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Introduction

This appendix provides an analysis of flood risk to the allocated development sites within the London Borough of Tower Hamlets (LBTH), in accordance with the National Planning Policy Framework (NPPF) and the National Planning Practice Guidance.

Twenty six development sites have been identified within the Borough, as a part of the ongoing local plan formulation. A brief profile has been created for each of these sites, providing an overview of the various sources of flood risk based on the datasets collated during the production of the Strategic Flood Risk Assessment (SFRA). The source of each of the flood risk datasets is further described in the SFRA Appendix C.

Key recommendations for managing flood risk are provided for each site. The suitability of the proposed development in accordance with the NPPF has been identified and the main requirements for satisfying the Sequential and Exception Tests clarified.

In considering each of these assessment reports, it should be noted that all figures have been adapted from Environment Agency (EA) datasets. Due to the strategic level at which the underlying datasets have been produced, these maps are not appropriate to act as the sole evidence for any site specific planning or regulatory decision or assessment of flood risk.

1 Bishopsgate Goods Yard

1.1 Overview

Bishopsgate Goods Yard is located on Shoreditch High Street and entirely within Flood Zone 1 (Figure 1-1). The site is 4.24 ha and currently occupied by the Shoreditch High Street Overground Station and vacant land. The development proposal comprises redevelopment for housing and compatible commercial uses, including Small and Medium Sized Enterprises (SME). Other infrastructure requirements have been identified as strategic open space and a community civic/local presence facility such as an Idea Store/library/archives facility or leisure facility.

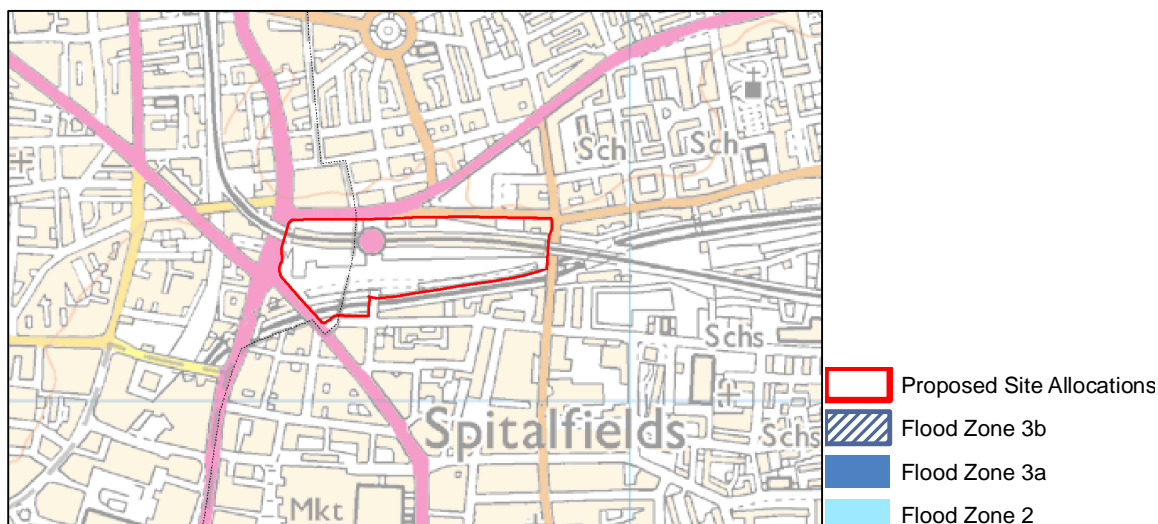


Figure 1-1: Bishopsgate Goods Yard – Flood Zone classification (© Crown Copyright and database right [2016])

The acceptability of the proposed land uses, and requirement for justification in accordance with the NPPF, is summarised in Table 1-1 below.

Table 1-1 – Requirement for justification of proposed land uses

Proposed Use	Vulnerability Classification	NPPF Flood Zone Compatibility	Sequential Test Required?
Housing	More vulnerable	Ü	No*
Employment (including SME)	Less vulnerable	Ü	No*
Open Space	Water compatible	Ü	No*
Community Civic/Local Presence Facility	More vulnerable	Ü	No*

KEY:

✓ Development is appropriate

*The Sequential Test is also required in Flood Zone 1 where the site is impacted by other sources of flood risk

1.2 Assessment of Flood Risk

1.2.1 Flood History

No historic flood events have been identified within this site.

1.2.2 Fluvial and Tidal Flood Risk

The site is located outside the extent of fluvial or tidal flood risk.

1.2.3 Pluvial Flood Risk

The site is generally at low risk of surface water flooding; however, some localised areas of medium to high flood risk are present, particularly along the line of the railway at the site boundary (Figure 1-2).

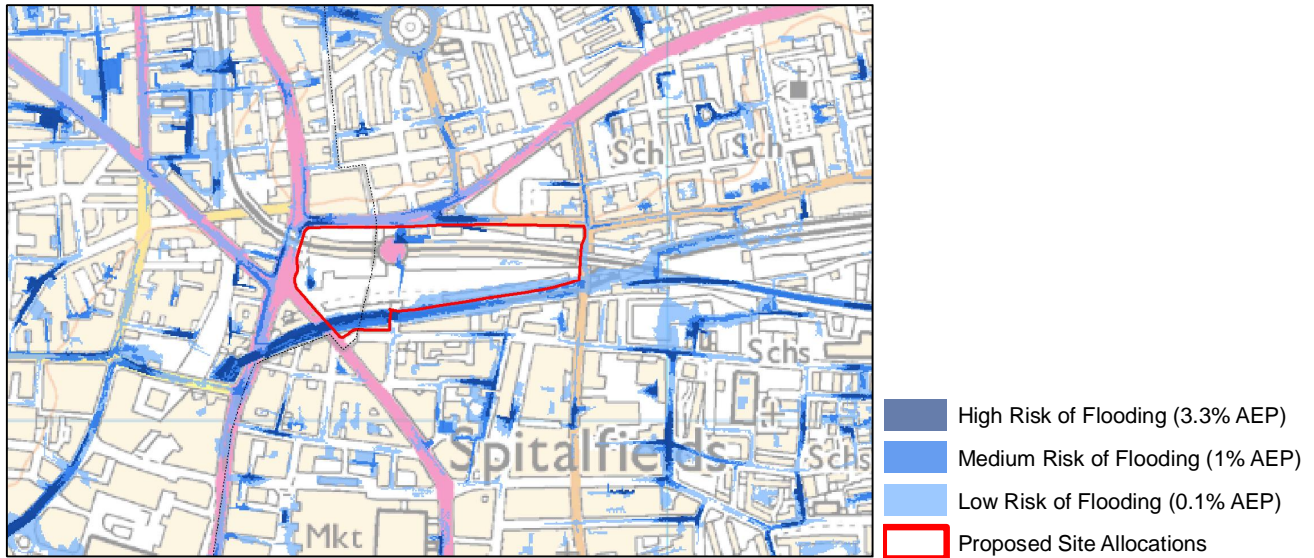


Figure 1-2: Risk of surface water flooding (© Crown Copyright and database right [2016])

1.2.4 Sewer Flood Risk

No information on sewer flood risk has been identified for the site.

1.2.5 Groundwater Flood Risk

Based on geological indicators, the majority of the site area has been identified as having limited potential for groundwater flooding (Figure 1-3). Surrounding areas adjacent to the site boundary have been identified as having potential for groundwater flooding to occur below groundwater.

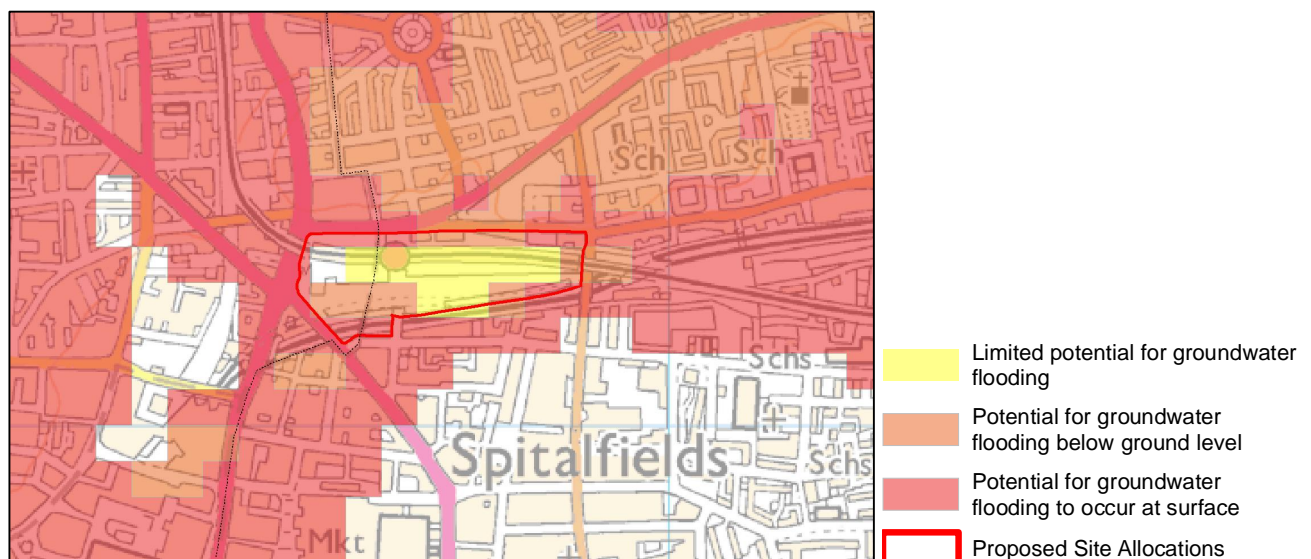


Figure 1-3: Susceptibility to groundwater flooding (© Crown Copyright and database right [2016])

1.2.6 Reservoirs and Artificial Sources of Flood Risk

No artificial sources of flood risk have currently been identified as affecting this site.

1.3 Managing Flood Risk

1.3.1 Conclusions

The site is located in Flood Zone 1 and therefore all planned development is considered appropriate in accordance with the NPPF. However, it is recommended that the Sequential Test is still carried out to confirm that there are no other sites available for development, which are at a lower risk of flooding (from all sources). As the site is greater than a hectare in size, a site-specific FRA will be required to assess all sources of flood risk.

1.3.2 Recommendations

The following flood risk mitigation measures are recommended for this site:

- Ground conditions should be confirmed through site investigation and dewatering of excavations and basement waterproofing implemented where required.
- SuDS should be implemented to manage surface water flood risk and restrict post-development runoff to greenfield rates. Geological data indicates that infiltration SuDS are likely to be suitable for use across the majority of the site. The drainage system should provide sufficient capacity to cater for all events up to the 1 in 100 year storm event, incorporating the latest allowances for climate change.

2 Marian Place Gas Works and the Oval

2.1 Overview

This site is located between Marian Place, The Oval and Emma Street and is entirely within Flood Zone 1 (Figure 2-1). The site has an area of 4.41 ha and is currently occupied by active gas holders and warehousing. The development proposal comprises redevelopment for housing and employment with strategic open space identified as an additional infrastructure requirement.

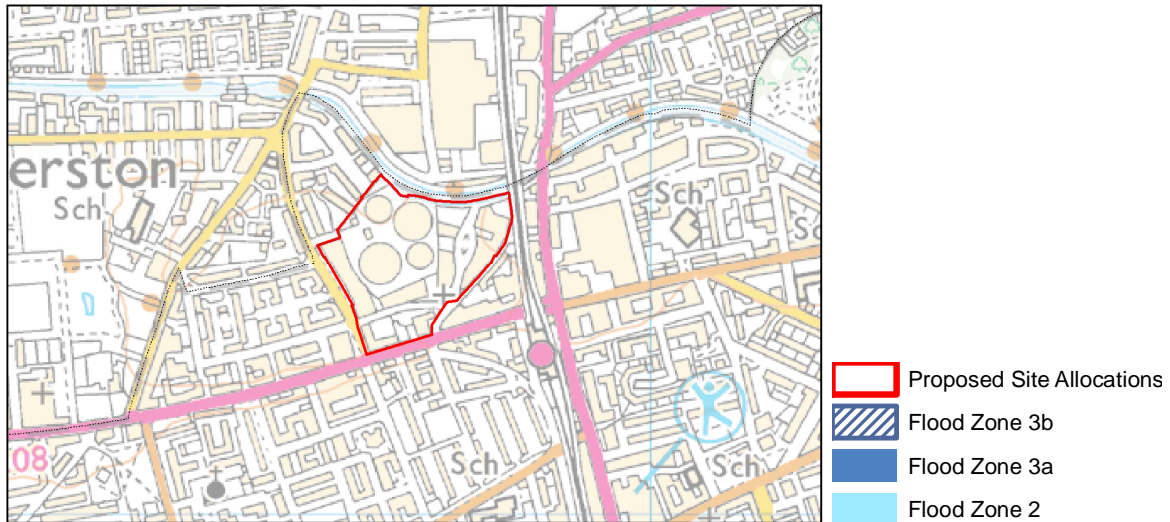


Figure 2-1: Marian Place Gas Works and the Oval – Flood Zone classification (© Crown Copyright and database right [2016])

The acceptability of the proposed land uses, and requirement for justification in accordance with the NPPF, is summarised in Table 2-1 below.

Table 2-1 – Requirement for justification of proposed land uses

Proposed Use	Vulnerability Classification	NPPF Flood Zone Compatibility	Sequential Test Required?
Housing	More vulnerable	ü	No*
Open Space	Water compatible	ü	No*
Employment	Less vulnerable	ü	No*

KEY:

✓ Development is appropriate

*The Sequential Test is also required in Flood Zone 1 where the site is impacted by other sources of flood risk

2.2 Assessment of Flood Risk

2.2.1 Flood History

No historic flood events have been identified within this site.

2.2.2 Fluvial and Tidal Flood Risk

The site is located outside the extent of fluvial or tidal flood risk.

2.2.3 Pluvial Flood Risk

The site is generally at low risk of surface water flooding; however, some localised areas at higher flood risk have been identified to the south east of the site (Figure 2-2).

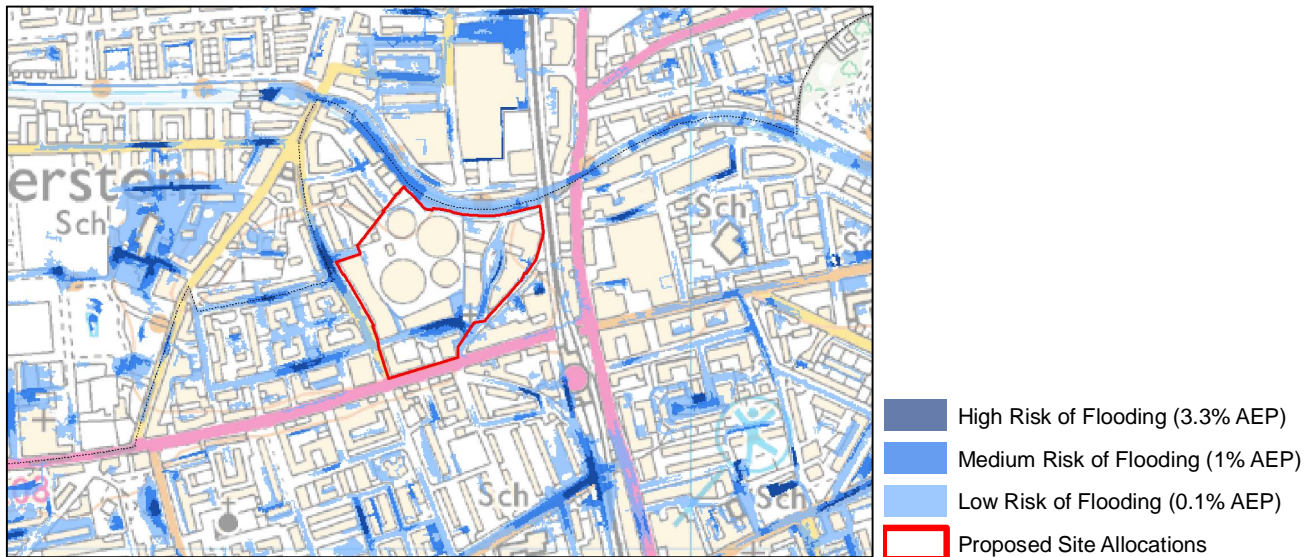


Figure 2-2: Risk of surface water flooding (© Crown Copyright and database right [2016])

2.2.4 Sewer Flood Risk

No information on sewer flood risk has been identified for the site.

2.2.5 Groundwater Flood Risk

Based on geological indicators, the site area has been identified as having the potential for groundwater flooding to occur at surface level (Figure 2-3).

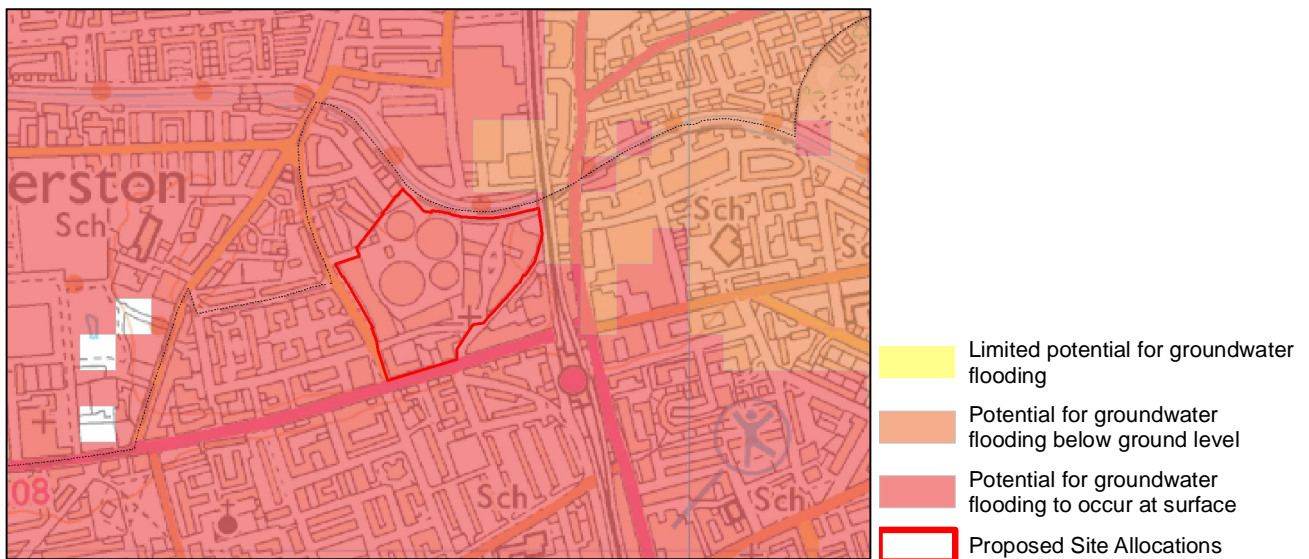


Figure 2-3: Susceptibility to groundwater flooding (© Crown Copyright and database right [2016])

2.2.6 Reservoirs and Artificial Sources of Flood Risk

This site is located adjacent to Regents Canal and flood risk from this source should be considered within the site-specific FRA. No other artificial sources of flood risk have currently been identified as affecting this site.

2.3 Managing Flood Risk

2.3.1 Conclusions

The site is located in Flood Zone 1 and therefore all planned development is considered appropriate in accordance with the NPPF. However, it is recommended that the Sequential Test is still carried out to confirm that there are no other sites available for development, which are at a lower risk of flooding (from all sources).

As the site is greater than a hectare in size, a site-specific FRA will be required to assess all sources of flood risk.

2.3.2 Recommendations

The following flood risk mitigation measures are recommended for this site:

- Ground conditions should be confirmed through site investigation and dewatering of excavations and basement waterproofing implemented where required.
- SuDS should be implemented to manage surface water flood risk and restrict post-development runoff to greenfield rates. Geological data indicates that infiltration SuDS are unlikely to be suitable for use across the majority of the site, so lined attenuation systems may be required. The drainage system should provide sufficient capacity to cater for all events up to the 1 in 100 year storm event, incorporating the latest allowances for climate change.

3 London Dock

3.1 Overview

London Dock is located on Pennington Street and almost entirely within Flood Zone 1, with a small area to the south of the site within Flood Zone 2 and Flood Zone 3a (Figure 3-1). The site has an area of 5.78 ha and is currently vacant with development under construction. The development proposal comprises redevelopment for employment. Other infrastructure requirements have been identified as of a secondary school, a small open space and a health facility.

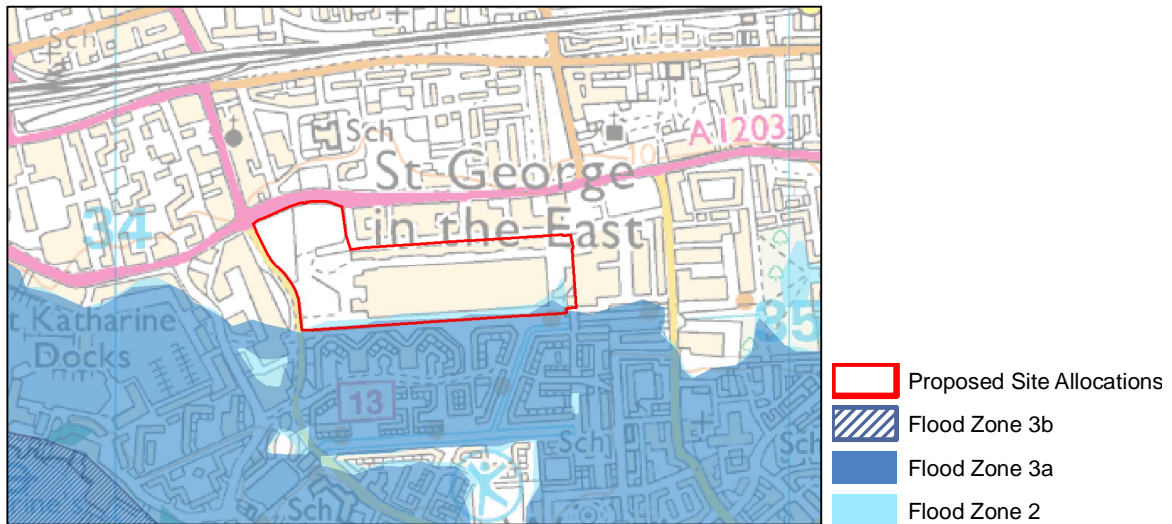


Figure 3-1: London Dock – Flood Zone Classification (© Crown Copyright and database right [2016])

The acceptability of the proposed land uses, and requirement for justification in accordance with the NPPF, is summarised in Table 3-1 below.

