risk elsewhere (See Safety of Development box). Mitigation measures to protect proposed developments against deep maximum fluvial flood depths can be implemented (See Mitigation / FRA Requirements). The site could also reduce flood risk overall with appropriate SuDS and flood storage compensation measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
Development should be directed towards the northern area of the site. Finished floor levels must be at least 0.3m above predicted flood levels and flood plain compensation provided	• Flood resistance and resilience construction of buildings is required where flood levels are less than 0.3m and more than 0.3m respectively. • Flood Emergency and Evacuation Plan.
Surface Water	
Developments within the 1 in 1000 year surface water extent require finished floor levels of at least 0.3m above the predicted flood level at that point. Floor level should be set to Flood Zone 3a + CC extent flood levels if predicted fluvial depths are higher.	• Flood plain compensation must be provided for events up to a 1 in 1000 year event. • See Mitigations - Surface Water Drainage box.
Sewer	
Thames Water must be consulted to confirm if the site has historically flooded.	If the site has historically flooded, the development must implement SuDS to reduce the runoff to sewer to greenfield rates.
Groundwater	
No mitigation measures required.	
Artificial	
Emergency planning officers must be consulted to create a reservoir failure emergency and evacuation plan.	

Figure 1 - Fluvial Flood Depth Map

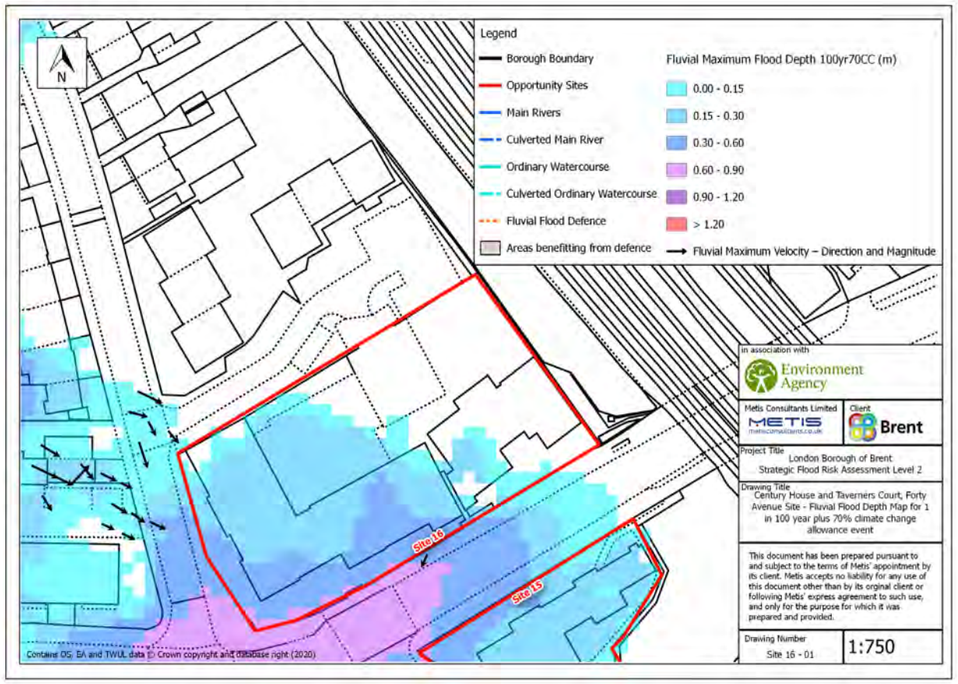


Figure 2 - Fluvial Flood Hazard Map

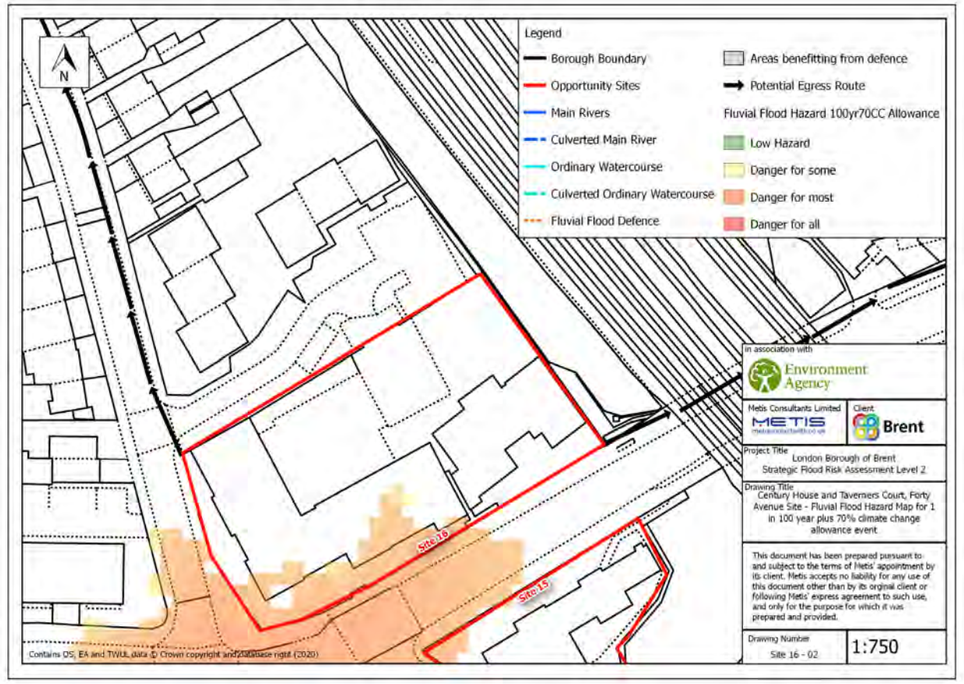


Figure 3 - RoFSW Flood Depth Map

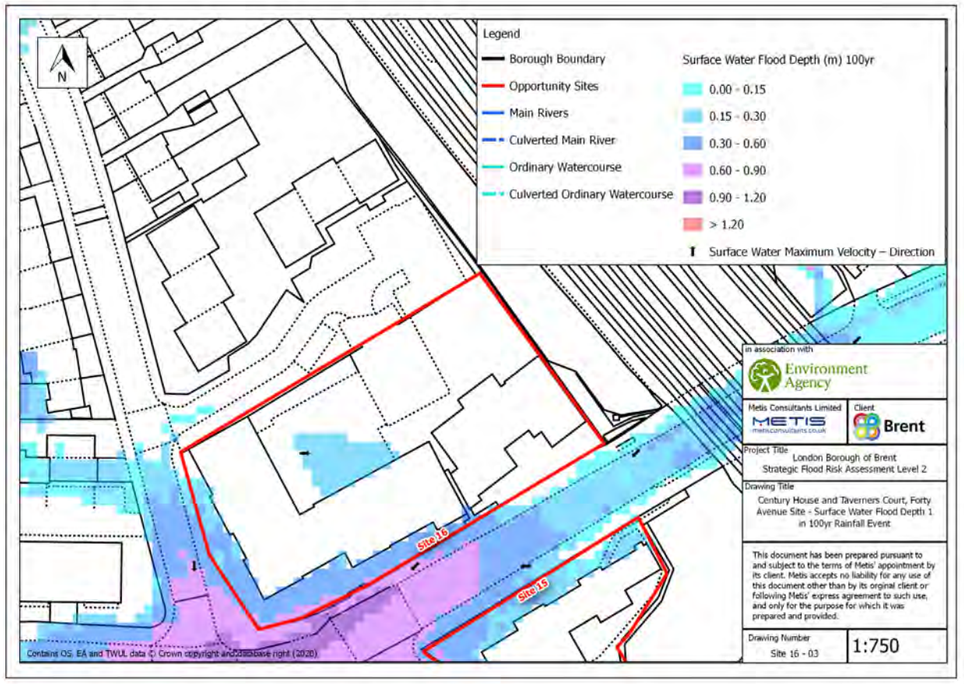


Figure 4 - RoFSW Flood Hazard Map

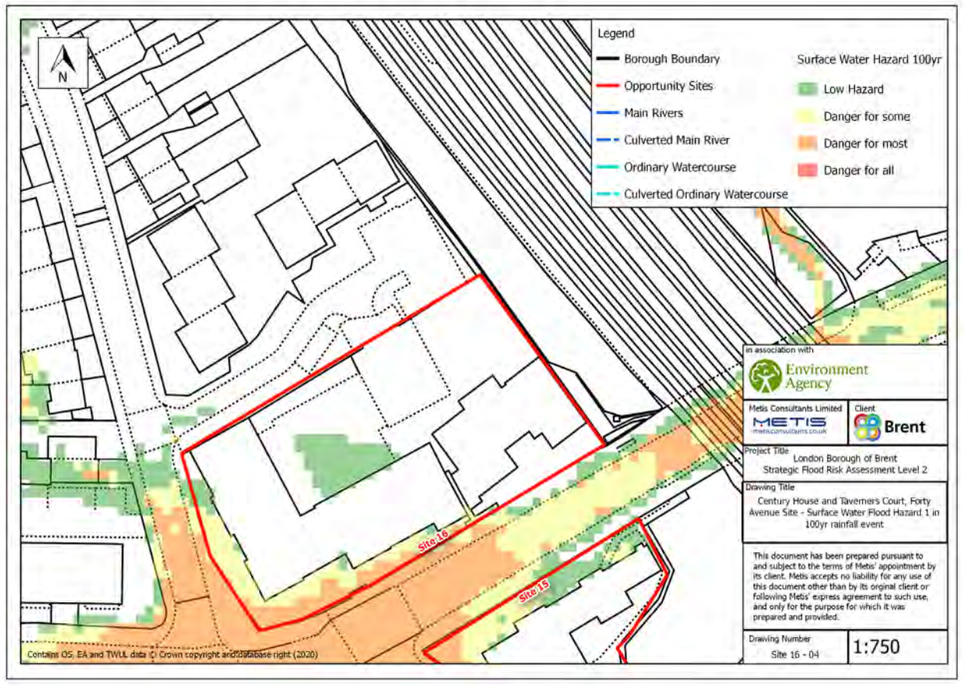


Figure 5 - Thames Water Sewer Flood Map

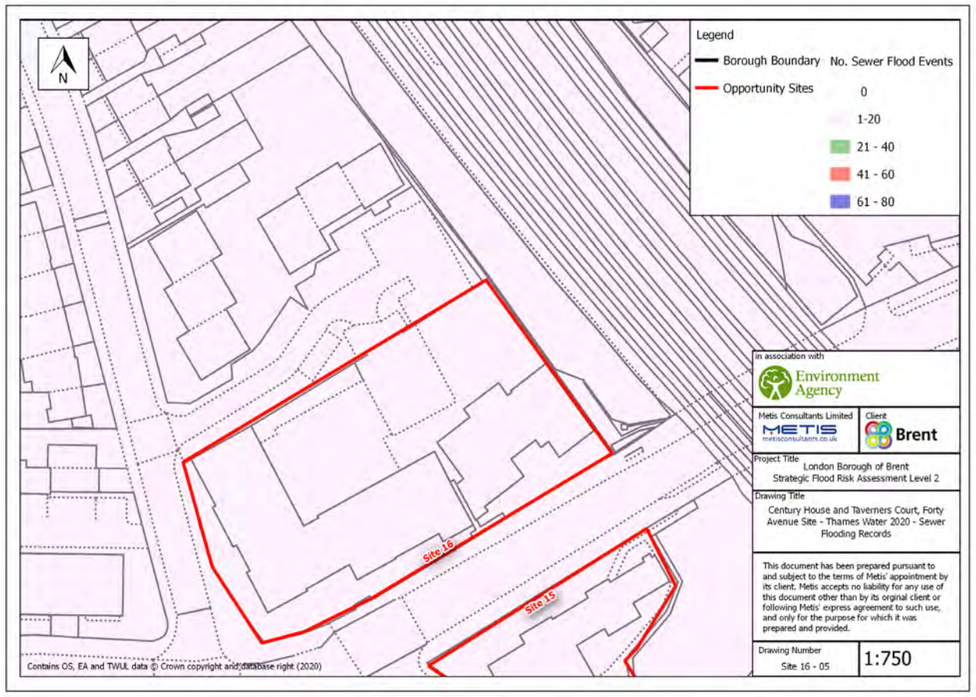


Figure 6 - Areas Susceptible to Groundwater Flooding Map

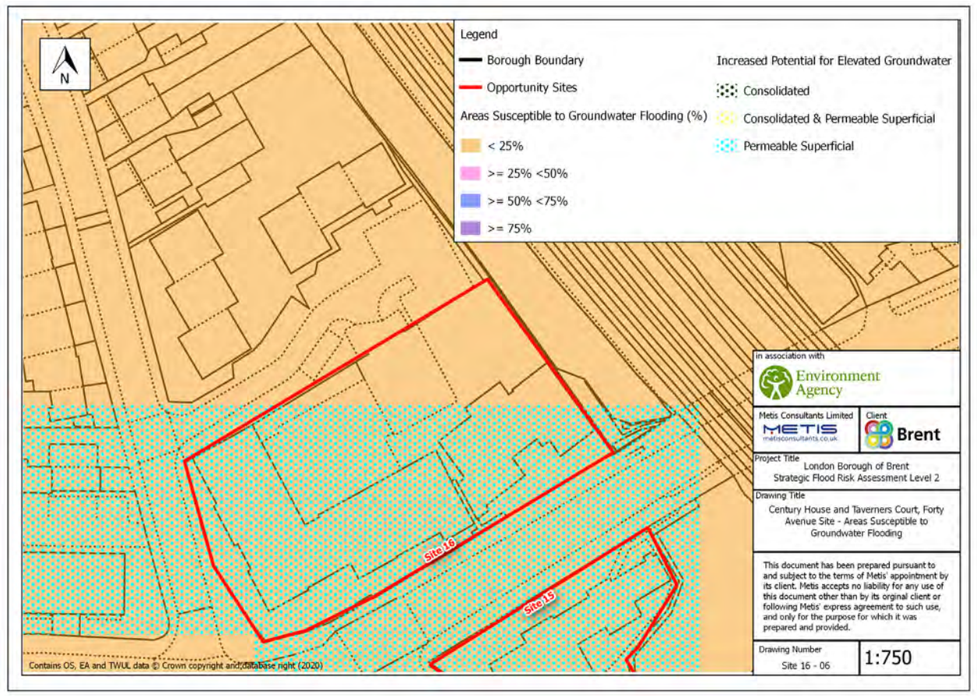
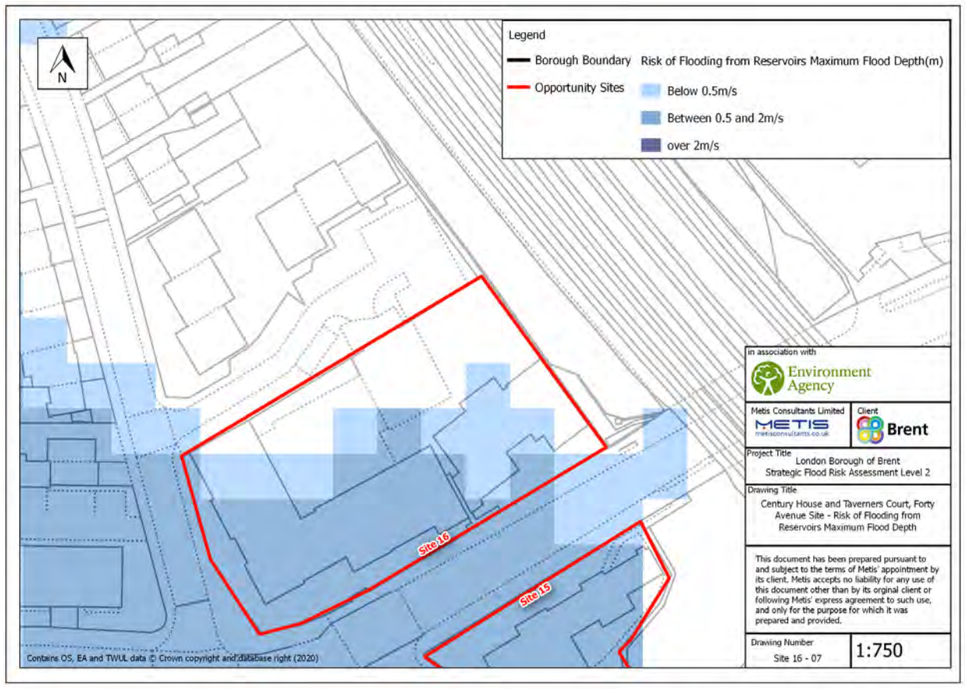


Figure 7 - Outline Reservoir Flood Map



SITE ASSESSMENT - 1-10 RICHMOND COURT AND 80b FORTY AVENUE - BD2

Address:	1-10 Richmond Court and 80b Forty Avenue, Wembley, HA9 8LN
Area:	0.25 **Ha**
Site Reference:	17

Current Use	Proposed Use
Residential	Residential

Current Vulnerability Classification	Proposed Vulnerability Classification
More Vulnerable	More Vulnerable

Current Risk Summary

Fluvial / Tidal			Groundwater		
FZ2	100	% of Site	<25	100	% of Site
FZ3a	74	% of Site	25-50	0	% of Site
FZ3b	15	% of Site	50-75	0	% of Site
Surface Water			>75	0	% of Site
30yr	49	% of Site	**Artificial**		
100yr	94	% of Site	Reservoir	Yes	At risk?
1000yr	100	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents	1-20				

Flood Defences

N/A - the site is not in an area benefitting from flood defences.

FLUVIAL / TIDAL

Risk Assessment (Defended)

Parameter	FZ3b	FZ3a	*FZ3a+CC	Units
Speed of inundation	7**	5**	4**	Hrs
Min. Depth	0	0	0	m
Max. Depth	2.1	2.7	3.5	m
Max. Velocity	1.2	1.7	1.7	m/s
Max Flood Level	31.75	32.39	32.95	m AOD
Max Ground Level	32.69	32.69	32.69	m AOD
Min Ground Level	30.03	30.03	30.03	m AOD
Flood Hazard	Danger for Some	Danger for All	Danger for All	N/A
Duration of Flood	11.5+**	13.5+**	14.5+**	Hrs

* The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)

Parameter	FZ3a	*FZ3a+CC	Units
Speed of inundation	5**	4**	Hrs
Min. Depth	0	0	m
Max. Depth	2.7	3.5	m
Max. Velocity	1.7	1.7	m/s
Max. Hazard	Danger for All	Danger for All	N/A
Duration of Flood	13.5+**	14.5+**	Hrs

Description of Flood Mechanism

•Flooding originates from the Wealdstone Brook, inundating the site from the south. The flooding extent covers more than half of the site for the 1 in 100 year event, with only two northern parts of the site falling outside of Flood Zone 3a. The flood risk extent for the climate change scenario is greater, covering the entirety of the site. Flood depths are higher, while the flow velocities are similar under climate change.

**The site boundary extends into the river channel, placing it by default into the Flood Zone 3b (1 in 20 year), 3a (1 in 100 year), and 3a + CC (1 in 100 year + CC). However, as the site is at predicted risk of flooding, we have assessed the flood inundation and flood duration based on when flooding exceeds the river channel extent and further encroaches onto the site. All other data has been assessed based on the overlap of the Brook and site extents.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

• The majority of the site is at predicted risk of flooding for the 1 in 100 year event, in Flood Zone 3a.
• The site borders Forty Avenue to the north. A safe access and egress route would need to be directed to that direction, through the part of the site outside Flood Zone 3a.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

• See SFRA - Level 2 Report Sections 4.1.1, 4.1.2, 4.1.3 and 4.1.4 for further requirements.
• To mitigate against the maximum flood depths, proposed developments on the site should take place in the northern side of the site, where maximum flood depths are lower.
• See SFRA - Level 2 Report Section 4.1.6 for Main River requirements.
• No basement dwellings.
• Develop a Flood Emergency and Evacuation Plans for the site.
• Site users should be signed up to EA's Flood Warning Service.

SURFACE WATER

Risk Assessment

Parameter	30yr	100yr	*1000yr	Units
Min. Depth	0	0	0.9-1.2	m
Max. Depth	0.6-0.9	>1.2	>1.2	m
Max. Velocity	1.0-2.0	>2.0	>2.0	m/s
Max. Hazard	1.25-2.0	>2.0	>2.0	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

• Surface water enters the site to the north via Forty Avenue and Brook Avenue. Surface water also enters the site to the south from the Wealdstone Brook.
• CC will increase the extent of the max depth, velocity and hazard flooding.

Figure 3 - RoFSW Flood Depth Map

Site Access / Egress

• There is no safe access route on the site. Development on the site must provide safe refuge via raised floor levels above predicted flood depths.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Flood Risk Requirements

• See SFRA - Level 2 Report Sections 4.1.2, 4.1.3 and 4.1.4.
• The entire site is predicted to flood in a 1 in 1000 year event.

Mitigation - Surface Water Drainage

• A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS.
• The site is underlain by London Clay - ground investigations are required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - 1-10 RICHMOND COURT AND 80b FORTY AVENUE - BD2

SEWER

Risk Assessment

• The area is served by separate surface water and foul sewer networks.
• The site falls within a post code district where there are 1 - 20 reported flood incidents from sewer flooding.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

• Thames Water must be consulted to confirm if the site has historically flooded.
• If the site has historically flooded, the development must implement SuDS to reduce the runoff to sewer to greenfield rates or as close as possible to greenfield rates.

GROUNDWATER

Risk Assessment

• The site falls in an area that is classified as having <25% susceptibility to groundwater flooding.
• The site falls within a 'Permeable Superficial' area with regards to Increased Potential for Elevated Groundwater. The site is in close proximity to the Wealdstone Brook, which is underlain by an alluvium (clay, silt, sand and gravel) superficial deposit geology.

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

No mitigation measures required.

ARTIFICIAL

Risk Assessment

• There is risk of flooding from the Brent (Welsh Harp) Reservoir.
• The whole site area is at risk from reservoir flooding.
• The site is predicted to flood between 0.3-2m depth in result of reservoir failure.
• Reservoir failure flood speeds would be below 0.5 m/s for the majority of the site, with a few areas flood speed predicted to be between 0.5-2m/s.

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

Local Authority Emergency Planning Officers must be consulted to create a reservoir failure emergency and evacuation plan.

PLANNING CONSIDERATIONS

Safety of Development

Can the development be future proofed for climate change considerations?
• Yes. See SFRA - Level 2 Report Sections 4.1.2 and 4.1.3 for the required finished floor levels and flood resistant / resilient building requirements.

Can the development be designed safe throughout its lifetime without increasing flood risk elsewhere?
• Yes - The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation.
• See SFRA - Level 2 Report Section 4.1.4 for compensatory flood storage requirements.

What is the cumulative impact of the development land use change and will flood risk increase?
• The development land use is not changing.
• There is green space currently on-site. Development must mitigate any increase in impermeable area to the site with flood plain compensation and runoff storage to prevent any increase in flood risk.

How can the development reduce risk overall?
• Directing development towards the north eastern part of the site where maximum flood depths are lower. Finished floor levels of at least 0.3m above predicted flood depths at that point should be implemented (See Mitigation / FRA Requirements & Mitigation - Flood Risk Requirements).
• The site is unlikely to control runoff from the site. New development can provide greater management of runoff through the introduction of SuDS (See Mitigation - Surface Water Drainage).
• An emergency evacuation plan must be created for the event of a reservoir failure.
• No basement dwelling developments. Basements developments, that are not basement dwellings, may be appropriate at some locations onsite, but a site-specific Flood Risk Assessment must be completed and the basement must not have any adverse impacts on flooding locally during a 1 in 100 year fluvial and surface water events. Basements must contain an egress route to a higher floor above the predicted Flood Zone 3a + CC fluvial and 1 in 1000 year surface water flood depths. Basements should be made flood resilient.

Will development require a flood risk activity permit / ordinary watercourse consent?
• Yes - Site is within 8m of the Wealdstone Brook - See SFRA - Level 2 Report Section 4.1.6

Exception Test

Development can be made safe throughout its lifetime across the site without increasing flood risk elsewhere (See Safety of Development box). Mitigation measures to protect proposed developments against deep maximum fluvial flood depths can be implemented (See Mitigation / FRA Requirements). The site could also reduce flood risk overall with appropriate SuDS and flood storage compensation measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
• No developments in Flood Zone 3b extent. • Development should be directed towards the north western area of the site. Finished floor levels must be at least 0.3m above predicted flood levels and flood plain compensation is required.	• Flood resistance and resilience construction of buildings is required where flood levels are less than 0.3m and more than 0.3m respectively. • Flood Emergency and Evacuation Plan.
Surface Water	
Developments within the 1 in 1000 year surface water extent require finished floor levels of at least 0.3m above the predicted flood level at that point. Floor level should be set to Flood Zone 3a + CC extent flood levels if predicted fluvial depths are higher.	• Flood plain compensation must be provided. • Site development should introduce SuDS to manage surface water runoff.
Sewer	
Thames Water must be consulted to confirm if the site has historically flooded.	If the site has historically flooded, the development must implement SuDS to reduce the runoff to sewer to greenfield rates.
Groundwater	
No mitigation measures required.	
Artificial	
Emergency planning officers must be consulted to create a reservoir failure emergency and evacuation plan.	