Table 3-1 – Requirement for justification of proposed land uses

Proposed Use	Vulnerability Classification	NPPF Flood Zone Compatibility	Sequential Test Required?
Secondary School	More Vulnerable	Exception Test required if proposed in Flood Zone 2 or 3a	In Flood Zone 2 or 3a*
Open Space	Water compatible	✓	In Flood Zone 2 or 3a*
Health Facility	More Vulnerable	Exception Test required if proposed in Flood Zone 2 or 3a	In Flood Zone 2 or 3a*
Housing	More vulnerable	Exception Test required if proposed in Flood Zone 2 or 3a	In Flood Zone 2 or 3a*
Employment	Less vulnerable	Exception Test required if proposed in Flood Zone 3a	In Flood Zone 2 or 3a*

KEY:

✓ Development is appropriate

*The Sequential Test is also required in Flood Zone 1 where the site is impacted by other sources of flood risk

3.2 Assessment of Flood Risk

3.2.1 Flood History

No historic flood events have been identified within this site.

3.2.2 Fluvial and Tidal Flood Risk

The majority of the site is located outside the extent of fluvial or tidal flood risk. However, the southern boundary of the site is located within Flood Zone 2 as associated with the tidal Thames, and therefore deemed at risk of flooding from tidal events between 1 in 200 and 1 in 1,000 annual probability (1% – 0.1% AEP). A small area in the South East of the site is located within Flood Zone 3a, and therefore at risk of flooding for tidal events with a 1 in 200 or greater annual probability (>0.5% AEP).

It should be noted that these flood zones represent the tidal flood risk, ignoring the presence of the Thames Tidal Defences, which provide protection against tidal flooding, up to the 1 in 1000 year event (0.1% AEP). The risk of flooding from this source is therefore residual, associated with failure or breach of flood defences.

3.2.3 Pluvial Flood Risk

The site is generally at low risk of surface water flooding; however, some localised areas at higher flood risk are present across the site, particularly along the northern boundary (Figure 3-2).

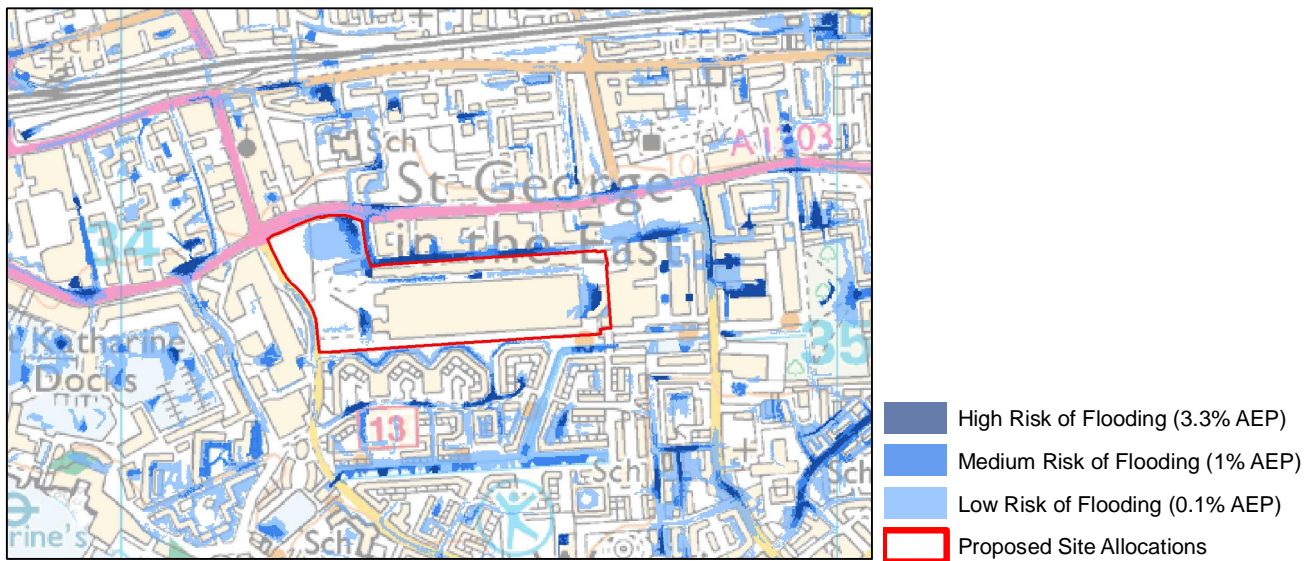


Figure 3-2: Risk of surface water flooding (© Crown Copyright and database right [2016])

3.2.4 Sewer Flood Risk

No information on sewer flood risk has been identified for the site.

3.2.5 Groundwater Flood Risk

Based on geological indicators, the majority of the site is not identified as being susceptible to groundwater flooding, apart from localised areas to the northern and southern extent of the site, which could have the potential for groundwater flooding to occur at the surface (Figure 3-3).

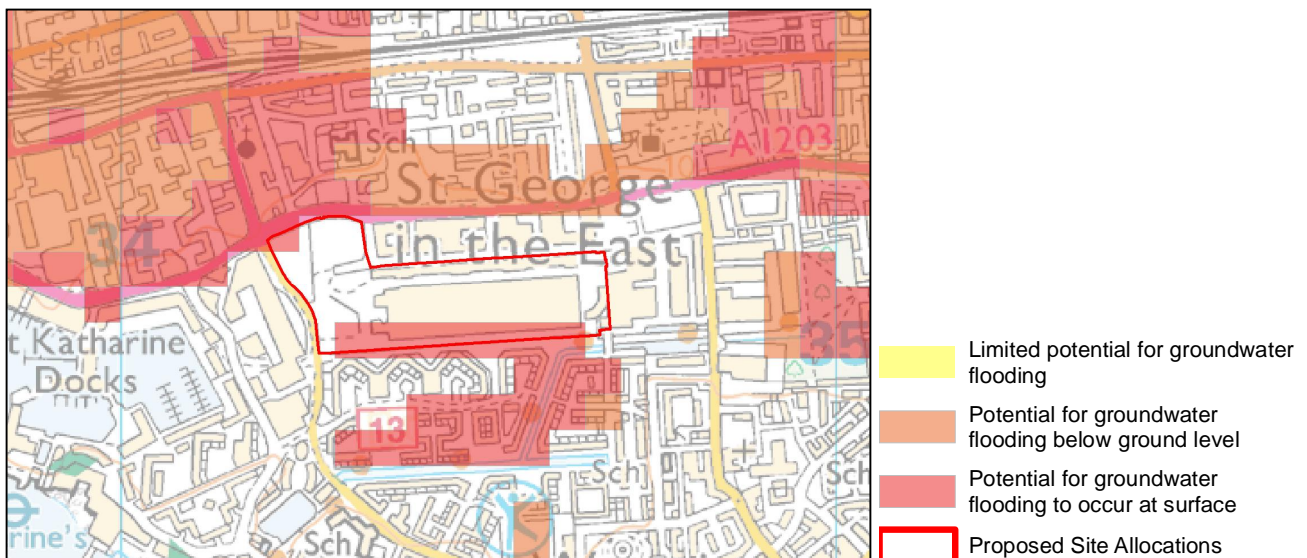


Figure 3-3: Susceptibility to groundwater flooding (© Crown Copyright and database right [2016])

3.2.6 Reservoirs and Artificial Sources

No artificial sources of flood risk have currently been identified as affecting this site.

3.3 Managing Flood Risk

3.3.1 Conclusions

The site is partially located in Flood Zones 2 and 3a and therefore a site-specific FRA is required in accordance with the NPPF. Development should be sequentially located in areas of lowest flood risk (Flood Zone 1), based on land use vulnerability. A Sequential Test will be required for any development in Flood Zone 2 and 3 as well as areas of Flood Zone 1 which are impacted by other sources of flood risk. An Exception Test will additionally be required for any *more vulnerable* development in Flood Zone 3.

3.3.2 Recommendations

The following flood risk mitigation measures are recommended for this site:

- All more vulnerable development should be located away from areas of Flood Zone 2 and 3. If any development is proposed in these areas, Finished Floor Levels should be situated 300 mm above the 2100 year maximum water level anticipated through a breach of the River Thames defences and a route of safe access and egress should be established, towards areas of the site within Flood Zone 1.
- No basement dwellings should be permitted within areas of the site located in Flood Zone 2 or 3a.
- Ground conditions should be confirmed through site investigation and dewatering of excavations and basement waterproofing implemented where required.
- SuDS should be implemented to manage surface water flood risk and restrict post-development runoff to greenfield rates. Geological data suggests that the northern portion of the site is potentially suitable for bespoke infiltration SuDS; however, the southern portion is unlikely to be suitable for infiltration. The drainage system should provide sufficient capacity to cater for up to the 1 in 100 year storm event, incorporating the latest guidance regarding climate change.

4 Bow Common Gas Works

4.1 Overview

Bow Gas Works is located on Bow Common Lane and entirely within Flood Zone 1 (Figure 4-1). The site has an area of 3.94 ha and is currently occupied by active gas holders, warehousing and car parking. The development proposal comprises of redevelopment for housing and employment. Other infrastructure requirements have been identified as a secondary school and strategic open space.

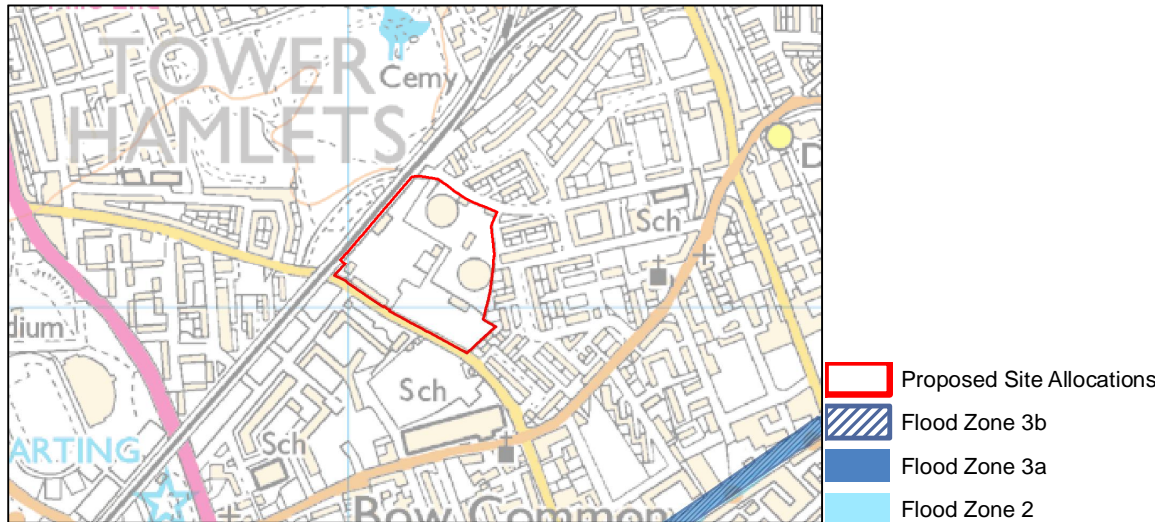


Figure 4-1: Bow Gas Works– Flood Zone classification (© Crown Copyright and database right [2016])

The acceptability of the proposed land uses, and requirement for justification in accordance with the NPPF, is summarised in Table 4-1 below.

Table 4-1 – Requirement for justification of proposed land uses

Proposed Use	Vulnerability Classification	NPPF Flood Zone Compatibility	Sequential Test Required?
Housing	More vulnerable	Ü	No*
Employment	Less vulnerable	Ü	No*
Secondary School	More vulnerable	Ü	No*
Open Space	Water Compatible	Ü	No*

KEY:

✓ Development is appropriate

*The Sequential Test is also required in Flood Zone 1 where the site is impacted by other sources of flood risk

4.2 Assessment of Flood Risk

4.2.1 Flood History

No historic flood events have been identified within this site.

4.2.2 Fluvial and Tidal Flood Risk

The site is located outside the extent of fluvial or tidal flood risk.

4.2.3 Pluvial Flood Risk

The site is generally at low risk of surface water flooding; however, some localised areas at higher flood risk are present across the site (Figure 4-2).

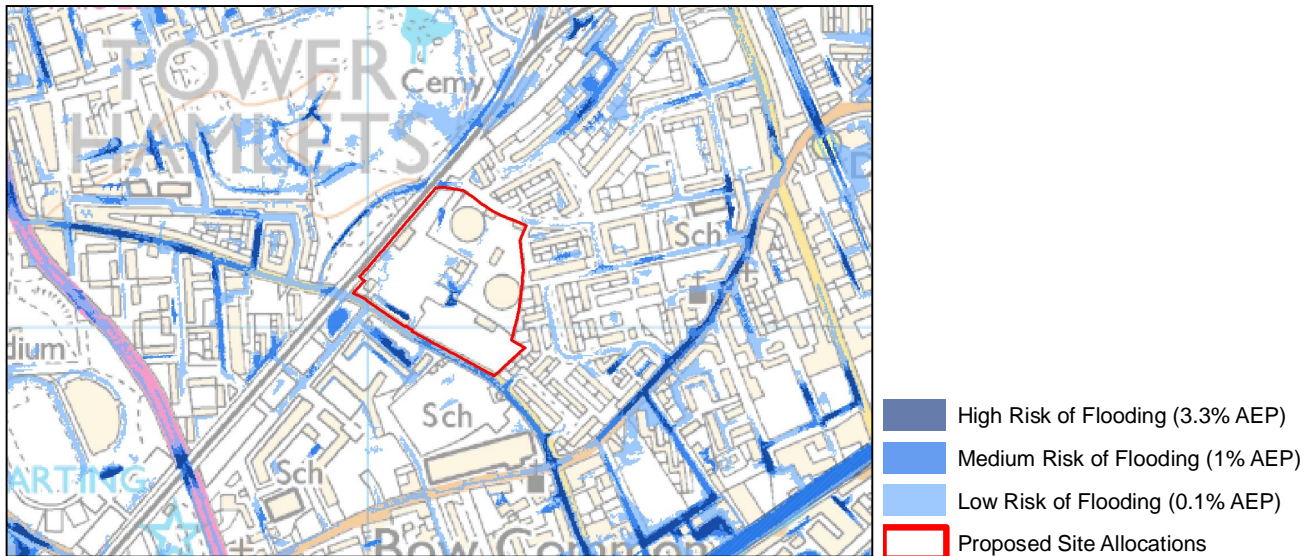


Figure 4-2: Risk of surface water flooding (© Crown Copyright and database right [2016])

4.2.4 Sewer Flood Risk

No information on sewer flood risk has been identified for the site.

4.2.5 Groundwater Flood Risk

Based on geological indicators, the site is suggested to have the potential for groundwater flooding to occur below ground level (Figure 4-3).

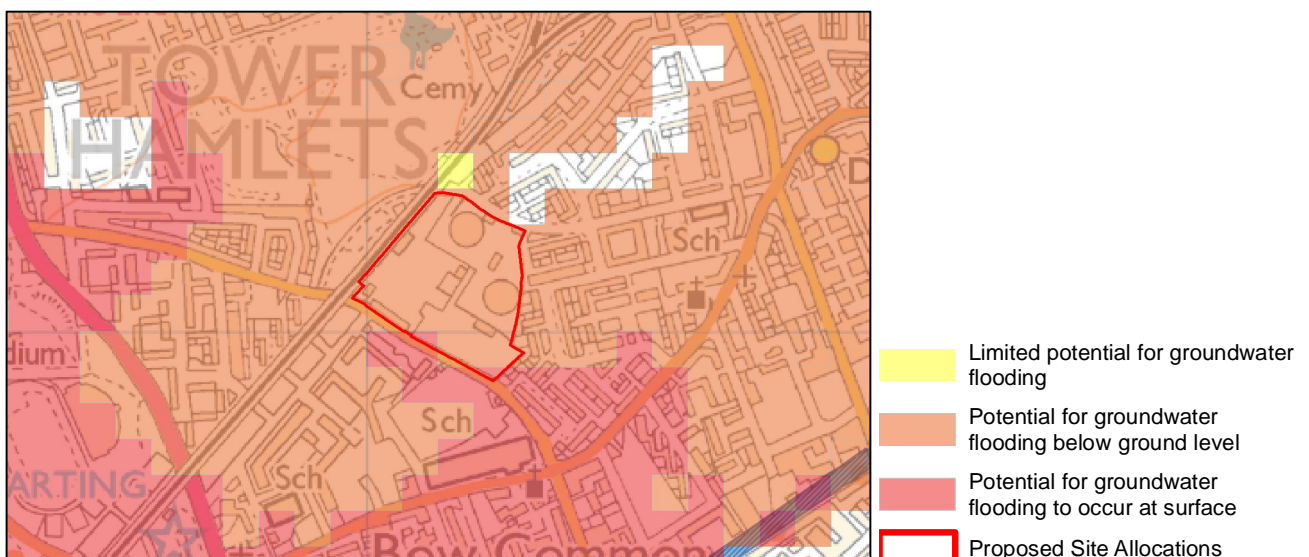


Figure 4-3: Susceptibility to groundwater flooding (© Crown Copyright and database right [2016])

4.2.6 Reservoirs and Artificial Sources of Flood Risk

No artificial sources of flood risk have currently been identified as affecting this site.

4.3 Managing Flood Risk

4.3.1 Conclusions

The site is located in Flood Zone 1 and therefore all planned development is considered appropriate in accordance with the NPPF. However, it is recommended that the Sequential Test is still carried out to confirm that there are no other sites available for development, which are at a lower risk of flooding (from all sources). As the site is greater than a hectare in size, a site-specific FRA will be required to assess all sources of flood risk.

4.3.2 Recommendations

The following flood risk mitigation measures are recommended for this site:

- Ground conditions should be confirmed through site investigation and dewatering of excavations and basement waterproofing implemented where required.
- SuDS should be implemented to manage surface water flood risk and restrict post-development runoff to greenfield rates. Geological data indicates that infiltration SuDS are unlikely to be suitable for use across the majority of the site, so lined attenuation systems may be required. The drainage system should provide sufficient capacity to cater for all events up to the 1 in 100 year storm event, incorporating the latest allowances for climate change.

5 Crisp Street Town Centre

5.1 Overview

Crisp Street Town Centre is located between Crisp Street, East India Road and Kerbey Street and located within Flood Zone 2, although the eastern site extent borders an area of Flood Zone 3a (Figure 5-1). The site has an area of 3.92 ha and is currently occupied by shops, community facilities, an idea store, public houses, cafes, a market and housing. The development proposal comprises mixed use redevelopment for housing, commercial, retail and other supporting uses. An idea store (re-provision) has been identified as an additional infrastructure requirement.

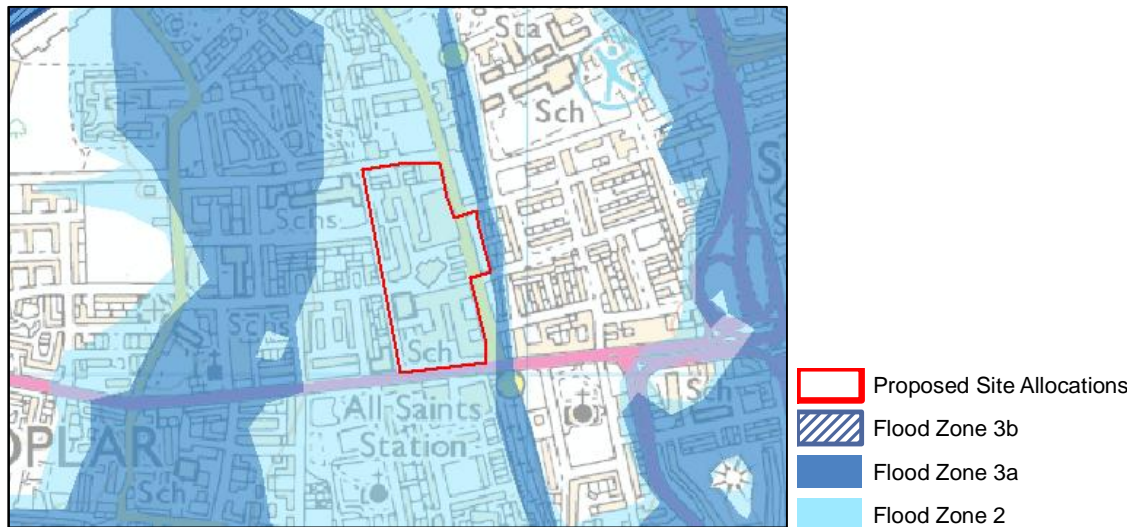


Figure 5-1: Crisp Street Town Centre – Flood Zone classification (© Crown Copyright and database right [2016])

The acceptability of the proposed land uses, and requirement for justification in accordance with the NPPF, is summarised in Table 5-1 below.

Table 5-1 – Requirement for justification of proposed land uses

Proposed Use	Vulnerability Classification	NPPF Flood Zone Compatibility	Sequential Test Required?
Housing	More vulnerable	Ü	Yes
Retail	Less vulnerable	Ü	Yes
Idea store	More vulnerable	Ü	Yes
Commercial	Less vulnerable	Ü	Yes

KEY:

✓ Development is appropriate

5.2 Assessment of Flood Risk

5.2.1 Flood History

No historic flood events have been identified within this site.

5.2.2 Fluvial and Tidal Flood Risk

The site is located within Flood Zone 2 as associated with the tidal Thames, and therefore deemed at risk of flooding from tidal events between 1 in 200 and 1 in 1,000 annual probability (1% – 0.1% AEP).

It should be noted that these flood zones represent the tidal flood risk, ignoring the presence of the Thames Tidal Defences, which provide protection against tidal flooding, up to the 1 in 1000 year event (0.1% AEP). The risk of flooding from this source is therefore residual, associated with failure or breach of flood defences.

5.2.3 Pluvial Flood Risk

The site is generally at low risk of surface water flooding; however, some localised areas at higher flood risk are present across the site (Figure 5-2).

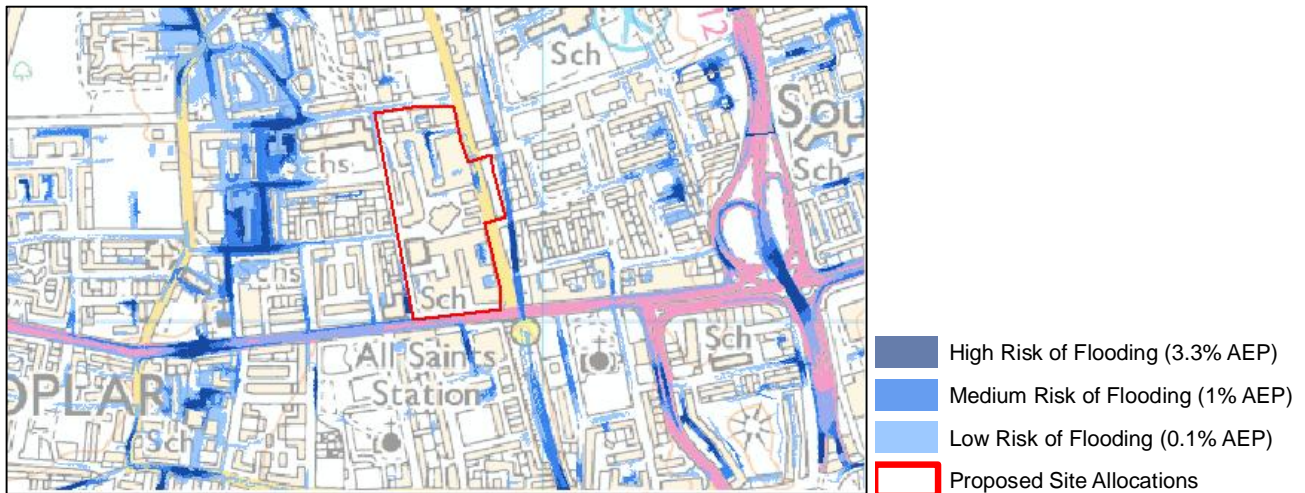


Figure 5-2: Risk of surface water flooding (© Crown Copyright and database right [2016])

5.2.4 Sewer Flood Risk

No information on sewer flood risk has been identified for the site.

5.2.5 Groundwater Flood Risk

Based on geological indicators, the southern portion of the site is suggested to have the potential for groundwater flooding to occur below ground level (Figure 5-3).

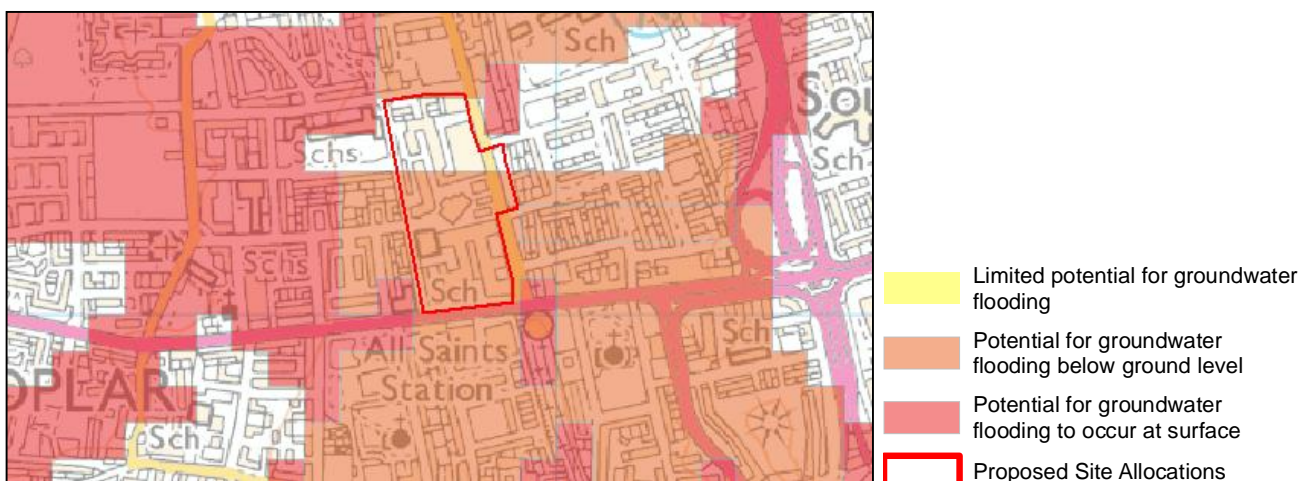


Figure 5-3: Susceptibility to groundwater flooding (© Crown Copyright and database right [2016])

5.2.6 Reservoirs and Artificial Sources of Flood Risk

No artificial sources of flood risk have currently been identified as affecting this site.

5.3 Managing Flood Risk

5.3.1 Conclusions

The site is located in Flood Zone 2 and therefore a site-specific FRA is required for the development in accordance with the NPPF. As the site is in Flood Zone 2, a Sequential Test is required for the development.

5.3.2 Recommendations

The following flood risk mitigation measures are recommended for this site:

- Finished Floor Levels should be situated 300 mm above the 2100 year maximum water level anticipated through a breach of the River Thames defences.
- Site specific emergency evacuation procedures should be established to ensure that the risk to life is minimised should a breach of the River Thames defences occur, and a route of safe access and egress should be established, towards Flood Zone 1.
- Basement dwellings should only be permitted within the site subject to the proposals passing the Exception Test.
- Ground conditions should be confirmed through site investigation and dewatering of excavations and basement waterproofing implemented where required.
- SuDS should be implemented to manage surface water flood risk and restrict post-development runoff to greenfield rates. Geological data indicates that infiltration SuDS are likely to be suitable for use, although bespoke design is likely to be required in the southern portion of the site. The drainage system should provide sufficient capacity to cater for up to the 1 in 100 year storm event, incorporating the latest guidance regarding climate change.

6 Ailsa Street

6.1 Overview

This site is located on Ailsa Street and entirely within Flood Zone 3a (Figure 6-1). The site has an area of 5.76 ha and is currently occupied by industrial activities, a former primary school and vacant land. The development proposal comprises mixed-use redevelopment for housing and commercial uses, including employment. Other infrastructure requirements have been identified as a primary school and a small open space.

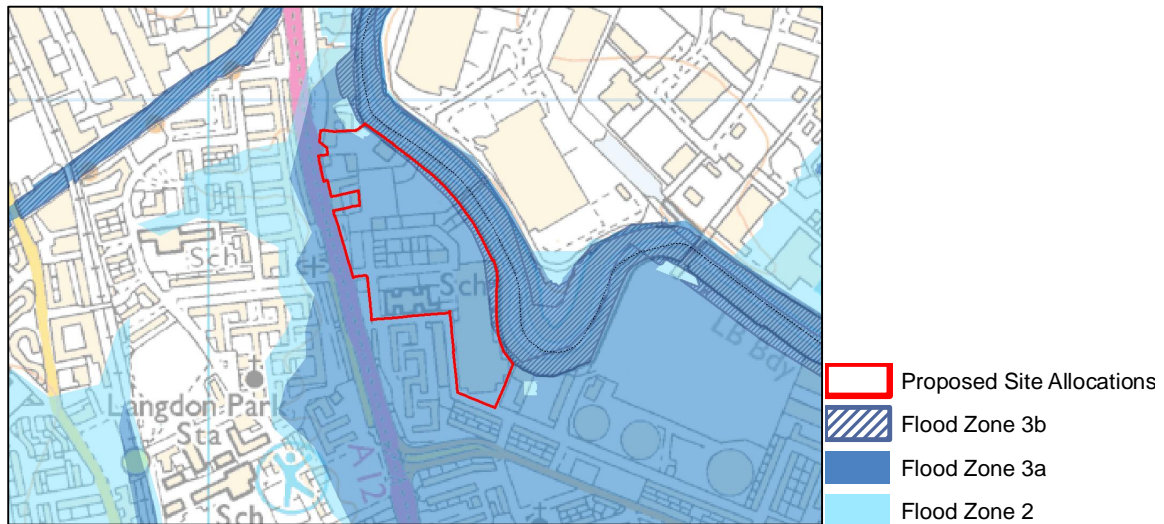


Figure 6-1: Ailsa Street – Flood Zone classification (© Crown Copyright and database right [2016])

The acceptability of the proposed land uses, and requirement for justification in accordance with the NPPF, is summarised in Table 6-1 below.

Table 6-1 – Requirement for justification of proposed land uses

Proposed Use	Vulnerability Classification	NPPF Flood Zone Compatibility	Sequential Test Required?
Housing	More vulnerable	Exception Test Required	Yes
Employment	Less vulnerable	ü	Yes
Primary School	More vulnerable	Exception Test Required	Yes
Open Space	Water compatible	ü	Yes
Commercial	Less vulnerable	ü	Yes

KEY:

✓ Development is appropriate

6.2 Assessment of Flood Risk

6.2.1 Flood History

The site is located within the extent of historic tidal flooding from the River Thames.

6.2.2 Fluvial and Tidal Flood Risk

The site is located within Flood Zone 3a, associated with the Tidal Thames, and therefore at risk of flooding for tidal events with a 1 in 200 or greater annual probability (>0.5% AEP).

The Flood Zone classification represents the tidal flood risk ignoring the presence of the Thames Tidal Defences, which provide protection against tidal flooding up to the 1 in 1000 year event (0.1% AEP). The risk of flooding from this source is therefore residual, associated with failure or breach of flood defences.

The distribution of maximum flood hazard across the site, as modelled during a 2100 year breach scenario is indicated in Figure 6-2

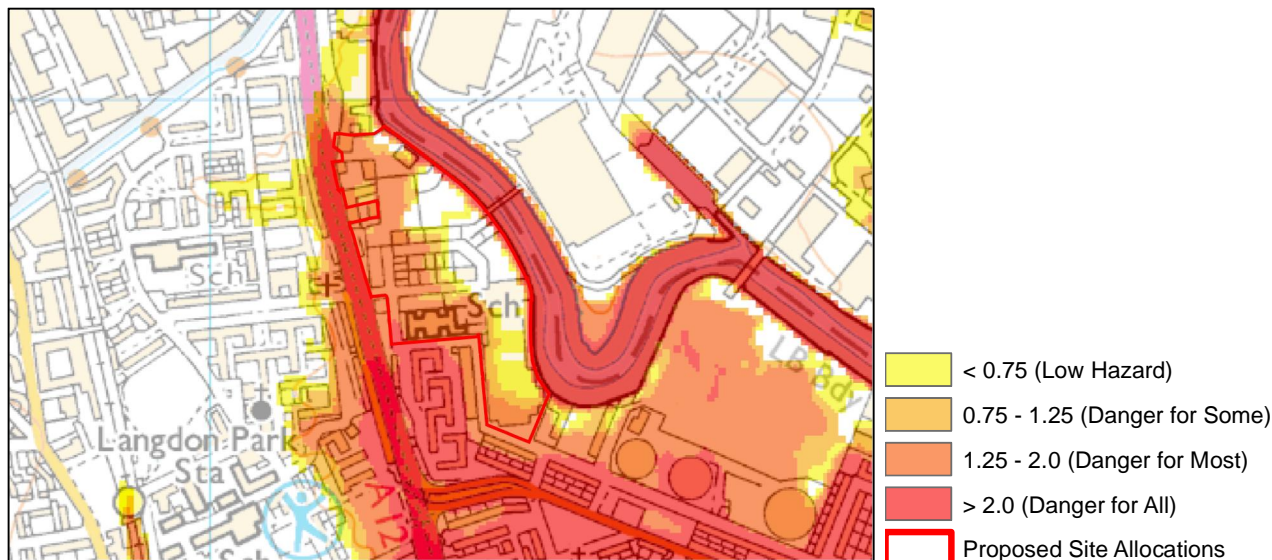


Figure 6-2: 2100 year breach flood hazard (© Crown Copyright and database right [2016])

6.2.3 Pluvial Flood Risk

The site is generally shown to be at low risk of surface water flooding (Figure 6-3). However, the site is also partially located within a Critical Drainage Area, indicating a high susceptibility to surface water flooding towards the south west of the site.

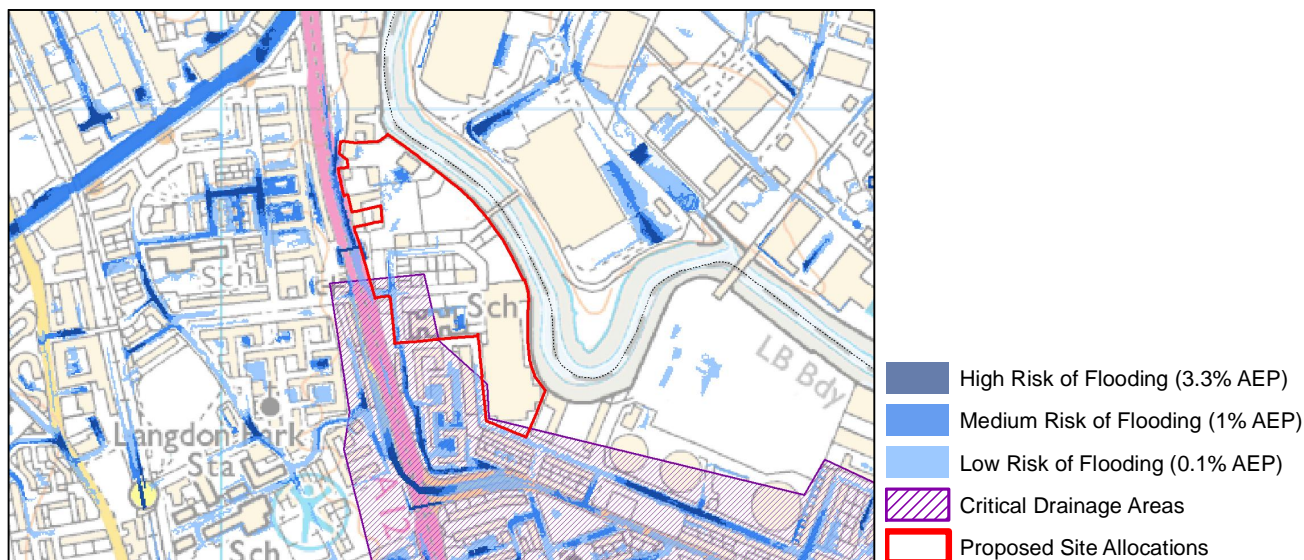


Figure 6-3: Risk of surface water flooding (© Crown Copyright and database right [2016])

6.2.4 Sewer Flood Risk

No information on sewer flood risk has been identified for the site.

6.2.5 Groundwater Flood Risk

Based on geological indicators, the majority of the site is not expected to be susceptible to groundwater flooding, apart from a localised area in the north western corner, which is suggested to have the potential for groundwater flooding to occur at surface level (Figure 6-4).

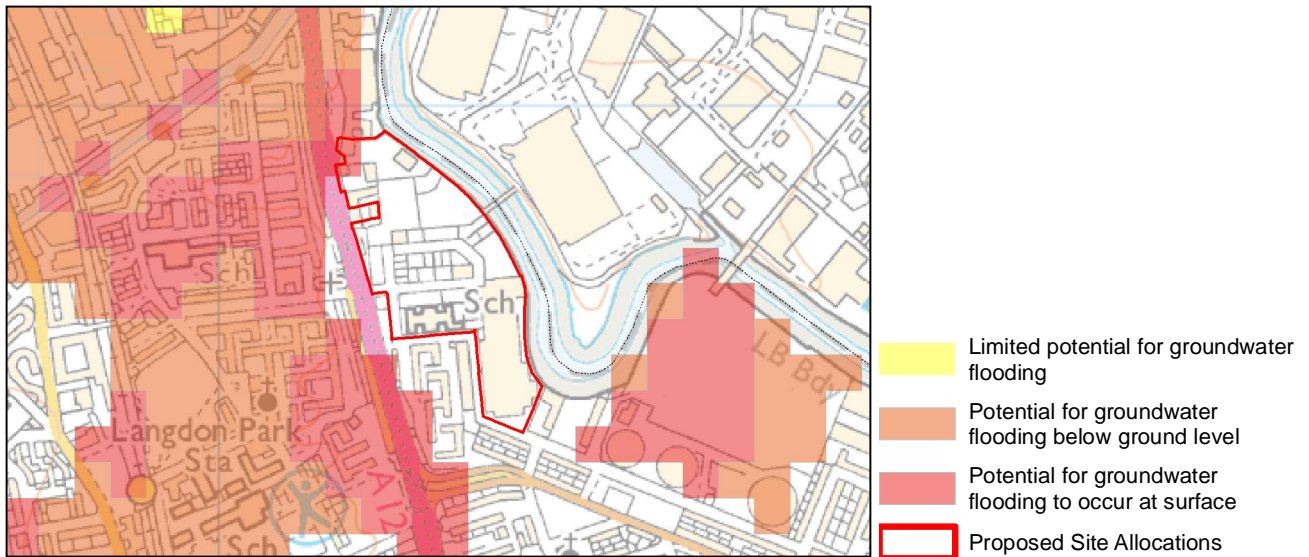


Figure 6-4: Susceptibility to groundwater flooding (© Crown Copyright and database right [2016])

6.2.6 Reservoirs and Artificial Sources

The Ailsa street site is within the extent of flooding anticipated through breach or failure of upstream reservoirs (Figure 6-5).

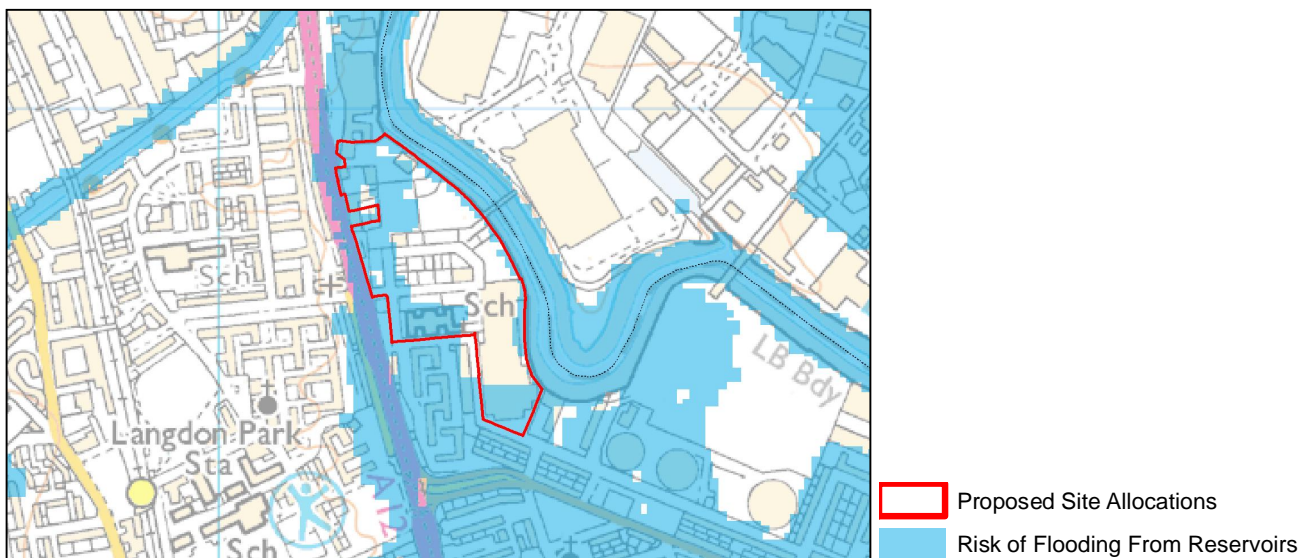


Figure 6-5: Risk of Reservoir Flooding (© Crown Copyright and database right [2016])

6.3 Managing Flood Risk

6.3.1 Conclusions

The site is located in Flood Zone 3a and therefore a site-specific FRA is required in accordance with the NPPF. As the development comprises of *more* and *less vulnerable* land uses, a Sequential Test and Exception Test is required for the development.

6.3.2 Recommendations

The following flood risk mitigation measures are recommended for this site:

- More vulnerable development should be sequentially allocated to areas of the site at lower relative risk of flooding (considering the flood hazard distribution across the site), with more flood compatible development (such as parking or open space) located in areas at the highest risk.

- The development site is located adjacent to the River Lee and a 16 m buffer strip must be maintained along the river corridor. Demonstration will be required that the associated flood defences will be safe over the lifetime of the development, including any required maintenance and improvements. Consideration should be given to the recommendations of the TE2100 plan and advice sought from the EA at an early stage.
- The impact of revised climate change allowances on fluvial flood risk from the River Lee should be considered in assessment of flood risk and mitigation.
- No basement dwellings should be permitted within the site.
- To mitigate against residual tidal flood risk, Finished Floor Levels should be raised 300 mm above the 2100 year maximum water level anticipated through a breach of the River Thames defences.
- Site specific emergency evacuation procedures must be in place to ensure that the risk to life is minimised should a breach of the River Thames defences occur. Safe access and egress routes should be provided above the 2100 breach flood level and lead to higher ground within Flood Zone 1. For residential developments where this is not feasible, a dedicated 'safe haven' can be provided above the flood level to enable rapid escape should defence failure occur. This may be provided in the form of a sheltered communal space within the building, accessed via internal stairs and sufficient in size to safely house all residents.
- Flood resilient construction techniques should be employed to reduce damage and increase the speed of recovery should any flooding events occur.
- Ground conditions should be confirmed through site investigation and dewatering of excavations and basement waterproofing implemented where required.
- The site is partially located within a Critical Drainage Area and therefore robust surface water management will be critical for the development. SuDS should be implemented to manage surface water flood risk and restrict post-development runoff to greenfield rates. Geological data indicates that the site may be potentially suitable for bespoke infiltration SuDS. The drainage system should provide sufficient capacity to cater for up to the 1 in 100 year storm event, incorporating the latest guidance regarding climate change.
- Consideration should be given to emergency planning to manage the risk of flooding from reservoir breach.