Figure 1 - Fluvial Flood Depth Map

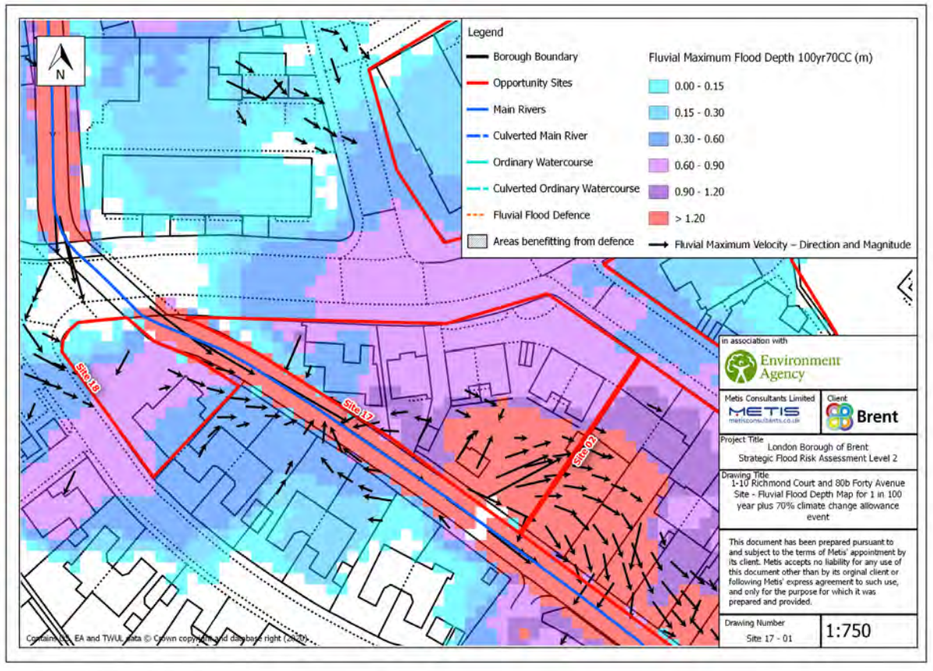


Figure 2 - Fluvial Flood Hazard Map

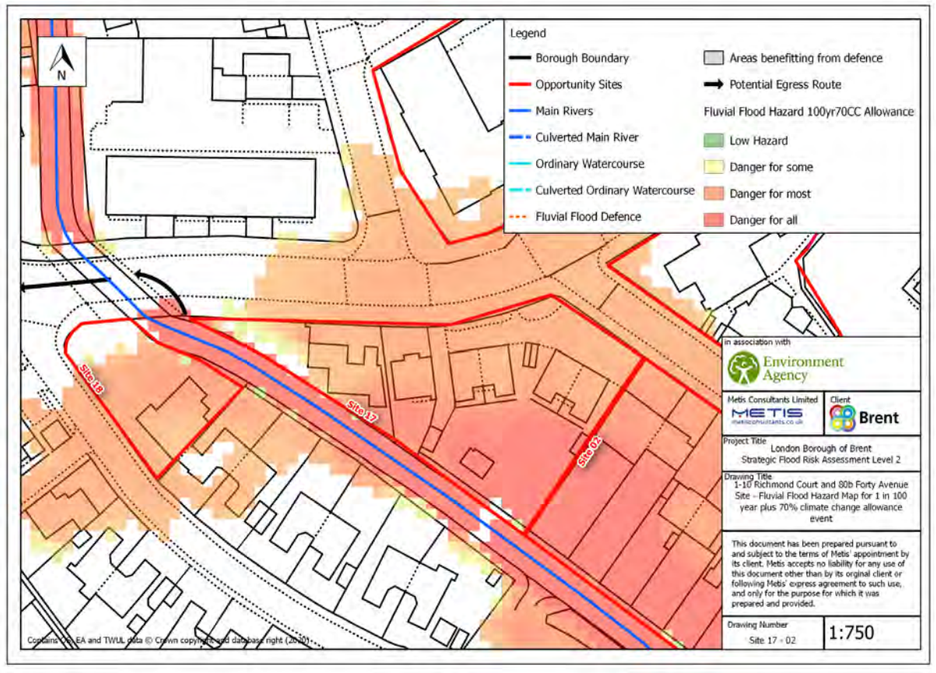


Figure 3 - RoFSW Flood Depth Map

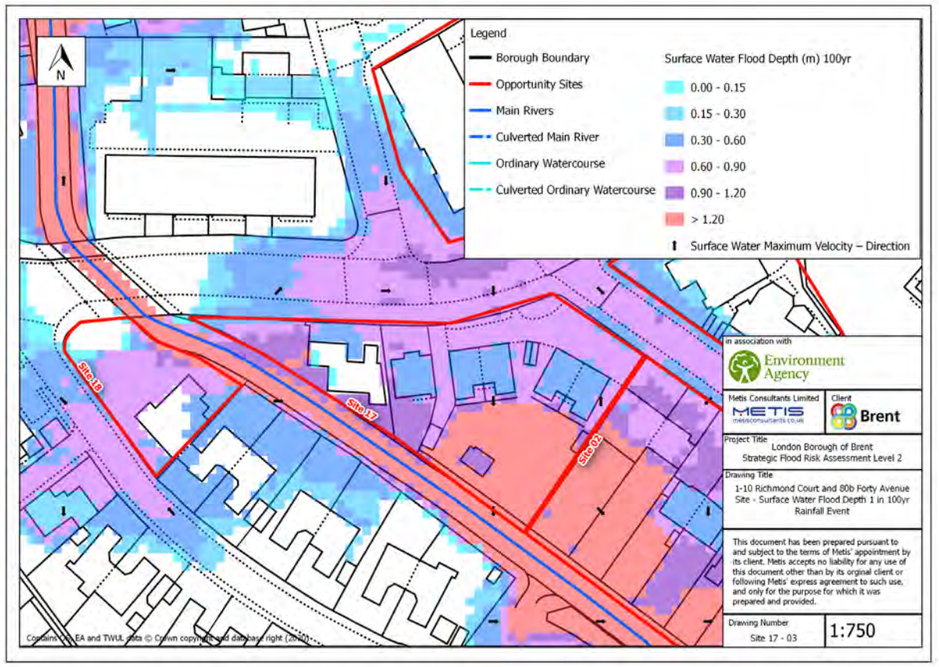


Figure 4 - RoFSW Flood Hazard Map

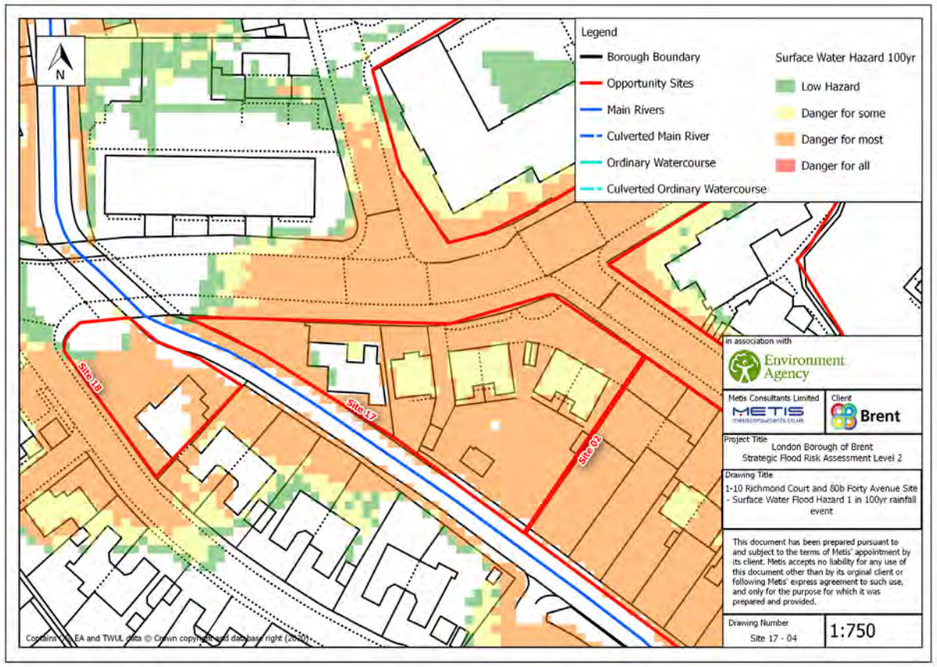


Figure 5 - Thames Water Sewer Flood Map

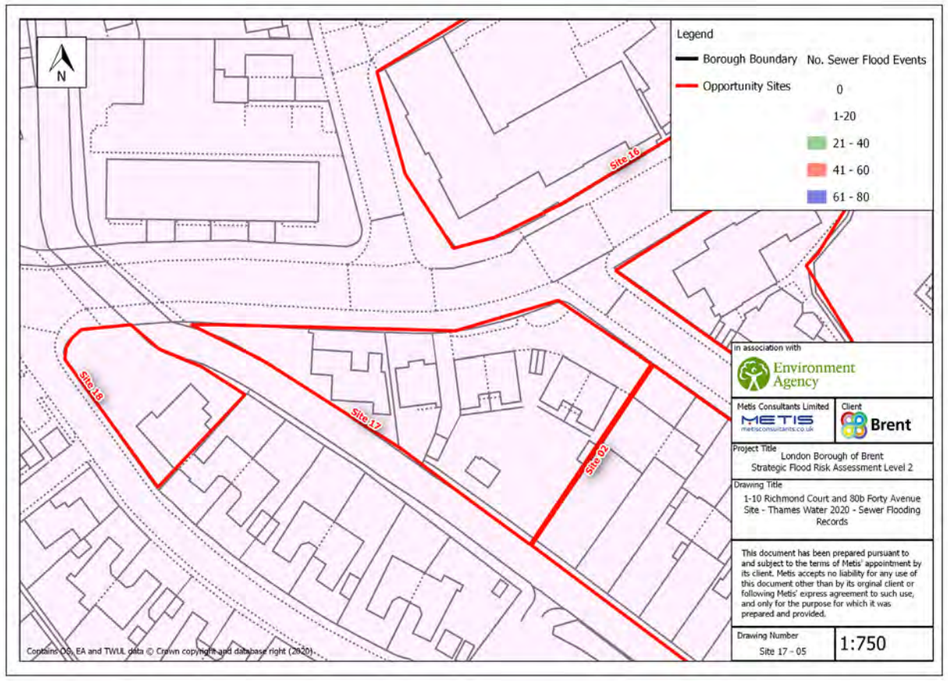


Figure 6 - Areas Susceptible to Groundwater Flooding Map

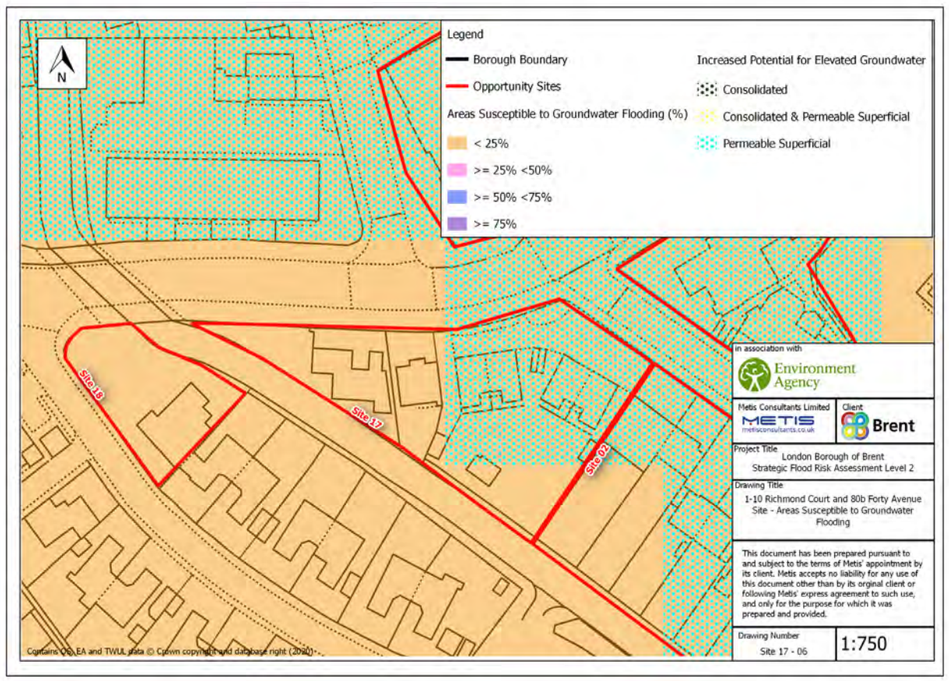
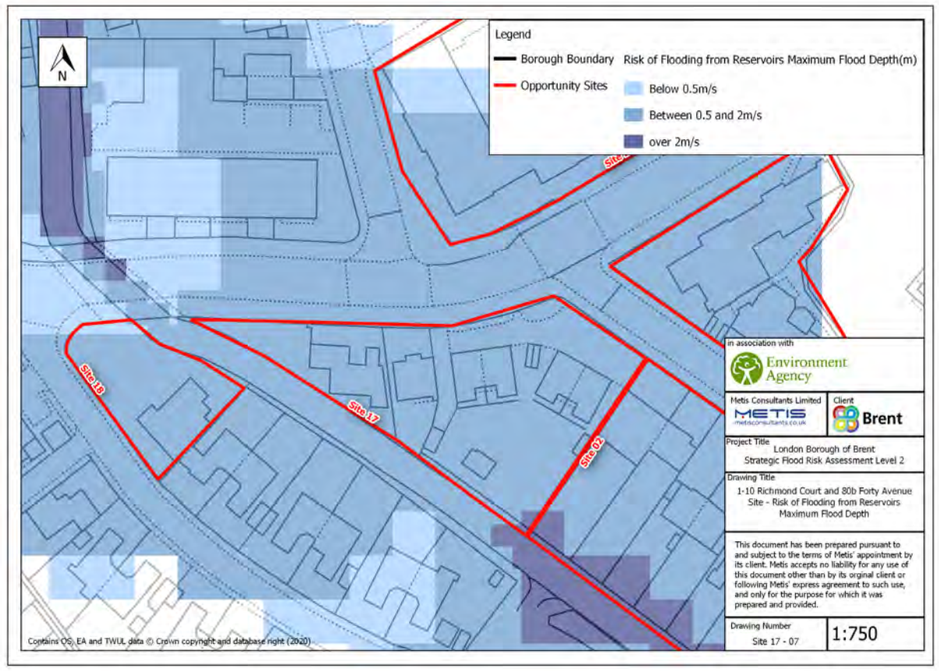


Figure 7 - Outline Reservoir Flood Map



SITE ASSESSMENT - 1 FORTY CLOSE - BD2

Address:	1 Forty Close and Meeting Room, Wembley, HA9
Area:	0.16 **Ha**
Site Reference:	18

Current Use	Proposed Use
Residential building	Residential and community space

Current Vulnerability Classification	Proposed Vulnerability Classification
More Vulnerable	More Vulnerable

Current Risk Summary					
Fluvial / Tidal			**Groundwater**		
FZ2	100	% of Site	<25	100	% of Site
FZ3a	5	% of Site	25-50	0	% of Site
FZ3b	5	% of Site	50-75	0	% of Site
Surface Water			>75	0	% of Site
30yr	5	% of Site	**Artificial**		
100yr	76	% of Site	Reservoir	Yes	At risk?
1000yr	100	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents	1-20				

Flood Defences
N/A - the site is not in an area benefitting from flood defences.

FLUVIAL / TIDAL

Risk Assessment (Defended)				
Parameter	**FZ3b**	**FZ3a**	***FZ3a+CC**	**Units**
Speed of inundation	N/A**	N/A**	5.5**	Hrs
Min. Depth	0	0	0	m
Max. Depth	1.6	2.1	2.7	m
Max. Velocity	0.9	1.1	1.2	m/s
Max Flood Level	31.75	32.33	33.02	m AOD
Max Ground Level	33.5	33.5	33.5	m AOD
Min Ground Level	32.05	32.05	32.05	m AOD
Flood Hazard	Danger for All	Danger for All	Danger for All	N/A
Duration of Flood	N/A**	N/A**	13+**	Hrs

*The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)			
Parameter	**FZ3a**	***FZ3a+CC**	**Units**
Speed of inundation	N/A**	5.5**	Hrs
Min. Depth	0	0(0.01)	m
Max. Depth	2.1	2.7	m
Max. Velocity	1.1	1.2	m/s
Max. Hazard	Danger for All	Danger for All	N/A
Duration of Flood	N/A**	13+**	Hrs

Description of Flood Mechanism

• Both sites are adjacent to the Wealdstone Brook. The Flood Zone 3a extent covers a small area in the north eastern part of the east site. The Flood Zone 3a extent covers the eastern border of the west site. The flood risk extent for the climate change scenario is much greater. The flooding extent covers the whole site area for both sites, excluding a small part of the east site in the north.

** The site boundary extends into the river channel, placing it by default into the Flood Zone 3b (1 in 20 year), 3a (1 in 100 year), and 3a + CC (1 in 100 year + CC) extent without any fluvial flooding occurring from the Wealdstone Brook bursting the banks. Therefore, we have assessed the flood inundation and flood duration based on when flooding exceeds the river channel extent and further encroaches onto the site. This has not happened at this site for the 1 in 20 and 1 in 100 year events, so this information has been categorised as N/A. All other data has been assessed based on the overlap of the Brook and site extents.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

• The majority of both the sites are not at predicted risk of flooding for the 1 in 100 year event.

• The east site borders Forty Avenue and Forty Close to the north and west respectively. A safe route would need to be directed to the north, through the part of the site outside Flood Zone 3a+CC.

• The west site borders Forty Avenue and Carlton Avenue East to the south and west respectively. A safe access route would need to be directed to the south, as fluvial flooding inundates the site from the north.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

• See SFRA - Level 2 Report Sections 4.1.1, 4.1.2, 4.1.3 and 4.1.4 for further requirements.

• See SFRA - Level 2 Report Section 4.1.6 for Main River requirements.

• To mitigate against the maximum flood depths, proposed developments on the site should not take place in the north eastern part of the site.

• No basement dwellings.

• Develop separate Flood Emergency and Evacuation Plans for both sites.

• Site users should be signed up to EA's Flood Warning Service.

SURFACE WATER

Risk Assessment				
Parameter	**30yr**	**100yr**	***1000yr**	**Units**
Min. Depth	0	0	0.3-0.6	m
Max. Depth	>1.2	>1.2	>1.2	m
Max. Velocity	1.0-2.0	>2.0	>2.0	m/s
Max. Hazard	>2.0	>2.0	>2.0	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

• Surface water enters the east site from the Wealdstone Brook in the northeast and from the south and west from Forty Close. Surface water inundates the west site from the Wealdstone Brook from the east.

• CC will increase the extent of the max depth, velocity and hazard of flooding.

Site Access / Egress

• Safe access and egress routes for the sites should be directed towards the intersection of Forty Close and the A4088. This is where there is the least risk for the east site and where land is topographically high for the west site.

Figure 3 - RoFSW Flood Depth Map

Mitigation - Flood Risk Requirements

• See SFRA - Level 2 Report Sections 4.1.2, 4.1.3 and 4.1.4 for further requirements.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Surface Water Drainage

• A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS.

• The site is underlain by London Clay - ground investigations are required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - 1 FORTY CLOSE - BD2

SEWER

Risk Assessment

- The area is served by separate surface water and foul sewer networks.
- The site falls within a post code district where there are 1 - 20 reported flood incidents from sewer flooding.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

- Thames Water must be consulted to confirm if the site has historically flooded.
- If the site has historically flooded, the development must implement SuDS to reduce the runoff to sewer to greenfield rates or as close as possible to greenfield rates.

GROUNDWATER

Risk Assessment

- The site falls in an area that is classified as having <25% susceptibility to groundwater flooding.
- The site falls within a 'Permeable Superficial' area with regards to Increased Potential for Elevated Groundwater. The site is in close proximity to the Wealdstone Brook, which is underlain by an alluvium (clay, silt, sand and gravel) superficial deposit geology.

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

No mitigation measures required.

ARTIFICIAL

Risk Assessment

- There is risk of flooding from the Brent (Welsh Harp) Reservoir.
- The whole site area is at risk from reservoir flooding.
- The site is predicted to flood between 0.3-2m depth in result of reservoir failure.
- Reservoir failure flood speeds would be below 0.5 m/s for the majority of the site.

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

Local Authority Emergency Planning Officers must be consulted to create a reservoir failure emergency and evacuation plan.

PLANNING CONSIDERATIONS

Safety of Development

Can the development be future proofed for climate change considerations?

- Yes. See SFRA - Level 2 Report Sections 4.1.2 and 4.1.3 for the required finished floor levels and flood resistant / resilient building requirements.

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

- Yes - The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation.
- See SFRA - Level 2 Report Section 4.1.4 for compensatory flood storage requirements.

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

- The development vulnerability is not changing.
- There is green space currently on both sites. Development must mitigate any increase in impermeable area to the site with flood plain compensation and runoff storage to prevent any increase in flood risk.

How can the development reduce risk overall?

- Directing developments towards the north western area of the east site and towards the south of the west site.
- The site is unlikely to control runoff from the site. New development can provide greater management of runoff through the introduction of SuDS (See Mitigation - Surface Water Drainage).
- An emergency evacuation plan must be created for the event of a reservoir failure.
- No basement dwelling developments. Basements developments, that are not basement dwellings, may be appropriate onsite, but a site-specific Flood Risk Assessment must be completed and the basement must not have any adverse impacts on flooding locally during a 1 in 100yr surface water event. Basement dwellings within the 1 in 100yr surface water flood extent may only be permitted if an exceptions test is passed. Basements must contain an egress route to a higher floor above the predicted 1 in 1000yr surface water flood depth. Basements should be made flood resilient.

Will development require a flood risk activity permit / ordinary watercourse consent?

- Yes - the site is within 8m of the Wealdstone Brook. Refer SFRA - Level 2 Report Section 4.1.6 for further requirements

Exception Test

Development can be made safe throughout its lifetime across the site without increasing flood risk elsewhere (See Safety of Development box). Mitigation measures to protect proposed developments against deep maximum fluvial flood depths can be implemented (See Mitigation / FRA Requirements). The site could also reduce flood risk overall with appropriate SuDS and flood storage compensation measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal

• No developments in Flood Zone 3b extent. • Development should be directed towards the north western area of the east site and towards the south of the west site. • Finished floor levels must be at least 0.3m above predicted flood levels and flood plain compensation provided.	• Flood resistance and resilience construction of buildings is required where flood levels are less than 0.3m and more than 0.3m respectively. • Flood Emergency and Evacuation Plans for both sites.

Surface Water

Developments within the 1 in 1000 year surface water extent require finished floor levels of at least 0.3m above the predicted flood level at that point. Floor level should be set to Flood Zone 3a + CC extent flood levels if predicted fluvial depths are higher.	• Flood plain compensation must be provided. • Site development should introduce SuDS to manage surface water runoff.

Sewer

Thames Water must be consulted to confirm if the site has historically flooded.	If the site has historically flooded, the development must implement SuDS to reduce the runoff to sewer to greenfield rates.

Groundwater

No mitigation measures required.	

Artificial

Emergency planning officers must be consulted to create a reservoir failure emergency and evacuation plan.	

Figure 1 - Fluvial Flood Depth Map

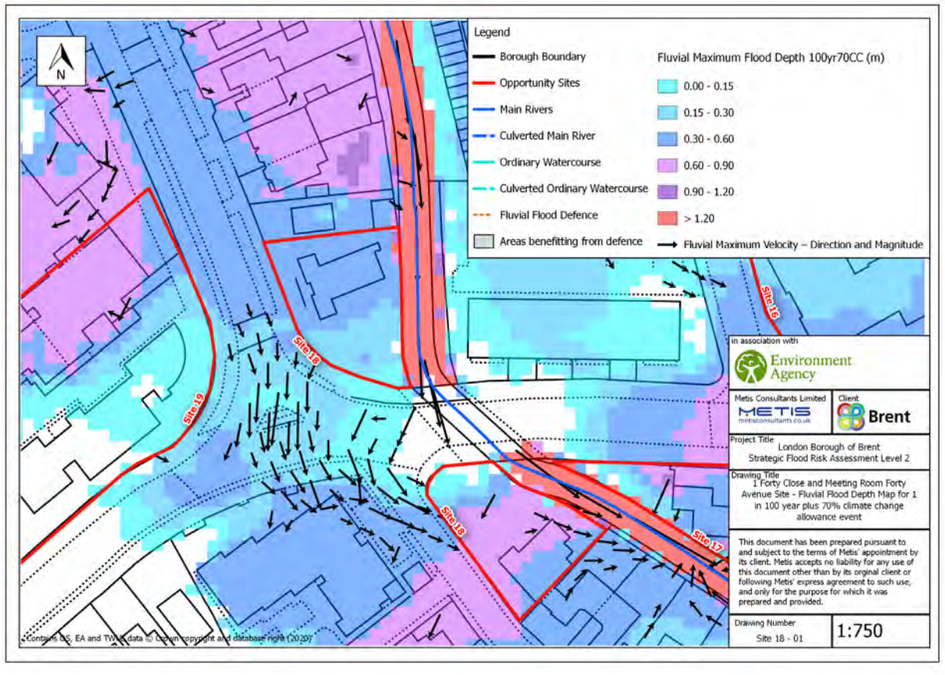


Figure 2 - Fluvial Flood Hazard Map

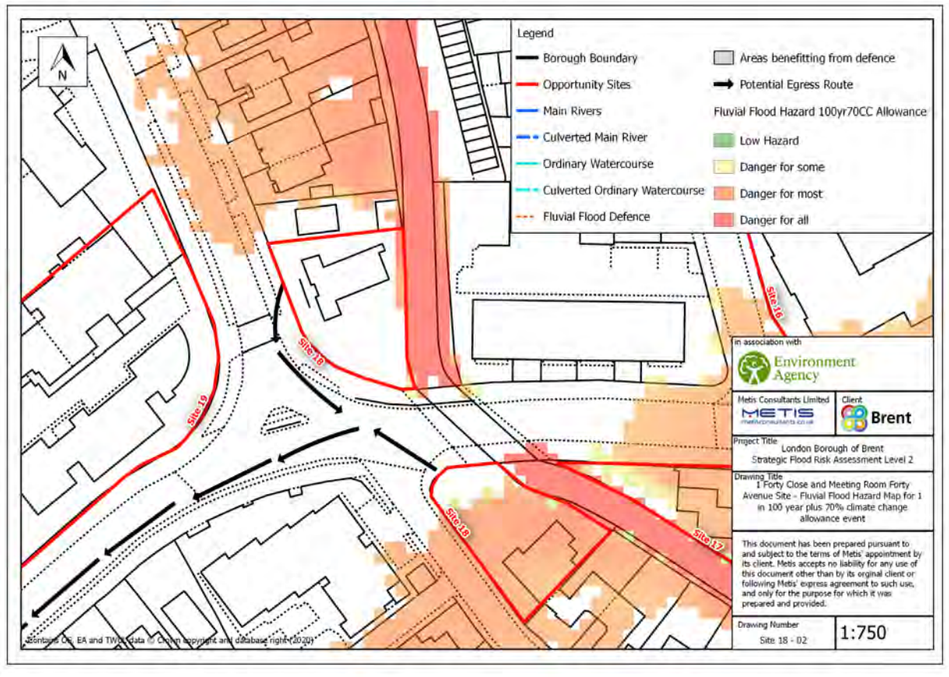


Figure 3 - RoFSW Flood Depth Map

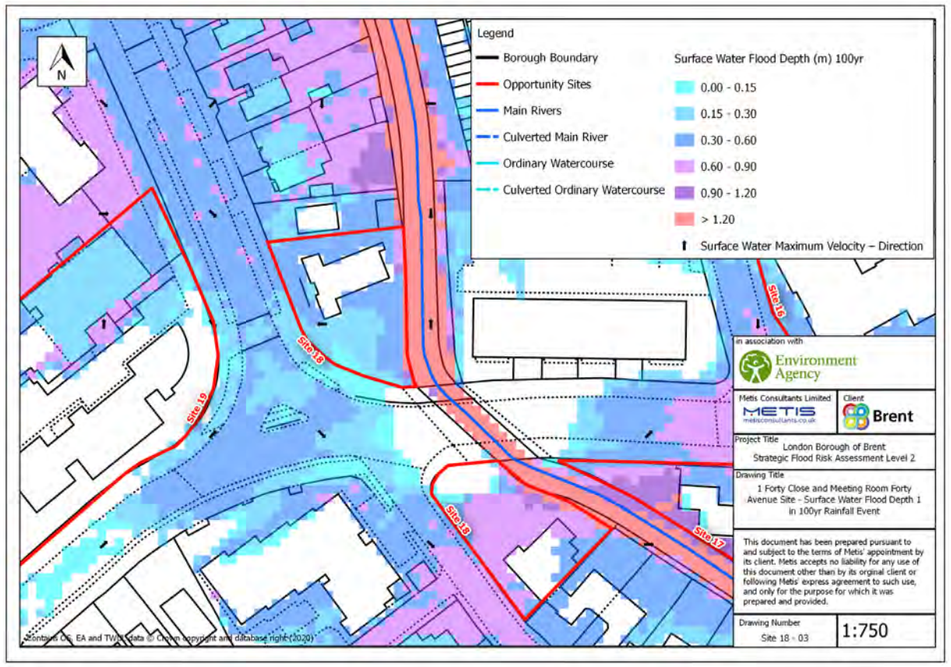


Figure 4 - RoFSW Flood Hazard Map

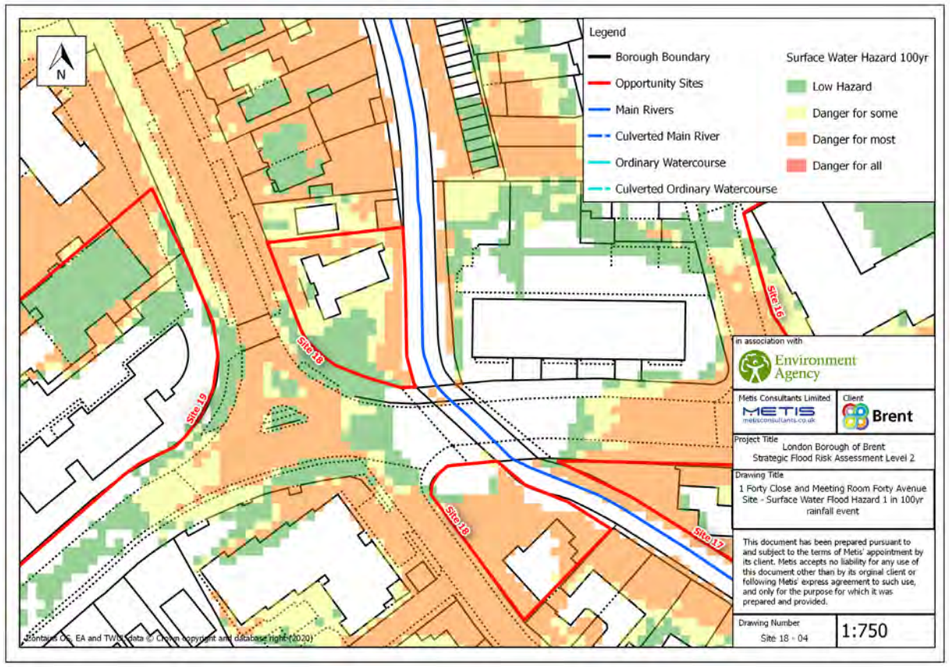


Figure 5 - Thames Water Sewer Flood Map

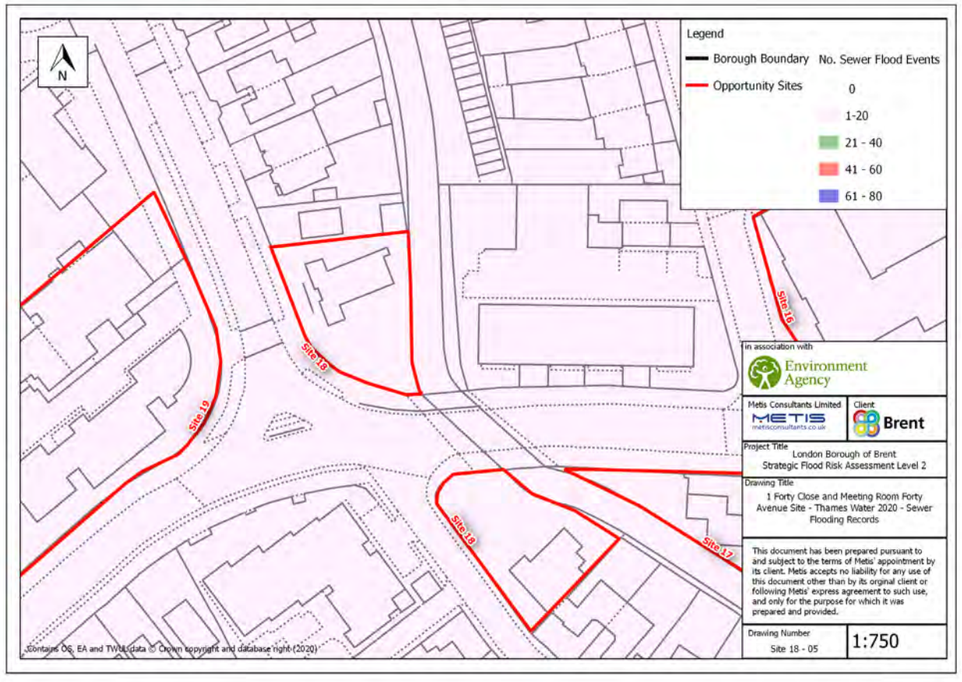


Figure 6 - Areas Susceptible to Groundwater Flooding Map

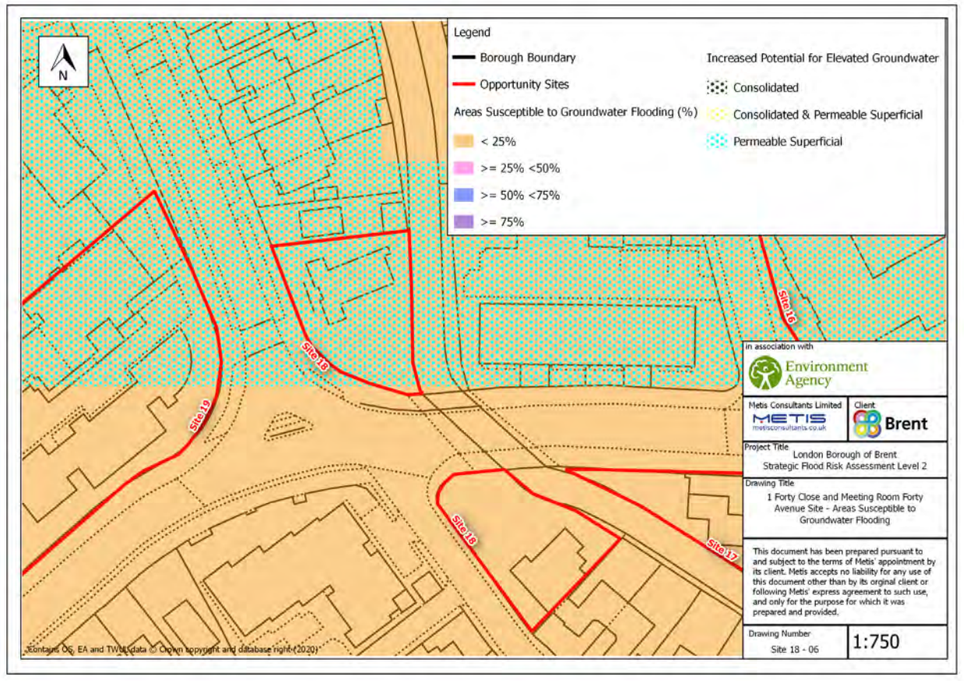
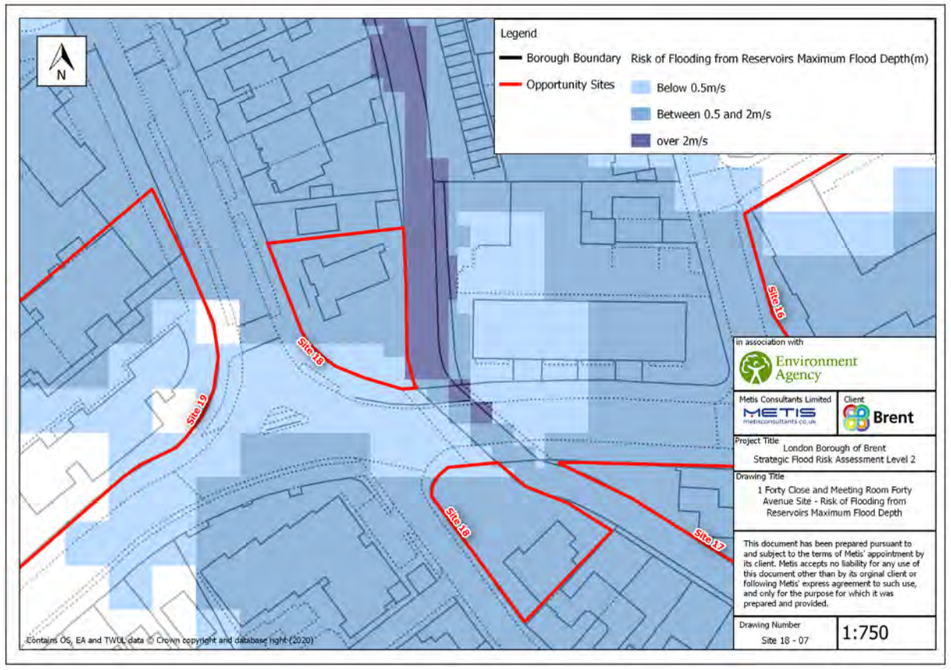


Figure 7 - Outline Reservoir Flood Map



SITE ASSESSMENT - 53-63 Forty Avenue, Perrin Grange, the City Learning Centre and Brook House and 58-64 Forty Avenue - BD2

Address:	Wembley, HA9 8LQ

Area:	0.74 **Ha**
Site Reference :	19

Current Use	Proposed Use
Residential and education	Residential and education (100yr design life)

Current Vulnerability Classification	Proposed Vulnerability Classification
More Vulnerable	More Vulnerable

Current Risk Summary					
Fluvial / Tidal			**Groundwater**		
FZ2	40	% of Site	<25	100	% of Site
FZ3a	0	% of Site	25-50	0	% of Site
FZ3b	0	% of Site	50-75	0	% of Site
Surface Water			>75	0	% of Site
30yr	18	% of Site	**Artificial**		
100yr	32	% of Site	Reservoir	Yes	At risk?
1000yr	73	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents		1-20			

Flood Defences
N/A - the site is not in an area benefitting from flood defences.

FLUVIAL / TIDAL

Risk Assessment (Defended)				
Parameter	**FZ3b**	**FZ3a**	***FZ3a+CC**	**Units**
Speed of inundation	N/A	N/A	6.5	Hrs
Min. Depth	N/A	N/A	0	m
Max. Depth	N/A	N/A	0.7	m
Max. Velocity	N/A	N/A	0.5	m/s
Max Flood Level	N/A	N/A	33.33	m AOD
Max Ground Level	N/A	N/A	35.89	m AOD
Min Ground Level	N/A	N/A	32.27	m AOD
Flood Hazard	N/A	N/A	N/A	N/A
Duration of Flood	N/A	N/A	12+	Hrs

* The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)			
Parameter	**FZ3a**	***FZ3a+CC**	**Units**
Speed of inundation	N/A	6.5	Hrs
Min. Depth	N/A	0	m
Max. Depth	N/A	0.7	m
Max. Velocity	N/A	0.5	m/s
Max. Hazard	N/A	N/A	N/A
Duration of Flood	N/A	12+	Hrs

Description of Flood Mechanism

- The site is within 50m of the Wealdstone Brook, with the river located north east of the site.
- Climate change factors place the site at risk of fluvial flooding. Fluvial flooding from the Brent inundates the site from the north, with water flowing across Carlton Avenue East and along Forty Avenue to the east.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

- Approximately 60% of the site lies within Flood Zone 1. The southern extent of the site is not at predicted risk of flooding for the 1 in 100 year + CC event.
- The site borders Forty Avenue and Hollycroft Avenue to the east and south respectively. A safe access and egress route should be directed to the east and south of the site, where the risk is lowest.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

- See SFRA - Level 2 Report Sections 4.1.1 for further requirements.
- A Flood Emergency and Evacuation Plan is required.
- Site users should be signed up to EA's Flood Warning Service.
- For finished floor levels, see the 'Mitigation - Flood Risk Requirements' box. Predicted surface water flooding is greater than predicted fluvial flooding.

SURFACE WATER

Risk Assessment				
Parameter	**30yr**	**100yr**	***1000yr**	**Units**
Min. Depth	0	0	0	m
Max. Depth	>1.2	>1.2	>1.2	m
Max. Velocity	1.0-2.0	1.0-2.0	>2.0	m/s
Max. Hazard	1.25-2.0	1.25-2.0	>2.0	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

- Water enters the back gardens of houses 53-63 Forty Ave (southwest of site) through the gap between houses on Hollycroft Ave and from Carlton Ave to the car park in the northeast of the site.
- CC will increase the extent, velocity, hazard but will not increase the maximum depth of flooding.

Site Access / Egress

- Safe access and egress routes should be directed towards the south of the site towards Forty Avenue and Hollycroft Avenue.

Figure 3 - RoFSW Flood Depth Map

Mitigation - Flood Risk Requirements

- See SFRA - Level 2 Report Sections 4.2.1, 4.2.2 and 4.2.3 for further requirements.
- Development by the northern boundary of the site should be avoided, if possible.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Surface Water Drainage

- A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS.
- The site is underlain by London Clay - ground investigations are required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - 53-63 Forty Avenue, Perrin Grange, the City Learning Centre and Brook House and 58-64 Forty Avenue - BD2

SEWER

Risk Assessment

- The area is served by a separate surface water and foul water sewer network.
- There have been 1-20 reported sewer flood incidents within the site's post code district.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

- Thames Water must be consulted to confirm if the site has historically flooded.
- If the site has historically flooded, the development must reduce the runoff to sewers from the site to greenfield rates or as close as possible to greenfield rates.

GROUNDWATER

Risk Assessment

- The site falls in an area that is classified as having < 25% susceptibility to groundwater flooding.
- The north corner of the site falls within a 'Permeable Superficial' area with regards to Increased Potential for Elevated Groundwater.

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

No mitigation measures required.