7 Leven Road Gas Works

7.1 Overview

Leven Road Gas Works is located on Leven Road and entirely within Flood Zone 3a (Figure 7-1). The site has an area of 8.56 ha and is currently occupied by active gas holders. The development proposal is for housing and employment. Other infrastructure requirements have been identified as a secondary school and strategic open space.

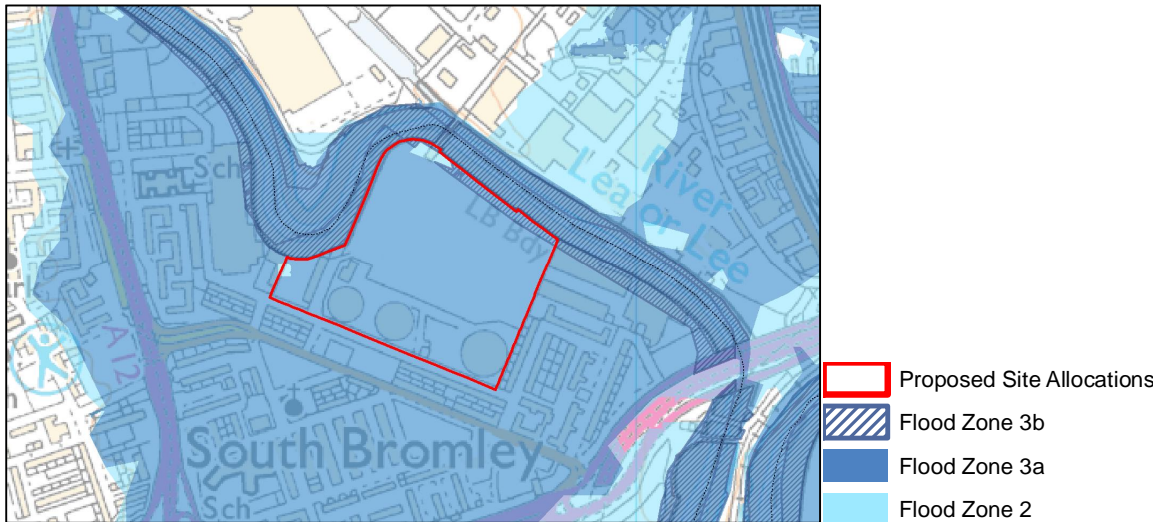


Figure 7-1: Leven Road Gas Works – Flood Zone classification (© Crown Copyright and database right [2016])

The acceptability of the proposed land uses, and requirement for justification in accordance with the NPPF, is summarised in Table 7-1 below.

Table 7-1 – Requirement for justification of proposed land uses

Proposed Use	Vulnerability Classification	NPPF Flood Zone Compatibility	Sequential Test Required?
Housing	More vulnerable	Exception Test Required	Yes
Secondary School	More vulnerable	Exception Test Required	Yes
Open Space	Water compatible	ü	Yes
Employment	Less vulnerable	ü	Yes

KEY:
 ✓ Development is appropriate

7.2 Assessment of Flood Risk

7.2.1 Flood History

The site is located within the extent of historic tidal flooding from the River Thames.

7.2.2 Fluvial and Tidal Flood Risk

The site is located within Flood Zone 3a, associated with the Tidal Thames, and therefore at risk of flooding for tidal events with a 1 in 200 or greater annual probability (>0.5% AEP).

The Flood Zone classification represents the tidal flood risk ignoring the presence of the Thames Tidal Defences, which provide protection against tidal flooding up to the 1 in 1000 year event (0.1% AEP). The risk of flooding from this source is therefore residual, associated with failure or breach of flood defences.

The distribution of maximum flood hazard across the site, as modelled during a 2100 year breach scenario is indicated in Figure 7-2.

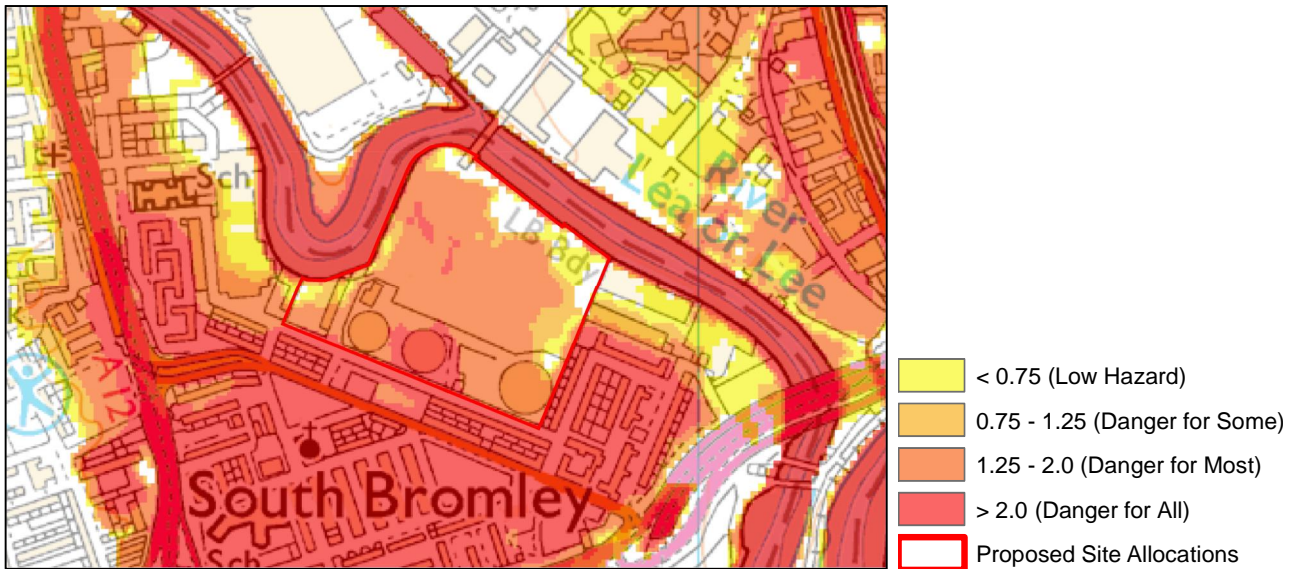


Figure 7-2: 2100 year breach flood hazard (© Crown Copyright and database right)

7.2.3 Pluvial Flood Risk

The site is generally shown to be at low risk of surface water flooding; however, it is also partially located within a Critical Drainage Area, indicating a high susceptibility to surface water flooding towards the southern extent of the site (Figure 7-3).

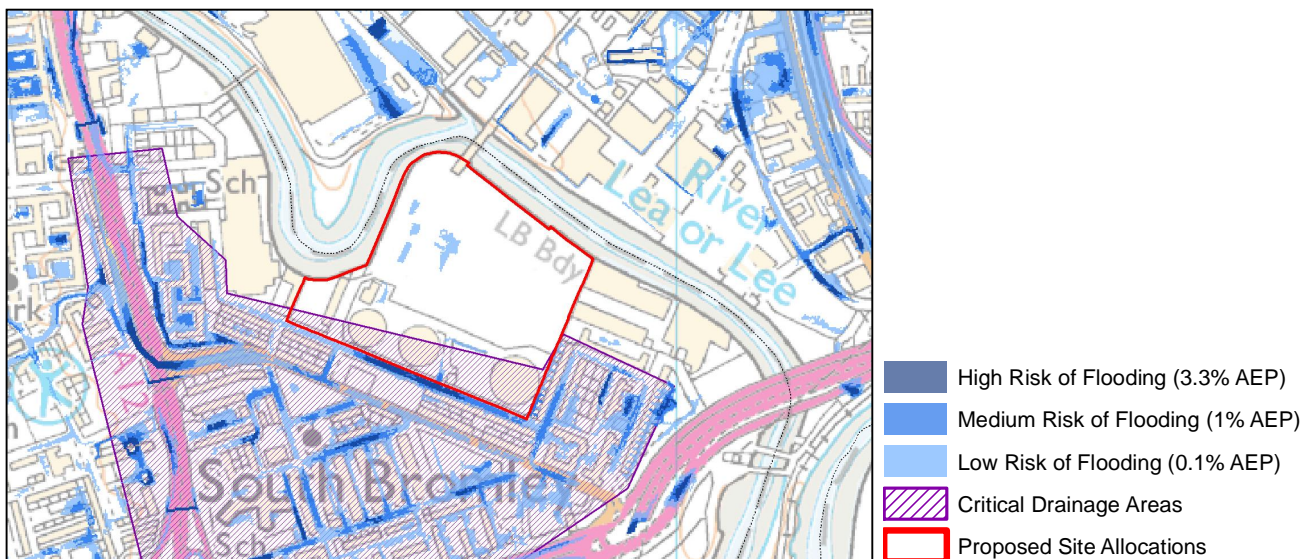


Figure 7-3: Risk of surface water flooding (© Crown Copyright and database right [2016])

7.2.4 Sewer Flood Risk

No information on sewer flood risk has been identified for the site.

7.2.5 Groundwater Flood Risk

Based on geological indicators, the site is suggested to have the potential for groundwater flooding to occur below ground level and at the surface (Figure 7-4).

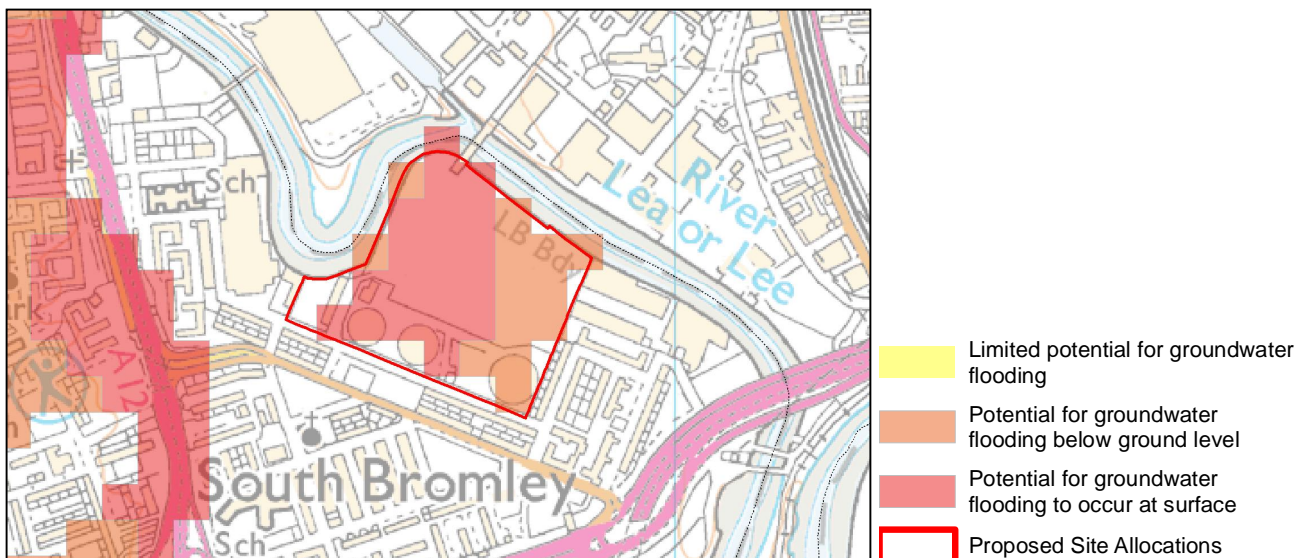


Figure 7-4: Susceptibility to groundwater flooding (© Crown Copyright and database right [2016])

7.2.6 Reservoirs and Artificial Sources of Flood Risk

The Leven Road Gas Works site is partially located within the extent of flooding anticipated through breach or failure of upstream reservoirs (Figure 7-5).

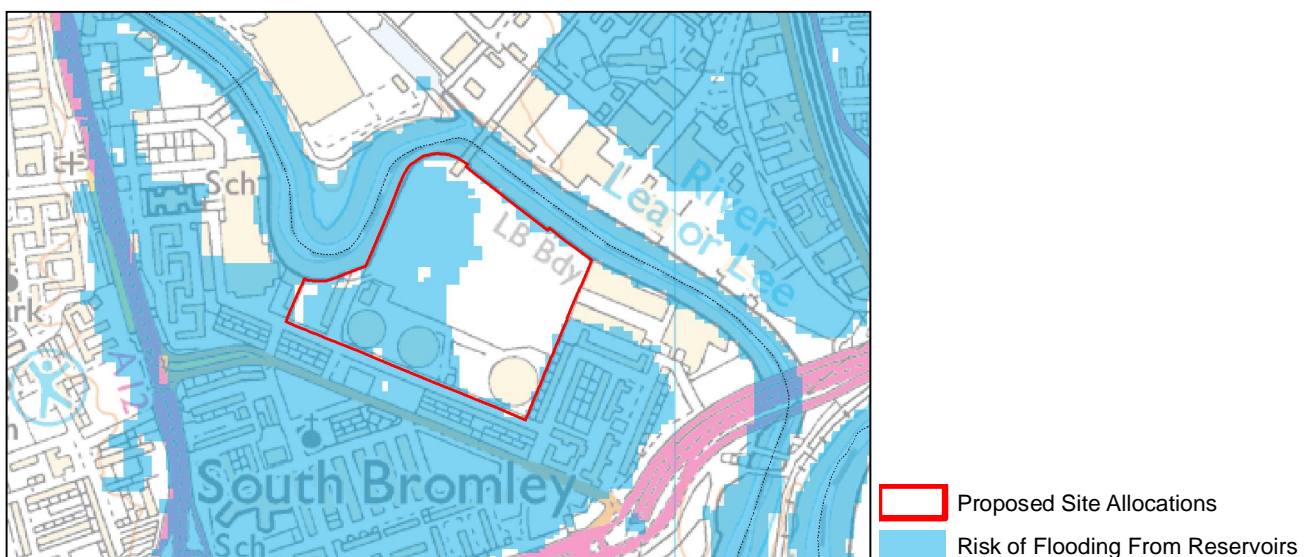


Figure 7-5: Risk of Reservoir Flooding (© Crown Copyright and database right [2016])

7.3 Managing Flood Risk

7.3.1 Conclusions

The site is located in Flood Zone 3a and therefore a site-specific FRA is required in accordance with the NPPF. As the development is in Flood Zone 3a, a Sequential Test is required.

7.3.2 Recommendations

The following flood risk mitigation measures are recommended for this site:

- More vulnerable development should be sequentially allocated to areas of the site at lower relative risk of flooding (considering the flood hazard distribution across the site), with more flood compatible development (such as parking or open space) located in areas at the highest risk.
- The development site is located adjacent to the River Lee and a 16 m buffer strip must be maintained along the river corridor. Demonstration will be required that the associated flood defences will be safe

over the lifetime of the development, including any required maintenance and improvements. Consideration should be given to the recommendations of the TE2100 plan and advice sought from the EA at an early stage.

- The impact of revised climate change allowances on fluvial flood risk from the River Lee should be considered in assessment of flood risk and mitigation.
- No basement dwellings should be permitted within the site.
- To mitigate against residual tidal flood risk, Finished Floor Levels should be raised 300 mm above the 2100 year maximum water level anticipated through a breach of the River Thames defences.
- Site specific emergency evacuation procedures must be in place to ensure that the risk to life is minimised should a breach of the River Thames defences occur. Safe access and egress routes should be provided above the 2100 breach flood level and lead to higher ground within Flood Zone 1. For residential developments where this is not feasible, a dedicated 'safe haven' can be provided above the flood level to enable rapid escape should defence failure occur. This may be provided in the form of a sheltered communal space within the building, accessed via internal stairs and sufficient in size to safely house all residents.
- Flood resilient construction techniques should be employed to reduce damage and increase the speed of recovery should any flooding events occur.
- Ground conditions should be confirmed through site investigation and dewatering of excavations and basement waterproofing implemented where required.
- The site is partially located within a Critical Drainage Area and therefore robust surface water management will be critical for the development.
- SuDS should be implemented to manage surface water flood risk and restrict post-development runoff from the site to greenfield rates. Geological data indicates that infiltration SuDS are unlikely to be suitable for use across the site, so lined attenuation systems may be required. The drainage system should provide sufficient capacity to cater for up to the 1 in 100 year storm event, incorporating the latest guidance regarding climate change.
- Consideration should also be given to emergency planning for the event of reservoir breach.

8 Billingsgate Market

8.1 Overview

Billingsgate Market is located on Trafalgar Way and is predominately within Flood Zone 3a, with a small portion of the site in Flood Zone 2 (Figure 8-1). The site has an area of 5.74 ha and is currently occupied by a wholesale market. The development proposal is for housing, a wholesale market, a secondary school, small open space, employment and other commercial uses.

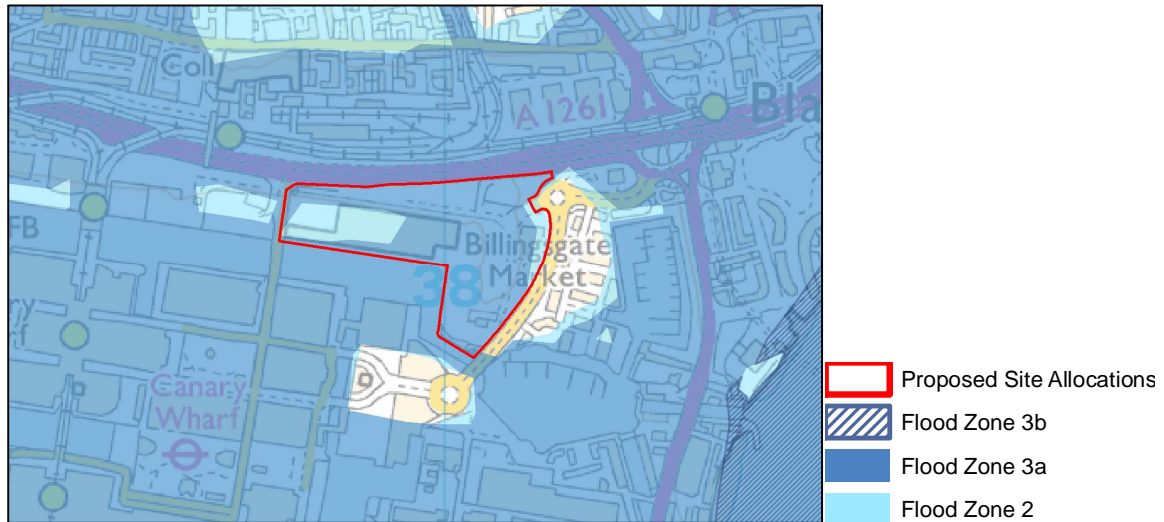


Figure 8-1: Billingsgate Market – Flood Zone classification (© Crown Copyright and database right [2016])

The acceptability of the proposed land uses, and requirement for justification in accordance with the NPPF, is summarised in Table 8-1 below.

Table 8-1 – Requirement for justification of proposed land uses

Proposed Use	Vulnerability Classification	NPPF Flood Zone Compatibility	Sequential Test Required?
Housing	More vulnerable	Exception Test Required in Flood Zone 3	Yes
Secondary School	More vulnerable	Exception Test Required in Flood Zone 3	Yes
Open Space	Water compatible	ü	Yes
Employment	Less vulnerable	ü	Yes
Commercial	Less vulnerable	ü	Yes

KEY:

✓ Development is appropriate

8.2 Assessment of Flood Risk

8.2.1 Flood History

No historic flood events have been identified within this site.

8.2.2 Fluvial and Tidal Flood Risk

The site is predominately located in Flood Zone 3a as associated with the Tidal Thames, and therefore at risk of flooding for tidal events with a 1 in 200 or greater annual probability (>0.5% AEP). A portion of the site is

Flood Zone 2, deemed at risk of flooding from tidal events between 1 in 200 and 1 in 1000 annual probability (1% – 0.1% AEP).

It should be noted that these flood zones represent the tidal flood risk, ignoring the presence of the Thames Tidal Defences, which provide protection against tidal flooding, up to the 1 in 1000 year event (0.1% AEP). The risk of flooding from this source is therefore residual, associated with failure or breach of flood defences.

The distribution of maximum flood hazard across the site, as modelled during a 2100 year breach scenario is indicated in Figure 8-2.

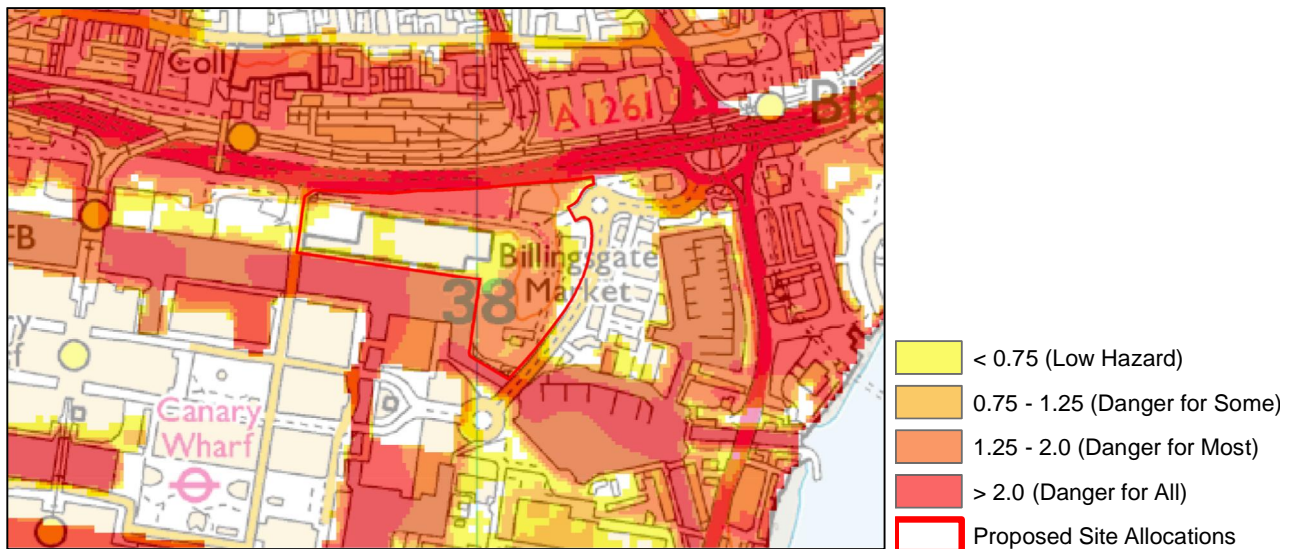


Figure 8-2: 2100 year breach flood hazard (© Crown Copyright and database right)

8.2.3 Pluvial Flood Risk

The site is generally shown to be at low risk of surface water flooding, with areas of medium to high risk towards the northern site boundary (Figure 8-3).