ARTIFICIAL

Risk Assessment

- There is risk of flooding from the Brent (Welsh Harp) Reservoir, northeast of Gabrielle Close.
- Where there is flood risk, the site is predicted to flood between 0-2m depth in result of reservoir failure.
- Reservoir failure flood speed would be below 0.5m/s for the majority of the site where there is flood risk.

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

Local Authority Emergency Planning Officers must be consulted to create a reservoir failure emergency and evacuation plan.

PLANNING CONSIDERATIONS

Safety of Development

Can the development be future proofed for climate change considerations?

- Yes. See SFRA - Level 2 Report Sections 4.2.1 and 4.2.2 for the required finished floor levels and flood resistant / resilient building requirements. .

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

- Yes - The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation.
- See SFRA - Level 2 Report Section 4.2.3 for compensatory flood storage requirements.

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

- The development land use is not changing.
- The site currently contains impermable and permeable space. Development must mitigate any increase in impermeable area with runoff storage to prevent any increase in flood risk.

How can the development reduce risk overall?

- The site is unlikely to control runoff from the site. New development can provide greater management of runoff through the introduction of SuDS. (See Mitigation - Surface Water Drainage).
- An emergency evacuation plan must be created for the event of a reservoir failure.
- No basement dwelling developments. Basements developments, that are not basement dwellings, may be appropriate at some locations onsite, but a site-specific Flood Risk Assessment must be completed and the basement must not have any adverse impacts on flooding locally during a 1 in 100 year event. Basements must contain an egress route to a higher floor above the predicted Flood Zone 3a + CC fluvial and 1 in 1000 year surface water flood depths. Basements should be made flood resilient.
- Developments should be directed towards the southern extent of the site where maximum flood depths are lower (See Mitigation / FRA Requirements).

Will development require a flood risk activity permit / ordinary watercourse consent?

- No

Exception Test

Proposed developments can be made safe throughout their lifetime without increasing flood risk elsewhere (See Safety of Development box). Mitigation measures to protect proposed developments against deep maximum surface water flood depths can be implemented. In addition, the site could also reduce flood risk overall with appropriate SuDS and flood compensation measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
Development should be directed towards the western half of the site where maximum flood depths are lower. Finished floor levels must be at least 0.3m above predicted flood levels.	• Flood Emergency and Evacuation Plan required. • Site users should be signed up to EA's Flood Warning Service.
Surface Water	
Developments within the 1 in 1000 year surface water extent require finished floor levels of at least 0.3m above the predicted flood level at that point. Floor level should be set to Flood Zone 3a + CC extent flood levels if predicted fluvial depths are higher.	• See SFRA - Level 2 Report Sections 4.2.1, 4.2.2 and 4.2.3 for further requirements.
Sewer	
Thames Water must be consulted to confirm if the site has historically flooded.	If the site has historically flooded, the development must reduce the runoff to sewers to greenfield rates.
Groundwater	
No mitigation measures required.	
Artificial	
Emergency planning officers must be consulted to create a reservoir failure emergency and evacuation plan.	

Figure 1 - Fluvial Flood Depth Map

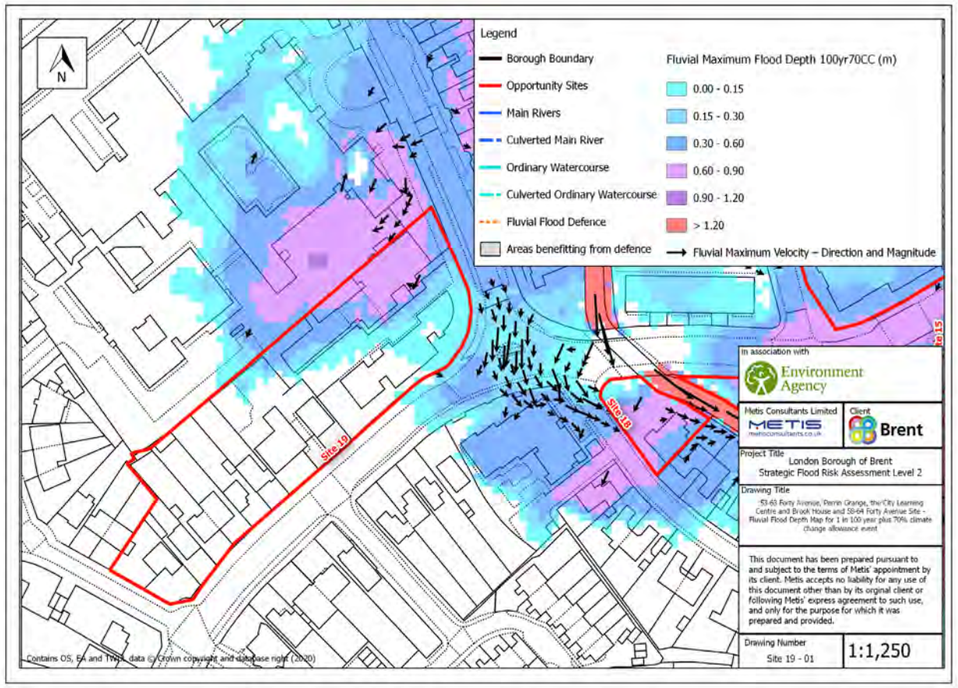


Figure 2 - Fluvial Flood Hazard Map

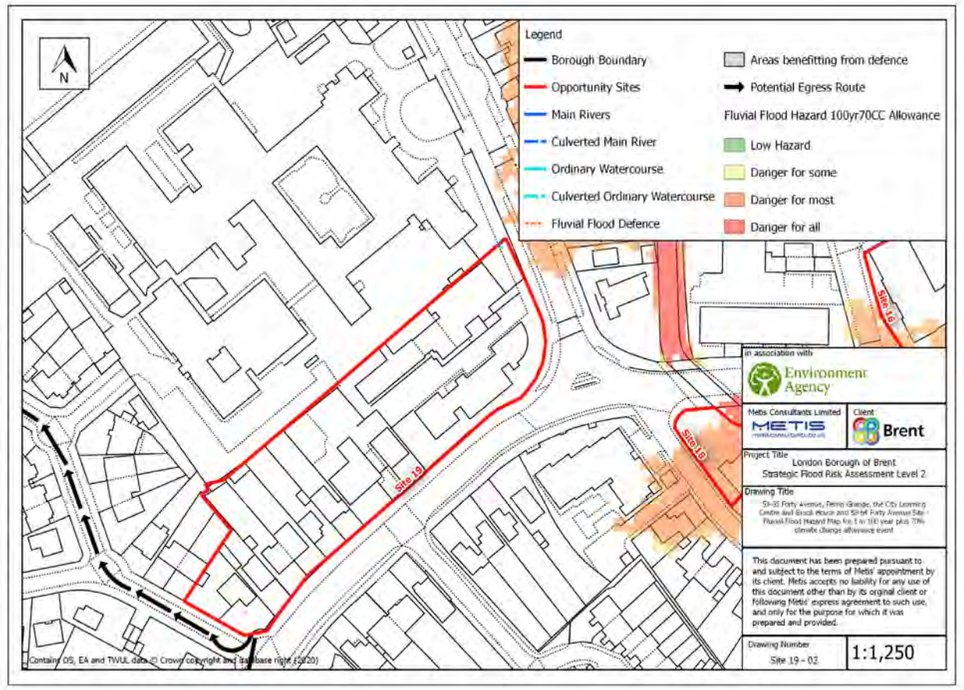


Figure 3 - RoFSW Flood Depth Map

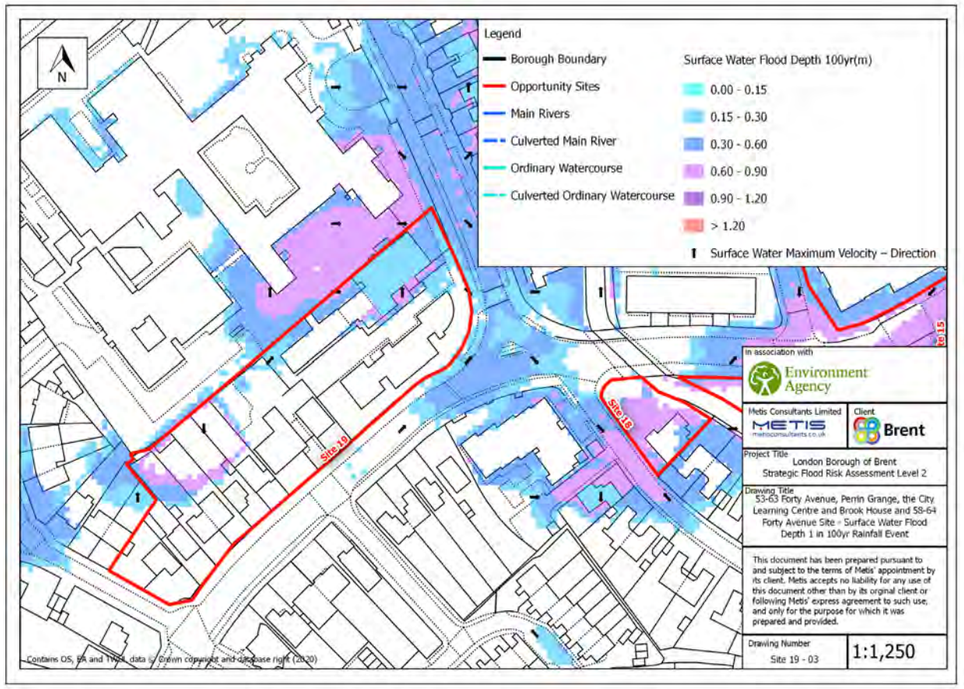


Figure 4 - RoFSW Flood Hazard Map

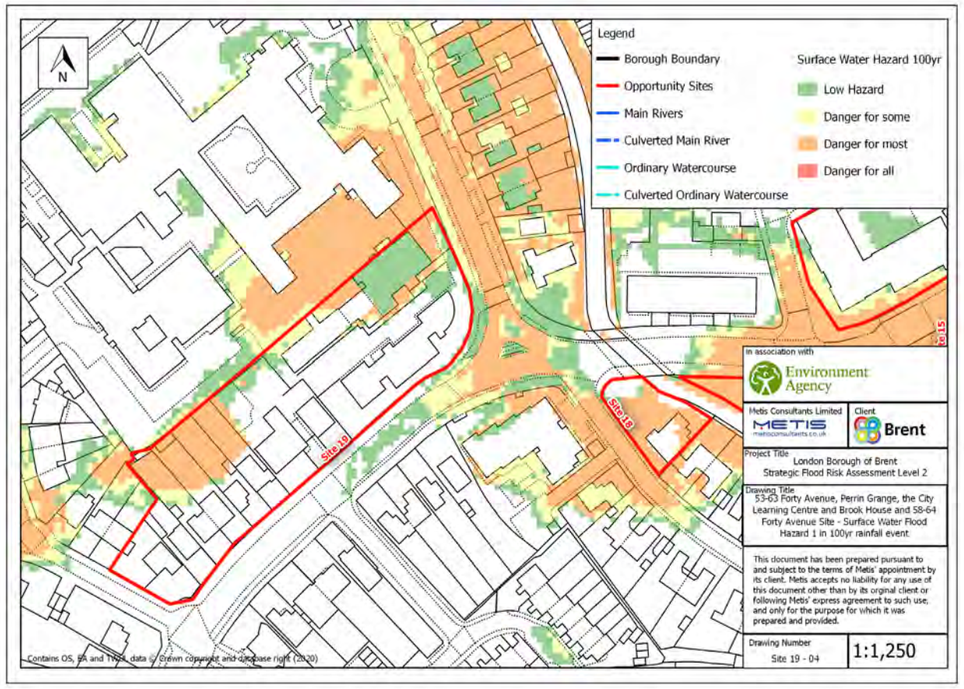


Figure 5 - Thames Water Sewer Flood Map

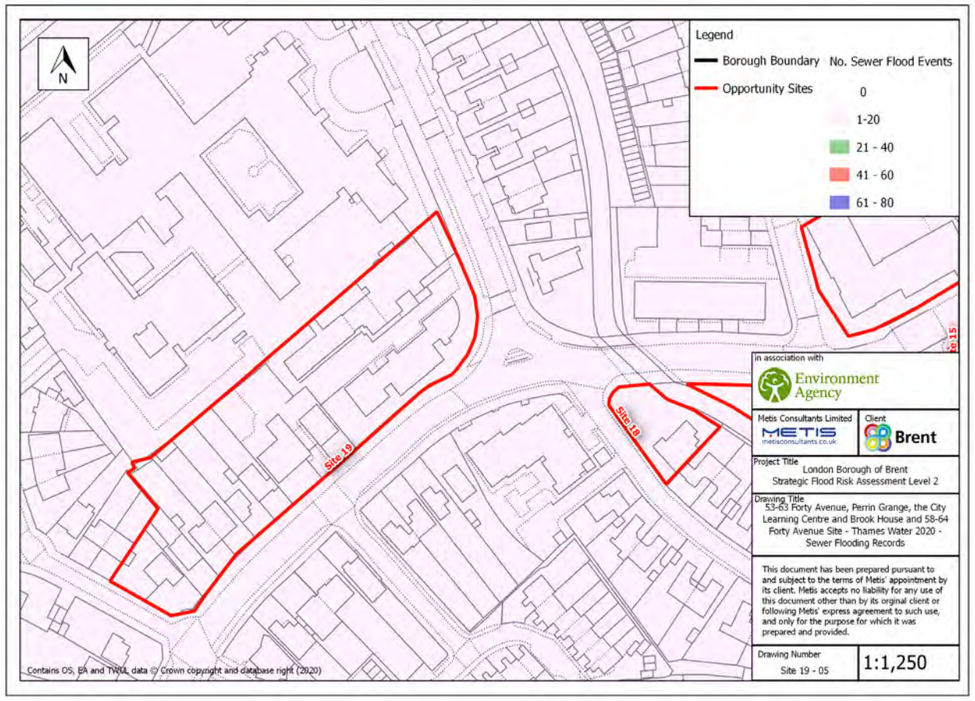


Figure 6 - Areas Susceptible to Groundwater Flooding Map

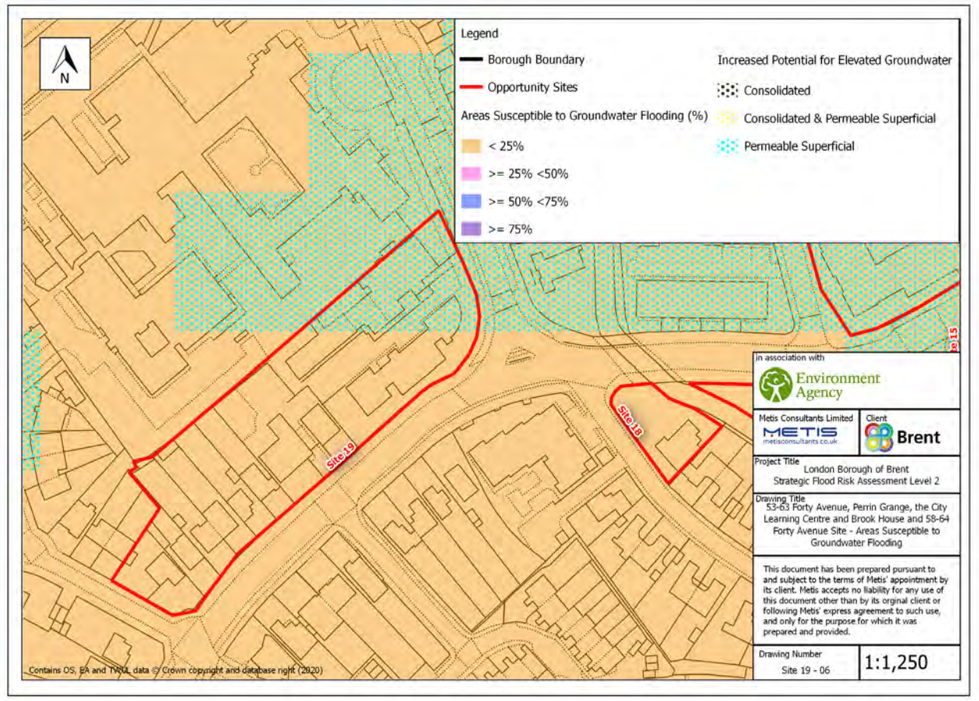
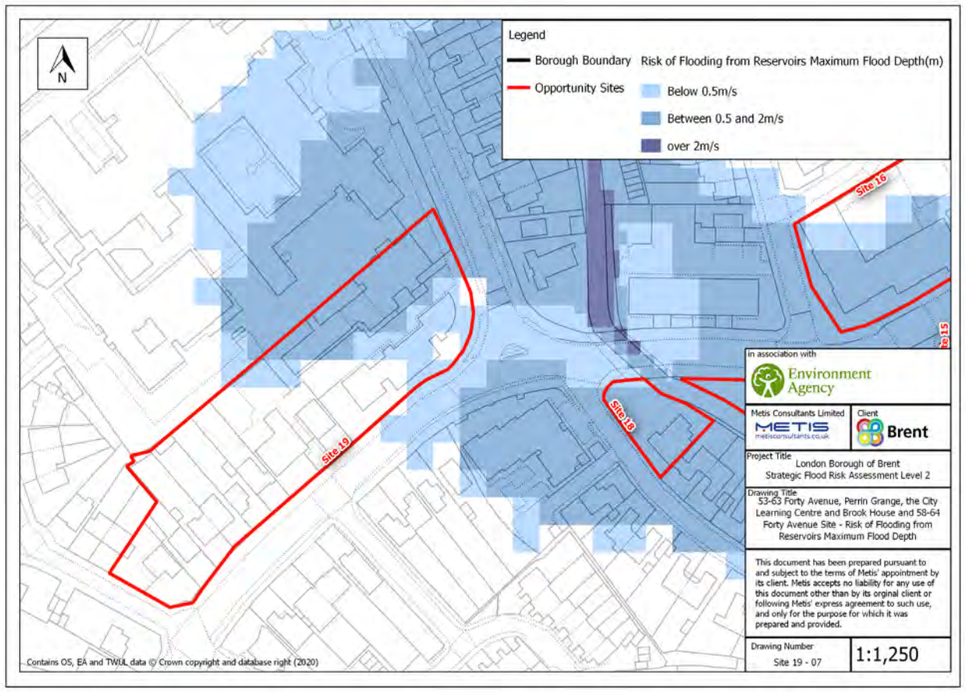


Figure 7 - Outline Reservoir Flood Map



Appendix B - Site Assessments

Assessment of sites triggered by Surface Water Risk

SITE ASSESSMENT - Neasden Stations Growth Area - BEGA1

Address: Neasden Lane NW10 1PH

Area: 11.78 **Ha**

Site Reference: 20

Current Use	Proposed Use
Residential, industrial, transport infrastructure, social infrastructure	Residential, industrial, transport infrastructure, social infrastructure (100yr design life)

Current Vulnerability Classification	Proposed Vulnerability Classification
Less Vulnerable / More Vulnerable / Essential Infrastructure (transport infrastructure)	Less Vulnerable / More Vulnerable / Essential Infrastructure (transport infrastructure)

Current Risk Summary					
Fluvial / Tidal			**Groundwater**		
FZ2	0	% of Site	<25	No data	% of Site
FZ3a	0	% of Site	25-50	No data	% of Site
FZ3b	0	% of Site	50-75	No data	% of Site
Surface Water			>75	No data	% of Site
30yr	6	% of Site	**Artificial**		
100yr	17	% of Site	Reservoir	Yes	At risk?
1000yr	32	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents	0				

Flood Defences

N/A - The site is not protected by any fluvial or tidal flood defences.

FLUVIAL / TIDAL

Risk Assessment (Defended)				
Parameter	**FZ3b**	**FZ3a**	***FZ3a+CC**	**Units**
Speed of inundation	N/A	N/A	N/A	Hrs
Min. Depth	N/A	N/A	N/A	m
Max. Depth	N/A	N/A	N/A	m
Max. Velocity	N/A	N/A	N/A	m/s
Max Flood Level	N/A	N/A	N/A	m AOD
Max Ground Level	N/A	N/A	N/A	m AOD
Min Ground Level	N/A	N/A	N/A	m AOD
Flood Hazard	N/A	N/A	N/A	N/A
Duration of Flood	N/A	N/A	N/A	Hrs

*The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)			
Parameter	**FZ3a**	***FZ3a+CC**	**Units**
Speed of inundation	N/A	N/A	Hrs
Min. Depth	N/A	N/A	m
Max. Depth	N/A	N/A	m
Max. Velocity	N/A	N/A	m/s
Max. Hazard	N/A	N/A	N/A
Duration of Flood	N/A	N/A	Hrs

Description of flood mechanism

N/A - No fluvial / tidal risk is predicted at this site.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

N/A - No fluvial / tidal risk is predicted at this site.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

N/A - No fluvial / tidal risk is predicted at this site.

SURFACE WATER

Risk Assessment				
Parameter	30yr	100yr	*1000yr	Units
Min. Depth	0	0	0	m
Max. Depth	0.3-0.6	0.9-1.2	>1.2	m
Max. Velocity	0.5-1.0	1.0-2.0	>2.0	m/s
Max. Hazard	1.25-2.0	1.25-2.0	>2.0	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

- Surface water flows down from the B453, Denzil Road and Southview Avenue towards the railway tracks.
- CC will increase the predicted extent, depth velocity and hazard of flooding.

Site Access / Egress

- There is no safe access route for the three site areas located between railroad tracks and the B453. Development on these sites must provide safe refuge via raised floor levels above predicted flood depths.
- Egress routes for the other site areas could be directed towards Dudden Hill Ln (large site) or towards the A406 and B453 (smaller two sites).

Figure 3 - RoFSW Flood Depth Map

Mitigation - Flood Risk Requirements

- See SFRA - Level 2 Report Sections 4.2.1, 4.2.2 and 4.2.3.
- More vulnerable development should be not located at sites that are between the railroad tracks. See Safety of Development Box for further details.
- Minimise flood storage lost by limiting development outside of the railway developments.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Surface Water Drainage

- A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS.
- The site is underlain by London Clay - ground investigations would be required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - Neasden Stations Growth Area - BEGA1

SEWER

Risk Assessment

- The area is served by a separate surface water and foul water sewer network.
- There have been no reported sewer flooding incidents within the site's post code district.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

No mitigation measures are required.

GROUNDWATER

Risk Assessment

- The site is not susceptible to groundwater flooding.
- There is no increased potential for elevated groundwater based upon the sites underlying geology (Thames Group / London Clay).
- The site overlays an unproductive, minor aquifer (Secondary A).

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

No mitigation measures required.

ARTIFICIAL

Risk Assessment

- There is risk of flooding from the Brent (Welsh Harp) Reservoir.
- The two most western site areas are predicted to flood between 0.3-2m depth. The rest of the sites are not at risk of reservoir flooding.
- Reservoir failure flood speeds would be below 0.5 m/s for the majority of the site, however a small portion of the sites could experience speeds of 0.5-2 m/s

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

Local Authority Emergency Planning Officers must be consulted to create a reservoir failure emergency and evacuation plan for any development located within the two western-most sites.

PLANNING CONSIDERATIONS

Safety of Development

Can the development future be proofed for climate change considerations?

- Yes - See SFRA - Level 2 Report Sections 4.2.1 and 4.2.2 for the required finished floor level and flood resistant / resilient building requirements.
- See SFRA - Level 2 Report Section 4.2.3 for requirements regarding compensatory flood storage.
- Many locations are not predicted to flood with climate change included, these sites must be prioritised for development.
- The sites located between the railroad tracks and the B453 predict flood depths of over 1.2m with climate change. Development should be limited to essential infrastructure / less vulnerable / water compatible uses in this area. If a more vulnerable use development must occur in the east of the site, any floors below the predicted flood depths of the 1 in 1000yr surface water event cannot be a more vulnerable use category. Less vulnerable use categories on these floors may be appropriate, however, the development must consider safe refuge and / or access / egress as a key element, taking into account speed of flooding inundation and create an evacuation plan for the development. Additional surface water modelling may be appropriate to include railroad culverts not represented in the RoFSW modelling. The detailed modelling may provide better insight as to whether these sites can be developed for other uses.

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

- Yes - The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation.

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

- The development land use is not changing, however developers should not develop the land between the railroads tracks with highly or more vulnerable uses, unless site specific detailed modelling is completed and the surface water flood risk is shown to be reduced.
- The development would have to mitigate any increase in impermeable area to the site and / or utilise the green space as flood storage.

How can the development reduce risk overall?

- The size and age of the site means that is it unlikely that runoff is controlled off-site in all locations. New development can provide greater management of runoff off-site and reduce flood risk overall.
- Basements are not permitted to be built in the sites between the railroad tracks and B453. Basements developments may be appropriate at other locations, except for self-contained basement dwellings, but a site-specific Flood Risk Assessment must be completed and the basement must not have any adverse impacts on flooding locally during a 1 in 100yr surface water event. Basement dwellings within the 1 in 100yr surface water flood extent may only be permitted if an exceptions test is passed. Basements must contain an egress route to a higher floor above the predicted 1 in 1000yr surface water flood depth. Basements should be made flood resilient.
- An emergency plan must be created in the event of a reservoir failure.

Will development require a flood risk permit/watercourse consent?

- The site will not require a flood risk permit / watercourse consent as there are no ordinary or main rivers near the site.

Exception Test

The site can be made safe for development throughout its lifetime without increasing flood risk elsewhere (See Safety of Development box). It could also reduce flood risk overall with appropriate surface water drainage and flood storage compensation measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
No mitigation measures required.	
Surface Water	
• Development of more vulnerable uses is not permitted at sites between the railway tracks. • Finished floor levels must be above max depths of the 1 in 1000yr event with 0.3m freeboard.	• Flood compensation must be provided if necessary. Flood resistant and resilient buildings required in some locations. • See Mitigation - Surface Water Drainage.
Sewer	
No mitigation measures required.	
Groundwater	
No mitigation measures required.	
Artificial	
Emergency planning officers must be consulted to create a reservoir failure emergency and evacuation plan.	