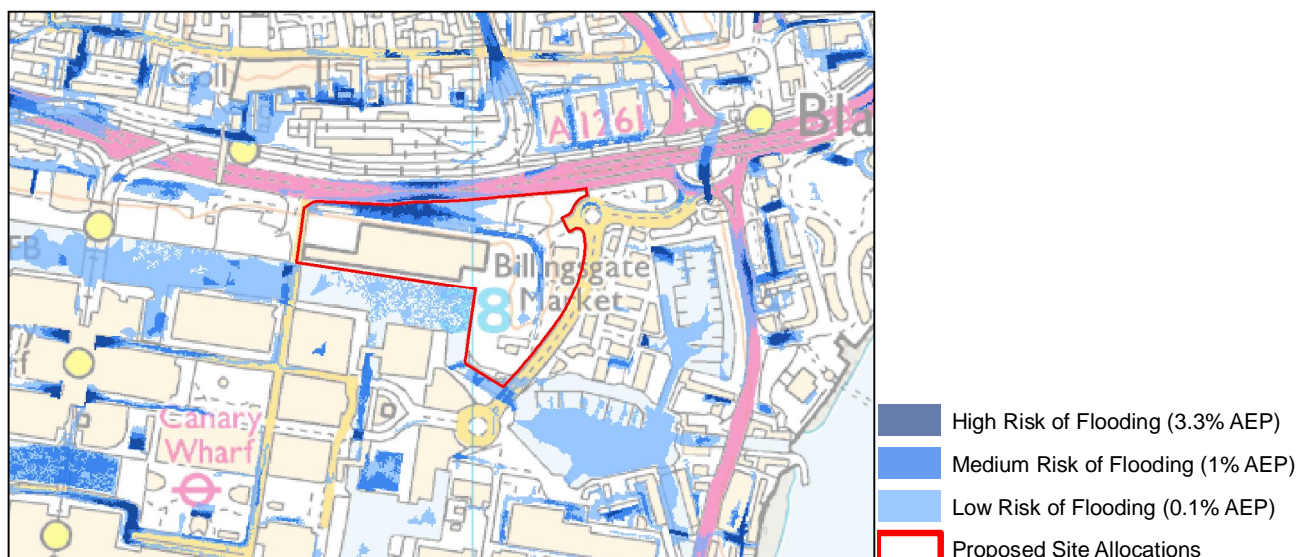


Figure 8-3: Risk of surface water flooding (© Crown Copyright and database right [2016])

8.2.4 Sewer Flood Risk

No information on sewer flood risk has been identified for the site.

8.2.5 Groundwater Flood Risk

Based on geological indicators, the majority of the site is not likely to be susceptible to groundwater flooding (Figure 8-4).

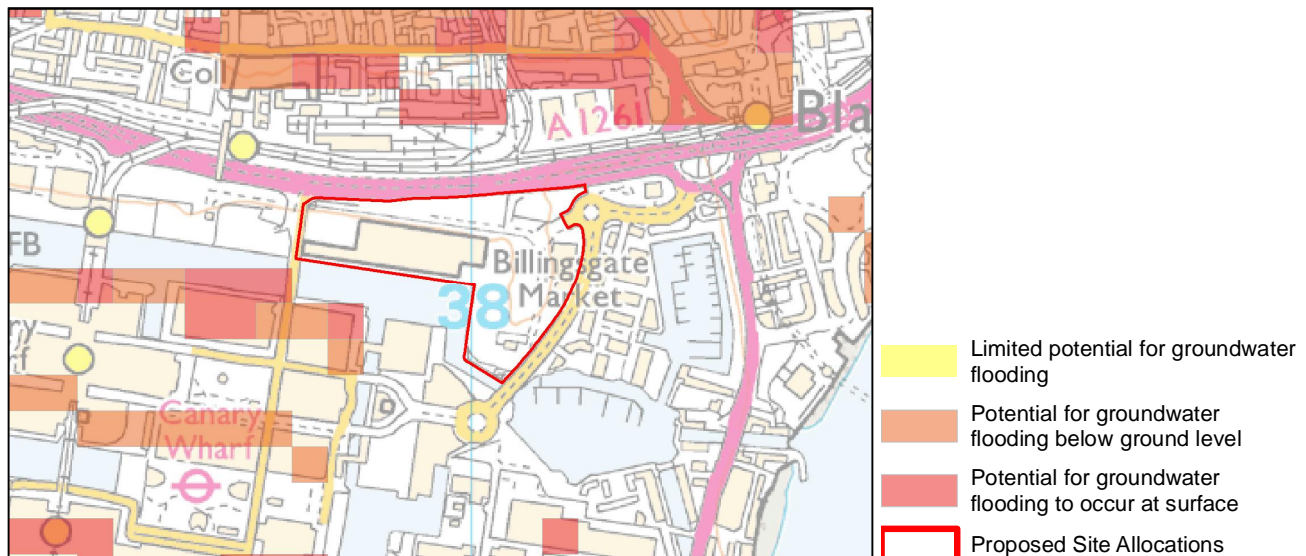


Figure 8-4: Susceptibility to groundwater flooding (© Crown Copyright and database right [2016])

8.2.6 Reservoirs and Artificial Sources of Flood Risk

No artificial sources of flood risk have currently been identified as affecting this site.

8.3 Managing Flood Risk

8.3.1 Conclusions

The site is located in Flood Zones 2 and 3a and therefore a site-specific FRA is required in accordance with the NPPF. As the development comprises of *more vulnerable* land uses, a Sequential Test and Exception Test is required for the development.

8.3.2 Recommendations

The following flood risk mitigation measures are recommended for this site:

- More vulnerable development should be sequentially allocated to areas of the site at lower relative risk of flooding (areas of Flood Zone 2 and areas with a lower relative flood hazard), with more flood compatible development (such as parking or open space) located in areas at the highest risk.
- No basement dwellings should be permitted within Flood Zone 3a. They could be permitted in Flood Zone 2 subject to the proposals passing the Exception Test.
- To mitigate against residual tidal flood risk, Finished Floor Levels should be raised 300 mm above the 2100 year maximum water level anticipated through a breach of the River Thames defences.
- Site specific emergency evacuation procedures must be in place to ensure that the risk to life is minimised should a breach of the River Thames defences occur. Safe access and egress routes should be provided above the 2100 breach flood level and lead to higher ground within Flood Zone 1. For residential developments where this is not feasible, a dedicated 'safe haven' can be provided above the flood level to enable rapid escape should defence failure occur. This may be provided in the form of a sheltered communal space within the building, accessed via internal stairs and sufficient in size to safely house all residents.
- Flood resilient construction techniques should be employed to reduce damage and increase the speed of recovery should any flooding events occur.

- SuDS should be implemented to manage surface water flood risk and restrict post-development runoff to greenfield rates. Geological data indicates that the site is potentially suitable for bespoke infiltration SuDS. The drainage system should provide sufficient capacity to cater for up to the 1 in 100 year storm event, incorporating the latest guidance regarding climate change.

9 Wood Wharf

9.1 Overview

Wood Wharf is located on Prestons Road and predominately within Flood Zone 3a, with some small areas of Flood Zone 2 (Figure 9-1). The site has an area of 7.29 ha and is currently partially vacant and under construction. The development proposal comprises redevelopment for housing and commercial uses, including employment. Other infrastructure requirements have been identified as a health facility, open space, an idea store and a primary school.

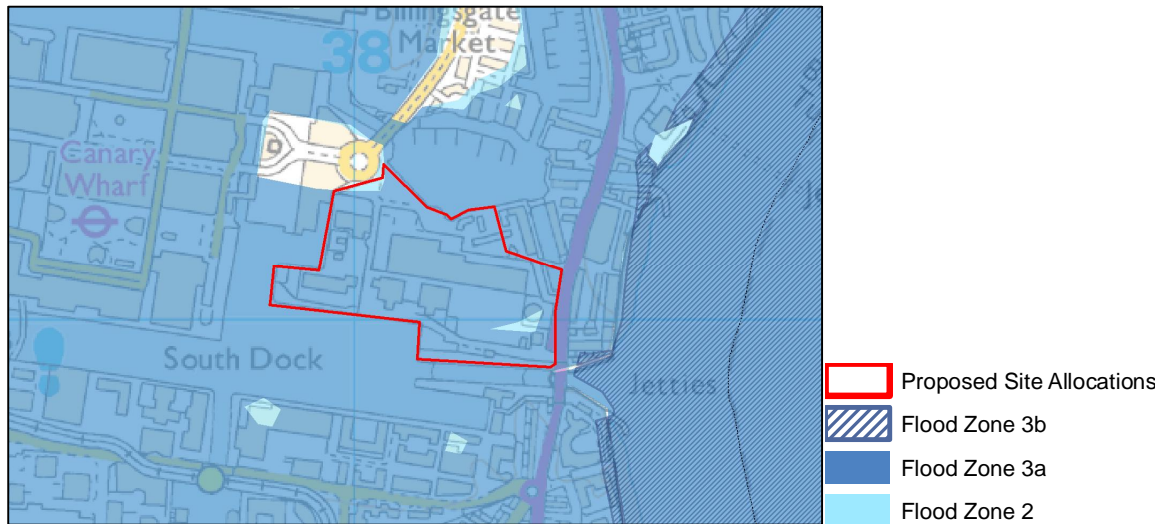


Figure 9-1: Wood Wharf site – Flood Zone classification (© Crown Copyright and database right [2016])

The acceptability of the proposed land uses, and requirement for justification in accordance with the NPPF, is summarised in Table 9-1.

Table 9-1 – Requirement for justification of proposed land uses

Proposed Use	Vulnerability Classification	NPPF Flood Zone Compatibility	Sequential Test Required?
Housing	More vulnerable	Exception Test Required	Yes
Commercial	Less vulnerable	ü	Yes
Employment	Less vulnerable	ü	Yes
Health facility	More vulnerable	Exception Test Required	Yes
Open Space	Water Compatible	ü	Yes
Idea Store	More vulnerable	Exception Test Required	Yes
Primary School	More vulnerable	Exception Test Required	Yes

KEY:

✓ Development is appropriate

9.2 Assessment of Flood Risk

9.2.1 Flood History

No historic flood events have been identified within this site.

9.2.2 Fluvial and Tidal Flood Risk

The site is predominately located in Flood Zone 3a as associated with the Tidal Thames, and therefore at risk of flooding for tidal events with a 1 in 200 or greater annual probability (>0.5% AEP). A portion of the site is Flood Zone 2, deemed at risk of flooding from tidal events between 1 in 200 and 1 in 1,000 annual probability (1% – 0.1% AEP).

It should be noted that these flood zones represent the tidal flood risk, ignoring the presence of the Thames Tidal Defences, which provide protection against tidal flooding, up to the 1 in 1000 year event (0.1% AEP). The risk of flooding from this source is therefore residual, associated with failure or breach of flood defences.

The distribution of maximum flood hazard across the site, as modelled during a 2100 year breach scenario is indicated in Figure 9-2.

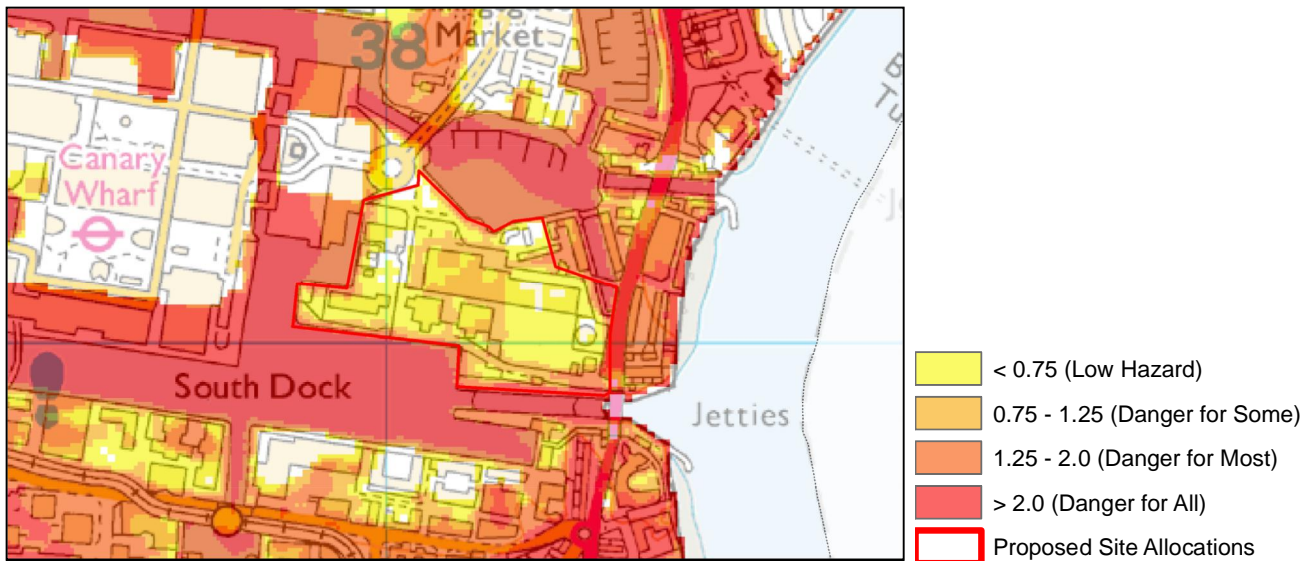


Figure 9-2: 2100 year breach flood hazard (© Crown Copyright and database right)

9.2.3 Pluvial Flood Risk

The site is generally shown to be at low risk of surface water flooding, with localised areas of medium to high risk (Figure 9-3).

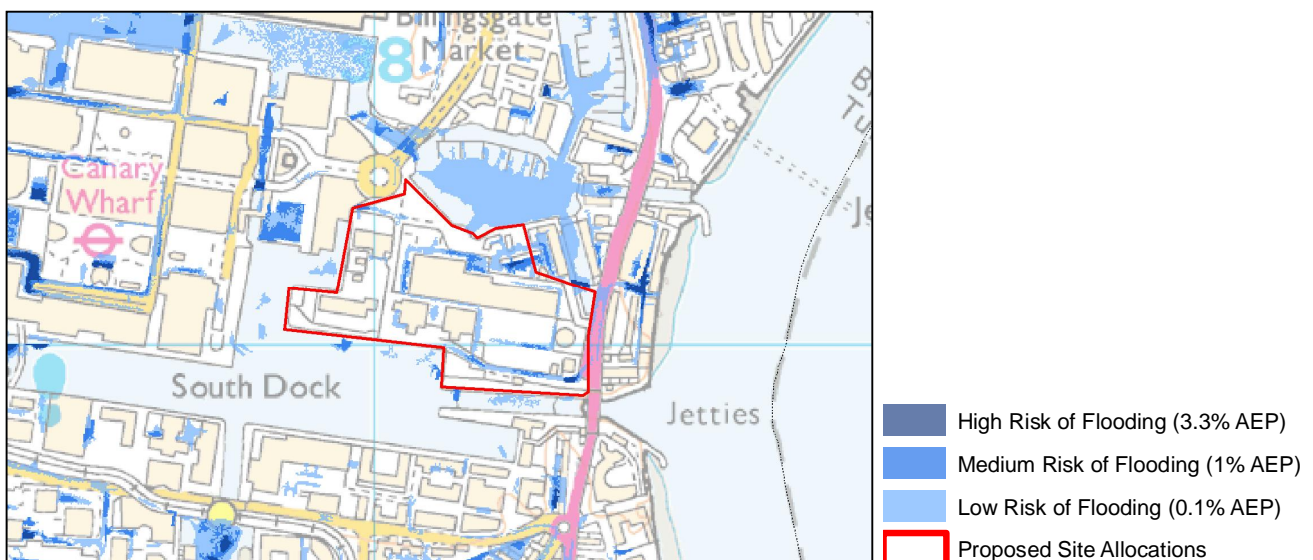


Figure 9-3: Risk of surface water flooding (© Crown Copyright and database right [2016])

9.2.4 Sewer Flood Risk

No information on sewer flood risk has been identified for the site.

9.2.5 Groundwater Flood Risk

Based on geological indicators, the majority of the site is unlikely to be susceptible to groundwater flooding, excepting localised areas, which are suggested to have the potential for groundwater flooding to occur at surface level (Figure 9-4).

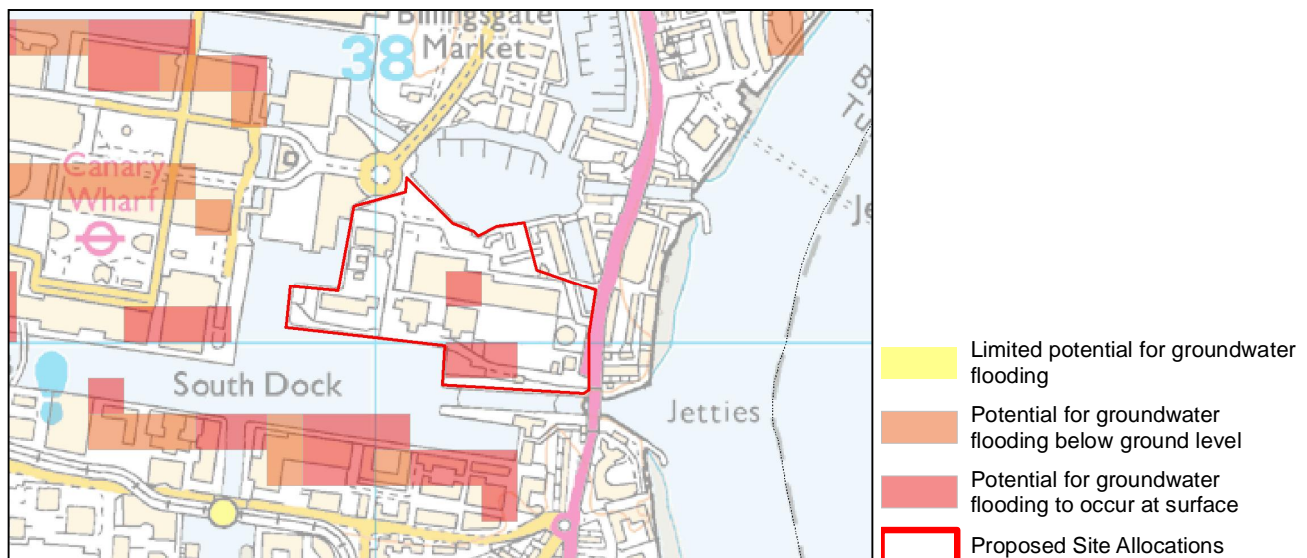


Figure 9-4: Susceptibility to groundwater flooding (© Crown Copyright and database right [2016])

9.2.6 Reservoirs and Artificial Sources of Flood Risk

The site is located immediately adjacent to a dock system and flood risk from this source should be considered within the site-specific FRA. No other artificial sources of flood risk have currently been identified as affecting this site.

9.3 Managing Flood Risk

9.3.1 Conclusions

The site is located in Flood Zones 2 and 3a and therefore a site-specific FRA is required in accordance with the NPPF. As the development comprises of *more vulnerable* land uses, a Sequential Test and Exception Test is required for the development.

9.3.2 Recommendations

The following flood risk mitigation measures are recommended for this site:

- More vulnerable development should be sequentially allocated to areas of the site at lower relative risk of flooding (areas of Flood Zone 2 and with a lower relative flood hazard), with more flood compatible development (such as parking or open space) located in areas at the highest risk.
- No basement dwellings should be permitted within the site.
- To mitigate against residual tidal flood risk, Finished Floor Levels should be raised 300 mm above the 2100 year maximum water level anticipated through a breach of the River Thames defences.
- Site specific emergency evacuation procedures must be in place to ensure that the risk to life is minimised should a breach of the River Thames defences occur. Safe access and egress routes should be provided above the 2100 breach flood level and lead to higher ground within Flood Zone 1. For residential developments where this is not feasible, a dedicated 'safe haven' can be provided above the flood level to enable rapid escape should defence failure occur. This may be provided in the form of a sheltered communal space within the building, accessed via internal stairs and sufficient in size to safely house all residents.

- Flood resilient construction techniques should be employed to reduce damage and increase the speed of recovery should any flooding events occur.
- Ground conditions should be confirmed through site investigation and dewatering of excavations and basement waterproofing implemented where required.
- SuDS should be implemented to manage surface water flood risk and restrict post-development runoff to greenfield rates. Geological data indicates that the central area of the site is unlikely to be suitable for infiltration; however, the eastern and western extents of the site may be suitable for bespoke infiltration SuDS design. The drainage system should provide sufficient capacity to cater for up to the 1 in 100 year storm event, incorporating the latest guidance regarding climate change.
- The development site is located adjacent to a dock system and consideration should be given to the recommendations of the TE2100 plan with respect to future dock wall raising and advice sought from the EA at an early stage.

10 Westferry Printworks

10.1 Overview

Westferry Printworks is located on Westferry Road and entirely within Flood Zone 3a. The site has an area of 6.16 ha and is currently occupied by an office, print-works and parking. The development proposal comprises mixed use redevelopment for housing and employment. Other infrastructure requirements have been identified as strategic open space, a secondary school and an expanded leisure centre.

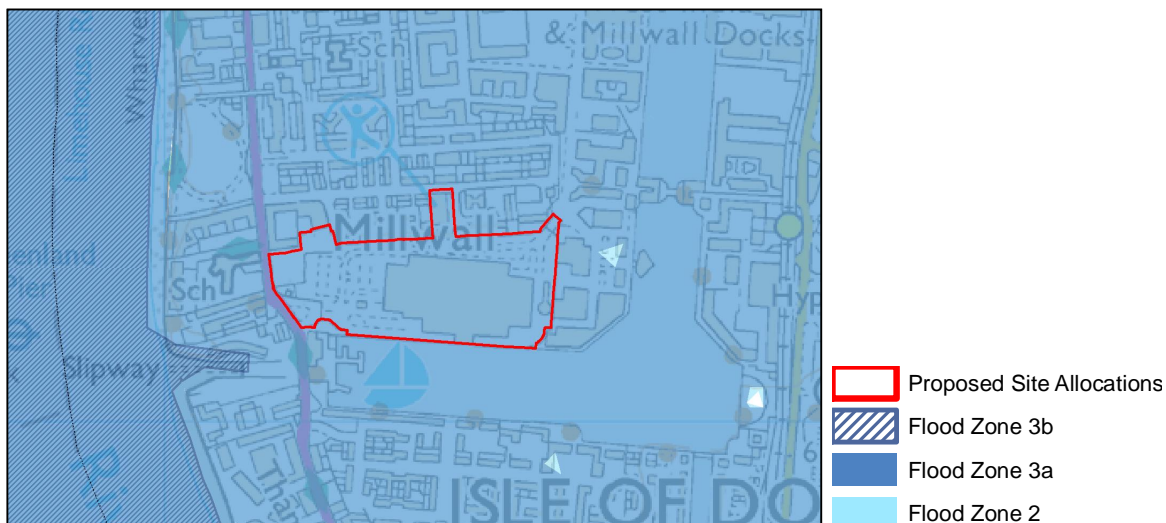


Figure 10-1: Westferry Printworks – Flood Zone classification (© Crown Copyright and database right [2016])

The acceptability of the proposed land uses, and requirement for justification in accordance with the NPPF, is summarised in Table 10-1.

Table 10-1 – Requirement for justification of proposed land uses

Proposed Use	Vulnerability Classification	NPPF Flood Zone Compatibility	Sequential Test Required?
Housing	More vulnerable	Exception Test Required	Yes
Open space	Water compatible	ü	Yes
Secondary school	More vulnerable	Exception Test Required	Yes
Leisure centre	Less vulnerable	ü	Yes
Employment	Less vulnerable	ü	Yes

KEY:

✓ Development is appropriate

10.2 Assessment of Flood Risk

10.2.1 Flood History

The site is located within the extent of historic tidal flooding from the River Thames.

10.2.2 Fluvial and Tidal Flood Risk

The site is located within Flood Zone 3a, associated with the Tidal Thames, and therefore at risk of flooding for tidal events with a 1 in 200 or greater annual probability (>0.5% AEP).

The Flood Zone classification represents the tidal flood risk ignoring the presence of the Thames Tidal Defences, which provide protection against tidal flooding up to the 1 in 1000 year event (0.1% AEP). The risk of flooding from this source is therefore residual, associated with failure or breach of flood defences.

The distribution of maximum flood hazard across the site, as modelled during a 2100 year breach scenario is indicated in Figure 10-2.

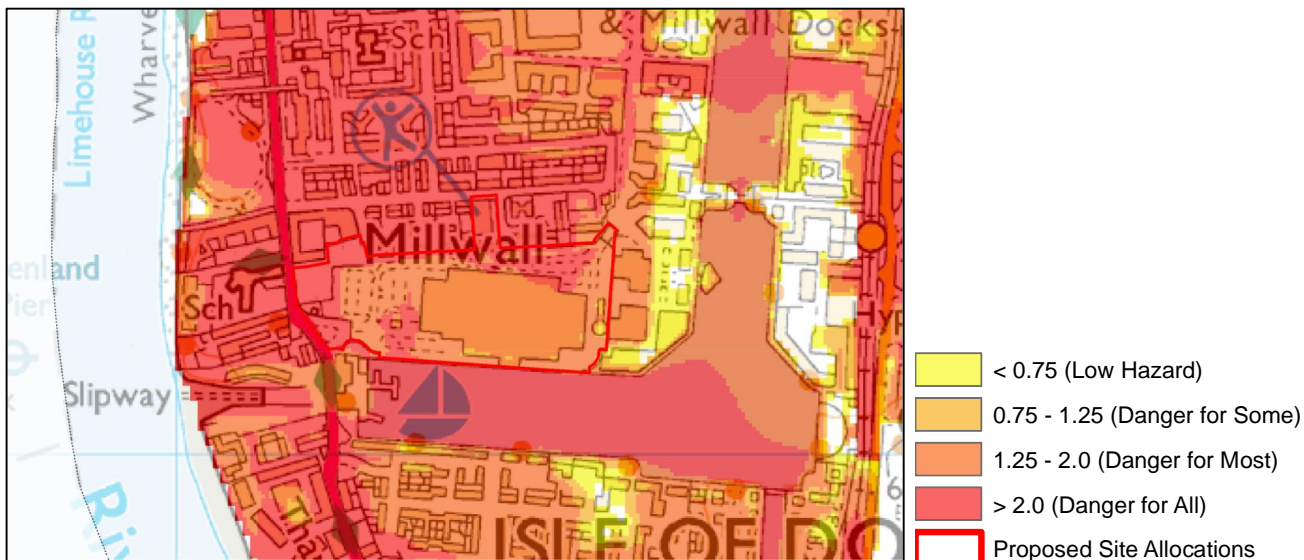


Figure 10-2: 2100 year breach flood hazard (© Crown Copyright and database right)

10.2.3 Pluvial Flood Risk

The site is generally shown to be at low risk of surface water flooding; however, it is also partially located within a Critical Drainage Area, indicating a high susceptibility to surface water flooding towards the northern extent of the site (Figure 10-1).

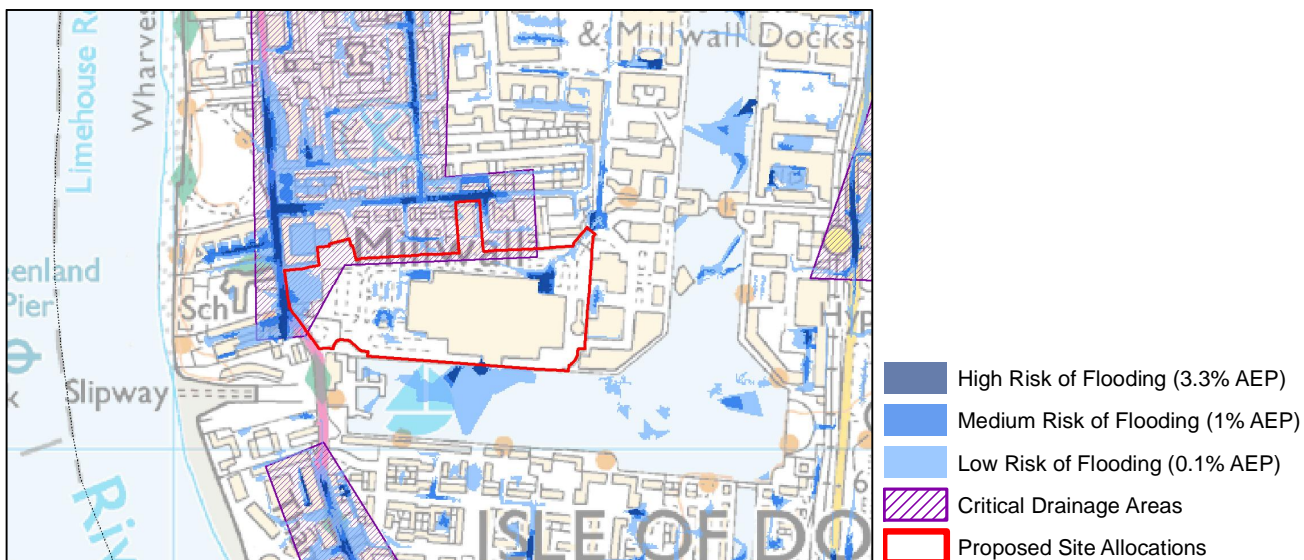


Figure 10-3: Risk of surface water flooding (© Crown Copyright and database right [2016])

10.2.4 Sewer Flood Risk

No information on sewer flood risk has been identified for the site.

10.2.5 Groundwater Flood Risk

Based on geological indicators, the site is unlikely to be susceptible to groundwater flooding (Figure 10-4).

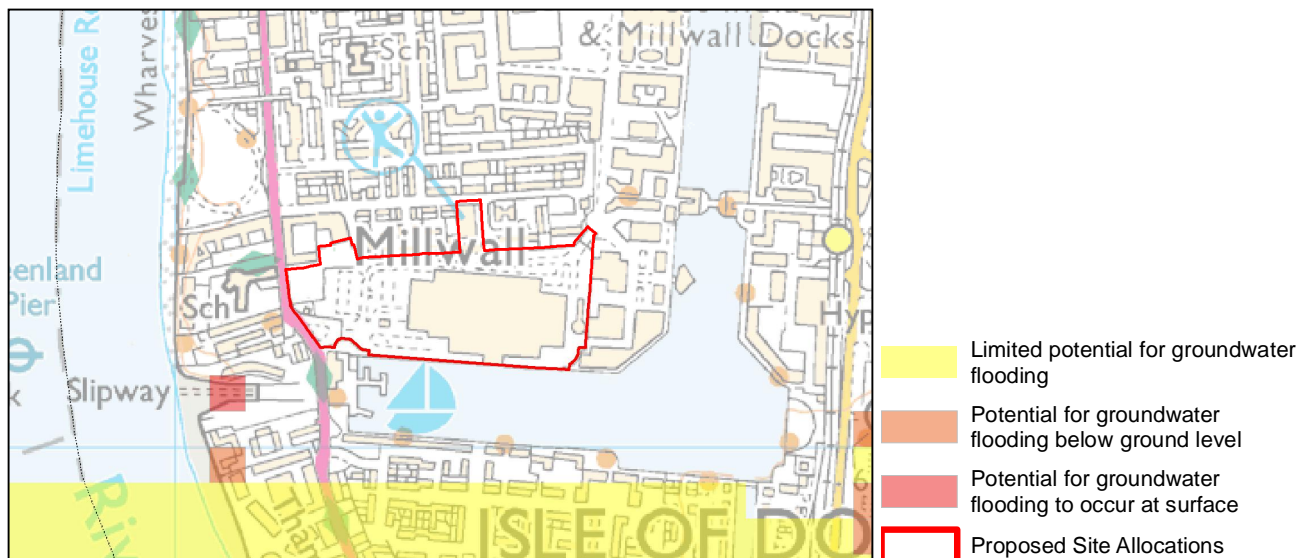


Figure 10-4: Susceptibility to groundwater flooding (© Crown Copyright and database right [2016])

10.2.6 Reservoirs and Artificial Sources of Flood Risk

The site is located immediately adjacent to a dock system and flood risk from this source should be considered within the site-specific FRA. No other artificial sources of flood risk have currently been identified as affecting this site.

10.3 Managing Flood Risk

10.3.1 Conclusions

The site is located in Flood Zone 3a and therefore a site-specific FRA is required in accordance with the NPPF. A Sequential Test is required for the development.

10.3.2 Recommendations

The following flood risk mitigation measures are recommended for this site:

- More vulnerable development should be sequentially allocated to areas of the site at lower relative risk of flooding (considering the flood hazard distribution across the site), with more flood compatible development (such as parking or open space) located in areas at the highest risk.
- No basement dwellings should be permitted within the site.
- To mitigate against residual tidal flood risk, Finished Floor Levels should be raised 300 mm above the 2100 year maximum water level anticipated through a breach of the River Thames defences.
- Site specific emergency evacuation procedures must be in place to ensure that the risk to life is minimised should a breach of the River Thames defences occur. Safe access and egress routes should be provided above the 2100 breach flood level and lead to higher ground within Flood Zone 1. For residential developments where this is not feasible, a dedicated 'safe haven' can be provided above the flood level to enable rapid escape should defence failure occur. This may be provided in the form of a sheltered communal space within the building, accessed via internal stairs and sufficient in size to safely house all residents.
- Flood resilient construction techniques should be employed to reduce damage and increase the speed of recovery should any flooding events occur.
- The site is partially located within a Critical Drainage Area and is therefore robust surface water management will be critical for the development. SuDS should be implemented to manage surface water flood risk and restrict post-development runoff to greenfield rates. Geological data indicates that the site is potentially suitable for bespoke infiltration SuDS. The drainage system should provide sufficient capacity

to cater for up to the 1 in 100 year storm event, incorporating the latest guidance regarding climate change.

- The development site is located adjacent to a dock system and consideration should be given to the recommendations of the TE2100 plan with respect to future dock wall raising and advice sought from the EA at an early stage.

11 Crossharbour Town Centre

11.1 Overview

Crossharbour Town Centre is located on East Ferry Road and entirely within Flood Zone 3a (Figure 11-1). The site has an area of 6.16 ha and is currently occupied by a supermarket, car parking, offices, health facility and Crossharbour DLR station. The development proposal comprises mixed use redevelopment for housing, retail and other supporting town centre uses. Other infrastructure requirements have been identified as an idea store/library/archives facility, a health facility and a primary school.

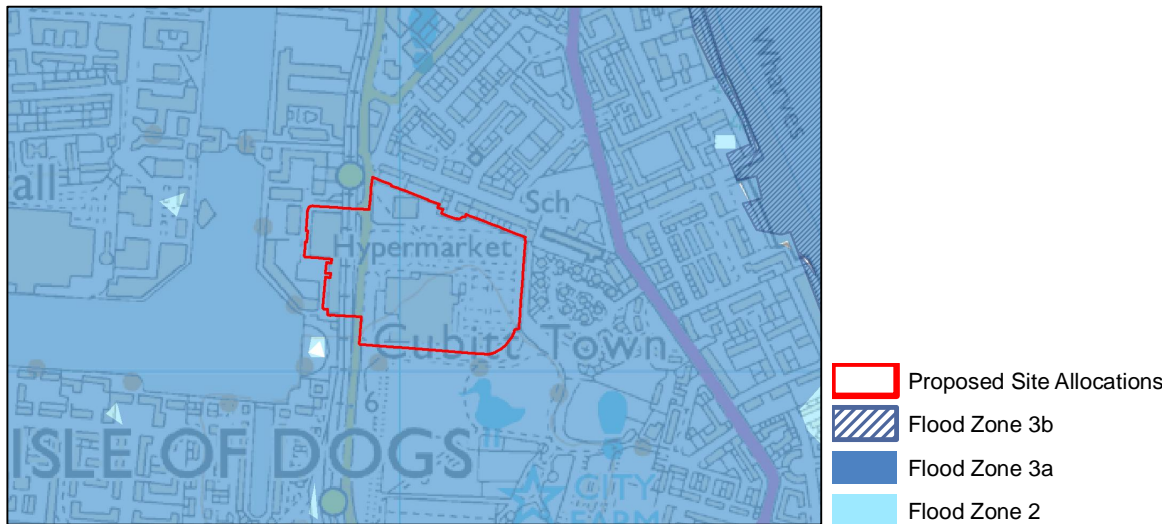


Figure 11-1: Crossharbour Town Centre – Flood Zone classification (© Crown Copyright and database right [2016])

The acceptability of the proposed land uses, and requirement for justification in accordance with the NPPF, is summarised in Table 11-1.

Table 11-1 – Requirement for justification of proposed land uses

Proposed Use	Vulnerability Classification	NPPF Flood Zone Compatibility	Sequential Test Required?
Housing	More vulnerable	Exception Test Required	Yes
Retail/commercial	Less vulnerable	ü	Yes
Idea store	More vulnerable	Exception Test Required	Yes
Health facility	More vulnerable	Exception Test Required	Yes
Primary school	More vulnerable	Exception Test Required	Yes

KEY:

✓ Development is appropriate

11.2 Assessment of Flood Risk

11.2.1 Flood History

No historic flood events have been identified within this site.

11.2.2 Fluvial and Tidal Flood Risk

The site is located within Flood Zone 3a, associated with the Tidal Thames, and therefore at risk of flooding for tidal events with a 1 in 200 or greater annual probability (>0.5% AEP).

The Flood Zone classification represents the tidal flood risk ignoring the presence of the Thames Tidal Defences, which provide protection against tidal flooding up to the 1 in 1000 year event (0.1% AEP). The risk of flooding from this source is therefore residual, associated with failure or breach of flood defences.

The distribution of maximum flood hazard across the site, as modelled during a 2100 year breach scenario is indicated in Figure 11-2.

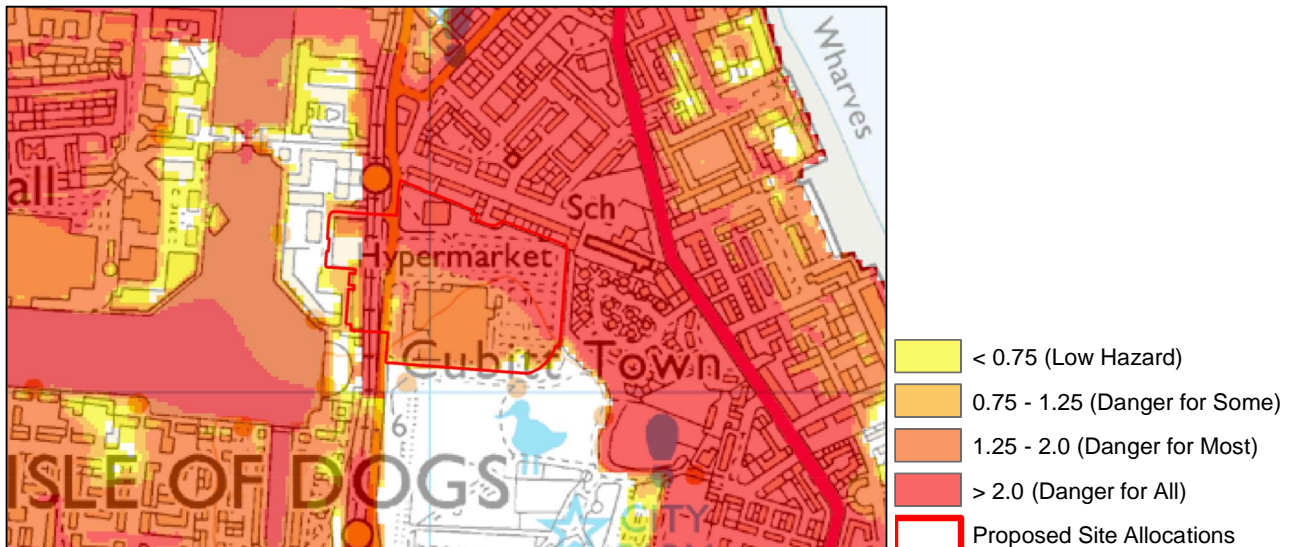


Figure 11-2: 2100 year breach flood hazard (© Crown Copyright and database right)

11.2.3 Pluvial Flood Risk

The site is generally shown to be at low risk of surface water flooding; however, it is also partially located within a Critical Drainage Area, indicating a high susceptibility to surface water flooding towards the northern extent of the site (Figure 11-3).

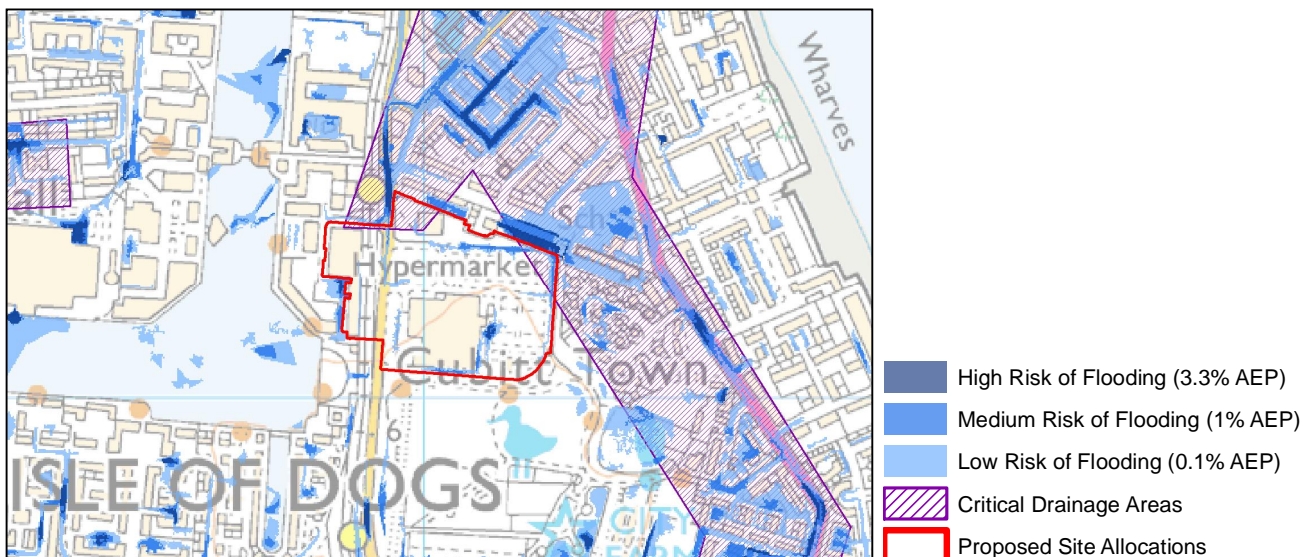


Figure 11-3: Risk of surface water flooding (© Crown Copyright and database right [2016])

11.2.4 Sewer Flood Risk

No information on sewer flood risk has been identified for the site.

11.2.5 Groundwater Flood Risk

Based on geological indicators, the majority of the site is not indicated to be susceptible to groundwater flooding, excepting a small area along the southern boundary which is suggested to have the potential for groundwater flooding to occur below ground level (Figure 11-4).