Figure 1 - Fluvial Flood Depth Map

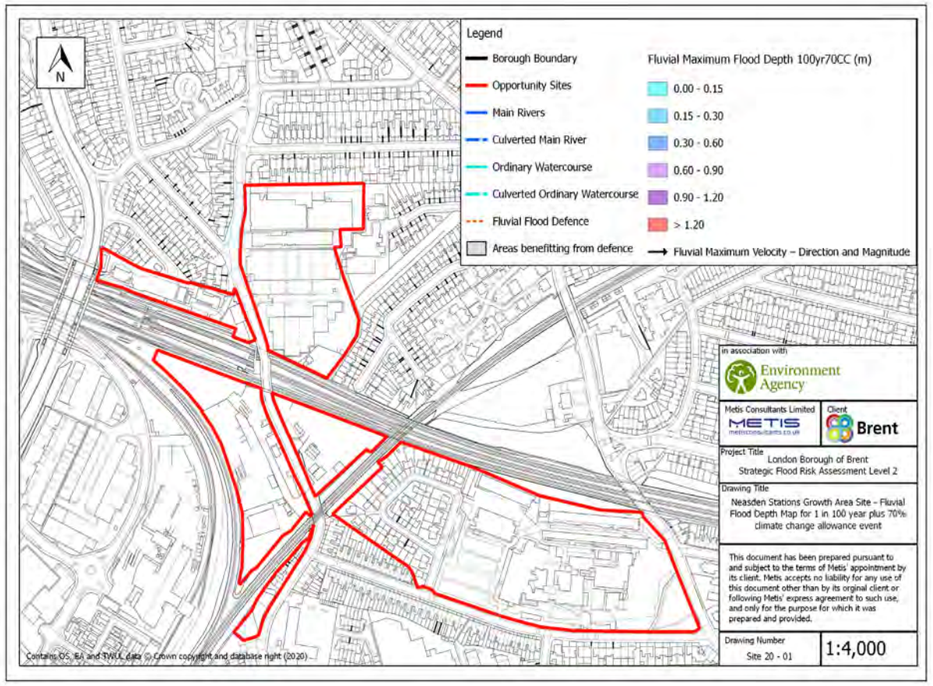


Figure 2 - Fluvial Flood Hazard Map

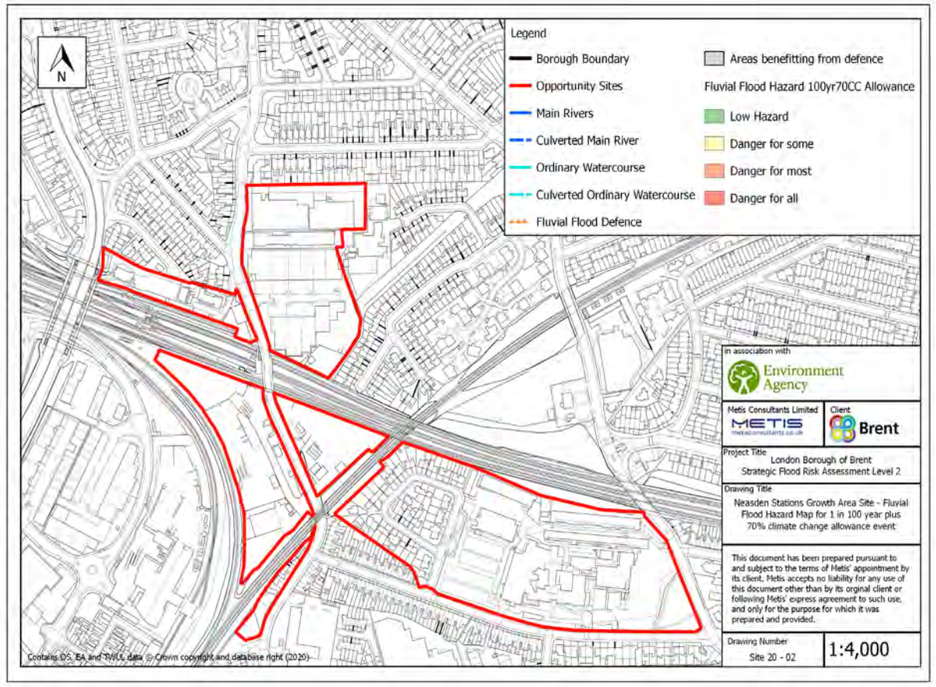


Figure 3 - RoFSW Flood Depth Map

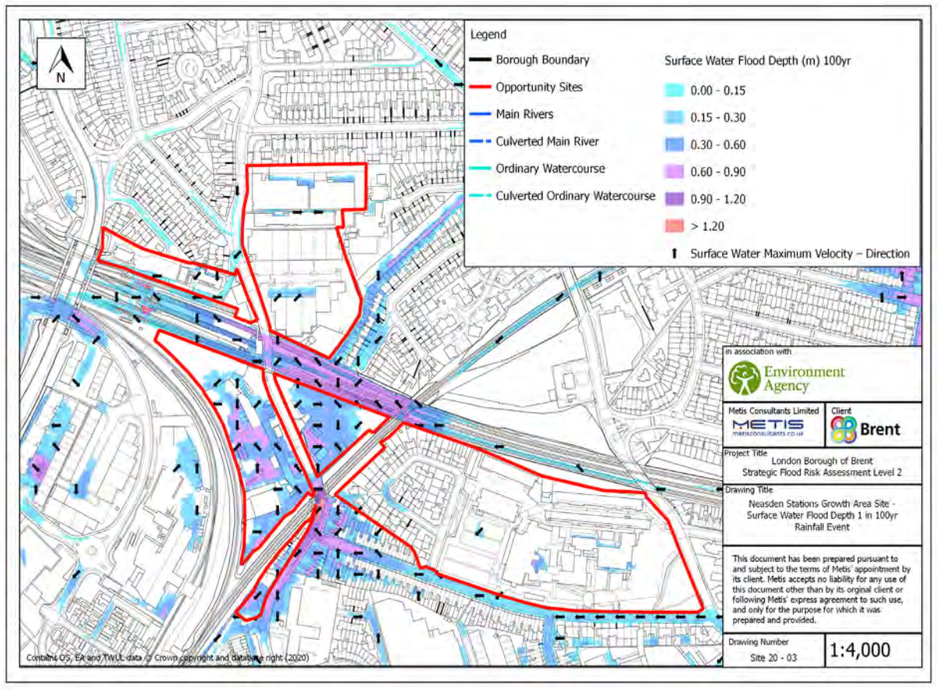


Figure 4 - RoFSW Flood Hazard Map

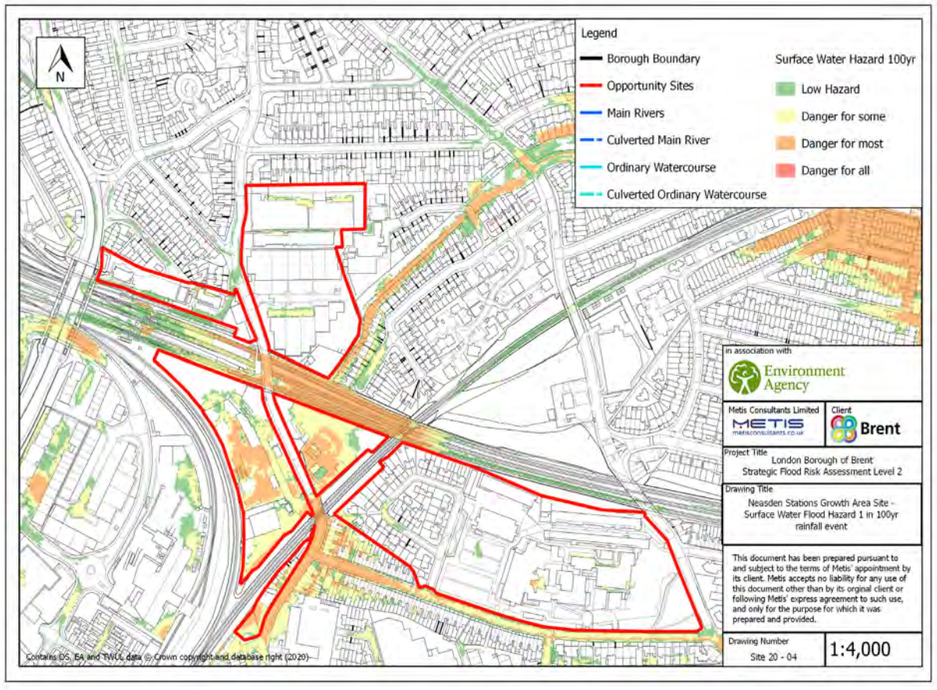


Figure 5 - Thames Water Sewer Flood Map

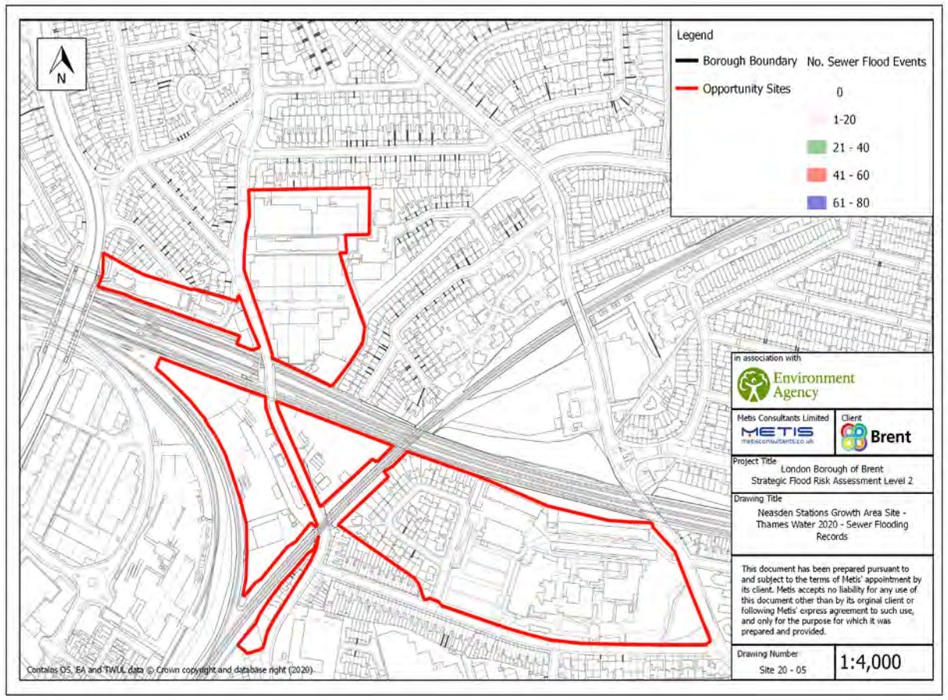


Figure 6 - Areas Susceptible to Groundwater Flooding Map

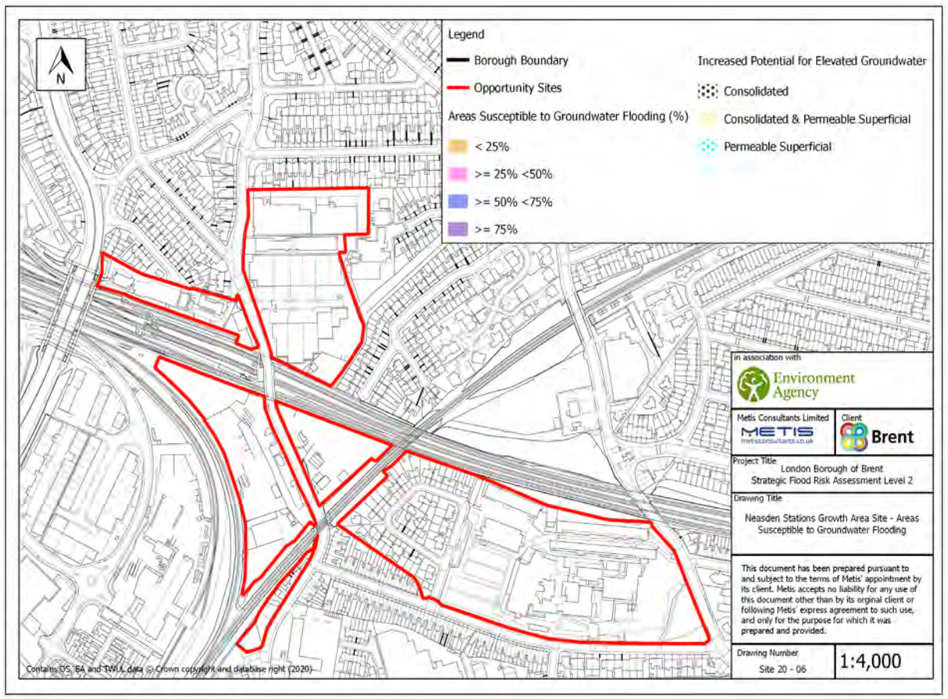
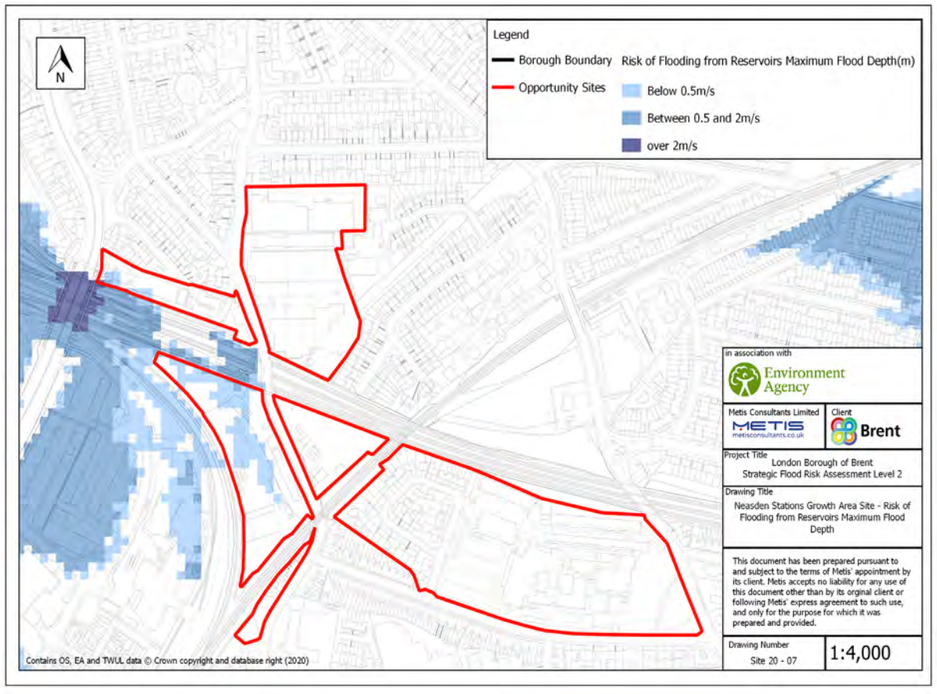


Figure 7 - Outline Reservoir Flood Map



SITE ASSESSMENT - Turpin's Yard - BSESA31

Address: Oakland Road, NW2 6LL

Area: 0.38 **Ha**

Site Reference: 21

Current Use	Proposed Use
Industrial estate	Residential and industrial (100yr design life)

Current Vulnerability Classification	Proposed Vulnerability Classification
Less Vulnerable	More Vulnerable / Less Vulnerable

Current Risk Summary					
Fluvial / Tidal			**Groundwater**		
FZ2	0	% of Site	<25	0	% of Site
FZ3a	0	% of Site	25-50	0	% of Site
FZ3b	0	% of Site	50-75	0	% of Site
Surface Water			>75	0	% of Site
30yr	10	% of Site	**Artificial**		
100yr	25	% of Site	Reservoir	No	At risk?
1000yr	56	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents	1-20				

Flood Defences

N/A - The site is not protected by any fluvial or tidal flood defences.

FLUVIAL / TIDAL

Risk Assessment (Defended)				
Parameter	**FZ3b**	**FZ3a**	***FZ3a+CC**	**Units**
Speed of inundation	N/A	N/A	N/A	Hrs
Min. Depth	N/A	N/A	N/A	m
Max. Depth	N/A	N/A	N/A	m
Max. Velocity	N/A	N/A	N/A	m/s
Max Flood Level	N/A	N/A	N/A	m AOD
Max Ground Level	N/A	N/A	N/A	m AOD
Min Ground Level	N/A	N/A	N/A	m AOD
Flood Hazard	N/A	N/A	N/A	N/A
Duration of Flood	N/A	N/A	N/A	Hrs

*The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)			
Parameter	**FZ3a**	***FZ3a+CC**	**Units**
Speed of inundation	N/A	N/A	Hrs
Min. Depth	N/A	N/A	m
Max. Depth	N/A	N/A	m
Max. Velocity	N/A	N/A	m/s
Max. Hazard	N/A	N/A	N/A
Duration of Flood	N/A	N/A	Hrs

Description of flood mechanism

N/A - No fluvial / tidal risk is predicted at this site.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

N/A - No fluvial / tidal risk is predicted at this site.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

N/A - No fluvial / tidal risk is predicted at this site.

SURFACE WATER

Risk Assessment				
Parameter	30yr	100yr	*1000yr	Units
Min. Depth	0	0	0	m
Max. Depth	0.3-0.6	0.3-0.6	0.6-0.9	m
Max. Velocity	0.5-1.0	1.0-2.0	> 2.0	m/s
Max. Hazard	1.25-2.0	1.25-2.0	1.25-2.0	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

- Surface water enters the site via Oaklands Road and back gardens south of the site.
- CC will increase the extent of flooding, depth and velocity, but will not increase the maximum hazard of the flooding.

Site Access / Egress

- The flooding occurs to the west of the site and on Oaklands Road, making these exits potentially hazardous.
- A safe access route would need to be directed to the southeast corner of the site, where the risk is lowest.

Figure 3 - RoFSW Flood Depth Map

Mitigation - Flood Risk Requirements

- See SFRA - Level 2 Report Sections 4.2.1, 4.2.2 and 4.2.3.
- Development should be prioritised on the eastern side of the site, due to the lower flood depths predicted.
- Minimise flood storage lost by limiting development in the centre of the site.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Surface Water Drainage

- A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS.
- The site is underlain by London Clay - ground investigations are required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - Turpin's Yard - BSESA31

SEWER

Risk Assessment

- The area is served by a separate surface water and foul water sewer network.
- There have been 1-20 reported sewer flood incidents within the site's post code district.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

- Thames Water must be consulted to confirm if the site has historically flooded.
- If the site has historically flooded, the development must reduce the runoff to sewer to greenfield rates or as close as possible to greenfield rates.

GROUNDWATER

Risk Assessment

- The site is not susceptible to groundwater flooding.
- There is no increased potential for elevated groundwater based upon the sites underlying geology (Thames Group / London Clay).
- The site overlays an unproductive, minor aquifer (Secondary A).

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

No mitigation measures required.

ARTIFICIAL

Risk Assessment

There is no risk from artificial flooding.

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

No mitigation measures required.

PLANNING CONSIDERATIONS

Safety of Development

Can the development future be proofed for climate change considerations?

- Yes. See SFRA - Level 2 Report Sections 4.2.1 and 4.2.2 for the required finished floor level and flood resistant / resilient building requirements.
- See SFRA - Level 2 Report Section 4.2.3 for requirements regarding compensatory flood storage.

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

- Yes - The development must use proper surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation.

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

- The development land may change from a less vulnerable use classification to a more vulnerable use classification. Development of more vulnerable use classifications should be avoided on the western side of the site, if possible.

How can the development reduce risk overall?

- New development can provide greater management of runoff off-site and reduce flood risk overall through the introduction of SuDS (See Mitigation - Surface Water Drainage). These could include rainwater harvesting, above ground SuDS or below ground attenuation features.
- There is currently no green space located on the development. Further development should consider the introduction of green space to reduce the surface water flood risk on and off-site.
- Basements developments, except for self-contained basement dwellings, may be appropriate onsite, but a site-specific Flood Risk Assessment must be completed and the basement must not have any adverse impacts on flooding locally during a 1 in 100yr surface water event. Basement dwellings within the 1 in 100yr surface water flood extent may only be permitted if an exceptions test is passed. Basements must contain an egress route to a higher floor above the predicted 1 in 1000yr surface water flood depth. Basements should be made flood resilient.

Will development require a flood risk permit/watercourse consent?

- The site will not require a flood risk permit / watercourse consent as there are no ordinary or main rivers near the site.

Exception Test

The site can be made safe for development throughout its lifetime without increasing flood risk elsewhere (See Safety of Development box). It could also reduce flood risk overall with appropriate surface water drainage and flood storage compensation measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
No mitigation measures required.	
Surface Water	
• Floor levels must be 0.3m above the predicted 1 in 1000yr event flood depth at any point onsite • Flood plain compensation must be provided for up to and including a 1 in 1000yr event.	• Flood resistant / resilient buildings required. • An FRA is required for basement developments. • See Mitigation - Surface Water Drainage box.
Sewer	
Thames Water must be consulted to confirm if the site has historically flooded.	If the site has historically flooded, the development must reduce the runoff to sewer to greenfield rates.
Groundwater	
No mitigation measures required.	
Artificial	
No mitigation measures required.	

Figure 1 - Fluvial Flood Depth Map

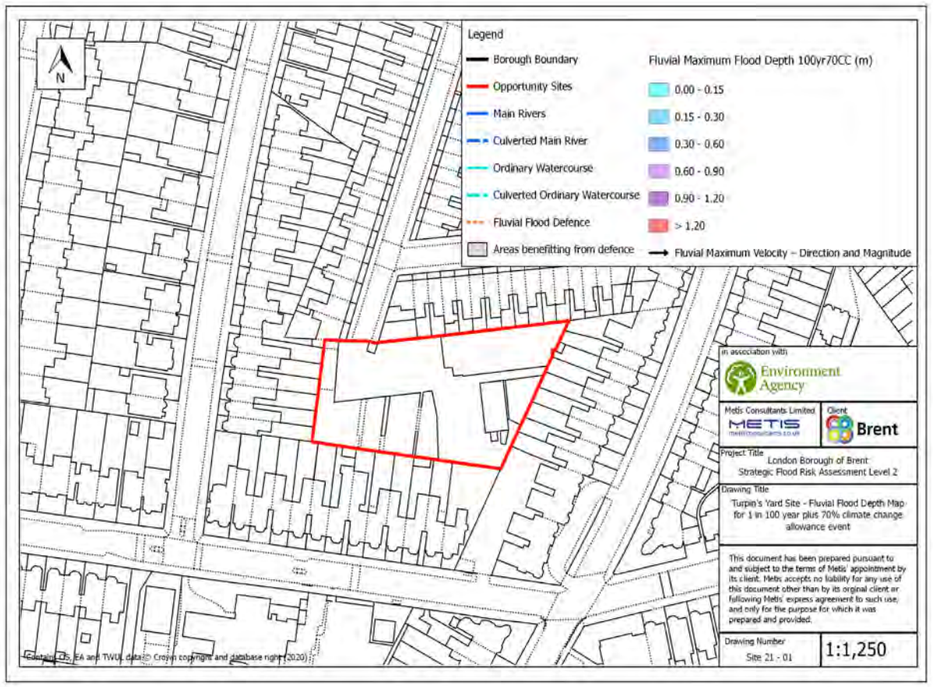


Figure 2 - Fluvial Flood Hazard Map

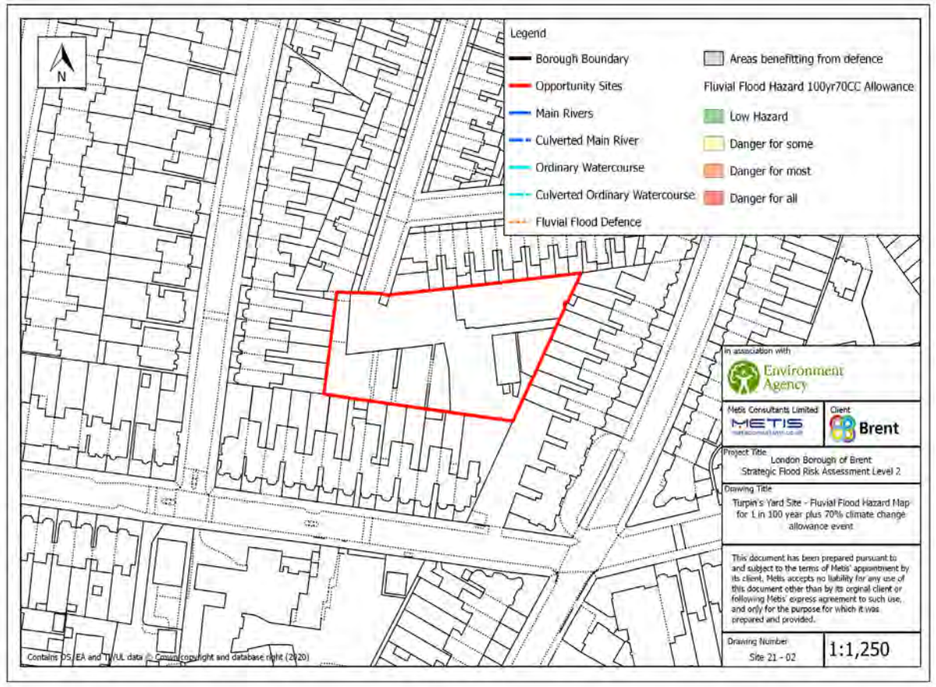


Figure 3 - RoFSW Flood Depth Map

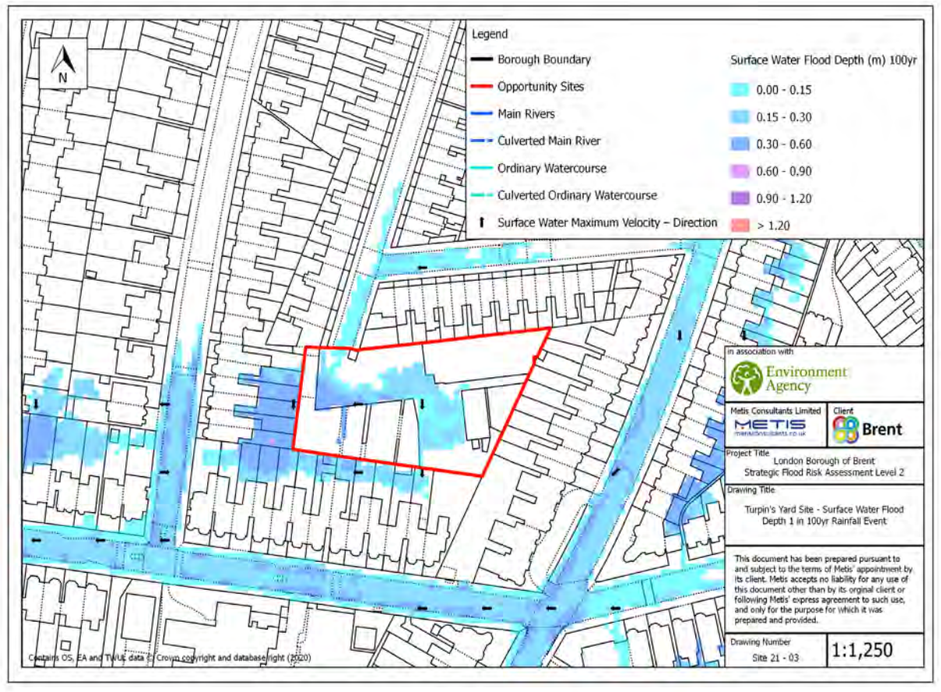


Figure 4 - RoFSW Flood Hazard Map

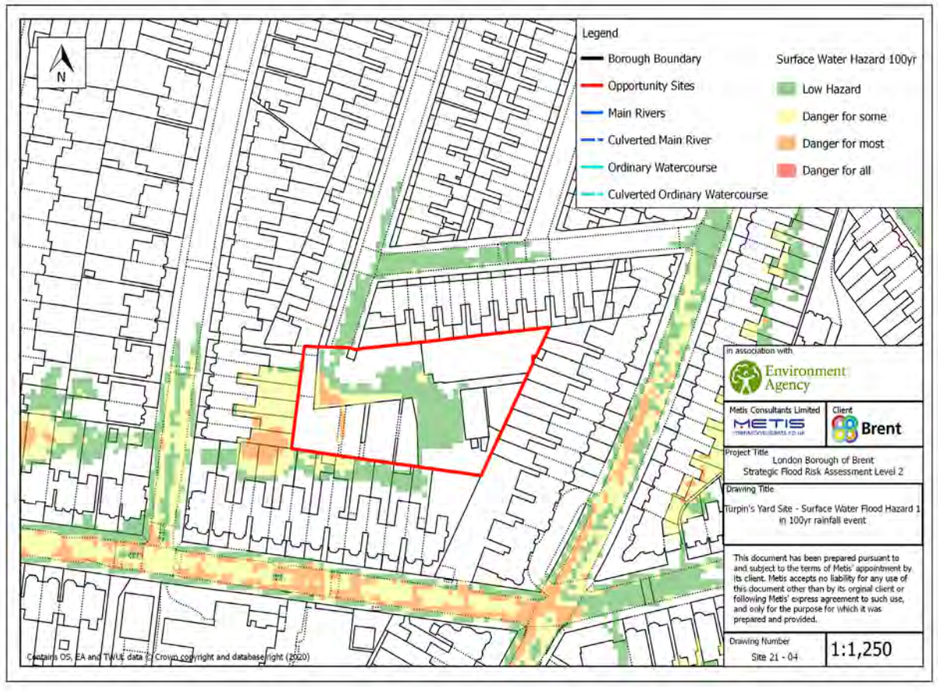


Figure 5 - Thames Water Sewer Flood Map

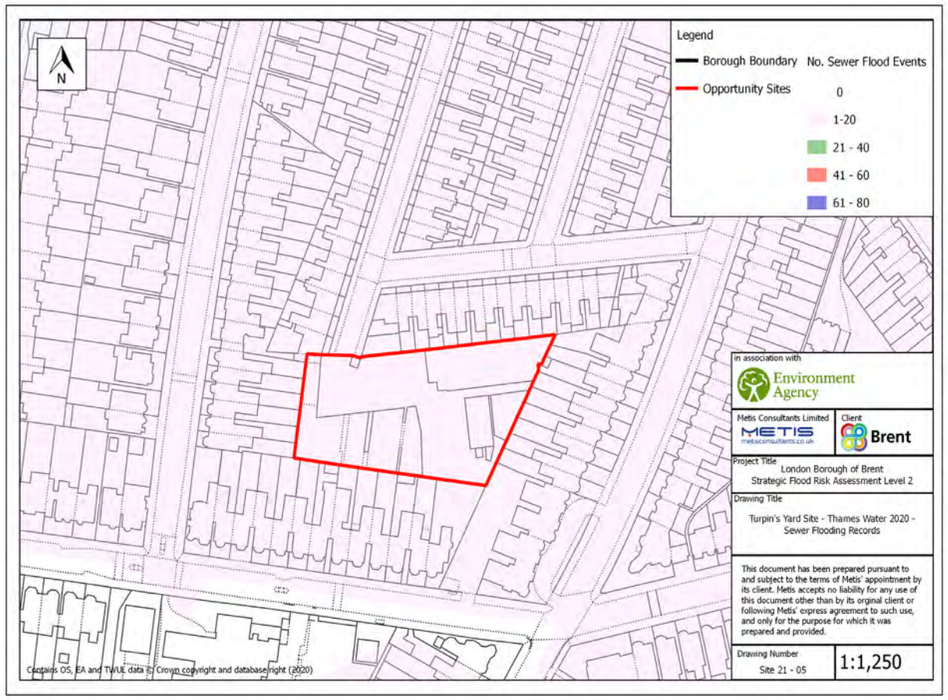


Figure 6 - Areas Susceptible to Groundwater Flooding Map

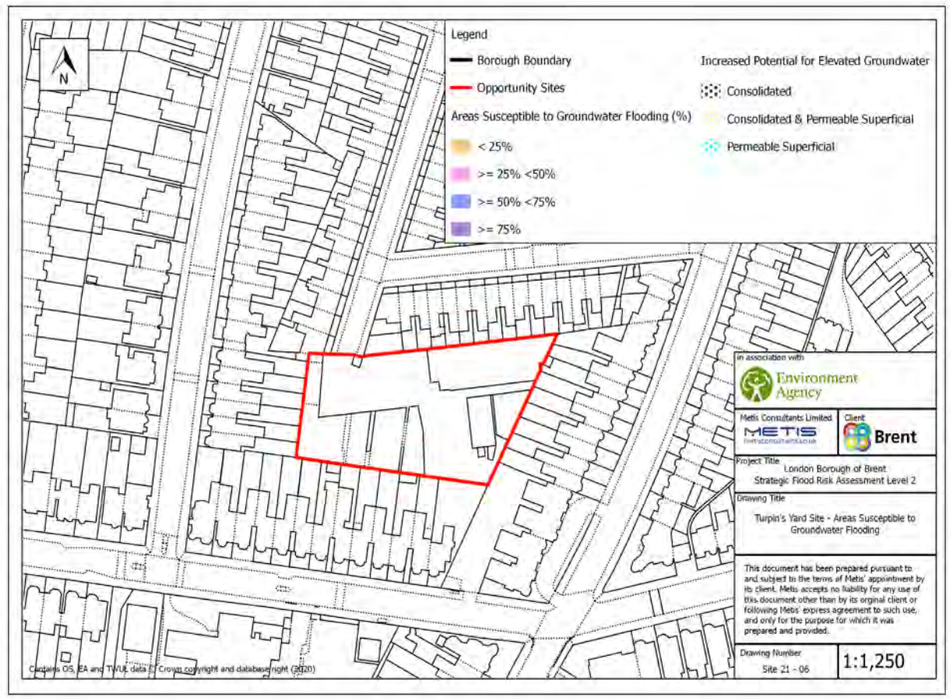
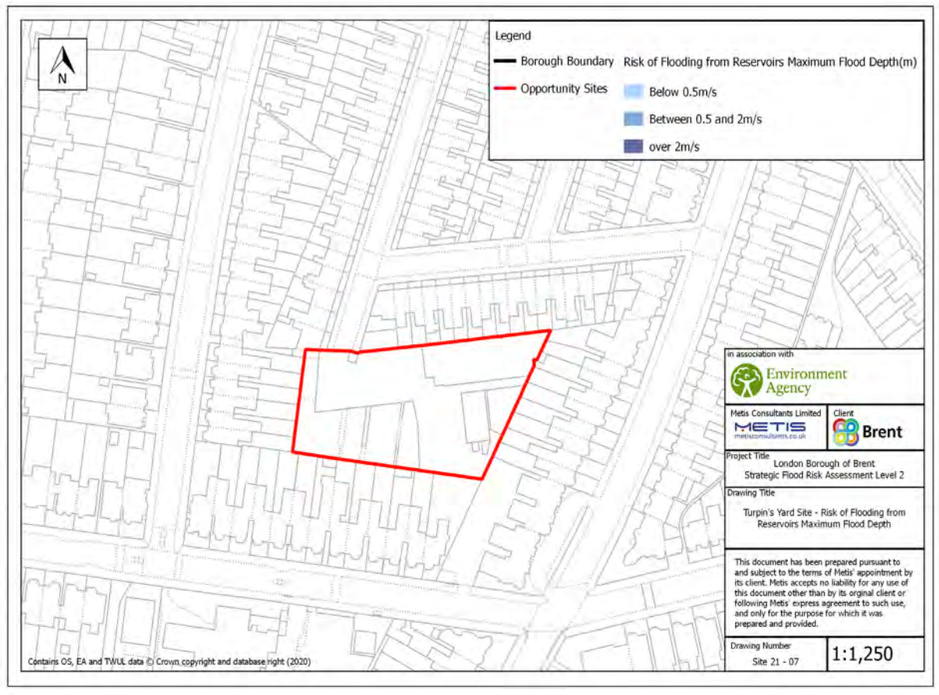


Figure 7 - Outline Reservoir Flood Map



SITE ASSESSMENT - Site NW04 Wembley Masterplan - BSCA16

Address:	Engineers Way, NW10 0DA

Area:	0.35 **Ha**
Site Reference:	22

Current Use	Proposed Use
The site was formerly a car park. It is currently classified as public realm.	Residential and commercial (100yr design life)

Current Vulnerability Classification	Proposed Vulnerability Classification
Less Vulnerable	More Vulnerable / Less Vulnerable

Current Risk Summary					
Fluvial / Tidal			**Groundwater**		
FZ2	0	% of Site	<25	100	% of Site
FZ3a	0	% of Site	25-50	0	% of Site
FZ3b	0	% of Site	50-75	0	% of Site
Surface Water			>75	0	% of Site
30yr	2	% of Site	**Artificial**		
100yr	23	% of Site	Reservoir	No	At risk?
1000yr	82	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents		0			

Flood Defences

N/A - The site is not protected by any fluvial or tidal flood defences.

FLUVIAL / TIDAL

Risk Assessment (Defended)				
Parameter	**FZ3b**	**FZ3a**	***FZ3a+CC**	**Units**
Speed of inundation	N/A	N/A	N/A	Hrs
Min. Depth	N/A	N/A	N/A	m
Max. Depth	N/A	N/A	N/A	m
Max. Velocity	N/A	N/A	N/A	m/s
Max Flood Level	N/A	N/A	N/A	m AOD
Max Ground Level	N/A	N/A	N/A	m AOD
Min Ground Level	N/A	N/A	N/A	m AOD
Flood Hazard	N/A	N/A	N/A	N/A
Duration of Flood	N/A	N/A	N/A	Hrs

*The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)			
Parameter	**FZ3a**	***FZ3a+CC**	**Units**
Speed of inundation	N/A	N/A	Hrs
Min. Depth	N/A	N/A	m
Max. Depth	N/A	N/A	m
Max. Velocity	N/A	N/A	m/s
Max. Hazard	N/A	N/A	N/A
Duration of Flood	N/A	N/A	Hrs

Description of flood mechanism

N/A - No fluvial / tidal risk is predicted at this site.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

N/A - No fluvial / tidal risk is predicted at this site.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

N/A - No fluvial / tidal risk is predicted at this site.

SURFACE WATER

Risk Assessment				
Parameter	30yr	100yr	*1000yr	Units
Min. Depth	0	0	0	m
Max. Depth	0.15-0.3	0.15-0.3	0.3-0.6	m
Max. Velocity	0.5-1.0	1.0-2.0	1.0-2.0	m/s
Max. Hazard	0.5-0.75	0.5-0.75	1.25-2.0	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

- Water enters the site from the south from Engineers Way.
- Climate change will increase the predicted flood depths and extent throughout the site, covering almost the entire site area.

Site Access / Egress

There is a safe access route out of the site in the northwest of the site onto Exhibition Way.

Figure 3 - RoFSW Flood Depth Map

Mitigation - Flood Risk Requirements

- See SFRA - Level 2 Report Sections 4.2.1, 4.2.2 and 4.2.3.
- Ground levels should be limited to less vulnerable uses.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Surface Water Drainage

- A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS.
- The site is underlain by London Clay - ground investigations are required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - Site NW04 Wembley Masterplan - BSCA16

SEWER

Risk Assessment

• The area is served by a separate surface water and foul water sewer network.
• There have been no reported sewer flood incidents within the site's post code district.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

No mitigation measures required.

GROUNDWATER

Risk Assessment

• The site is susceptible to groundwater flooding at a risk of < 25%.
• There is no increased potential for elevated groundwater based upon the sites underlying geology (Thames Group / London Clay).
• The site overlays an unproductive, minor aquifer (Secondary A).

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

No mitigation measures required.

ARTIFICIAL

Risk Assessment

There is no risk of artificial flooding at this site.

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

No mitigation measures required.

PLANNING CONSIDERATIONS

Safety of Development

Can the development future be proofed for climate change considerations?
• Yes - See SFRA - Level 2 Report Sections 4.2.1 and 4.2.2 for the required finished floor level and flood resistant / resilient building requirements.
• See SFRA - Level 2 Report Section 4.2.3 for requirements regarding compensatory flood storage.

Can the development be designed safe throughout its lifetime without increasing flood risk elsewhere?
• Yes - The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation.
• Basements must be limited to less vulnerable / water compatible uses and contain an egress route to a higher floor above the predicted 1000yr flood depth.

What is the cumulative impact of the development land use change and will flood risk increase?
• Formerly a car park, the site is currently in use as public realm. The ground coverage on the site is currently porous pavement. It is subject to controlled off-site surface water flows as part of the wider Wembley masterplan drainage strategy.
• The development land use change will not increase flood risk if managed with the drainage hierarchy and the inclusion of SuDS. As off-site surface water flows are currently being managed, the site development must not to increase these flows.

How can the development reduce risk overall?
• The site is currently permitted to discharge runoff off-site. New development can provide improved management of runoff through the introduction of SuDS (See Mitigation - Surface Water Drainage). These could include rainwater harvesting, above ground SuDS or below ground attenuation features.
• The development can require that the ground floor are designated for commercial or retail use, which is classified as a less vulnerable use.
• Basements developments, except for self-contained basement dwellings, may be appropriate onsite, but a site-specific Flood Risk Assessment must be completed and the basement must not have any adverse impacts on flooding locally during a 1 in 100yr surface water event. Basement dwellings within the 1 in 100yr surface water flood extent may only be permitted if an exceptions test is passed. Basements must contain an egress route to a higher floor above the predicted 1 in 1000yr surface water flood depth. Basements should be made flood resilient.
• The development must implement SuDS to reduce the runoff to sewer to greenfield rates.

Will development require a flood risk permit/watercourse consent?
• The site will not require a flood risk permit / watercourse consent as there are no ordinary or main rivers near the site.

Exception Test

The site can be made safe for development throughout its lifetime without increasing flood risk elsewhere (See Safety of Development box). It could also reduce flood risk overall with appropriate surface water drainage and flood storage compensation measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
No mitigation measures required.	
Surface Water	
• Floor levels must be 0.3m above the predicted 1 in 1000yr event flood depth at any point onsite • Flood plain compensation must be provided for up to and including a 1 in 1000yr event.	• Flood resistant buildings required. • Basements and ground floors should only be used for less vulnerable / water compatible uses. • See Mitigation - Surface Water Drainage box.
Sewer	
No mitigation measures required.	
Groundwater	
No mitigation measures required.	
Artificial	
No mitigation measures required.	