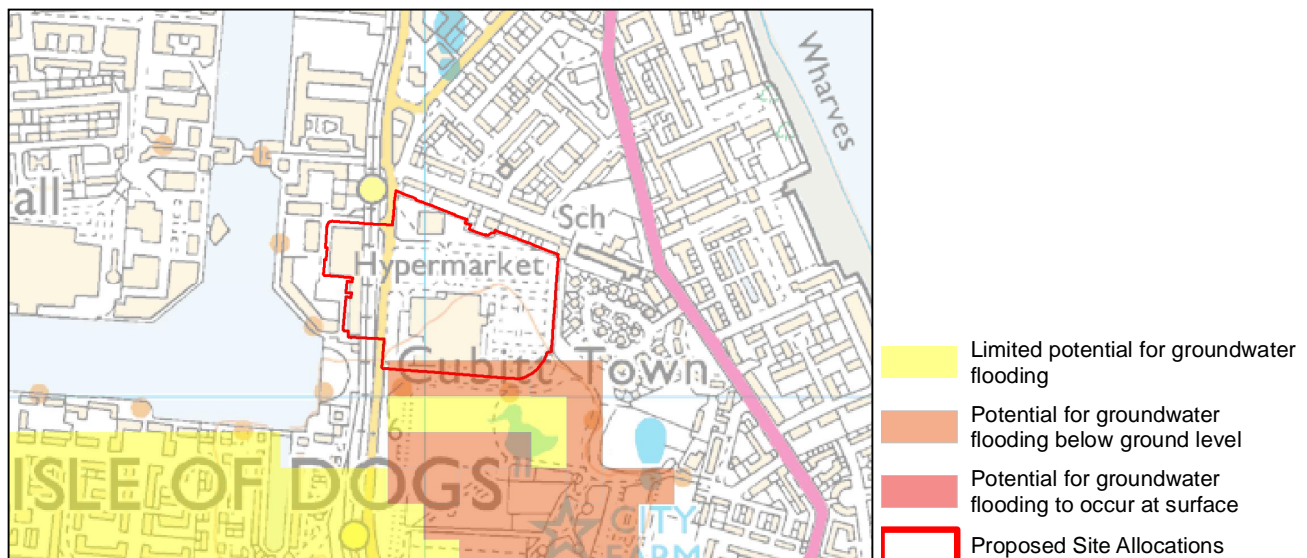


Figure 11-4: Susceptibility to groundwater flooding (© Crown Copyright and database right [2016])

11.2.6 Reservoirs and Artificial Sources of Flood Risk

The site is located in close proximity to a dock system and flood risk from this source should be considered within the site-specific FRA. No other artificial sources of flood risk have currently been identified as affecting this site.

11.3 Managing Flood Risk

11.3.1 Conclusions

The site is located in Flood Zone 3a and therefore a site-specific FRA is required in accordance with the NPPF. A Sequential Test is required for the development.

11.3.2 Recommendations

The following flood risk mitigation measures are recommended for this site:

- More vulnerable development should be sequentially allocated to areas of the site at lower relative risk of flooding (considering the flood hazard distribution across the site), with more flood compatible development (such as parking or open space) located in areas at the highest risk.
- No basement dwellings should be permitted within the site.
- To mitigate against residual tidal flood risk, Finished Floor Levels should be raised 300 mm above the 2100 year maximum water level anticipated through a breach of the River Thames defences.
- Site specific emergency evacuation procedures must be in place to ensure that the risk to life is minimised should a breach of the River Thames defences occur. Safe access and egress routes should be provided above the 2100 breach flood level and lead to higher ground within Flood Zone 1. For residential developments where this is not feasible, a dedicated 'safe haven' can be provided above the flood level to enable rapid escape should defence failure occur. This may be provided in the form of a sheltered communal space within the building, accessed via internal stairs and sufficient in size to safely house all residents.
- Flood resilient construction techniques should be employed to reduce damage and increase the speed of recovery should any flooding events occur.
- Ground conditions should be confirmed through site investigation and dewatering of excavations and basement waterproofing implemented where required.
- The site is partially located within a Critical Drainage Area and is therefore robust surface water management will be critical for the development.

- SuDS should be implemented to manage surface water flood risk and restrict post-development runoff to greenfield rates. Geological data indicates that a substantial proportion of the site is potentially suitable for bespoke infiltration SuDS. The drainage system should provide sufficient capacity to cater for up to the 1 in 100 year storm event, incorporating the latest guidance regarding climate change.
- The development site is located adjacent to a dock system so consideration should be given to the recommendations of the TE2100 plan with respect to future dock wall raising and advice sought from the EA at an early stage.

12 Aspen Way

12.1 Overview

The site is located on Aspen Way and within Flood Zones 2 and 3a (Figure 12-1). The site has an area of 4.61 ha and is currently occupied by a wholesale market, dual-carriage way, DLR services and housing. The development proposal comprises redevelopment for housing, commercial uses, including employment, a college (re-provision) and strategic open space.

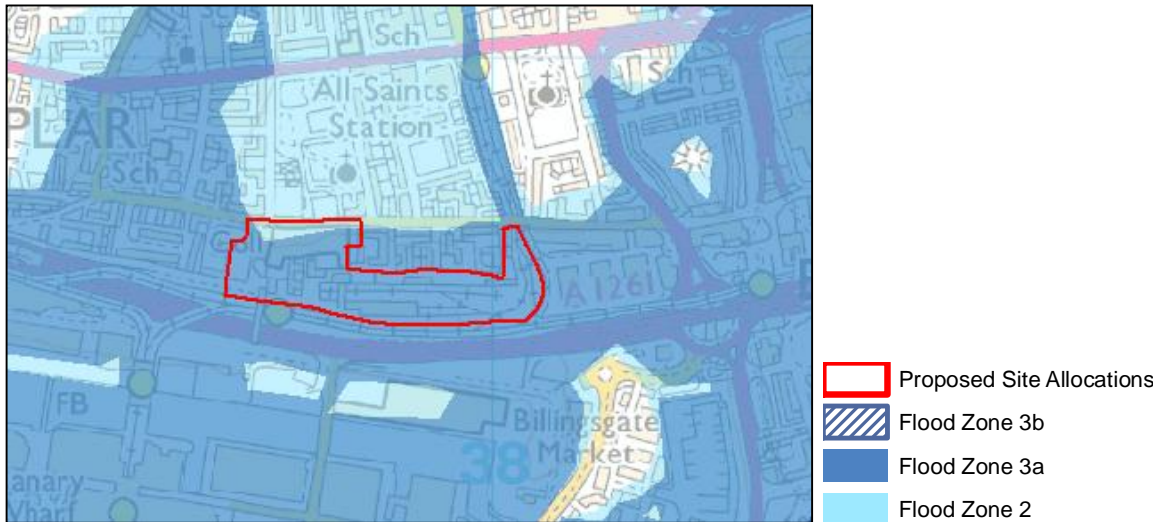


Figure 12-1: Aspen Way – Flood Zone classifications (© Crown Copyright and database right [2016])

The acceptability of the proposed land uses, and requirement for justification in accordance with the NPPF, is summarised in Table 12-1.

Table 12-1 – Requirement for justification of proposed land uses

Proposed Use	Vulnerability Classification	NPPF Flood Zone Compatibility	Sequential Test Required?
Housing	More vulnerable	Exception Test Required	Yes
Employment	Less vulnerable	✓	Yes
College	More vulnerable	Exception Test Required	Yes
Open space	Water compatible	✓	Yes

KEY:
 ✓ Development is appropriate

12.2 Assessment of Flood Risk

12.2.1 Flood History

The site is located within the extent of historic tidal flooding from the River Thames.

12.2.2 Fluvial and Tidal Flood Risk

The site is located within Flood Zone 3a, associated with the Tidal Thames, and therefore at risk of flooding for tidal events with a 1 in 200 or greater annual probability (>0.5% AEP).

The Flood Zone classification represents the tidal flood risk ignoring the presence of the Thames Tidal Defences, which provide protection against tidal flooding up to the 1 in 1000 year event (0.1% AEP). The risk of flooding from this source is therefore residual, associated with failure or breach of flood defences.

The distribution of maximum flood hazard across the site, as modelled during a 2100 year breach scenario is indicated in Figure 12-2.

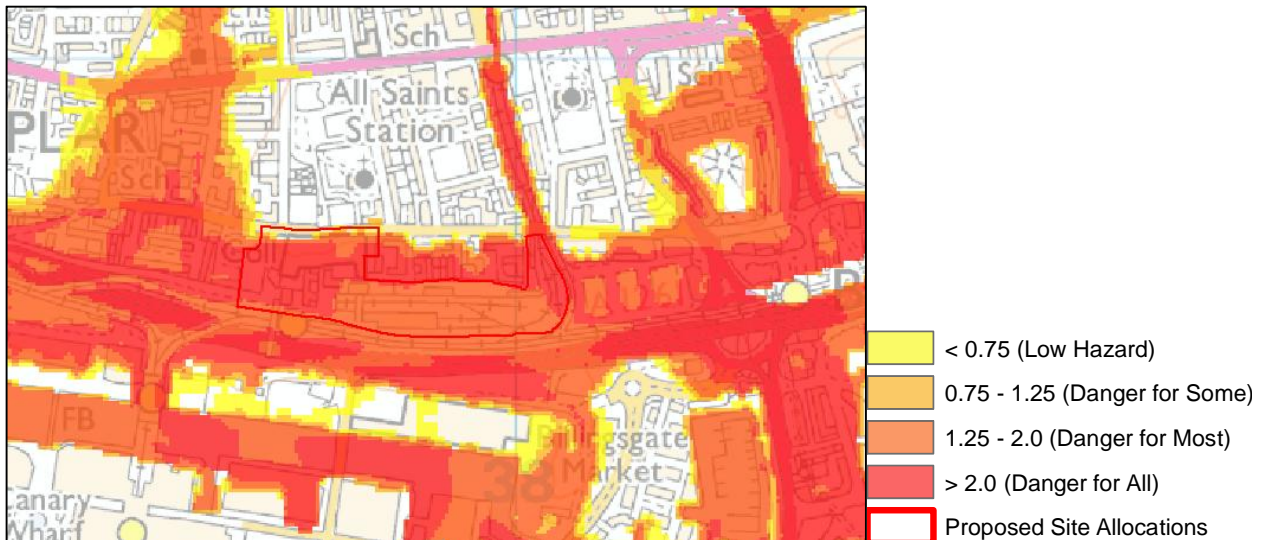


Figure 12-2: 2100 year breach flood hazard (© Crown Copyright and database right [2016])

12.2.3 Pluvial Flood Risk

The site is generally shown to be at low risk of surface water flooding; however, pockets on the western area of the site and areas around the site boundary are at medium to high risk of flooding (Figure 12-3).

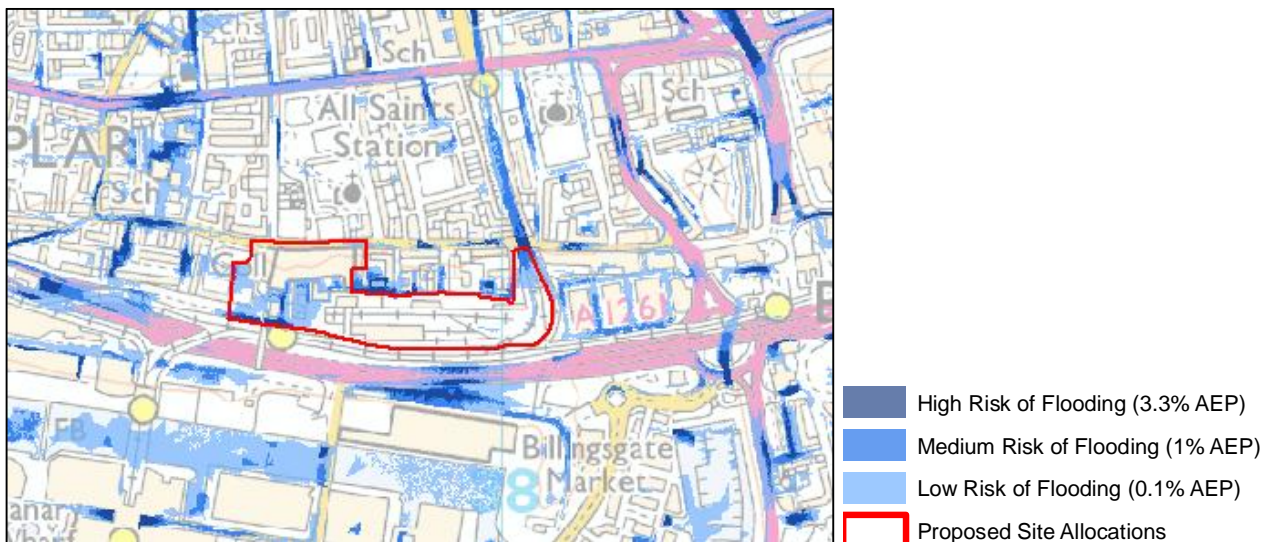


Figure 12-3: Risk of surface water flooding (© Crown Copyright and database right [2016])

12.2.4 Sewer Flood Risk

No information on sewer flood risk has been identified for the site.

12.2.5 Groundwater Flood Risk

Based on geological indicators, the majority of the site is not indicated to be susceptible to groundwater flooding, excepting an area along the northern boundary which is suggested to have the potential for groundwater flooding to occur at surface level (Figure 12-4).

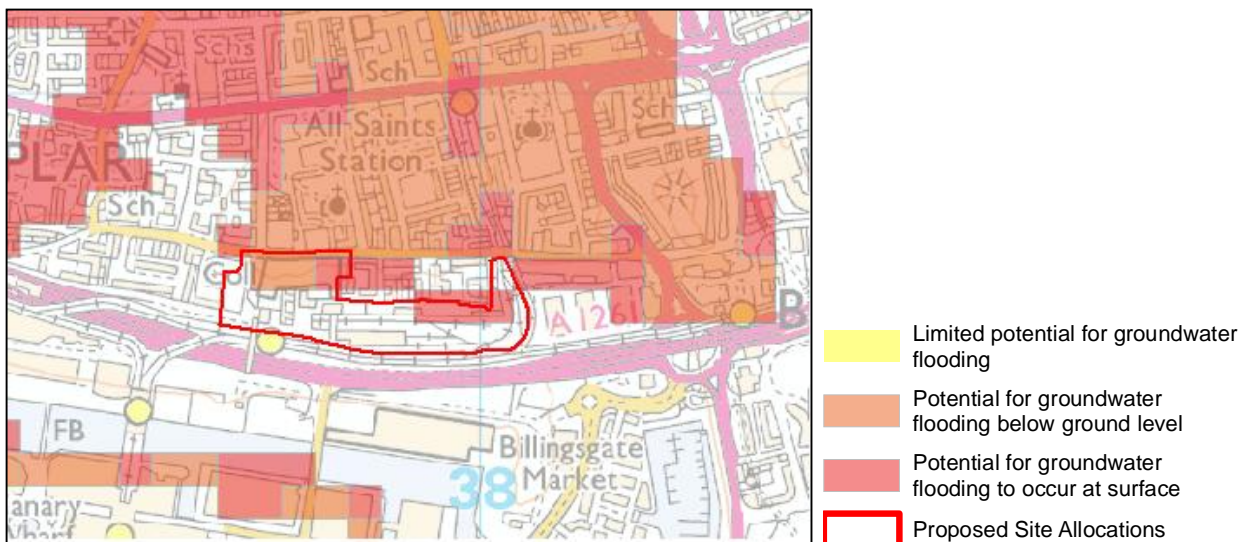


Figure 12-4: Susceptibility to groundwater flooding (© Crown Copyright and database right [2016])

12.2.6 Reservoirs and Artificial Sources of Flood Risk

The Western portion of the Aspen Way site is shown to be within the extent of flooding anticipated through breach or failure of upstream reservoirs (Figure 12-5).

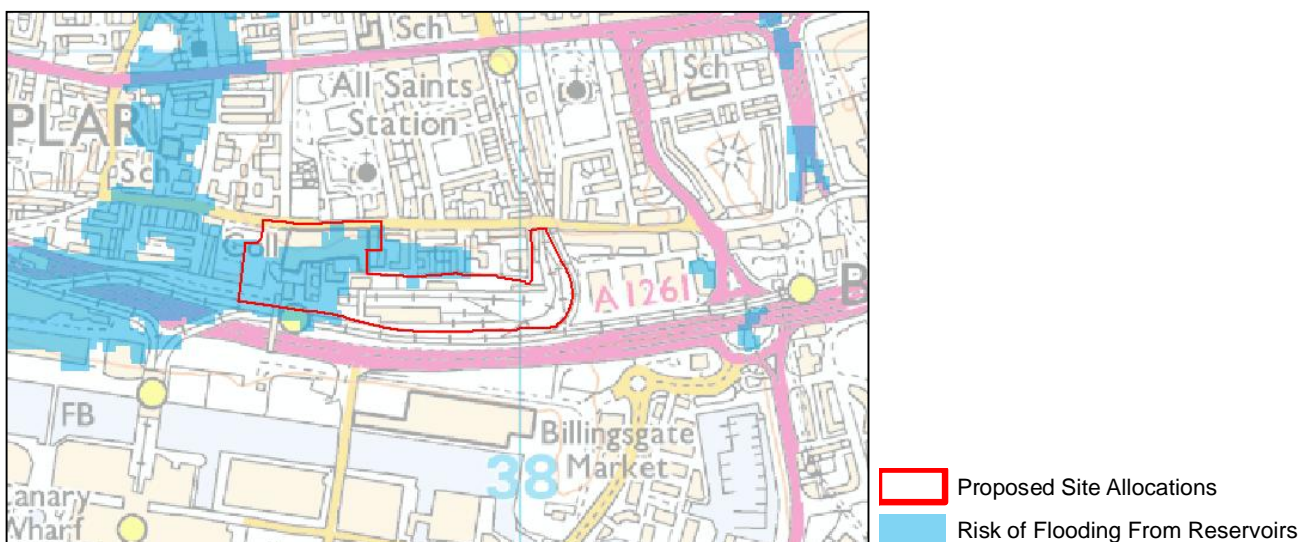


Figure 12-5: Risk of Reservoir Flooding (© Crown Copyright and database right [2016])

12.3 Managing Flood Risk

12.3.1 Conclusions

The site is located in Flood Zone 3a and therefore a site-specific FRA is required in accordance with the NPPF. A Sequential Test is required for the development.

12.3.2 Recommendations

The following flood risk mitigation measures are recommended for this site:

- More vulnerable development should be sequentially allocated to areas of the site at lower relative risk of flooding (considering the flood hazard distribution across the site), with more flood compatible development (such as parking or open space) located in areas at the highest risk.
- No basement dwellings should be permitted within the site.

- To mitigate against residual tidal flood risk, Finished Floor Levels should be raised 300 mm above the 2100 year maximum water level anticipated through a breach of the River Thames defences.
- Site specific emergency evacuation procedures must be in place to ensure that the risk to life is minimised should a breach of the River Thames defences occur. Safe access and egress routes should be provided above the 2100 breach flood level and lead to higher ground within Flood Zone 1. For residential developments where this is not feasible, a dedicated 'safe haven' can be provided above the flood level to enable rapid escape should defence failure occur. This may be provided in the form of a sheltered communal space within the building, accessed via internal stairs and sufficient in size to safely house all residents.
- Flood resilient construction techniques should be employed to reduce damage and increase the speed of recovery should any flooding events occur.
- Ground conditions should be confirmed through site investigation and dewatering of excavations and basement waterproofing implemented where required.
- SuDS should be implemented to manage surface water flood risk and restrict post-development runoff to greenfield rates. Geological data indicates that areas within the western and eastern extents of the site are potentially suitable for bespoke infiltration SuDS. The drainage system should provide sufficient capacity to cater for up to the 1 in 100 year storm event, incorporating the latest guidance regarding climate change.
- Consideration should be given to emergency planning to manage the risk of flooding due to upstream reservoir breach.

13 Limeharbour

13.1 Overview

Limeharbour is located on Limeharbour Marshwall and entirely within Flood Zone 3a (Figure 13-1). The site has an area of 5.25 ha and is currently occupied by industrial and office space. The development proposal comprises redevelopment for housing and commercial uses, including employment. Other infrastructure requirements have been identified as a primary school and small open space.

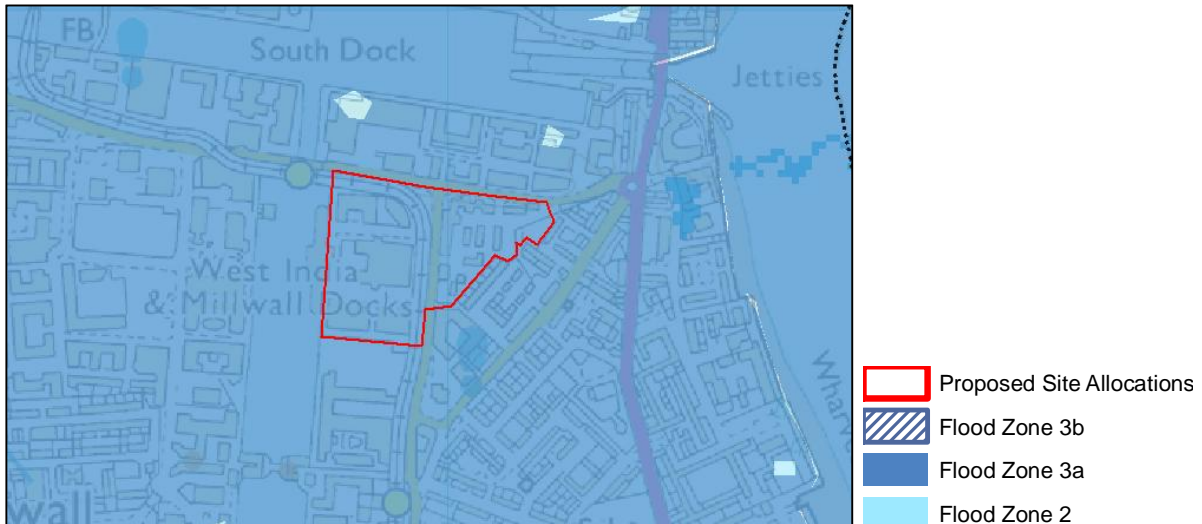


Figure 13-1: Limeharbour - Flood Zone classification (© Crown Copyright and database right [2016])

The acceptability of the proposed land uses, and requirement for justification in accordance with the NPPF, is summarised in Table 13-1.