Figure 1 - Fluvial Flood Depth Map

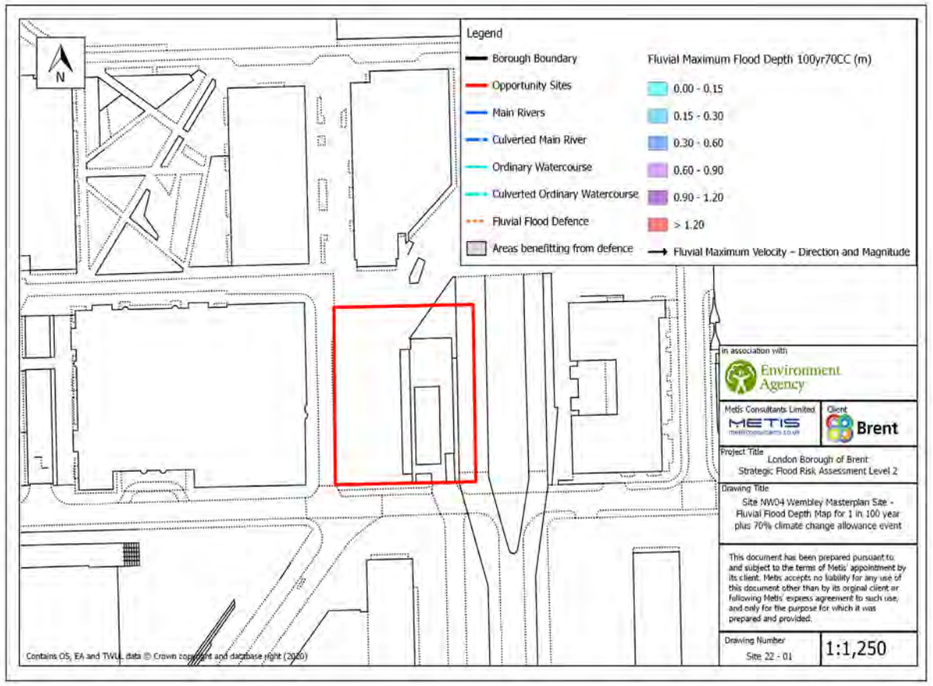


Figure 2 - Fluvial Flood Hazard Map

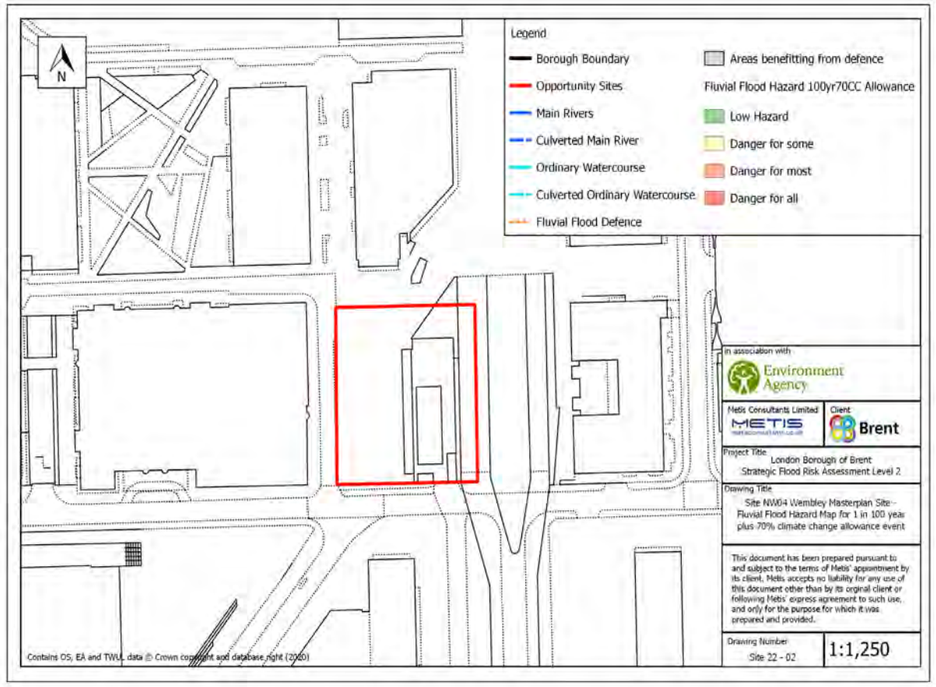


Figure 3 - RoFSW Flood Depth Map

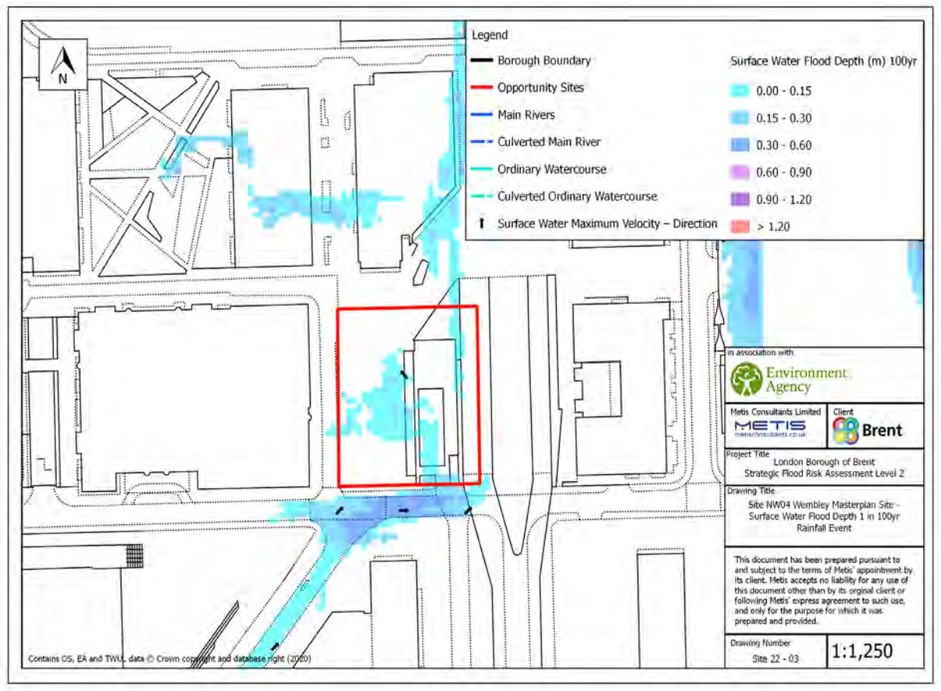


Figure 4 - RoFSW Flood Hazard Map

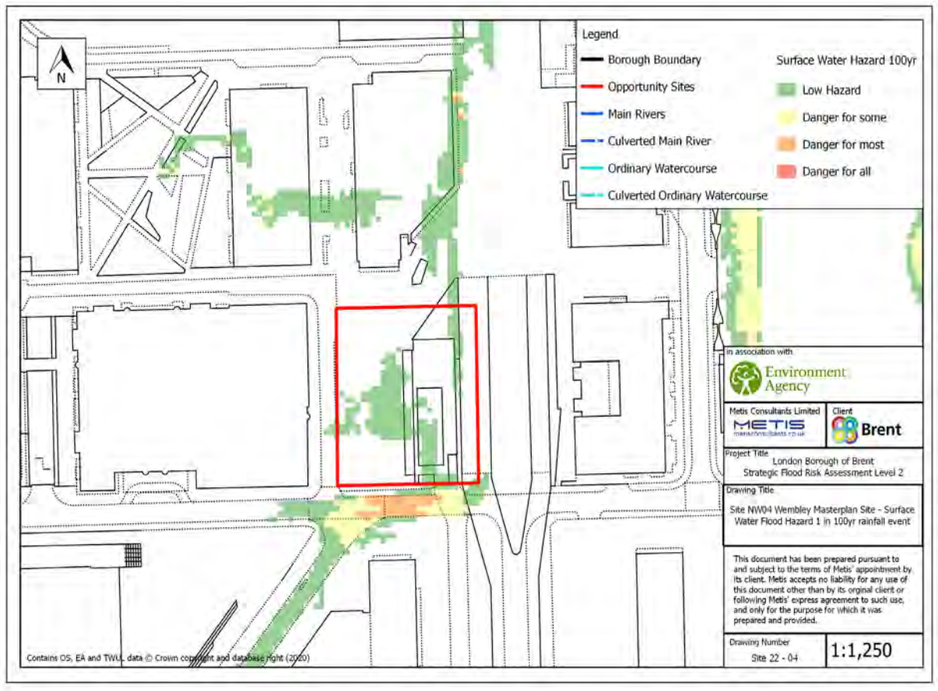


Figure 5 - Thames Water Sewer Flood Map

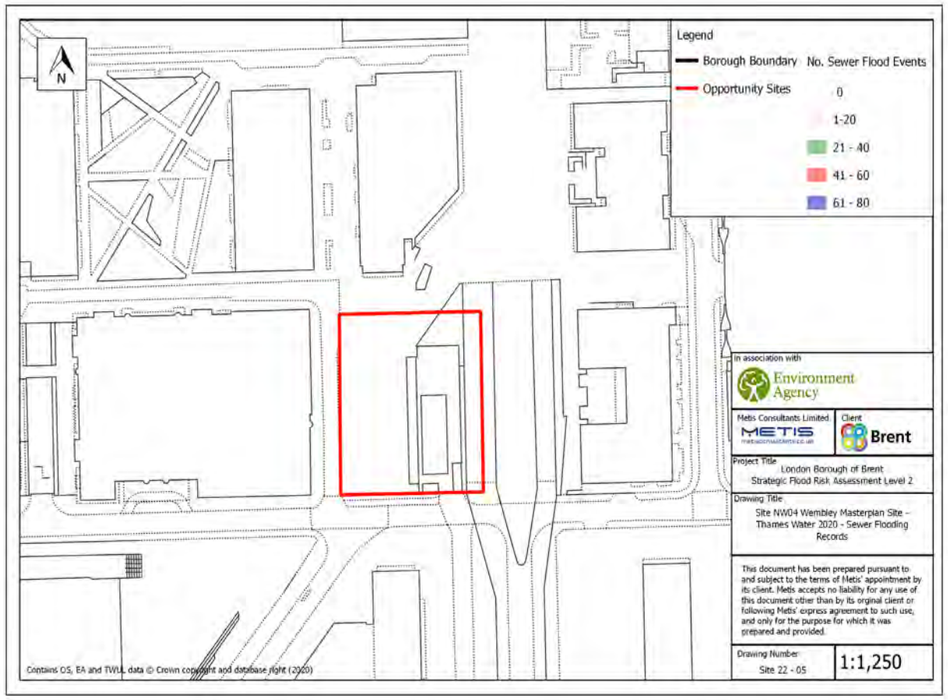


Figure 6 - Areas Susceptible to Groundwater Flooding Map

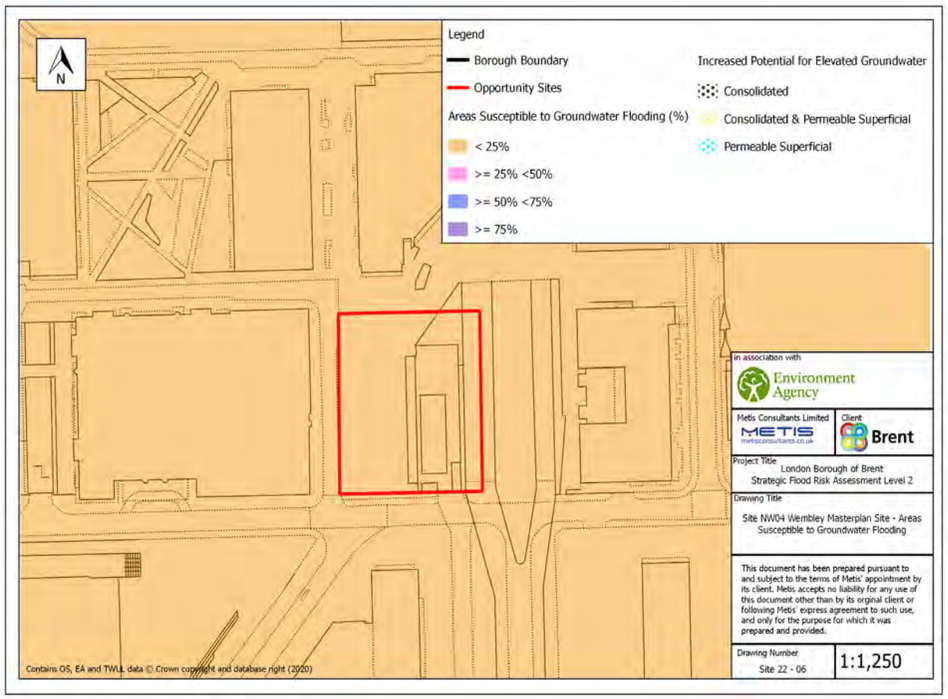
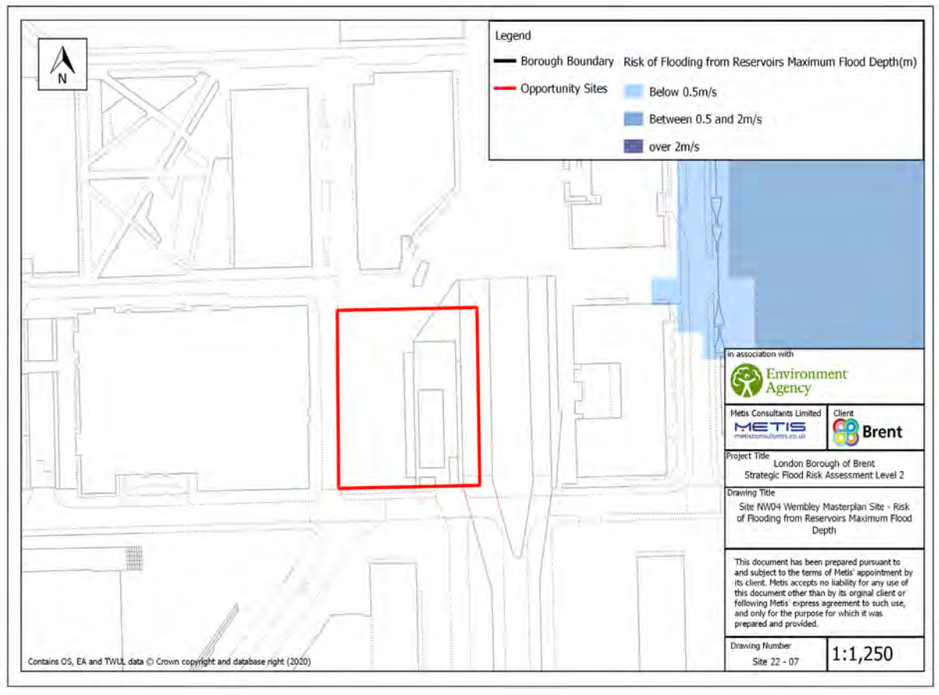


Figure 7 - Outline Reservoir Flood Map



SITE ASSESSMENT - 84-98 Wembley Park Drive - BD2

Address:	84-98 Wembley Park Drive, HA9 8HW
Area:	0.53 **Ha**
Site Reference:	23

Current Use	Proposed Use
Residential	Residential (100yr design life)

Current Vulnerability Classification	Proposed Vulnerability Classification
More Vulnerable	More Vulnerable

Current Risk Summary					
Fluvial / Tidal			**Groundwater**		
FZ2	0	% of Site	<25	100	% of Site
FZ3a	0	% of Site	25-50	0	% of Site
FZ3b	0	% of Site	50-75	0	% of Site
Surface Water			>75	0	% of Site
30yr	11	% of Site	**Artificial**		
100yr	18	% of Site	Reservoir	No	At risk?
1000yr	37	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents	1-20				

Flood Defences

N/A - The site is not protected by any fluvial or tidal flood defences.

FLUVIAL / TIDAL

Risk Assessment (Defended)				
Parameter	**FZ3b**	**FZ3a**	***FZ3a+CC**	**Units**
Speed of inundation	N/A	N/A	N/A	Hrs
Min. Depth	N/A	N/A	N/A	m
Max. Depth	N/A	N/A	N/A	m
Max. Velocity	N/A	N/A	N/A	m/s
Max Flood Level	N/A	N/A	N/A	m AOD
Max Ground Level	N/A	N/A	N/A	m AOD
Min Ground Level	N/A	N/A	N/A	m AOD
Flood Hazard	N/A	N/A	N/A	N/A
Duration of Flood	N/A	N/A	N/A	Hrs

* The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)			
Parameter	**FZ3a**	***FZ3a+CC**	**Units**
Speed of inundation	N/A	N/A	Hrs
Min. Depth	N/A	N/A	m
Max. Depth	N/A	N/A	m
Max. Velocity	N/A	N/A	m/s
Max. Hazard	N/A	N/A	N/A
Duration of Flood	N/A	N/A	Hrs

Description of flood mechanism

N/A - No fluvial / tidal risk is predicted at this site.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

N/A - No fluvial / tidal risk is predicted at this site.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

N/A - No fluvial / tidal risk is predicted at this site.

SURFACE WATER

Risk Assessment				
Parameter	**30yr**	**100yr**	***1000yr**	**Units**
Min. Depth	0	0	0	m
Max. Depth	0.3-0.6	0.3-0.6	0.6-0.9	m
Max. Velocity	0.25-0.5	0.5-1.0	1.0-2.0	m/s
Max. Hazard	0.75-1.25	0.75-1.25	1.25-2.0	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

- Water enters the properties back gardens through an access road off of Wembley Park Drive, on the eastern side of the site.
- Climate change will increase the predicted extent, depths, velocities and hazard of the site.

Site Access / Egress

There is a safe access / egress route to the western side of the site, towards Manor Drive or to the southwest of the site, towards Empire Way.

Figure 3 - RoFSW Flood Depth Map

Mitigation - Flood Risk Requirements

- See SFRA - Level 2 Report Sections 4.2.1, 4.2.2 and 4.2.3.
- Minimise flood storage lost by limiting development to the rear of Nos. 92-98.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Surface Water Drainage

- A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS.
- The site is underlain by London Clay - ground investigations are required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - 84-98 Wembley Park Drive - BD2

SEWER

Risk Assessment

- The area is served by a separate surface water and foul water sewer network.
- There have been between 1-20 sewer flood incidents reported within the site's post code district.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

- Thames Water must be consulted to confirm if the site has historically flooded.
- If the site has historically flooded, the development must reduce the runoff to sewers from the site to greenfield rates or as close as possible to greenfield rates.

GROUNDWATER

Risk Assessment

- The site is susceptible to groundwater flooding at a risk of < 25%
- There is no increased potential for elevated groundwater based upon the sites underlying geology (Thames Group / London Clay).
- The site overlays an unproductive, minor aquifer (Secondary A)

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

No mitigation measures required.

ARTIFICIAL

Risk Assessment

There is no risk of artificial flooding at this site.

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

No mitigation measures required.

PLANNING CONSIDERATIONS

Safety of Development

Can the development future be proofed for climate change considerations?

- Yes - See SFRA - Level 2 Report Sections 4.2.1 and 4.2.2 for the required finished floor level and flood resistant / resilient building requirements.
- See SFRA - Level 2 Report Section 4.2.3 for further requirements on compensatory flood storage.
- The western half of the site should be prioritised for development, due to the lower flood depths predicted.

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

- Yes - The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation.

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

- The development land use is not changing. The site is currently residential and split between impermeable buildings and permeable back gardens. Development must mitigate any increase in impermeable area with runoff storage to prevent any increase in flood risk.

How can the development reduce risk overall?

- The age of the site means that is it unlikely that runoff is controlled off-site. New development can provide better management of runoff through the introduction of SuDS (See Mitigation - Surface Water Drainage). These could include rainwater harvesting, above ground SuDS or below ground attenuation features.
- Focussing development on the western side of the site can reduce surface water flood risk to the development. Utilising the eastern side of the site as flood plain storage through SuDS or other methods could reduce surface water flood risk in the area.
- The development must reduce the runoff to sewers to greenfield rates or as close as possible to greenfield rates.
- Basements developments, except for self-contained basement dwellings, may be appropriate onsite, but a site-specific Flood Risk Assessment must be completed and the basement must not have any adverse impacts on flooding locally during a 1 in 100yr surface water event. Basement dwellings within the 1 in 100yr surface water flood extent may only be permitted if an exceptions test is passed. Basements must contain an egress route to a higher floor above the predicted 1 in 1000yr surface water flood depth. Basements should be made flood resilient.
- The development must implement SuDS to reduce the runoff to sewer to greenfield rates.

Will development require a flood risk permit/watercourse consent?

- The site will not require a flood risk permit / watercourse consent as there are no ordinary or main rivers near the site.

Exception Test

The site can be made safe for development throughout its lifetime without increasing flood risk elsewhere (See Safety of Development box). It could also reduce flood risk overall with appropriate surface water drainage and flood storage compensation measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
No mitigation measures required.	
Surface Water	
• Floor levels must be 0.3m above the predicted 1 in 1000yr event flood depth at any point onsite. • Flood plain compensation must be provided for up to and including a 1 in 1000yr surface water event.	• Development should focus on the western side of the site, if possible. • Flood resistant / resilient buildings required. •See Mitigation - Surface Water Drainage box.
Sewer	
Thames Water must be consulted to confirm if the site has historically flooded.	If the site has historically flooded, the development must reduce the runoff to sewers to greenfield rates.
Groundwater	
No mitigation measures required.	
Artificial	
No mitigation measures required.	

Figure 1 - Fluvial Flood Depth Map

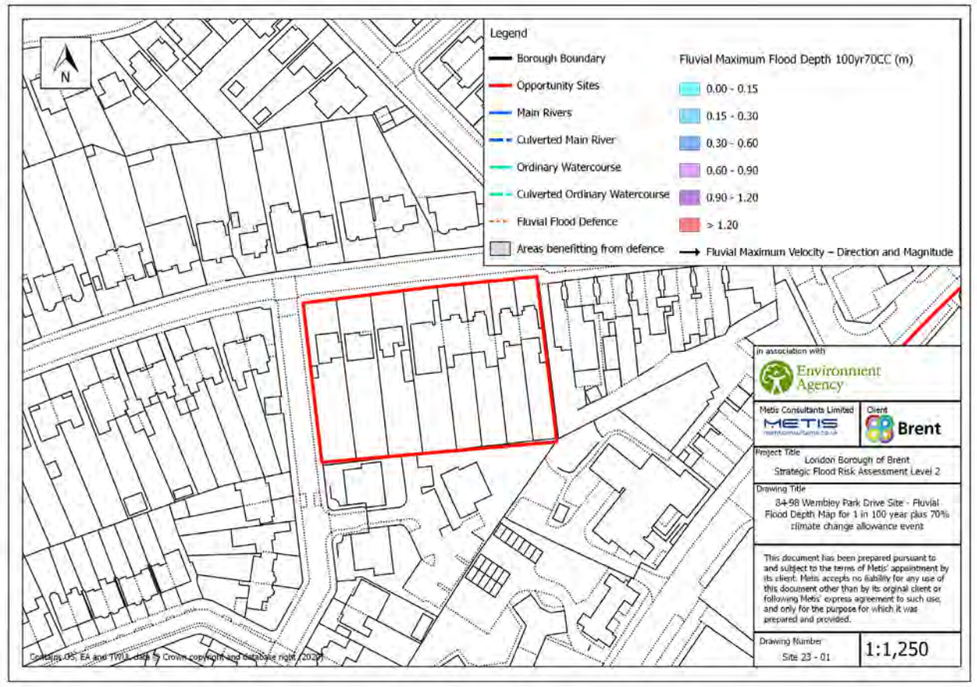


Figure 2 - Fluvial Flood Hazard Map

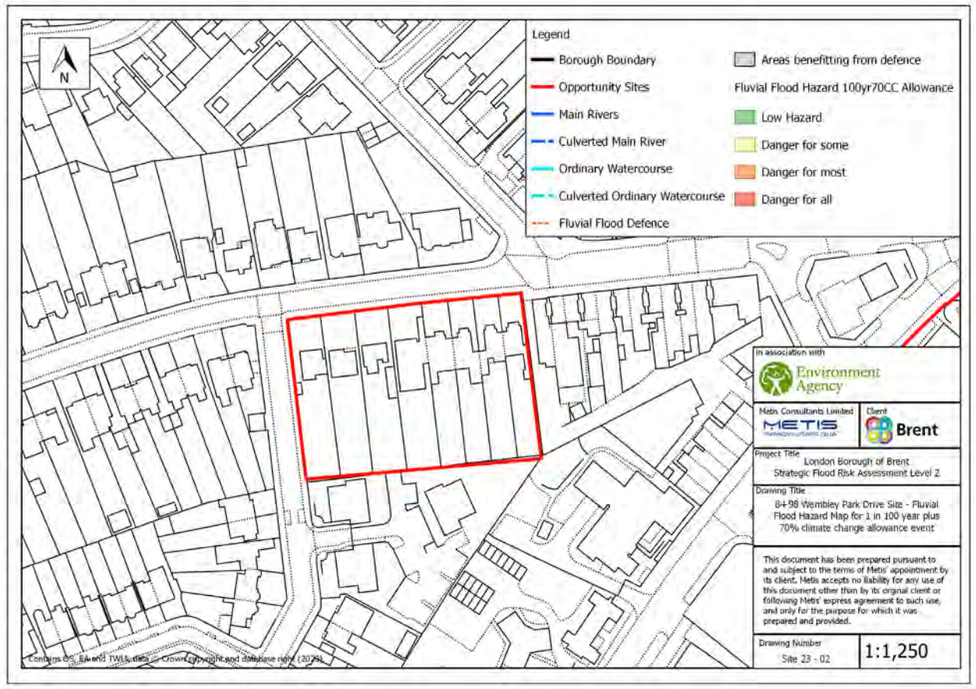


Figure 3 - RoFSW Flood Depth Map

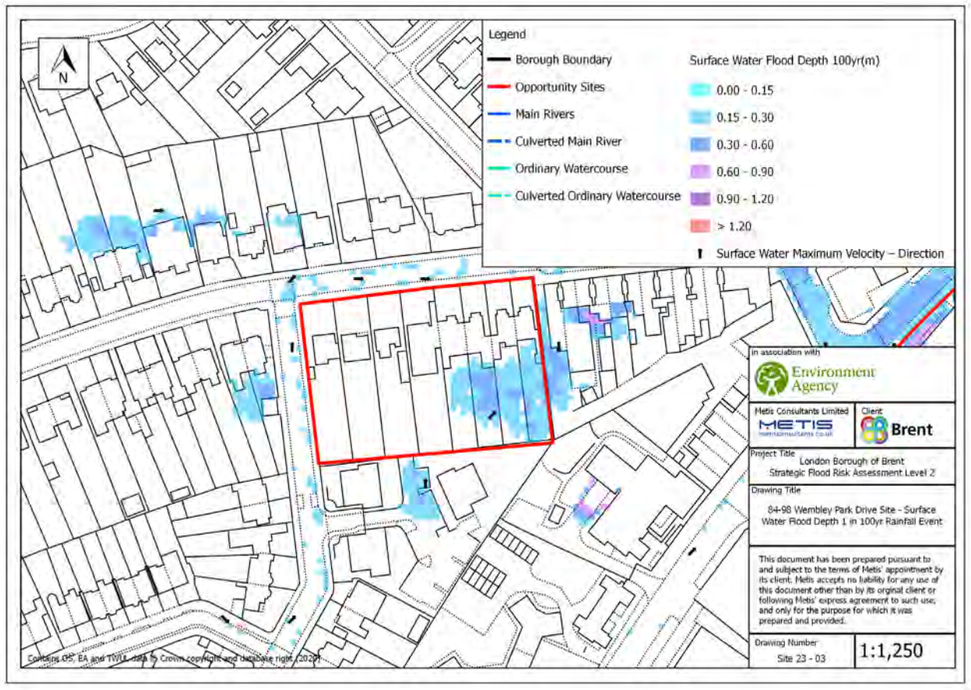


Figure 4 - RoFSW Flood Hazard Map

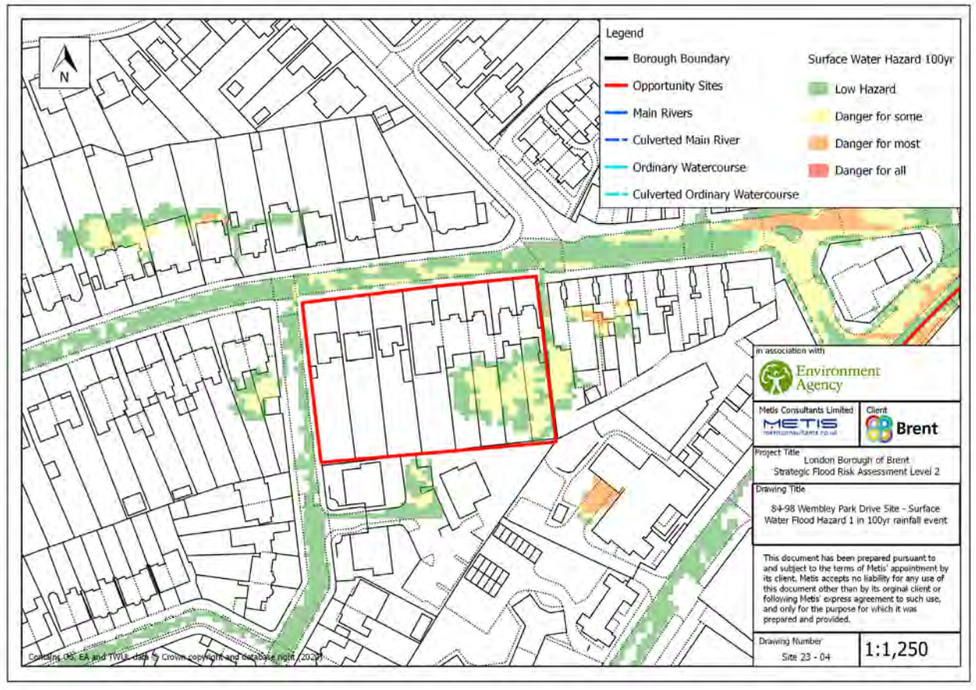


Figure 5 - Thames Water Sewer Flood Map

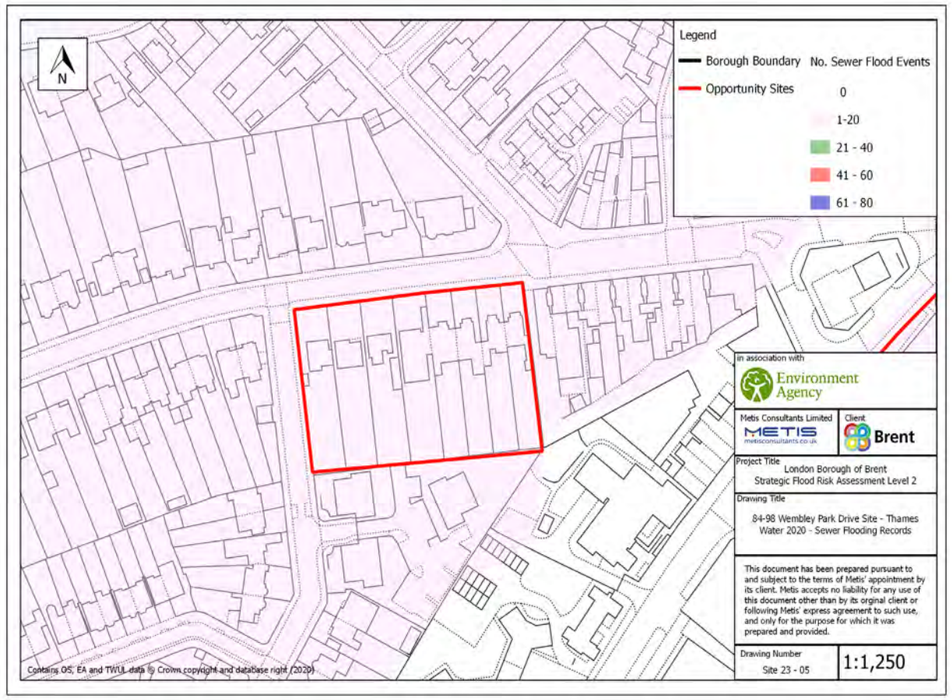


Figure 6 - Areas Susceptible to Groundwater Flooding Map

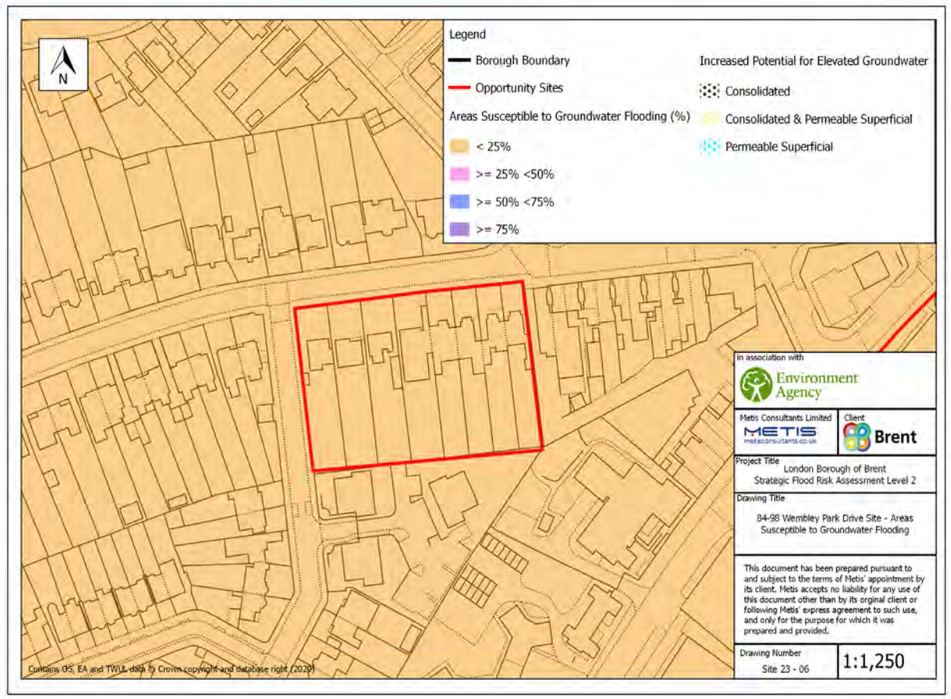
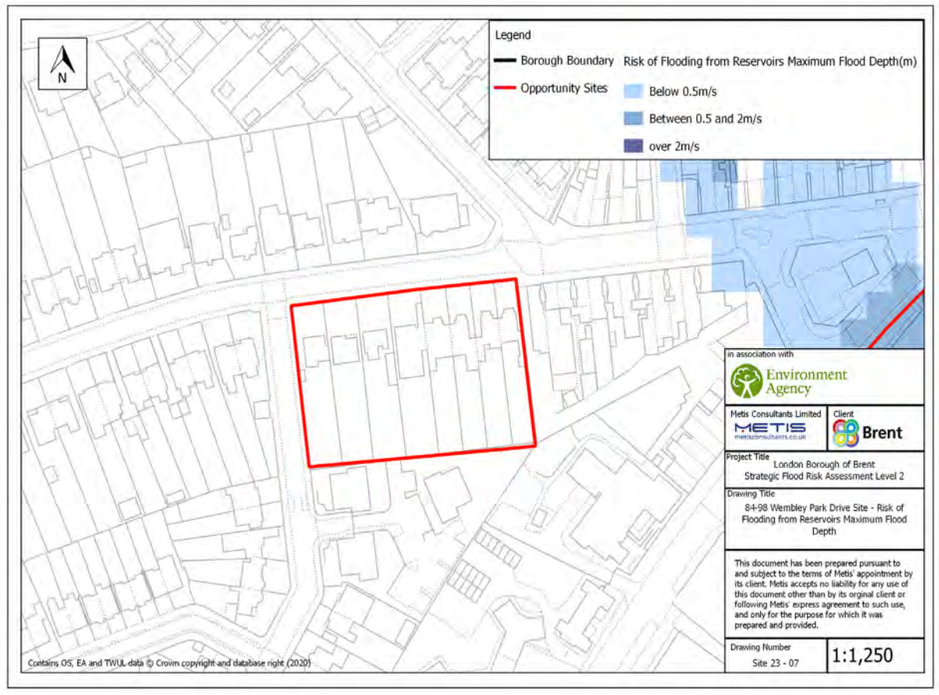


Figure 7 - Outline Reservoir Flood Map



SITE ASSESSMENT - Queensbury Station Car Park - BNSA8

Address:	Turner Road, HA8 5NP
Area:	0.2 **Ha**
Site Reference:	24

Current Use	Proposed Use
Car park	Residential and car parking (100yr design life)

Current Vulnerability Classification	Proposed Vulnerability Classification
Less Vulnerable	More Vulnerable / Less Vulnerable

Current Risk Summary					
Fluvial / Tidal			**Groundwater**		
FZ2	0	% of Site	<25	100	% of Site
FZ3a	0	% of Site	25-50	0	% of Site
FZ3b	0	% of Site	50-75	0	% of Site
Surface Water			>75	0	% of Site
30yr	49	% of Site	**Artificial**		
100yr	71	% of Site	Reservoir	No	At risk?
1000yr	100	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents	0				

Flood Defences

N/A - The site is not protected by any fluvial or tidal flood defences.

FLUVIAL / TIDAL

Risk Assessment (Defended)				
Parameter	**FZ3b**	**FZ3a**	***FZ3a+CC**	**Units**
Speed of inundation	N/A	N/A	N/A	Hrs
Min. Depth	N/A	N/A	N/A	m
Max. Depth	N/A	N/A	N/A	m
Max. Velocity	N/A	N/A	N/A	m/s
Max Flood Level	N/A	N/A	N/A	m AOD
Max Ground Level	N/A	N/A	N/A	m AOD
Min Ground Level	N/A	N/A	N/A	m AOD
Flood Hazard	N/A	N/A	N/A	N/A
Duration of Flood	N/A	N/A	N/A	Hrs

*The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)			
Parameter	**FZ3a**	***FZ3a+CC**	**Units**
Speed of inundation	N/A	N/A	Hrs
Min. Depth	N/A	N/A	m
Max. Depth	N/A	N/A	m
Max. Velocity	N/A	N/A	m/s
Max. Hazard	N/A	N/A	N/A
Duration of Flood	N/A	N/A	Hrs

Description of flood mechanism

N/A - No fluvial / tidal risk is predicted at this site.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

N/A - No fluvial / tidal risk is predicted at this site.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

N/A - No fluvial / tidal risk is predicted at this site.

SURFACE WATER

Risk Assessment				
Parameter	30yr	100yr	*1000yr	Units
Min. Depth	0	0	0	m
Max. Depth	0.6-0.9	0.9-1.2	>1.2	m
Max. Velocity	0.25-0.5	0.5-1.0	1.0-2.0	m/s
Max. Hazard	1.25-2.0	1.25-2.0	> 2.0	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

- Surface water is trapped against the railroad embankment and enters the site from the south and west.
- CC will increase the extent, depth, velocity and hazard of flooding.

Site Access / Egress

A safe access route could be made to the north of the site, towards Turner Road.

Figure 3 - RoFSW Flood Depth Map

Mitigation - Flood Risk Requirements

- See SFRA - Level 2 Report Sections 4.2.1, 4.2.2 and 4.2.3.
- Northern half of site should be prioritized for development.
- High flood depths may make compensatory flood storage difficult, ground level uses must be less vulnerable. Minimise flood storage lost by focussing development in the north of the site.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Surface Water Drainage

- A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS.
- The site is underlain by London Clay - ground investigations are required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - Queensbury Station Car Park - BNSA8

SEWER

Risk Assessment

- The area is served by a separate surface water and foul water sewer network.
- There have been no reported sewer flood incidents within the site's post code district.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

No mitigation measures required.

GROUNDWATER

Risk Assessment

- The site is susceptible to groundwater flooding at a risk of < 25%.
- There is no increased potential for elevated groundwater based upon the sites underlying geology (Thames Group / London Clay).
- The site overlays an unproductive, minor aquifer (Secondary A)

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

No mitigation measures required.

ARTIFICIAL

Risk Assessment

There is no risk from artificial flooding.

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

No mitigation measures required.

PLANNING CONSIDERATIONS

Safety of Development

Can the development future be proofed for climate change considerations?

- Yes. See SFRA - Level 2 Report Sections 4.2.1 and 4.2.2 for the required finished floor level and flood resistant / resilient building requirements.
- See SFRA - Level 2 Report Section 4.2.3 for requirements regarding compensatory flood storage.

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

- Yes - The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation.

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

- The development land use is changing to include more vulnerable uses. The site must not develop the southern half of the site with more vulnerable uses. If a more vulnerable use development must occur in the south of the site, any floors below the predicted flood depths of the 1 in 1000yr surface water event cannot be a more vulnerable use category. Less vulnerable use categories on these floors may be appropriate, however, the development must consider safe refuge access, speed of flooding inundation and create an evacuation plan for the development.
- Additional surface water modelling may be appropriate to include railroad culverts not represented in the RoFSW modelling. The detailed modelling may provide better insight as to what flood risk mitigation measures are required throughout the site and whether the southern half of the site could be developed for more vulnerable uses.

How can the development reduce risk overall?

- New development can provide greater management of runoff off-site and reduce flood risk overall through the introduction of SuDS (See Mitigation - Surface Water Drainage). These could include rainwater harvesting, above ground SuDS or below ground attenuation features.
- There is no currently green space located on the development. Further development should consider the introduction of green space to reduce the surface water flood risk on and off-site.
- Basements developments, except for self-contained basement dwellings, may be appropriate onsite, but a site-specific Flood Risk Assessment must be completed and the basement must not have any adverse impacts on flooding locally during a 1 in 100yr surface water event. Basement dwellings within the 1 in 100yr surface water flood extent may only be permitted if an exceptions test is passed. Basements must contain an egress route to a higher floor above the predicted 1 in 1000yr surface water flood depth. Basements should be made flood resilient.
- The development must implement SuDS to reduce the runoff to sewer to greenfield rates.

Will development require a flood risk permit/watercourse consent?

- The site will not require a flood risk permit / watercourse consent as there are no ordinary or main rivers near the site.

Exception Test

The site can be made safe for development throughout its lifetime without increasing flood risk elsewhere (See Safety of Development box). It could also reduce flood risk overall with appropriate surface water drainage and flood storage compensation measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
No mitigation measures required.	
Surface Water	
• Floor levels must be 0.3m above the predicted 1 in 1000yr event flood depth at any point onsite. Northern development should be prioritised. • Flood resilient buildings required.	• Flood plain compensation must be provided for up to and including a 1 in 1000yr event. • See Mitigation - Surface Water Drainage box.
Sewer	
No mitigation measures required.	
Groundwater	
No mitigation measures required.	
Artificial	
No mitigation measures required.	

Figure 1 - Fluvial Flood Depth Map

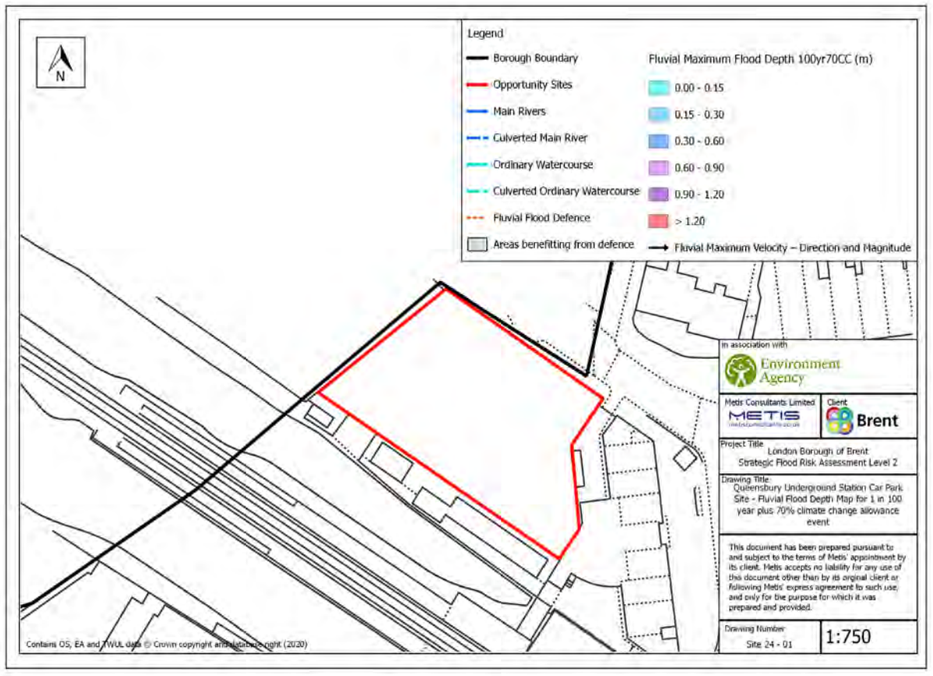


Figure 2 - Fluvial Flood Hazard Map

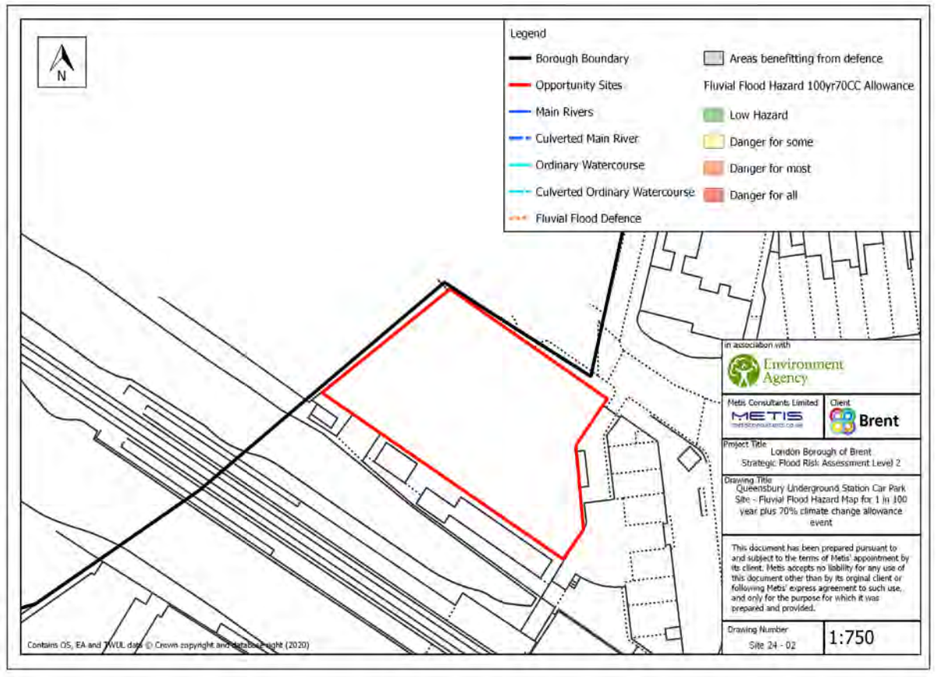


Figure 3 - RoFSW Flood Depth Map

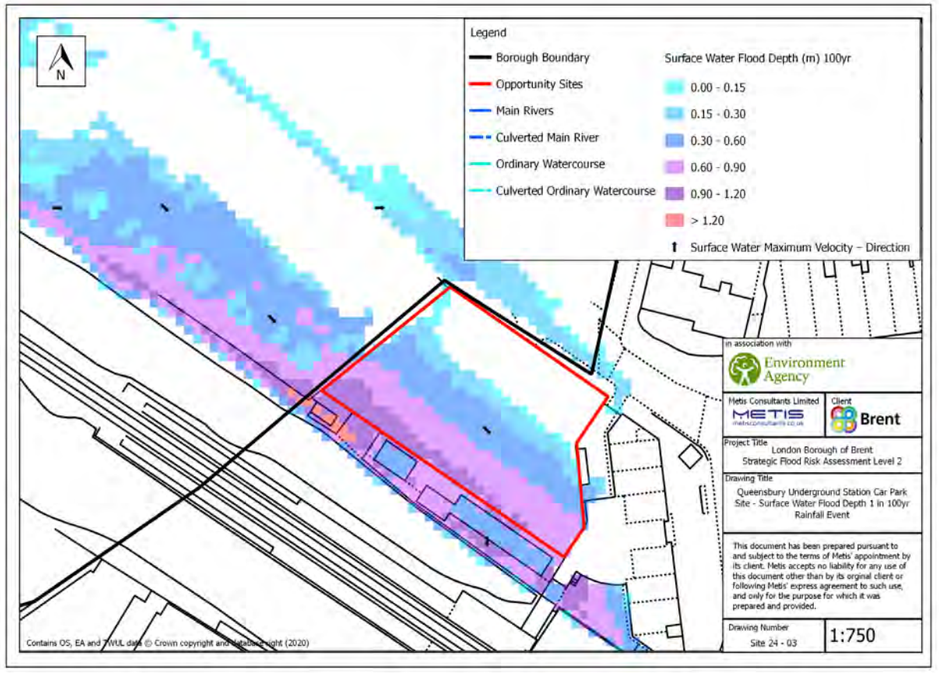


Figure 4 - RoFSW Flood Hazard Map

Figure 5 - Thames Water Sewer Flood Map

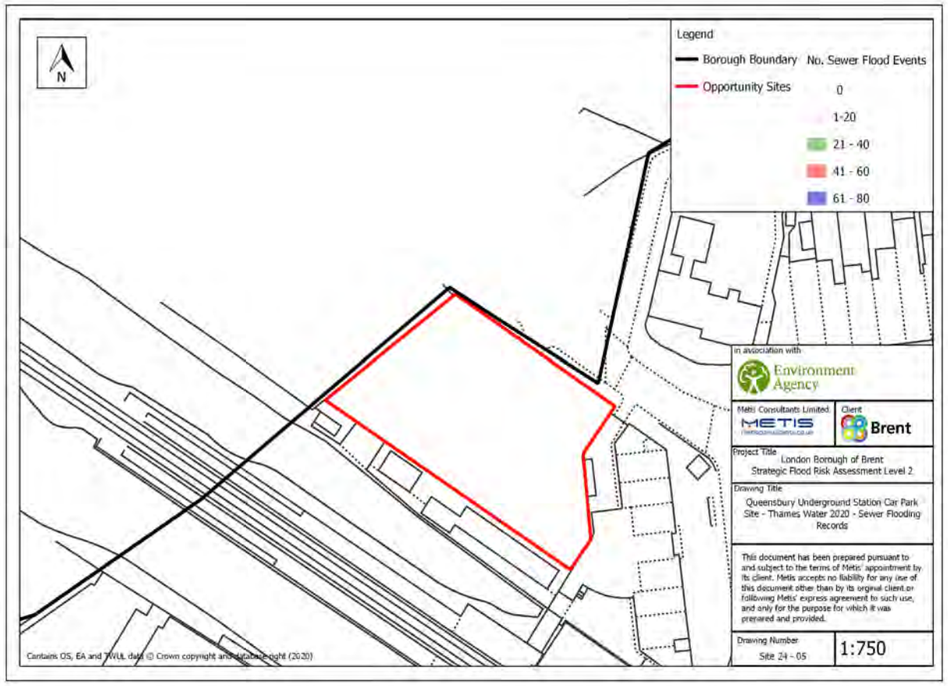


Figure 6 - Areas Susceptible to Groundwater Flooding Map

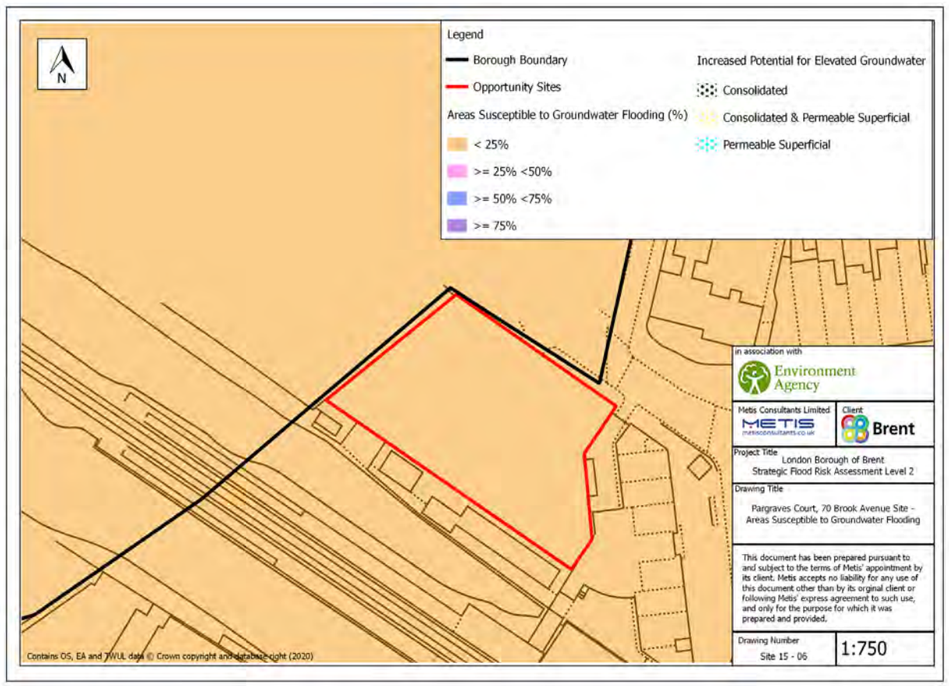
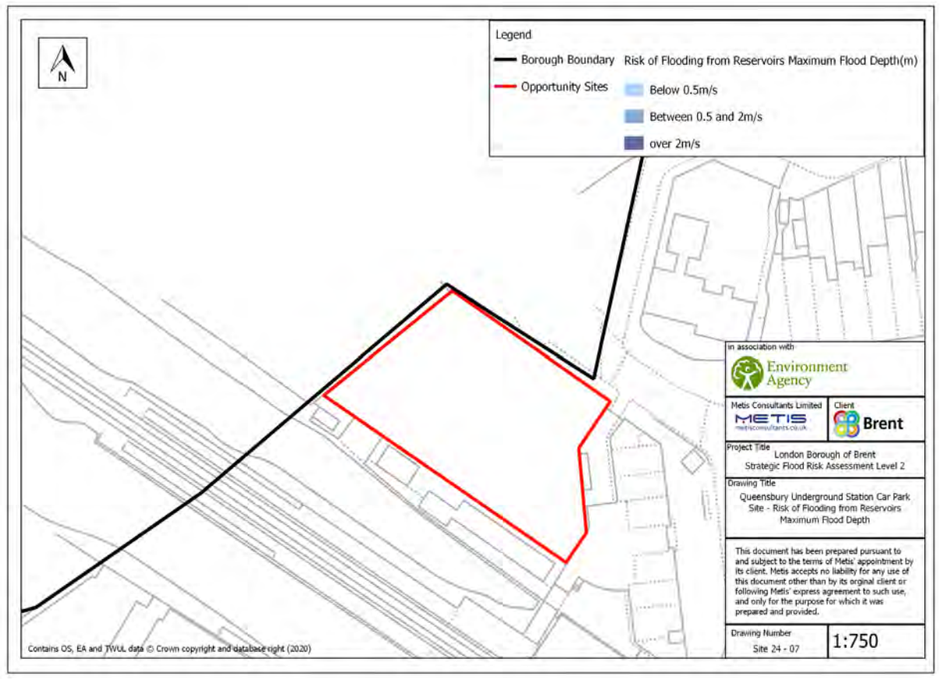


Figure 7 - Outline Reservoir Flood Map



SITE ASSESSMENT - 438-444 Neasden Lane and Pitt House - BD2

Address:	438-444 Neasden Land and Pitt House, NW10 0DA
Area:	0.46 **Ha**
Site Reference:	25

Current Use	Proposed Use
Residential	Residential (100yr design life)

Current Vulnerability Classification	Proposed Vulnerability Classification
More Vulnerable	More Vulnerable

Current Risk Summary

Fluvial / Tidal			Groundwater		
FZ2	0	% of Site	<25	0	% of Site
FZ3a	0	% of Site	25-50	100	% of Site
FZ3b	0	% of Site	50-75	0	% of Site
Surface Water			>75	0	% of Site
30yr	0	% of Site	**Artificial**		
100yr	33	% of Site	Reservoir	Yes	At risk?
1000yr	67	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents	0				

Flood Defences

N/A - The site is not protected by any fluvial or tidal flood defences.

FLUVIAL / TIDAL

Risk Assessment (Defended)

Parameter	FZ3b	FZ3a	*FZ3a+CC	Units
Speed of inundation	N/A	N/A	N/A	Hrs
Min. Depth	N/A	N/A	N/A	m
Max. Depth	N/A	N/A	N/A	m
Max. Velocity	N/A	N/A	N/A	m/s
Max Flood Level	N/A	N/A	N/A	m AOD
Max Ground Level	N/A	N/A	N/A	m AOD
Min Ground Level	N/A	N/A	N/A	m AOD
Flood Hazard	N/A	N/A	N/A	N/A
Duration of Flood	N/A	N/A	N/A	Hrs

*The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)

Parameter	FZ3a	*FZ3a+CC	Units
Speed of inundation	N/A	N/A	Hrs
Min. Depth	N/A	N/A	m
Max. Depth	N/A	N/A	m
Max. Velocity	N/A	N/A	m/s
Max. Hazard	N/A	N/A	N/A
Duration of Flood	N/A	N/A	Hrs

Description of flood mechanism

N/A - No fluvial / tidal risk is predicted at this site.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

N/A - No fluvial / tidal risk is predicted at this site.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

N/A - No fluvial / tidal risk is predicted at this site.

SURFACE WATER

Risk Assessment

Parameter	30yr	100yr	*1000yr	Units
Min. Depth	0	0	0	m
Max. Depth	0-0.15	0.3-0.6	0.3-0.6	m
Max. Velocity	0-0.25	1.0-2.0	1.0-2.0	m/s
Max. Hazard	0.5-0.75	1.25-2.0	1.25-2.0	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

- Surface water flow enters the site via Press Road and Aboyne Road.
- CC will increase the extent of flooding, but it does not increase maximum depth, velocity or hazard.

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Site Access / Egress

- The flooding occurs on either side of the site on Press Road, Aboyne Road and Neasden Lane, making these exits potentially hazardous.
- A safe access route would need to be directed to the south where the risk is lowest.

Figure 3 - RoFSW Flood Depth Map

Mitigation - Flood Risk Requirements

- See SFRA - Level 2 Report Sections 4.2.1, 4.2.2 and 4.2.3.
- Minimise flood storage lost by limiting development to the northeast of site.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Surface Water Drainage

- A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS.
- The site is underlain by London Clay - ground investigations are required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - 438-444 Neasden Lane and Pitt House - BD2

SEWER

Risk Assessment

- The area is served by a separate surface water and foul water sewer network.
- There have been no reported sewer flood incidents within the site's post code district.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

No mitigation measures required.

GROUNDWATER

Risk Assessment

- The site is susceptible to groundwater flooding at a risk of >= 25% < 50%.
- There is no increased potential for elevated groundwater based upon the sites underlying geology (Thames Group / London Clay).
- The site overlays an unproductive, minor aquifer (Secondary A).

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

- No basement dwellings should be developed onsite.
- If non-dwelling basements are being considered, a screening assessment must be provided that addresses the risk of groundwater flooding at the site and advises the level of impact and associated mitigation measures.

ARTIFICIAL

Risk Assessment

- There is risk of flooding from the Brent (Welsh Harp) Reservoir.
- The site is predicted to flood between 0.3-2m depth in result of reservoir failure.
- Reservoir failure flood speeds would be below 0.5 m/s for the majority of the site, however the northwest of the site could experience speeds of 0.5-2 m/s.

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

Local Authority Emergency Planning Officers must be consulted to create a reservoir failure emergency and evacuation plan.

PLANNING CONSIDERATIONS

Safety of Development

Can the development future be proofed for climate change considerations?

- Yes - See SFRA - Level 2 Report Sections 4.2.1 and 4.2.2 for the required finished floor level and flood resistant / resilient building requirements.
- See SFRA - Level 2 Report Section 4.2.3 for requirements regarding compensatory flood storage.

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

- Yes - The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation.

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

- The development land use is not changing and it will not increase flood risk.
- There is lots of green space currently on-site. Development must mitigate any increase in impermeable area to the site with flood plain compensation and runoff storage to prevent any increase in flood risk.

How can the development reduce risk overall?

- The age of the site means that is it unlikely that runoff is controlled off-site. New development can provide greater management of runoff through the introduction of SuDS (See Mitigation - Surface Water Drainage).
- An emergency evacuation plan must be created for the event of a reservoir failure.
- If basements are considered for development, a screening assessment is required (See Groundwater box).
- Basements developments, except for self-contained basement dwellings, may be appropriate onsite, but a site-specific Flood Risk Assessment must be completed and the basement must not have any adverse impacts on flooding locally during a 1 in 100yr surface water event. Basement dwellings within the 1 in 100yr surface water flood extent may only be permitted if an exceptions test is passed. Basements must contain an egress route to a higher floor above the predicted 1 in 1000yr surface water flood depth. Basements should be made flood resilient.
- Residual flood risk must be considered within any site-specific FRA.

Will development require a flood risk permit/watercourse consent?

- The site will not require a flood risk permit / watercourse consent as there are no ordinary or main rivers near the site.

Exception Test

The site can be made safe for development throughout its lifetime without increasing flood risk elsewhere (See Safety of Development box). It could also reduce flood risk overall with appropriate surface water drainage and flood storage compensation measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
No mitigation measures required.	
Surface Water	
• Floor levels must be 0.3m above the predicted 1 in 1000yr event flood depth at any point onsite. • Flood plain compensation must be provided for up to and including a 1 in 1000yr surface water event.	• Flood resistant buildings required. • See Mitigation - Surface Water Drainage box.
Sewer	
No mitigation measures required.	
Groundwater	
If basements are being considered onsite, a screening assessment must be provided (See Groundwater box).	No basement dwelling should be developed onsite.
Artificial	
Emergency planning officers must be consulted to create a reservoir failure emergency and evacuation plan.	

Figure 1 - Fluvial Flood Depth Map

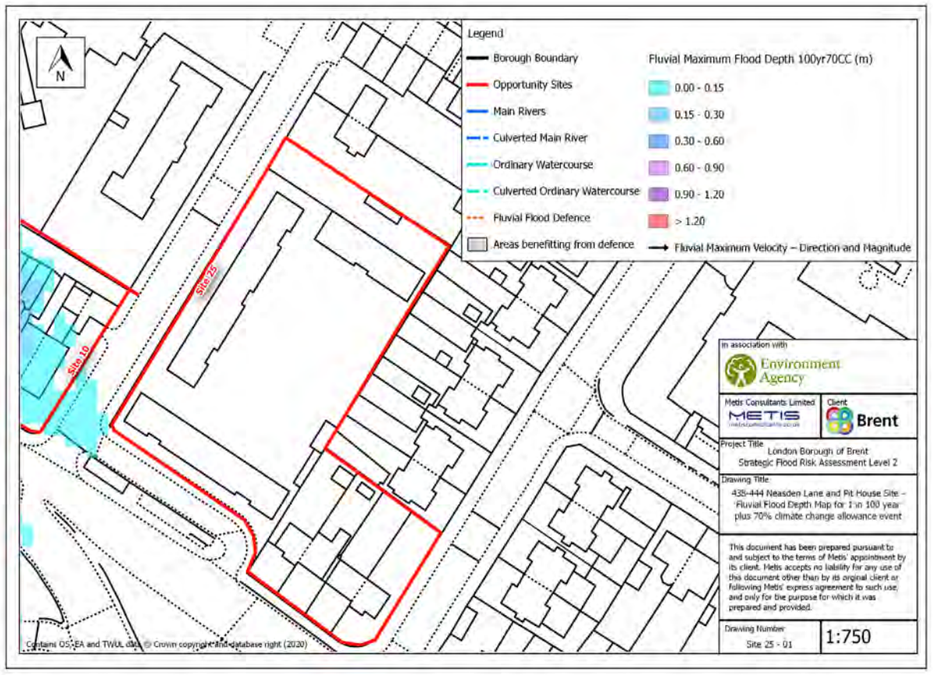


Figure 2 - Fluvial Flood Hazard Map

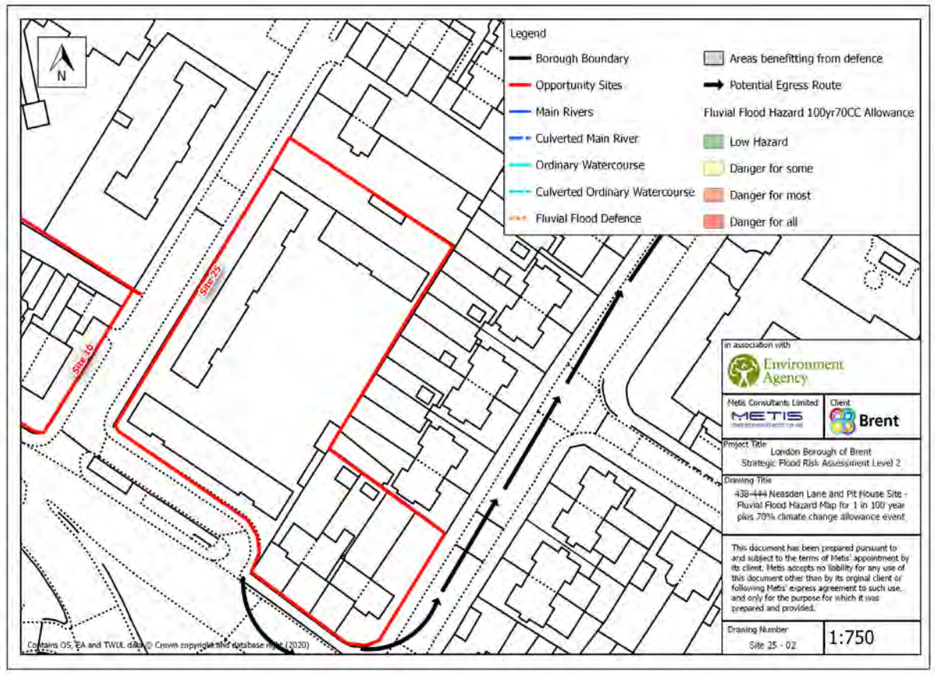


Figure 3 - RoFSW Flood Depth Map

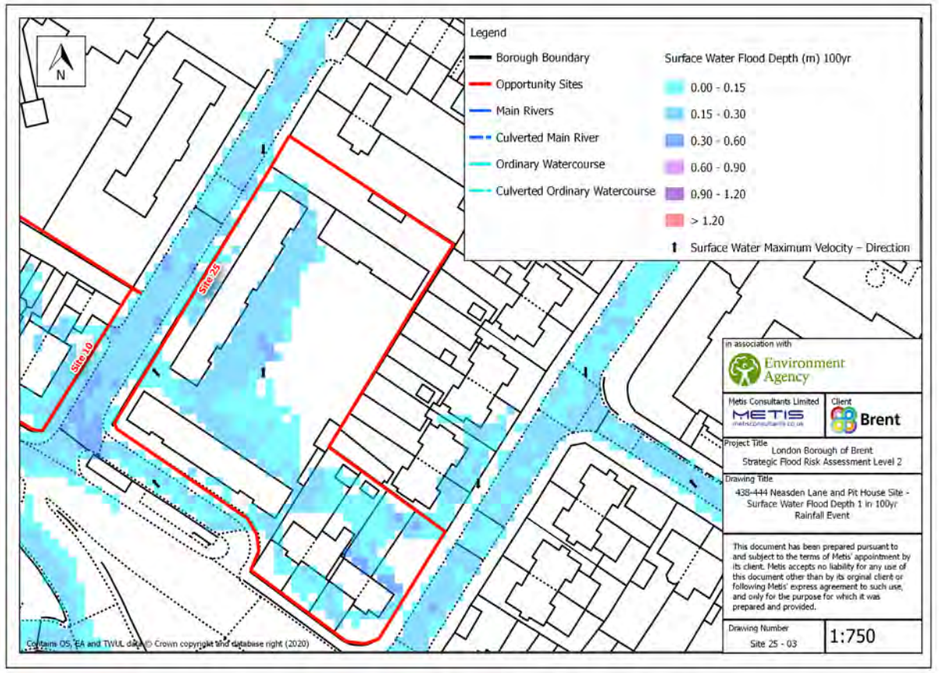


Figure 4 - RoFSW Flood Hazard Map

Figure 5 - Thames Water Sewer Flood Map

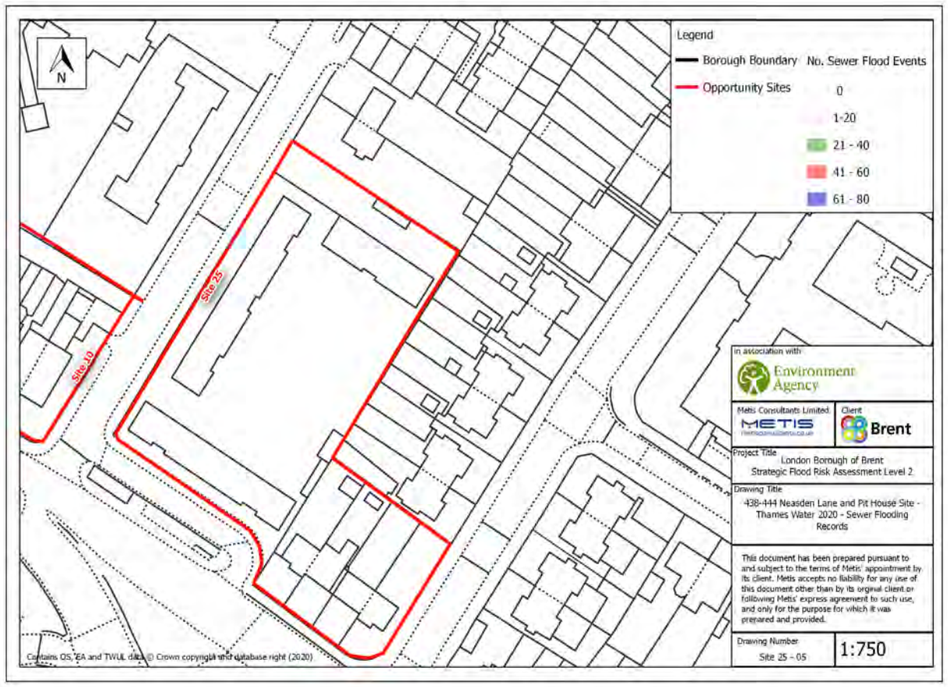


Figure 6 - Areas Susceptible to Groundwater Flooding Map

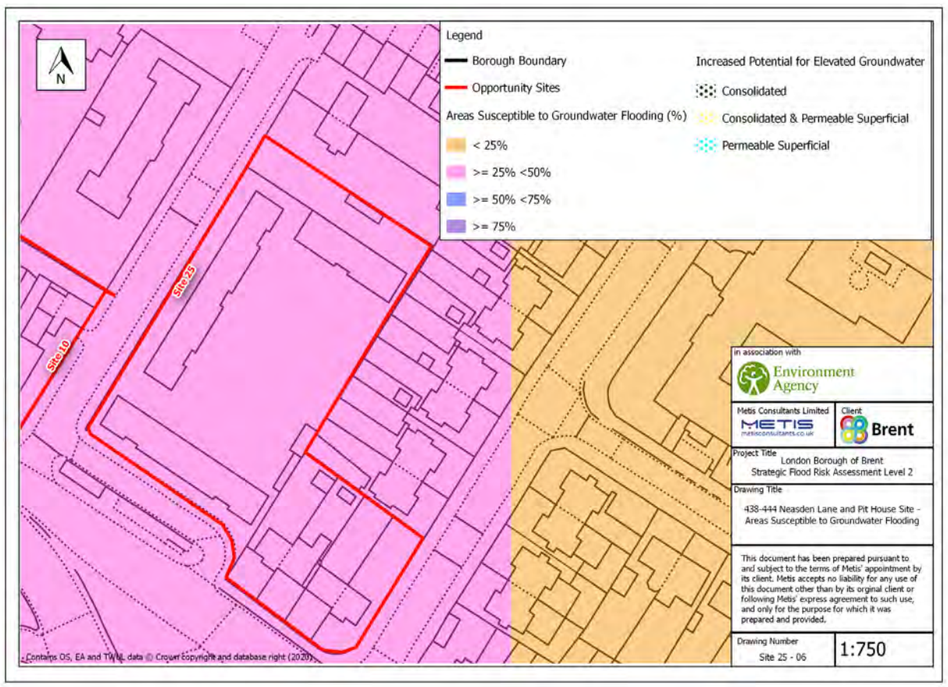
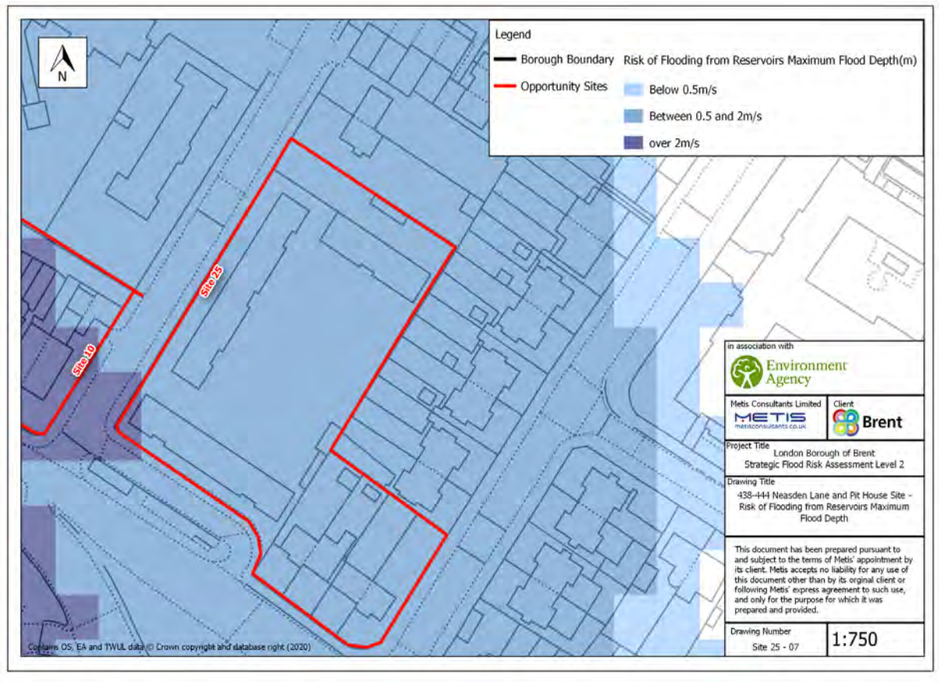


Figure 7 - Outline Reservoir Flood Map



SITE ASSESSMENT - Hereford House & Exeter Court - BSESA8

Address:	Hereford House & Exeter Court, NW6 5AJ
Area:	0.9 **Ha**
Site Reference:	26

Current Use	Proposed Use
Residential and commercial	Residential (100yr design life)

Current Vulnerability Classification	Proposed Vulnerability Classification
More Vulnerable / Less Vulnerable	More Vulnerable

Current Risk Summary					
Fluvial / Tidal			**Groundwater**		
FZ2	0	% of Site	<25	No data	% of Site
FZ3a	0	% of Site	25-50	No data	% of Site
FZ3b	0	% of Site	50-75	No data	% of Site
Surface Water			>75	No data	% of Site
30yr	17	% of Site	**Artificial**		
100yr	37	% of Site	Reservoir	No	At risk?
1000yr	62	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents		21-40			

Flood Defences

N/A - The site is not protected by any fluvial or tidal flood defences.

FLUVIAL / TIDAL

Risk Assessment (Defended)				
Parameter	**FZ3b**	**FZ3a**	***FZ3a+CC**	**Units**
Speed of inundation	N/A	N/A	N/A	Hrs
Min. Depth	N/A	N/A	N/A	m
Max. Depth	N/A	N/A	N/A	m
Max. Velocity	N/A	N/A	N/A	m/s
Max Flood Level	N/A	N/A	N/A	m AOD
Max Ground Level	N/A	N/A	N/A	m AOD
Min Ground Level	N/A	N/A	N/A	m AOD
Flood Hazard	N/A	N/A	N/A	N/A
Duration of Flood	N/A	N/A	N/A	Hrs

*The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)			
Parameter	**FZ3a**	***FZ3a+CC**	**Units**
Speed of inundation	N/A	N/A	Hrs
Min. Depth	N/A	N/A	m
Max. Depth	N/A	N/A	m
Max. Velocity	N/A	N/A	m/s
Max. Hazard	N/A	N/A	N/A
Duration of Flood	N/A	N/A	Hrs

Description of flood mechanism

N/A - No fluvial / tidal risk is predicted at this site.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

N/A - No fluvial / tidal risk is predicted at this site.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

N/A - No fluvial / tidal risk is predicted at this site.

SURFACE WATER

Risk Assessment				
Parameter	30yr	100yr	*1000yr	Units
Min. Depth	0	0	0	m
Max. Depth	0.3-0.6	0.6-0.9	>1.2	m
Max. Velocity	0.5-1.0	0.5-1.0	1.0-2.0	m/s
Max. Hazard	1.25-2.0	1.25-2.0	1.25-2.0	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

- Overland flow pools around Exeter Court as the site is in a depression between Granville Road and Carlton Vale.
- CC will increase the predicted extent, depth and velocity of flooding, but it does not increase maximum hazard.

Site Access / Egress

A safe access route could be provided to the east of the site, towards the back of Hereford House.

Figure 3 - RoFSW Flood Depth Map

Mitigation - Flood Risk Requirements

- See SFRA - Level 2 Report Sections 4.2.1, 4.2.2 and 4.2.3.
- More vulnerable development must be prioritised in the west towards Hereford House. See Safety of Development Box for further details.
- Minimise flood storage lost by limiting development around Exeter Court.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Surface Water Drainage

- A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS.
- The site is underlain by London Clay - ground investigations would be required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - Hereford House & Exeter Court - BSESA8

SEWER

Risk Assessment

- The area is served by a separate surface water and foul water sewer network.
- There have been between 21-40 sewer flooding incidents within the site's post code district.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

- Thames Water must be consulted to confirm if the site has historically flooded.
- If the site has historically flooded, the development must implement SuDS to reduce the runoff to sewer to greenfield rates or as close as possible to greenfield rates.

GROUNDWATER

Risk Assessment

- The site is not susceptible to groundwater flooding.
- There is no increased potential for elevated groundwater based upon the sites underlying geology (Thames Group / London Clay).
- The site overlays an unproductive, minor aquifer (Secondary A).

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

No mitigation measures required.

ARTIFICIAL

Risk Assessment

There is no risk from artificial flooding.

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

No mitigation measures required.

PLANNING CONSIDERATIONS

Safety of Development

Can the development future be proofed for climate change considerations?

- Yes - See SFRA - Level 2 Report Sections 4.2.1 and 4.2.1 for the required finished floor level and flood resistant / resilient building requirements. See SFRA - Level 2 Report Section 4.2.3 for requirements regarding compensatory flood storage.
- The centre / eastern side of the site predicts flood depths of over 1.2m with climate change. Development should be limited to less vulnerable / water compatible uses in this area. If a more vulnerable use development must occur in the east of the site, any floors below the predicted flood depths of the 1 in 1000yr surface water event cannot be a more vulnerable use category. Less vulnerable use categories on these floors may be appropriate, however, the development must consider safe refuge access, speed of flooding inundation and create an evacuation plan for the development.

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

- Yes - The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation.

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

- The development land use is partially changing to a more vulnerable risk category. This will not change surface water flood risk on the western side of the site (Hereford House), but may potentially increase surface water flood risk on the eastern side of the site. Developers should consider that a less vulnerable use development (such as commercial development) may be more appropriate for this side.
- The development would have to mitigate any increase in impermeable area to the site or utilise the green space as flood storage.

How can the development reduce risk overall?

- The age of the site means that is it unlikely that runoff is controlled off-site. New development can provide greater management of runoff off-site and reduce flood risk overall.
- Basements developments, except for self-contained basement dwellings, may be appropriate onsite, but a site-specific Flood Risk Assessment must be completed and the basement must not have any adverse impacts on flooding locally during a 1 in 100yr surface water event. Basement dwellings within the 1 in 100yr surface water flood extent may only be permitted if an exceptions test is passed. Basements must contain an egress route to a higher floor above the predicted 1 in 1000yr surface water flood depth. Basements should be made flood resilient.
- The development must implement SuDS to reduce the runoff to sewer to greenfield rates.

Will development require a flood risk permit/watercourse consent?

- The site will not require a flood risk permit / watercourse consent as there are no ordinary or main rivers near the site.

Exception Test

The site can be made safe for development throughout its lifetime without increasing flood risk elsewhere (See Safety of Development box). It could also reduce flood risk overall with appropriate surface water drainage and flood storage compensation measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
No mitigation measures required.	
Surface Water	
• Development of more vulnerable uses should be prioritised in the west of site. • Floor levels must be 0.3m above the predicted 1 in 1000yr event flood depth at any point onsite.	• Flood compensation must be provided if necessary. • Flood resistant / resilient buildings required. • See Mitigation - Surface Water Drainage.
Sewer	
Thames Water must be consulted to confirm if the site has historically flooded.	If the site has historically flooded, the development must implement SuDS to reduce the runoff to sewer to greenfield rates.
Groundwater	
No mitigation measures required.	
Artificial	
No mitigation measures required.	

Figure 1 - Fluvial Flood Depth Map

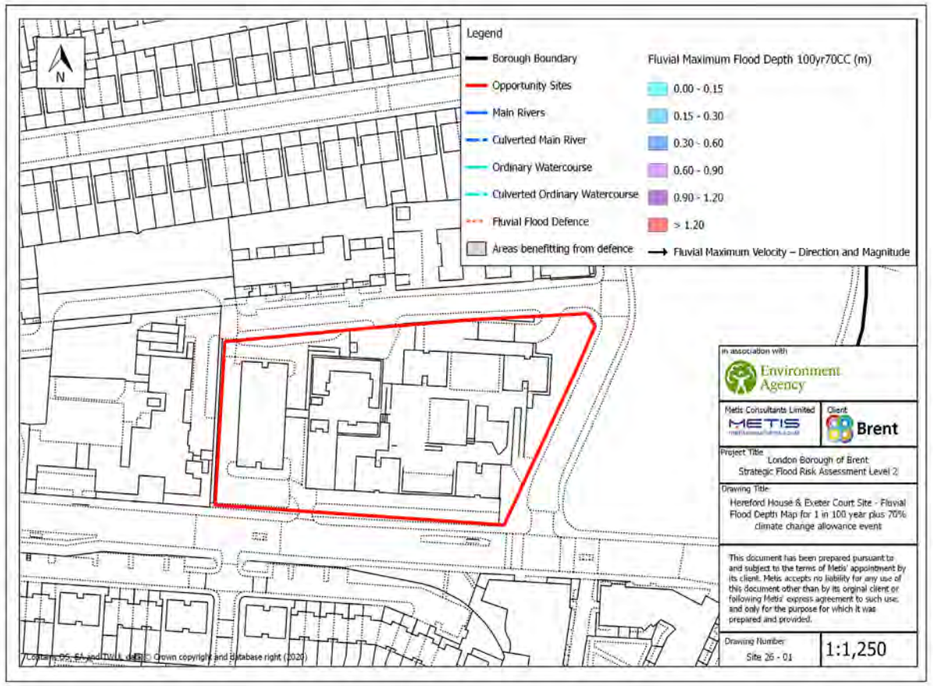


Figure 2 - Fluvial Flood Hazard Map

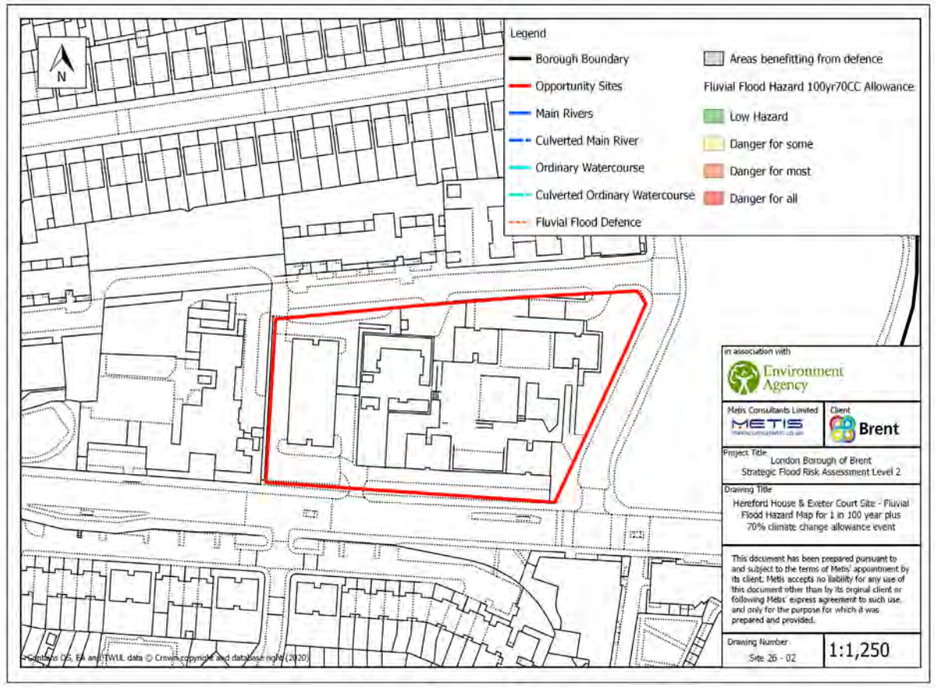


Figure 3 - RoFSW Flood Depth Map

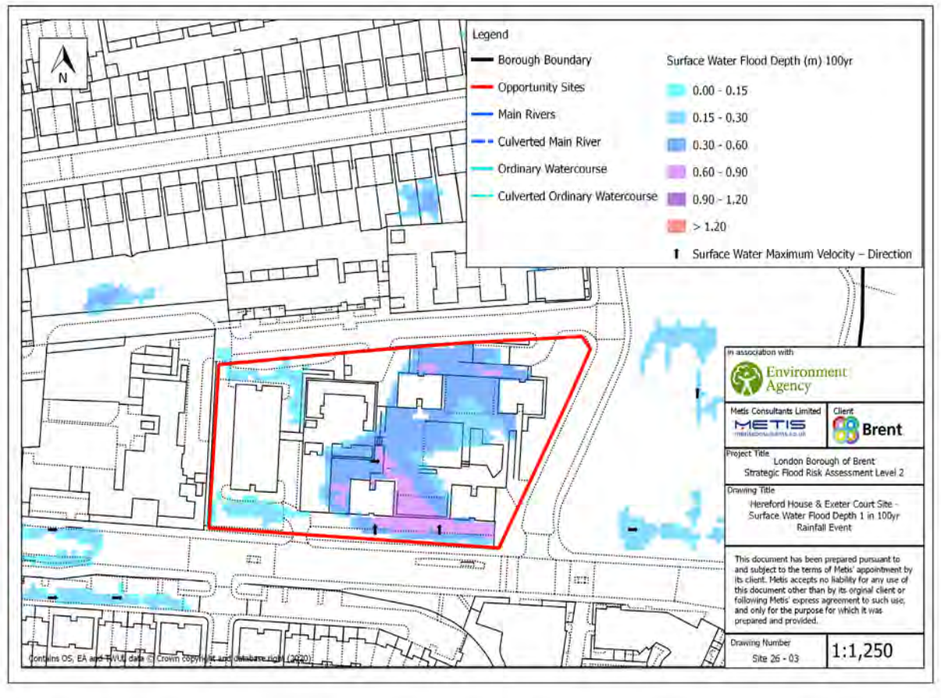


Figure 4 - RoFSW Flood Hazard Map

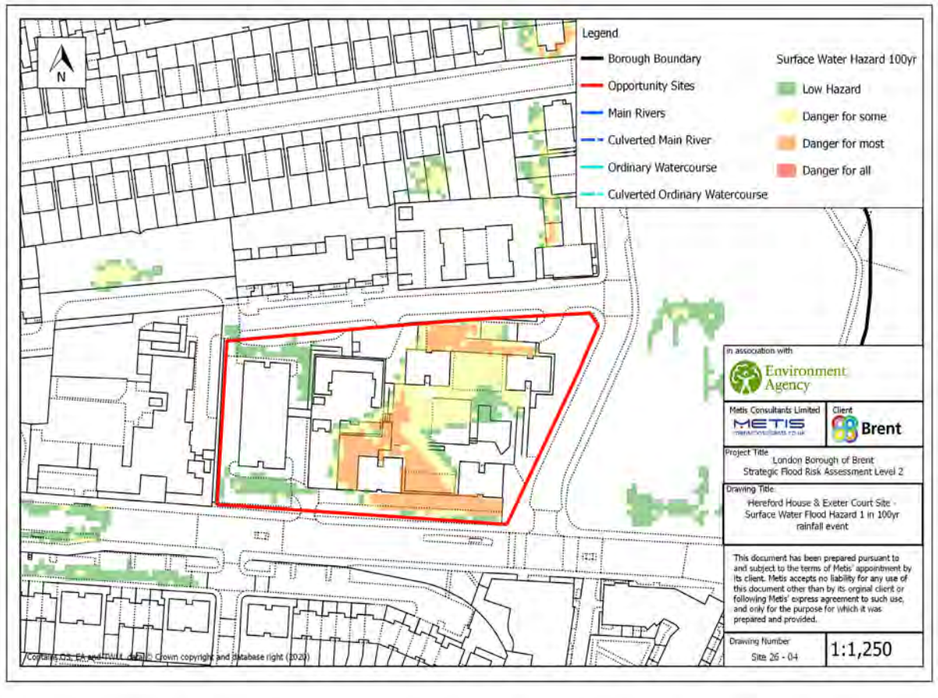


Figure 5 - Thames Water Sewer Flood Map

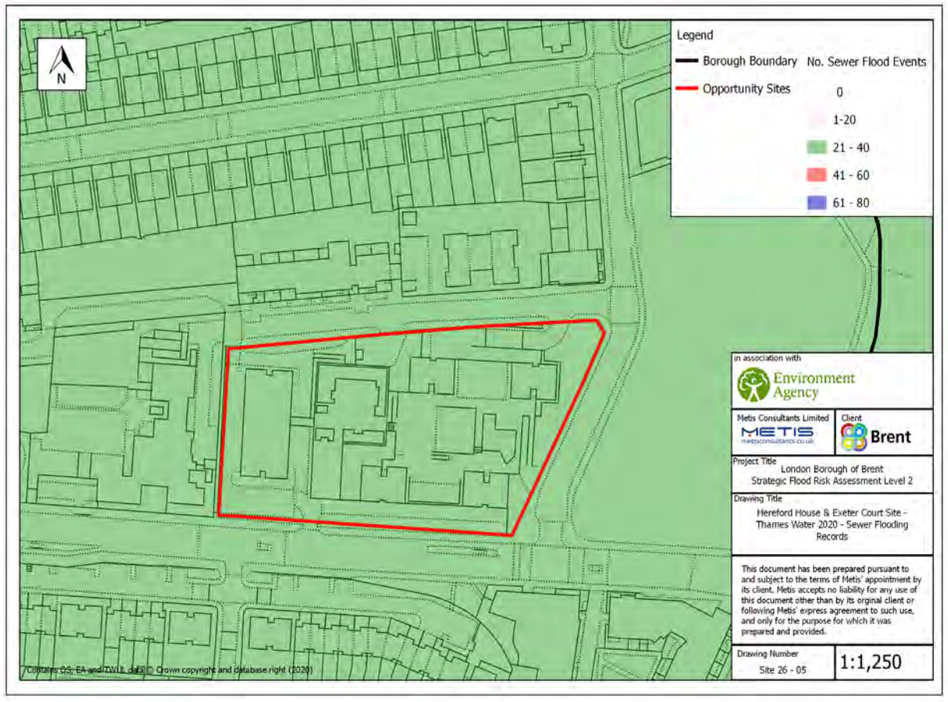


Figure 6 - Areas Susceptible to Groundwater Flooding Map

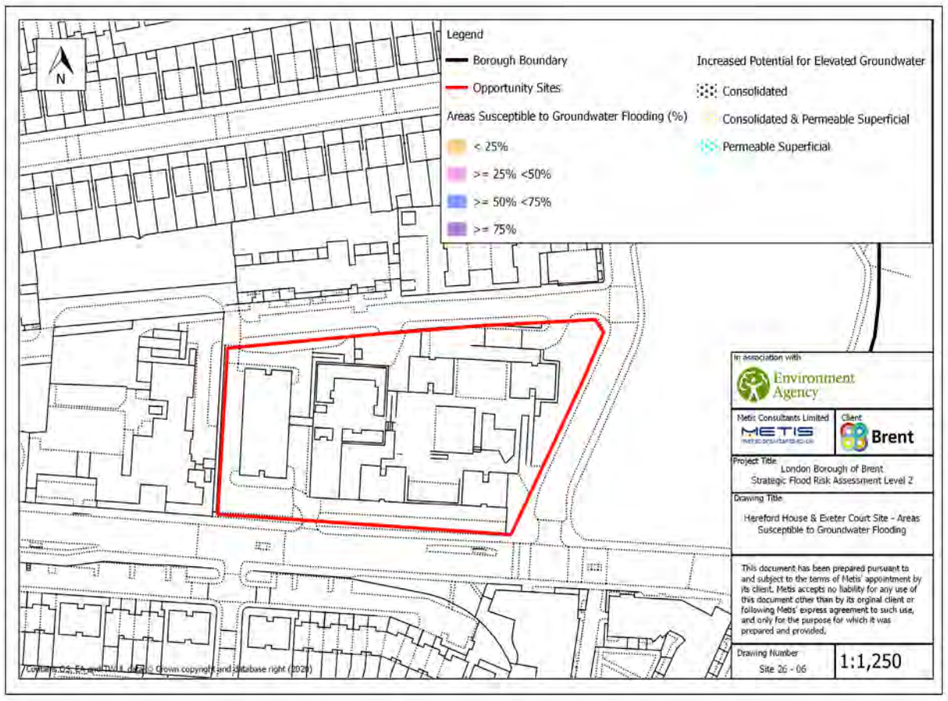


Figure 7 - Outline Reservoir Flood Map

SITE ASSESSMENT - Springhill House - BD2

Address:	Willesden Lane NW2 5DG
Area:	0.25 **Ha**
Site Reference:	27

Current Use	Proposed Use
Residential	Residential (100yr design life)

Current Vulnerability Classification	Proposed Vulnerability Classification
More Vulnerable	More Vulnerable

Current Risk Summary					
Fluvial / Tidal			**Groundwater**		
FZ2	0	% of Site	<25	0	% of Site
FZ3a	0	% of Site	25-50	0	% of Site
FZ3b	0	% of Site	50-75	0	% of Site
Surface Water			>75	0	% of Site
30yr	11	% of Site	**Artificial**		
100yr	22	% of Site	Reservoir	No	At risk?
1000yr	34	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents	0				

Flood Defences
N/A - The site is not protected by any fluvial or tidal flood defences.

FLUVIAL / TIDAL

Risk Assessment (Defended)				
Parameter	**FZ3b**	**FZ3a**	***FZ3a+CC**	**Units**
Speed of inundation	N/A	N/A	N/A	Hrs
Min. Depth	N/A	N/A	N/A	m
Max. Depth	N/A	N/A	N/A	m
Max. Velocity	N/A	N/A	N/A	m/s
Max Flood Level	N/A	N/A	N/A	m AOD
Max Ground Level	N/A	N/A	N/A	m AOD
Min Ground Level	N/A	N/A	N/A	m AOD
Flood Hazard	N/A	N/A	N/A	N/A
Duration of Flood	N/A	N/A	N/A	Hrs

*The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)			
Parameter	**FZ3a**	***FZ3a+CC**	**Units**
Speed of inundation	N/A	N/A	Hrs
Min. Depth	N/A	N/A	m
Max. Depth	N/A	N/A	m
Max. Velocity	N/A	N/A	m/s
Max. Hazard	N/A	N/A	N/A
Duration of Flood	N/A	N/A	Hrs

Description of flood mechanism
N/A - No fluvial / tidal risk is predicted at this site.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress
N/A - No fluvial / tidal risk is predicted at this site.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements
N/A - No fluvial / tidal risk is predicted at this site.

SURFACE WATER

Risk Assessment				
Parameter	30yr	100yr	*1000yr	Units
Min. Depth	0	0	0	m
Max. Depth	0.15-0.3	0.6-0.9	0.6-0.9	m
Max. Velocity	0.25-0.5	0.5-1.0	1.0-2.0	m/s
Max. Hazard	0.75-1.25	1.25-2.0	1.25-2.0	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism
• Surface water enters the site via back gardens to the south of the site and from Willesden Lane (only in the 1000yr event). • CC will increase the extent and velocity of flooding, but it does not increase maximum depth or hazard.

Figure 3 - RoFSW Flood Depth Map

Site Access / Egress
There is a safe access route out of the north of site, towards Willesden Lane.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Flood Risk Requirements
• See SFRA - Level 2 Report Sections 4.2.1, 4.2.2 and 4.2.3. • Minimise flood storage lost by limiting development in the centre of the site.

Mitigation - Surface Water Drainage
• A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS. • The site is underlain by London Clay - ground investigations are required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - Springhill House - BD2

SEWER

Risk Assessment

- The area is served by a separate surface water and foul water sewer network.
- There have been no reported sewer flood incidents within the site's post code district.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

No mitigation measures required.

GROUNDWATER

Risk Assessment

- The site is not susceptible to groundwater flooding.
- There is no increased potential for elevated groundwater based upon the sites underlying geology (Thames Group / London Clay).
- The site overlays an unproductive, minor aquifer (Secondary A)

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

No mitigation measures required.

ARTIFICIAL

Risk Assessment

There is no risk from artificial flooding.

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

No mitigation measures required.

PLANNING CONSIDERATIONS

Safety of Development

Can the development future be proofed for climate change considerations?

- Yes. See SFRA - Level 2 Report Sections 4.2.1 and 4.2.2 for the required finished floor level and flood resistant / resilient building requirements.
- See SFRA - Level 2 Report Section 4.2.3 for requirements regarding compensatory flood storage.

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

- Yes - The development must use surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation.

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

- The development land use is not changing and it will not increase flood risk.

How can the development reduce risk overall?

- New development can provide greater management of runoff through the introduction of SuDS (See Mitigation - Surface Water Drainage). These could include rainwater harvesting, above ground SuDS or below ground attenuation features.
- There is not a lot of green space / permeable area currently on-site. Development should incorporate more green space / permeable area to mitigate surface water flood risk on and off-site.
- Basements developments, except for self-contained basement dwellings, may be appropriate onsite, but a site-specific Flood Risk Assessment must be completed and the basement must not have any adverse impacts on flooding locally during a 1 in 100yr surface water event. Basement dwellings within the 1 in 100yr surface water flood extent may only be permitted if an exceptions test is passed. Basements must contain an egress route to a higher floor above the predicted 1 in 1000yr surface water flood depth. Basements should be made flood resilient.

Will development require a flood risk permit/watercourse consent?

The site will not require a flood risk permit / watercourse consent as there are no ordinary or main rivers near the site.

Exception Test

The site can be made safe for development throughout its lifetime without increasing flood risk elsewhere (See Safety of Development box). It could also reduce flood risk overall with appropriate surface water drainage and flood storage compensation measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
No mitigation measures required.	
Surface Water	
• Floor levels must be 0.3m above the predicted 1 in 1000yr event flood depth at any point onsite • Flood plain compensation must be provided for up to and including a 1 in 1000yr event.	• Flood resistant buildings required. • An FRA is required for basement developments. • See Mitigation - Surface Water Drainage box.
Sewer	
No mitigation measures required.	
Groundwater	
No mitigation measures required.	
Artificial	
No mitigation measures required.	

Figure 1 - Fluvial Flood Depth Map

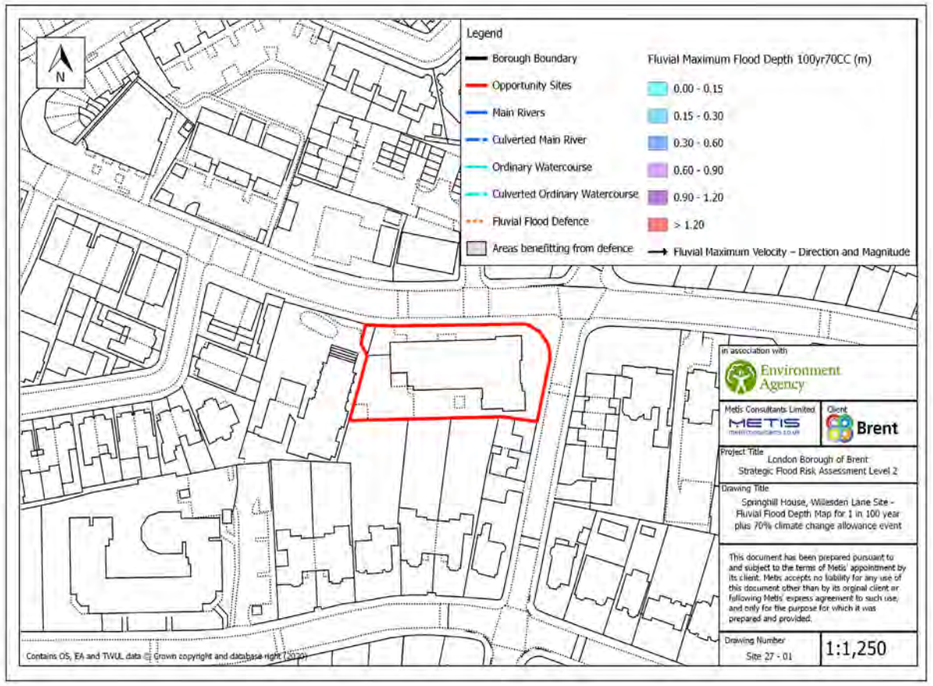


Figure 2 - Fluvial Flood Hazard Map

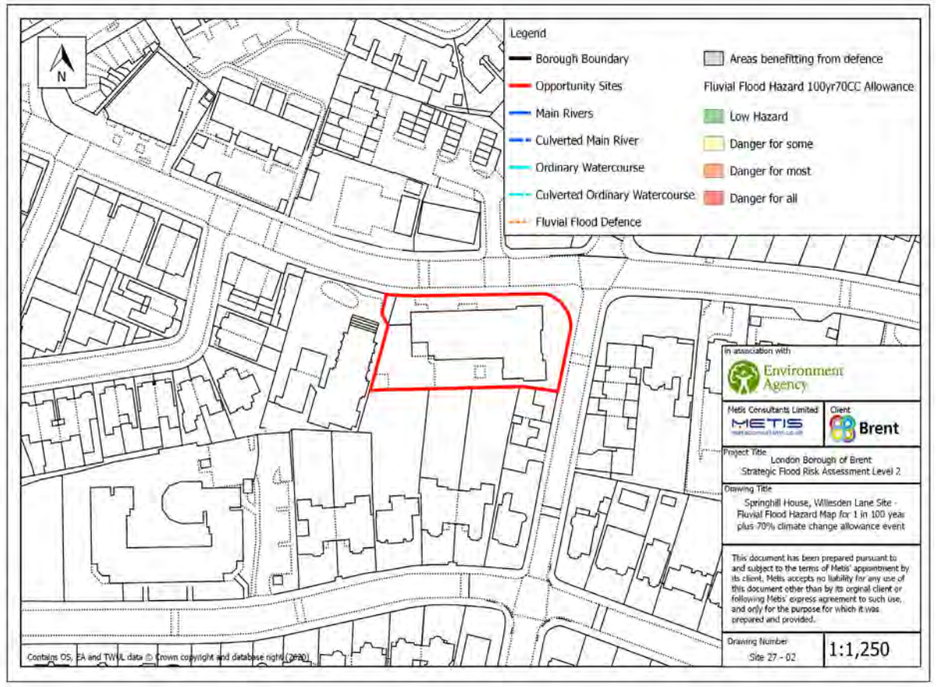


Figure 3 - RoFSW Flood Depth Map

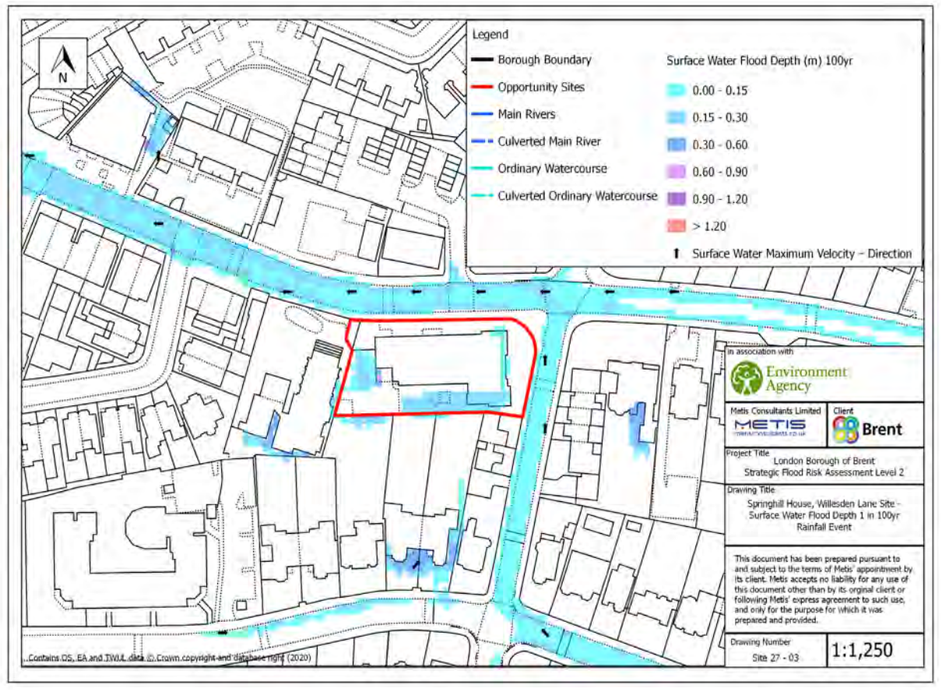


Figure 4 - RoFSW Flood Hazard Map

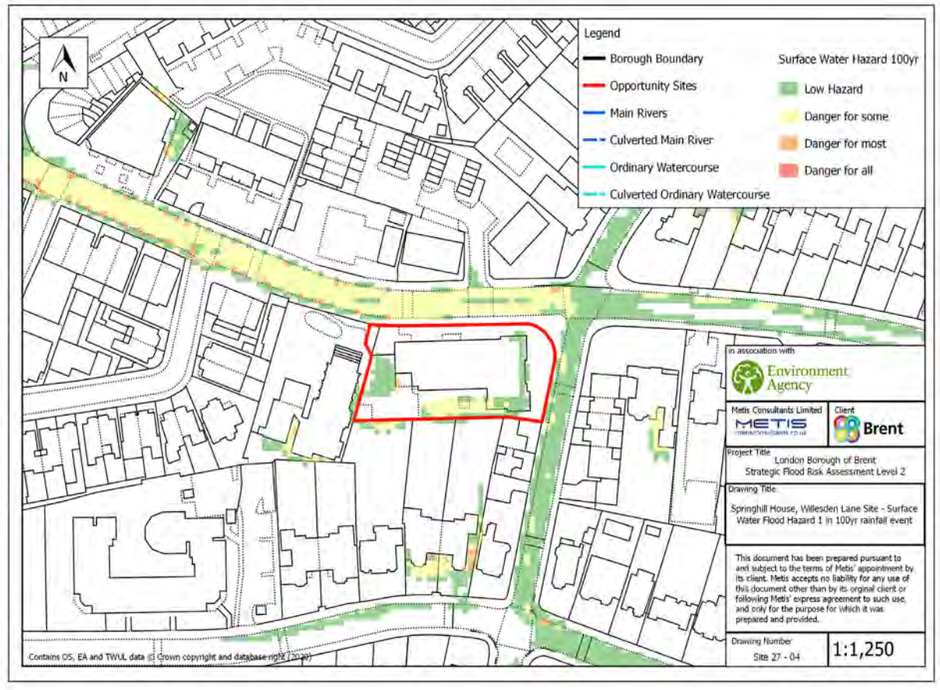


Figure 5 - Thames Water Sewer Flood Map

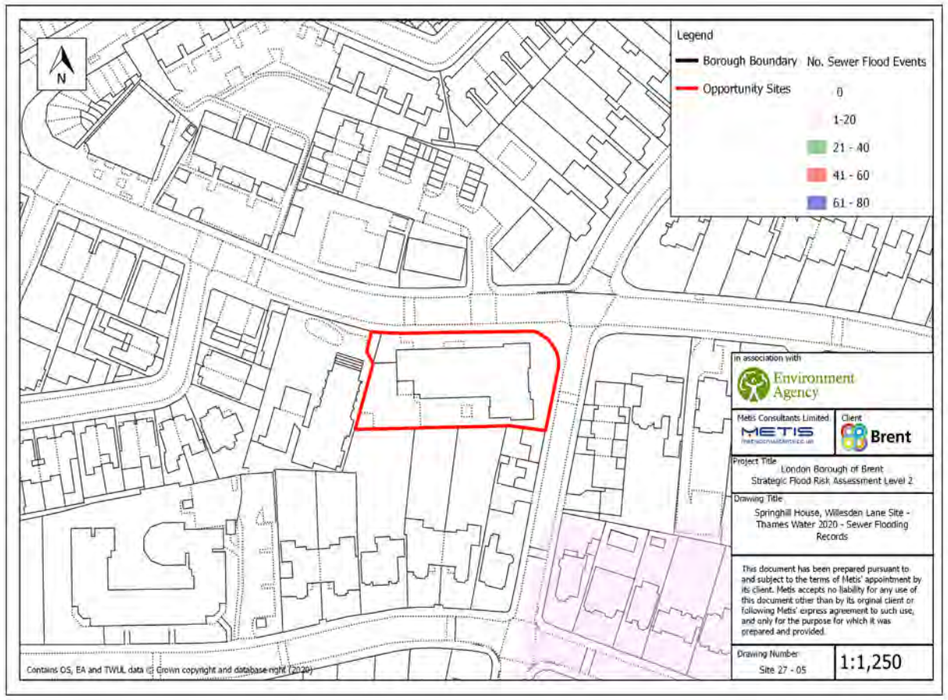


Figure 6 - Areas Susceptible to Groundwater Flooding Map

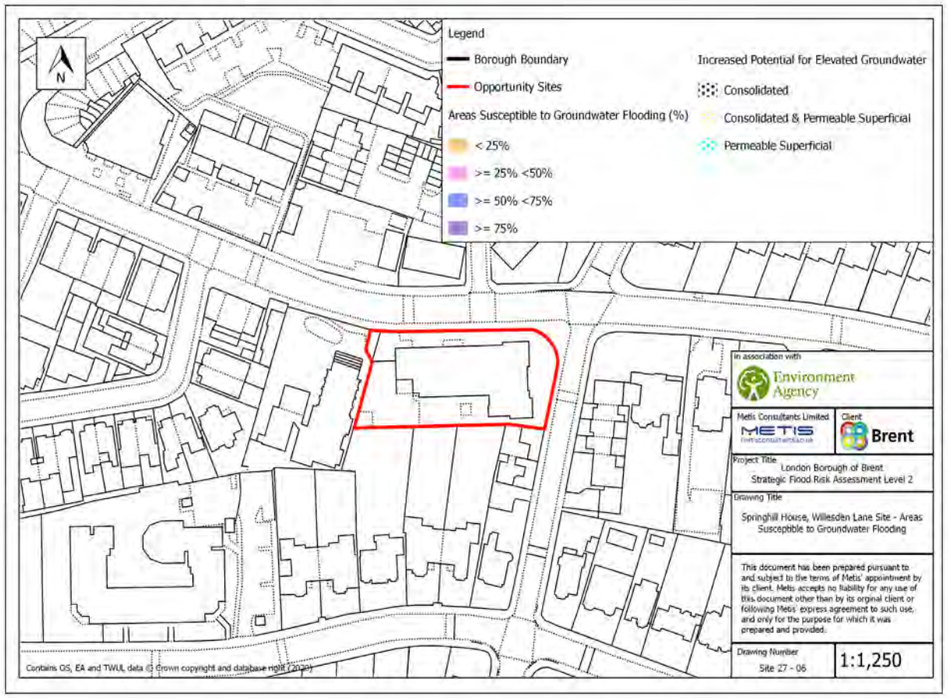
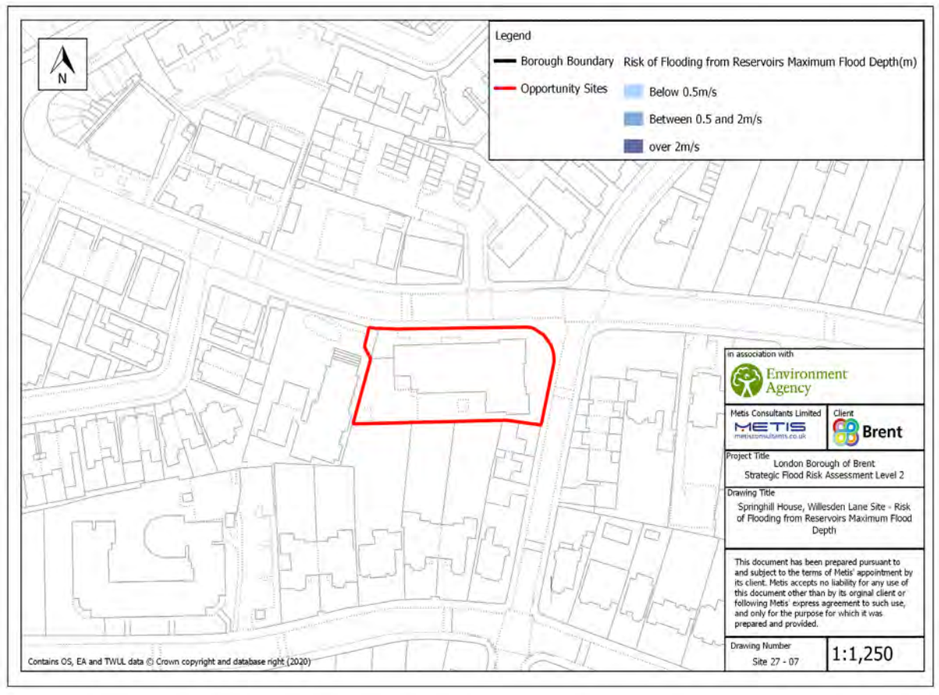


Figure 7 - Outline Reservoir Flood Map



SITE ASSESSMENT - Park Avenue Garage - BSESA25

Address: St Paul's Avenue, NW2 5TG

Area: 0.23 **Ha**

Site Reference: 28

Current Use	Proposed Use
Garage, car park	Residential (100yr design life)

Current Vulnerability Classification	Proposed Vulnerability Classification
Less Vulnerable	More Vulnerable

Current Risk Summary					
Fluvial / Tidal			**Groundwater**		
FZ2	0	% of Site	<25	0	% of Site
FZ3a	0	% of Site	25-50	0	% of Site
FZ3b	0	% of Site	50-75	0	% of Site
Surface Water			>75	0	% of Site
30yr	2	% of Site	**Artificial**		
100yr	25	% of Site	Reservoir	No	At risk?
1000yr	97	% of Site	Canal	No	At risk?
Sewer Flooding			Other	No	At risk?
No. Incidents	0				

Flood Defences

N/A - The site is not protected by any fluvial or tidal flood defences.

FLUVIAL / TIDAL

Risk Assessment (Defended)				
Parameter	**FZ3b**	**FZ3a**	***FZ3a+CC**	**Units**
Speed of inundation	N/A	N/A	N/A	Hrs
Min. Depth	N/A	N/A	N/A	m
Max. Depth	N/A	N/A	N/A	m
Max. Velocity	N/A	N/A	N/A	m/s
Max Flood Level	N/A	N/A	N/A	m AOD
Max Ground Level	N/A	N/A	N/A	m AOD
Min Ground Level	N/A	N/A	N/A	m AOD
Flood Hazard	N/A	N/A	N/A	N/A
Duration of Flood	N/A	N/A	N/A	Hrs

*The +70% Climate Change Allowance event (upper end allowance extreme case) is reviewed

Risk Assessment (Undefended)			
Parameter	**FZ3a**	***FZ3a+CC**	**Units**
Speed of inundation	N/A	N/A	Hrs
Min. Depth	N/A	N/A	m
Max. Depth	N/A	N/A	m
Max. Velocity	N/A	N/A	m/s
Max. Hazard	N/A	N/A	N/A
Duration of Flood	N/A	N/A	Hrs

Description of flood mechanism

N/A - No fluvial / tidal risk is predicted at this site.

Figure 1 - Fluvial Flood Depth Map

Site Access / Egress

N/A - No fluvial / tidal risk is predicted at this site.

Figure 2 - Fluvial Flood Hazard Map

Mitigation / FRA Requirements

N/A - No fluvial / tidal risk is predicted at this site.

SURFACE WATER

Risk Assessment				
Parameter	30yr	100yr	*1000yr	Units
Min. Depth	0	0	0	m
Max. Depth	0-0.15	0.3-0.6	0.9-1.2	m
Max. Velocity	0.25-0.5	1.0-2.0	1.0-2.0	m/s
Max. Hazard	0.5-0.75	1.25-2.0	1.25-2.0	N/A

*The 0.1% annual probability extent represents the potential climate change adjusted impact of current risk

Description of Flood Mechanism

- Surface water enters the site through Park Avenue in the west and back gardens and St Pauls Avenue in the east
- CC will increase the extent and depth of flooding, but it does not increase max velocity or hazard.

Site Access / Egress

- The most flooding occurs on Park Avenue making this exit potentially hazardous.
- A safe access route would need to be directed towards St Paul's Avenue to the southeast of the site, where the risk is the lowest.

Figure 3 - RoFSW Flood Depth Map

Mitigation - Flood Risk Requirements

- See SFRA - Level 2 Report Sections 4.2.1, 4.2.2 and 4.2.3.
- Minimise flood storage lost by limiting development to the west of the site.

Figure 4 - RoFSW Flood Hazard Map

Mitigation - Surface Water Drainage

- A detailed drainage plan must account for 100% of surface water generated from the site and comply with Policy 5.13 of the London Plan and Non-statutory technical standards for SuDS.
- The site is underlain by London Clay - ground investigations are required to confirm whether infiltration based SuDS are suitable.

SITE ASSESSMENT - Park Avenue Garage - BSESA25

SEWER

Risk Assessment

- The area is served by a separate surface water and foul water sewer network.
- There have been no reported sewer flood incidents within the site's post code district.

Figure 5 - Thames Water Sewer Flood Map

Mitigation Requirements

No mitigation measures required.

GROUNDWATER

Risk Assessment

- The site is not susceptible to groundwater flooding.
- There is no increased potential for elevated groundwater based upon the sites underlying geology (Thames Group / London Clay).
- The site overlays an unproductive, minor aquifer (Secondary A)

Figure 6 - Areas Susceptible to Groundwater Flooding Map

Mitigation Requirements

No mitigation measures required.

ARTIFICIAL

Risk Assessment

There is no risk from artificial flooding.

Figure 7 - Outline Reservoir Flood Map

Mitigation Requirements

No mitigation measures required.

PLANNING CONSIDERATIONS

Safety of Development

Can the development future be proofed for climate change considerations?

- Yes. See SFRA - Level 2 Report Sections 4.2.1 and 4.2.2 for the required finished floor level and flood resistant / resilient building requirements. See SFRA - Level 2 Report Section 4.2.3 for requirements regarding compensatory flood storage.
- Development along the western boundary of the site, along Park Avenue and the junction of Park Avenue and the railroad embankment, should be avoided due to high predicted flood depths.

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

- Yes - The development must use proper surface water drainage techniques to manage surface water runoff onsite through above ground SuDS and/or below ground attenuation.

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

- The development land use is changing from a less vulnerable to more vulnerable use classification. Development of more vulnerable use classifications should not be permitted along the western edge of the site.
- Additional surface water modelling may be appropriate to include railroad culverts not represented in the RoFSW modelling. The detailed modelling may provide better insight as to what flood risk mitigation measures are required throughout the site.
- There is no green space currently on-site. Development should include more green space / permeable area, lowering the risk of surface water flooding on and off-site.

How can the development reduce risk overall?

- The site is used as a car park / garage and surface water is unlikely to be controlled off-site. New development can provide better management of runoff through the introduction of SuDS (See Mitigation - Surface Water Drainage). These could include rainwater harvesting, above ground SuDS or below ground attenuation features.
- Focussing development on the eastern side of the site can reduce surface water flood risk to the development.
- Basements developments, except for self-contained basement dwellings, may be appropriate onsite, but a site-specific Flood Risk Assessment must be completed and the basement must not have any adverse impacts on flooding locally during a 1 in 100yr surface water event. Basement dwellings within the 1 in 100yr surface water flood extent may only be permitted if an exceptions test is passed. Basements must contain an egress route to a higher floor above the predicted 1 in 1000yr surface water flood depth. Basements should be made flood resilient.

Will development require a flood risk permit/watercourse consent?

- The site will not require a flood risk permit / watercourse consent as there are no ordinary or main rivers near the site.

Exception Test

The site can be made safe for development throughout its lifetime without increasing flood risk elsewhere (See Safety of Development box). It could also reduce flood risk overall with appropriate surface water drainage and flood storage compensation measures implemented (See Mitigation - Surface Water Drainage and Mitigation - Flood Risk Requirements boxes).

Summary - Site Specific FRA - Key Requirements

Fluvial / Tidal	
No mitigation measures required.	
Surface Water	
• Floor levels must be 0.3m above the predicted 1 in 1000yr event flood depth at any point onsite. • Flood plain compensation must be provided for up to and including a 1 in 1000yr event.	• Development should be located away from Park Avenue. • Flood resistant / resilient buildings required. •See Mitigation - Surface Water Drainage box.
Sewer	
No mitigation measures required.	
Groundwater	
No mitigation measures required.	
Artificial	
No mitigation measures required.	

Figure 1 - Fluvial Flood Depth Map

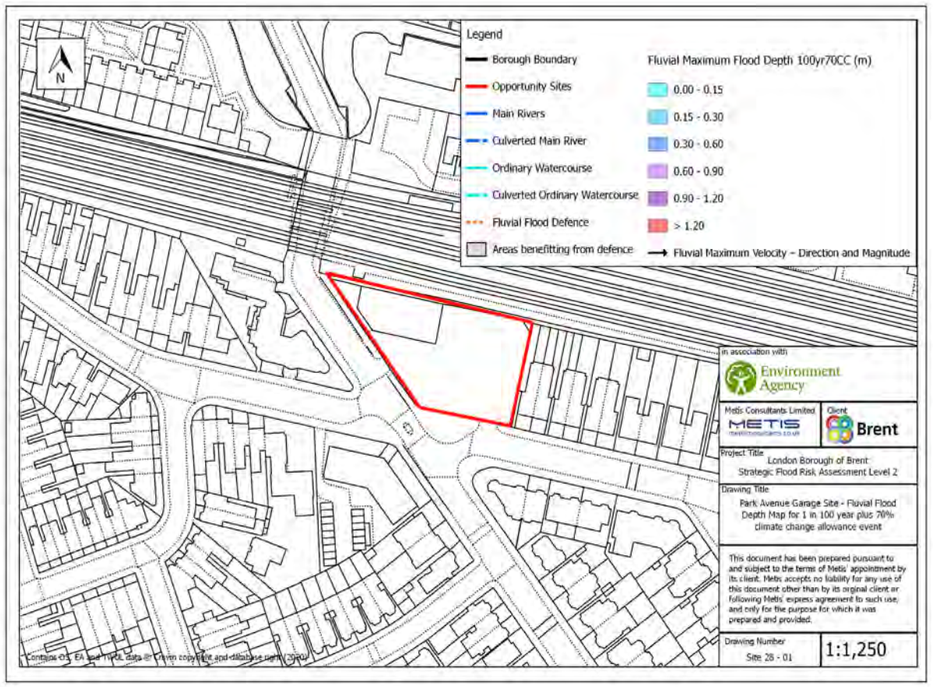


Figure 2 - Fluvial Flood Hazard Map

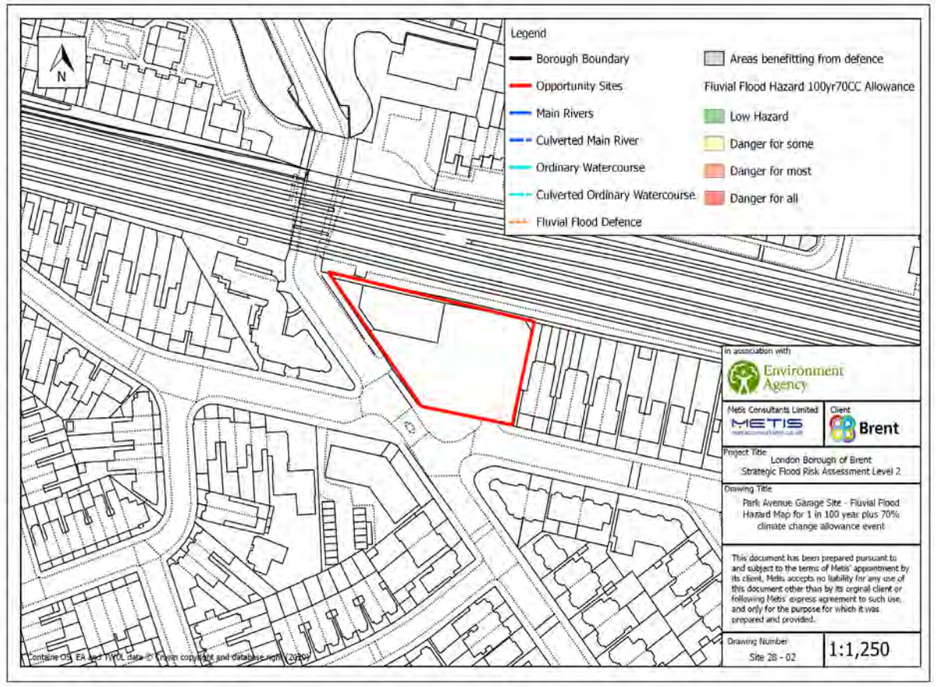


Figure 3 - RoFSW Flood Depth Map

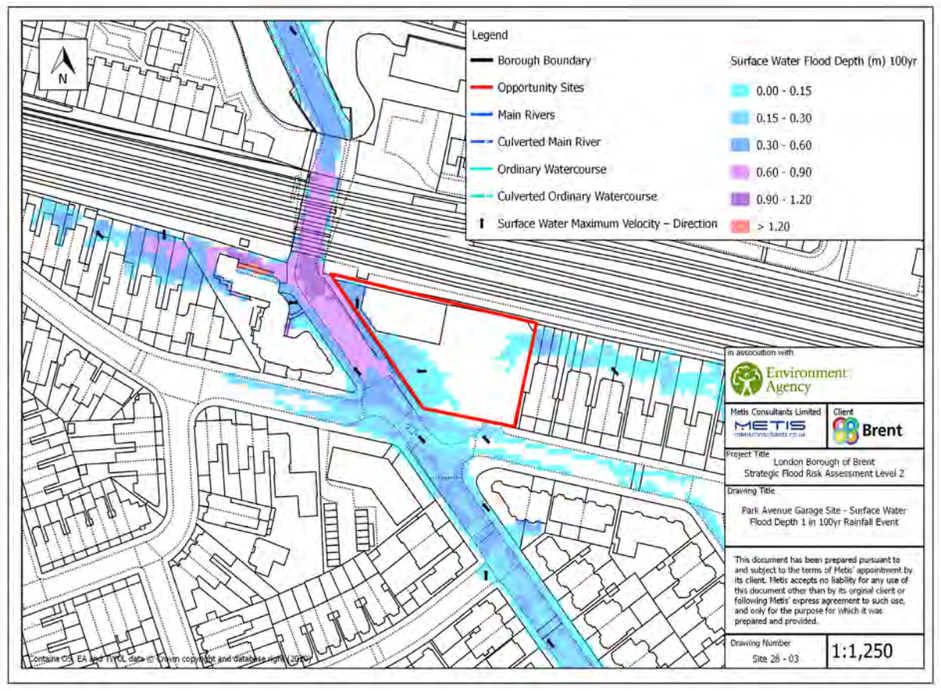


Figure 4 - RoFSW Flood Hazard Map

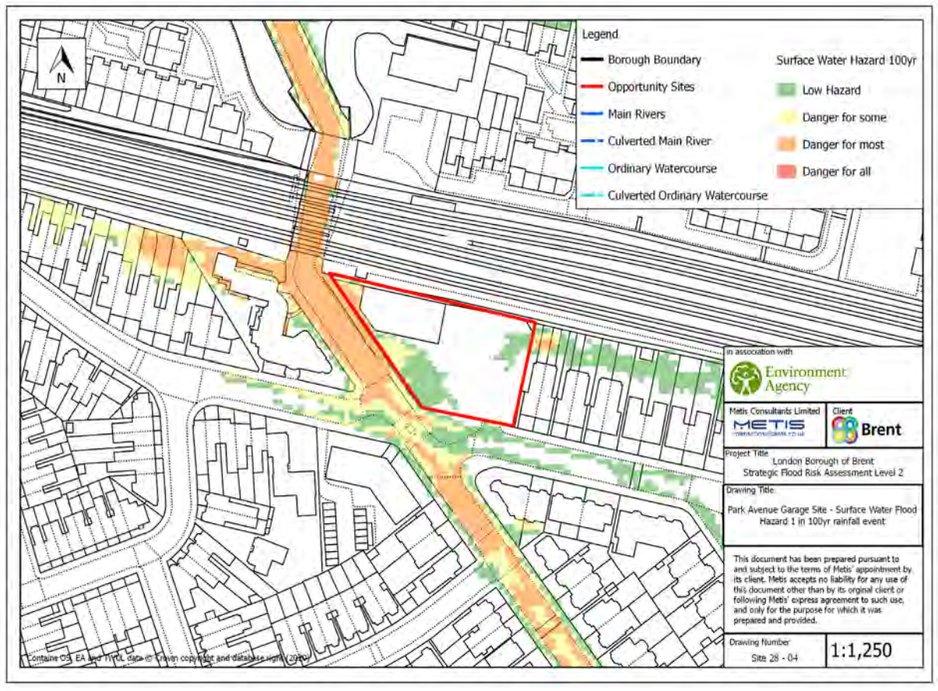


Figure 5 - Thames Water Sewer Flood Map

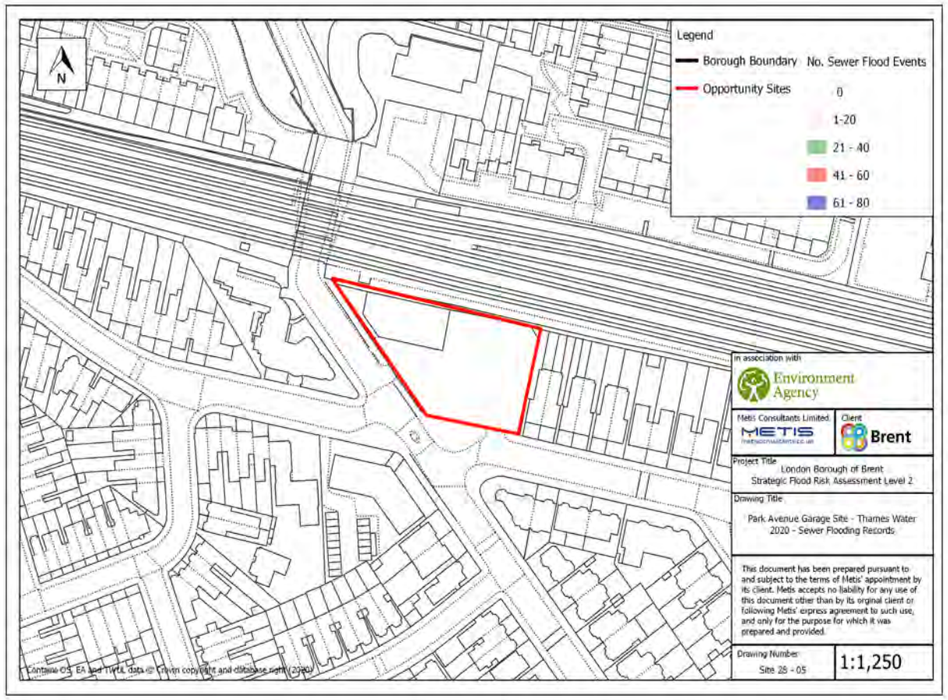


Figure 6 - Areas Susceptible to Groundwater Flooding Map

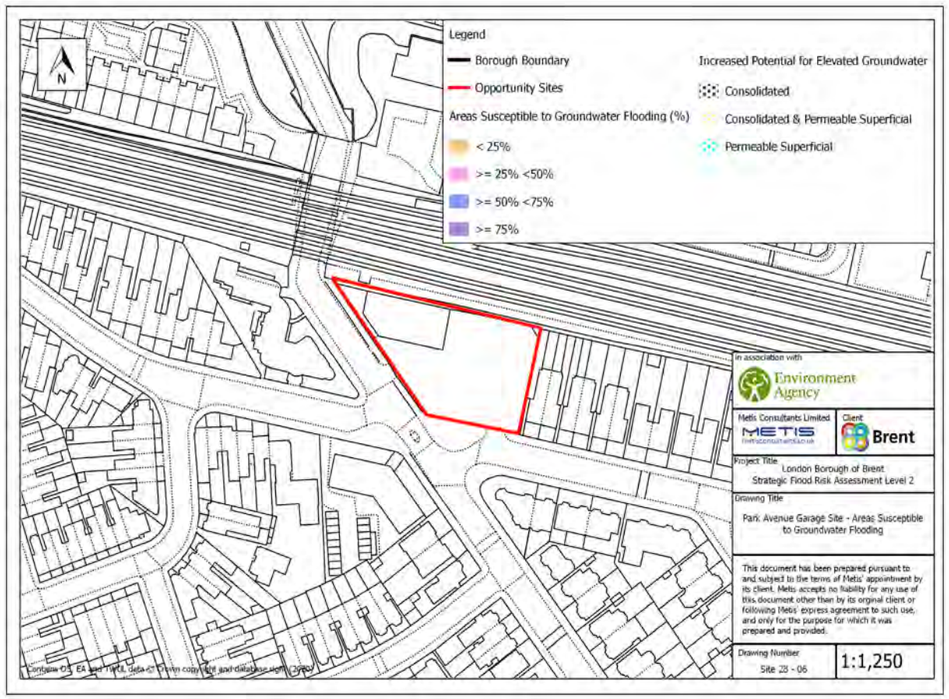


Figure 7 - Outline Reservoir Flood Map