Table 13-1 – Requirement for justification of proposed land uses

Proposed Use	Vulnerability Classification	NPPF Flood Zone Compatibility	Sequential Test Required?
Housing	More vulnerable	Exception Test Required	Yes
Employment	Less vulnerable	ü	Yes
Primary School	More vulnerable	Exception Test Required	Yes
Open Space	Water compatible	ü	Yes

KEY:

✓ Development is appropriate

13.2 Assessment of Flood Risk

13.2.1 Flood History

The site is located within the extent of historic tidal flooding from the River Thames.

13.2.2 Fluvial and Tidal Flood Risk

The site is located within Flood Zone 3a, associated with the Tidal Thames, and therefore at risk of flooding for tidal events with a 1 in 200 or greater annual probability (>0.5% AEP).

The Flood Zone classification represents the tidal flood risk ignoring the presence of the Thames Tidal Defences, which provide protection against tidal flooding up to the 1 in 1000 year event (0.1% AEP). The risk of flooding from this source is therefore residual, associated with failure or breach of flood defences.

The distribution of maximum flood hazard across the site, as modelled during a 2100 year breach scenario is indicated in Figure 13-2.

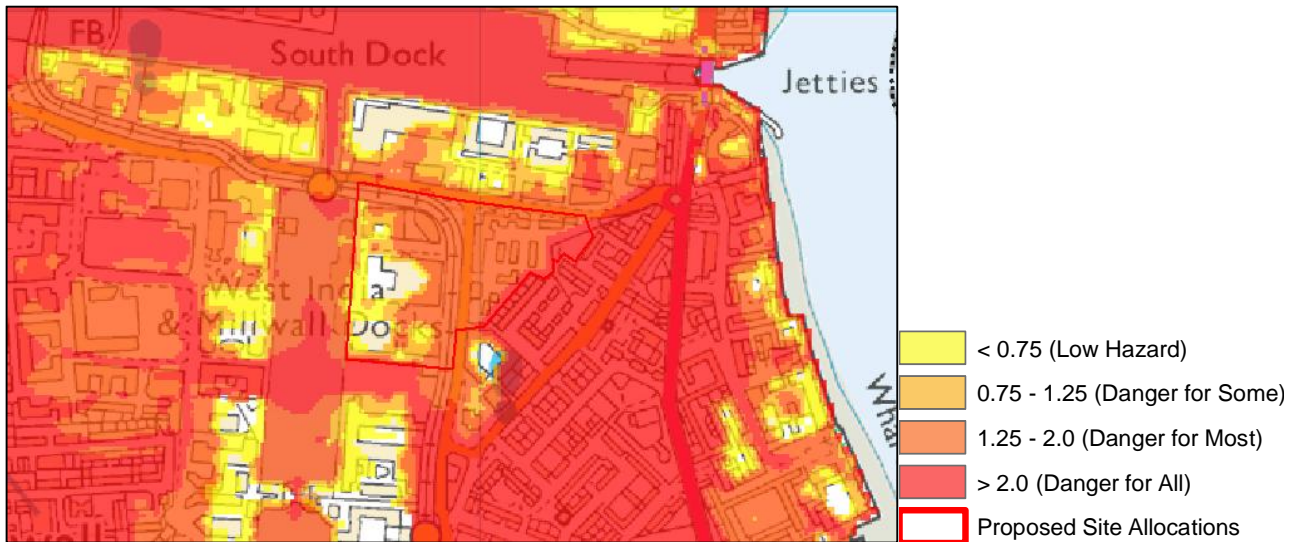


Figure 13-2: 2100 year breach flood hazard (© Crown Copyright and database right [2016])

13.2.3 Pluvial Flood Risk

The site is generally indicated to be at low risk of surface water flooding, with some areas of higher risk (Figure 13-3). However, the site also borders a Critical Drainage Area, so may be susceptible to higher levels of surface water flood risk.

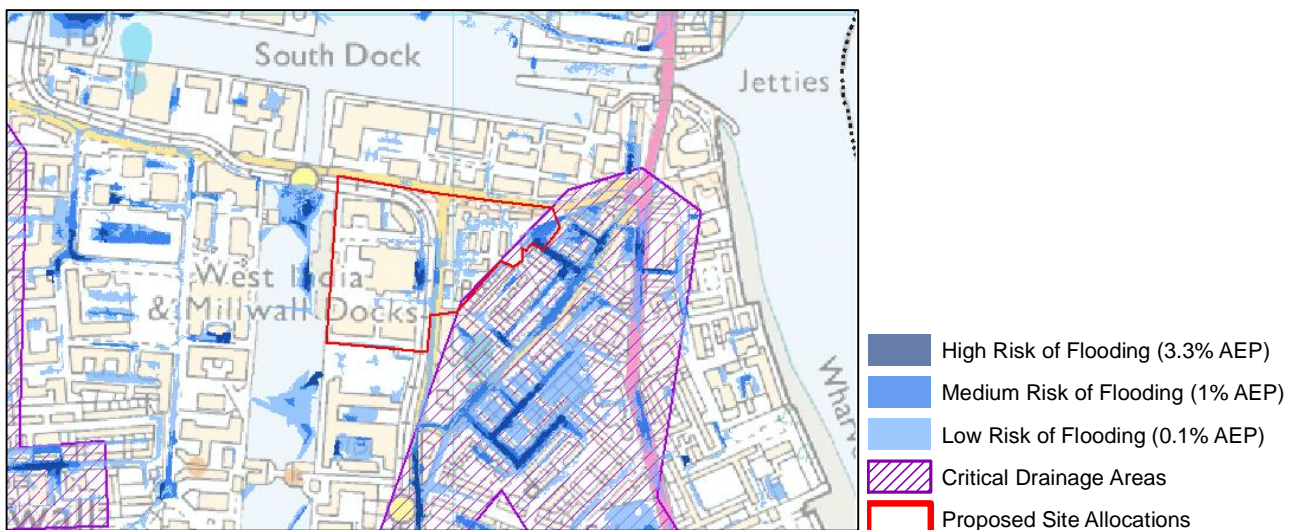


Figure 13-3: Risk of surface water flooding (© Crown Copyright and database right [2016])

13.2.4 Sewer Flood Risk

No information on sewer flood risk has been identified for the site.

13.2.5 Groundwater Flood Risk

Based on geological indicators, the site is unlikely to be susceptible to groundwater flooding (Figure 13-4).

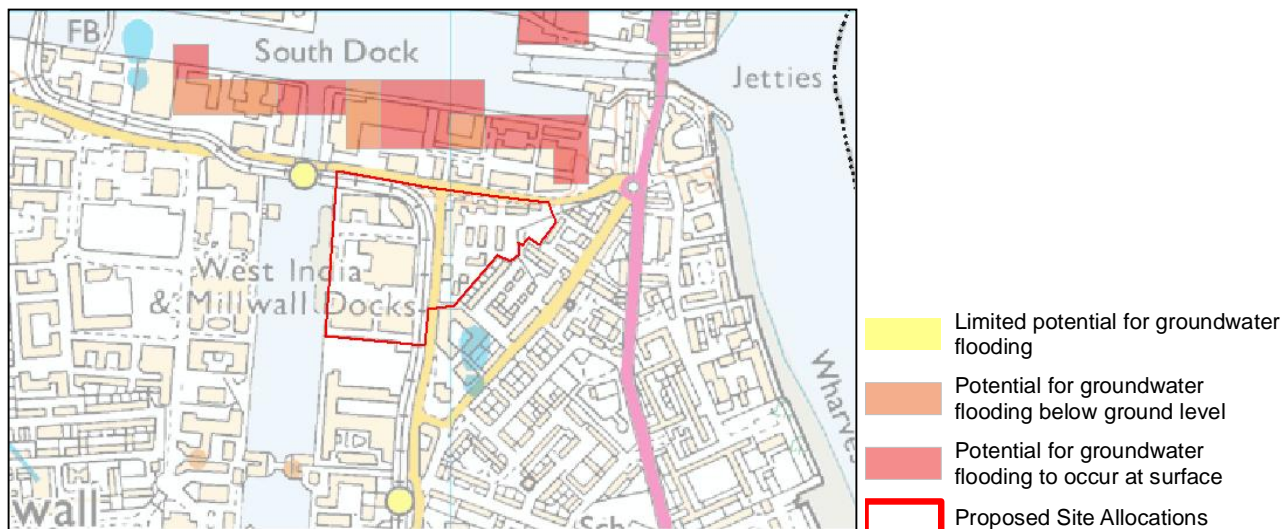


Figure 13-4: Susceptibility to groundwater flooding (© Crown Copyright and database right [2016])

13.2.6 Reservoirs and Artificial Sources of Flood Risk

The site is located immediately adjacent to a dock system and flood risk from this source should be considered within the site-specific FRA. No other artificial sources of flood risk have currently been identified as affecting this site.

13.3 Managing Flood Risk

13.3.1 Conclusions

The site is located in Flood Zone 3a and therefore a site-specific FRA is required in accordance with the NPPF. A Sequential Test is required for the development.

13.3.2 Recommendations

The following flood risk mitigation measures are recommended for this site:

- More vulnerable development should be sequentially allocated to areas of the site at lower relative risk of flooding (considering the flood hazard distribution across the site), with more flood compatible development (such as parking or open space) located in areas at the highest risk.
- No basement dwellings should be permitted within the site.
- To mitigate against residual tidal flood risk, Finished Floor Levels should be raised 300 mm above the 2100 year maximum water level anticipated through a breach of the River Thames defences.
- Site specific emergency evacuation procedures must be in place to ensure that the risk to life is minimised should a breach of the River Thames defences occur. Safe access and egress routes should be provided above the 2100 breach flood level and lead to higher ground within Flood Zone 1. For residential developments where this is not feasible, a dedicated 'safe haven' can be provided above the flood level to enable rapid escape should defence failure occur. This may be provided in the form of a sheltered communal space within the building, accessed via internal stairs and sufficient in size to safely house all residents.
- Flood resilient construction techniques should be employed to reduce damage and increase the speed of recovery should any flooding events occur.
- The site is partially located within a Critical Drainage Area and therefore robust surface water management will be critical for the development. SuDS should be implemented to manage surface water flood risk and restrict post-development runoff to greenfield rates. Geological data indicates that the site is potentially suitable for installation of bespoke infiltration SuDS. The drainage system should provide sufficient capacity to cater for up to the 1 in 100 year storm event, incorporating the latest guidance regarding climate change.

- The development site is located adjacent to a dock system so consideration should be given to the recommendations of the TE2100 plan with respect to future dock wall raising and advice sought from the EA at an early stage.

14 Marsh Wall East

14.1 Overview

Marsh Wall East is located on Limeharbour Marsh Wall and is within Flood Zone 3a, with small areas within Flood Zone 2 (Figure 14-1). The site has an area of 3.61 ha and is currently occupied by offices, housing, retail and a multi storey car park. The development proposal comprises redevelopment for housing and commercial uses, including employment. Other infrastructure requirements have been identified as a health facility, primary school and small open space.

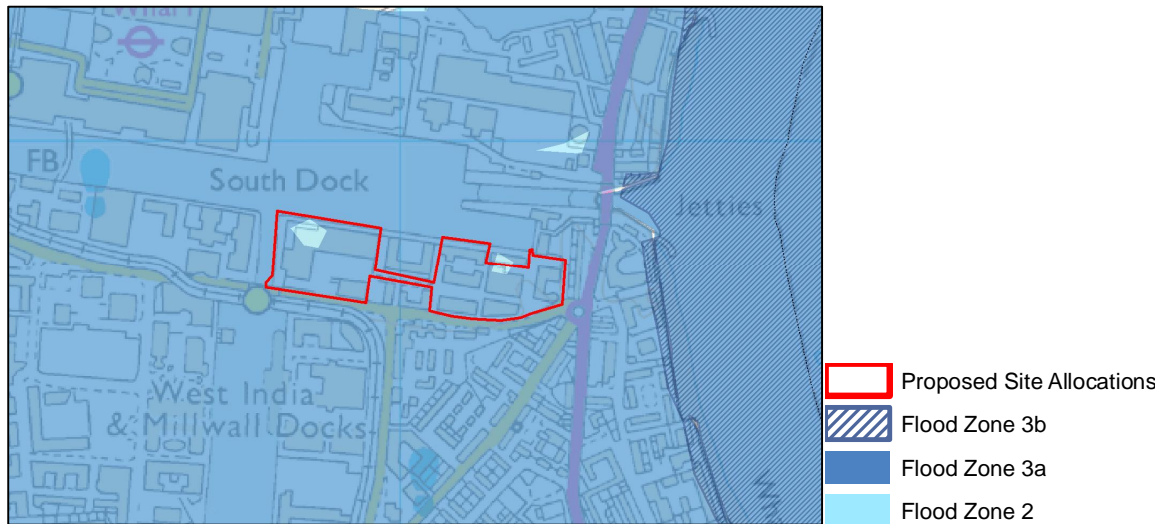


Figure 14-1: Marsh Wall East – Flood Zone classification (© Crown Copyright and database right [2016])

The acceptability of the proposed land uses, and requirement for justification in accordance with the NPPF, is summarised in Table 14-1.

Table 14-1 – Requirement for justification of proposed land uses

Proposed Use	Vulnerability Classification	NPPF Flood Zone Compatibility	Sequential Test Required?
Housing	More vulnerable	Exception Test Required	Yes
Employment	Less vulnerable	ü	Yes
Health facility	More vulnerable	Exception Test Required	Yes
Primary school	More vulnerable	Exception Test Required	Yes
Open Space	Water compatible	ü	Yes

KEY:

✓ Development is appropriate

14.2 Assessment of Flood Risk

14.2.1 Flood History

No historic flood events have been identified within this site.

14.2.2 Fluvial and Tidal Flood Risk

The site is at risk from tidal flood event less than or equal to the 1 in 200 year event (greater than 0.5% annual The site is predominately located in Flood Zone 3a as associated with the Tidal Thames, and therefore at risk of flooding for tidal events with a 1 in 200 or greater annual probability (>0.5% AEP). A portion of the site is Flood Zone 2, deemed at risk of flooding from tidal events between 1 in 200 and 1 in 1000 annual probability (1% – 0.1% AEP).

The Flood Zone classification represents the tidal flood risk ignoring the presence of the Thames Tidal Defences, which provide protection against tidal flooding up to the 1 in 1000 year event (0.1% AEP). The risk of flooding from this source is therefore residual, associated with failure or breach of flood defences.

The distribution of maximum flood hazard across the site, as modelled during a 2100 year breach scenario is indicated in Figure 14-2.

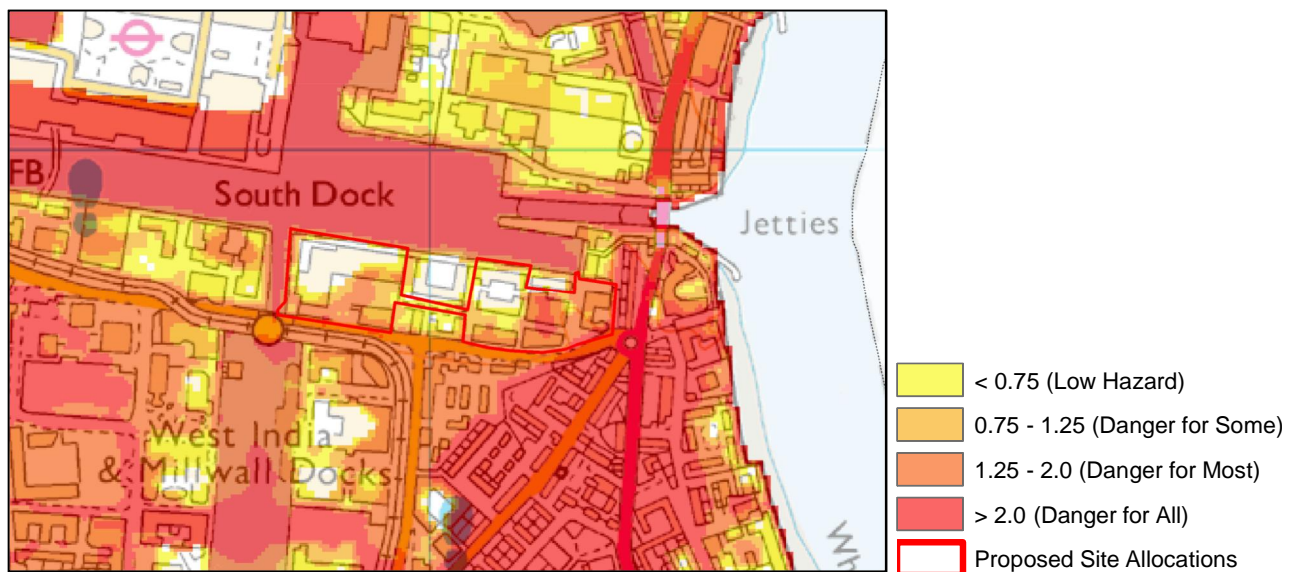


Figure 14-2: 2100 year breach flood hazard (© Crown Copyright and database right [2016])

14.2.3 Pluvial Flood Risk

The site is generally indicated to be at low risk of surface water flooding (Figure 14-3). However, the site also borders a Critical Drainage Area, so may be susceptible to higher levels of surface water flood risk.

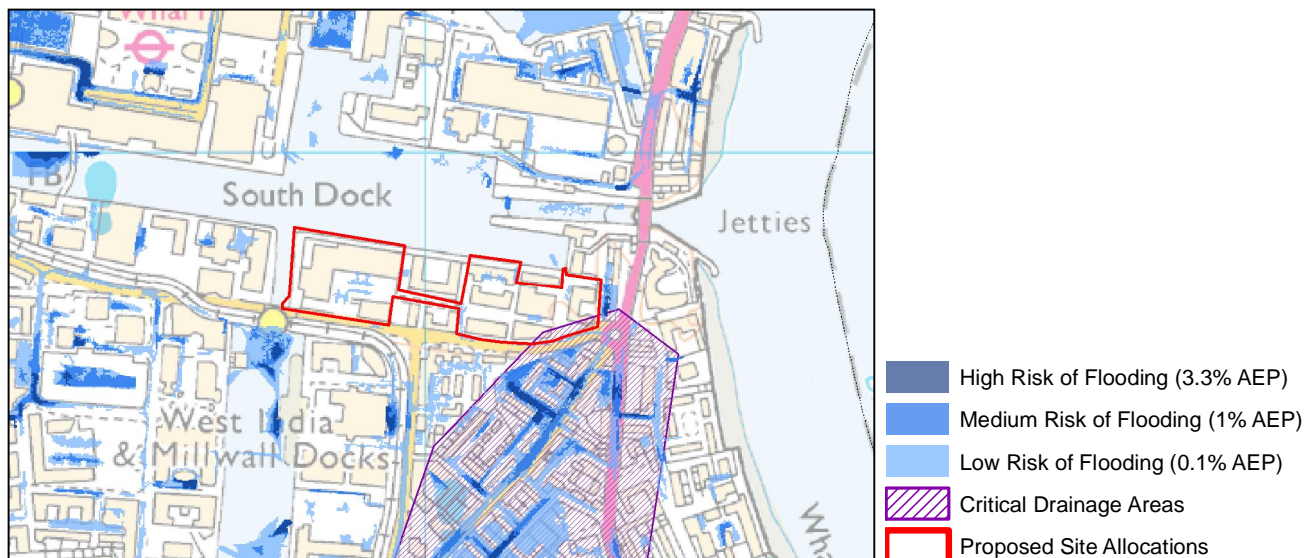


Figure 14-3: Risk of surface water flooding (© Crown Copyright and database right [2016])

14.2.4 Sewer Flood Risk

No information on sewer flood risk has been identified for the site.

14.2.5 Groundwater Flood Risk

Based on geological indicators, a large portion of the site is suggested to have the potential for groundwater flooding to occur at both surface level and below ground level (Figure 14-4).

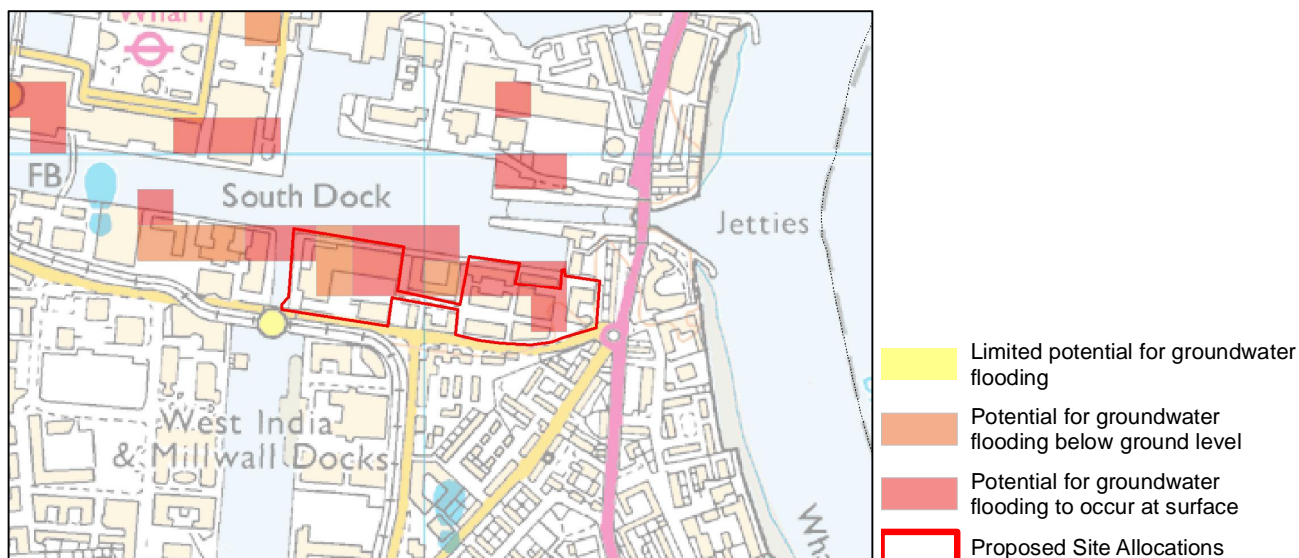


Figure 14-4: Susceptibility to groundwater flooding (© Crown Copyright and database right [2016])

14.2.6 Reservoirs and Artificial Sources of Flood Risk

The site is located immediately adjacent to a dock system and flood risk from this source should be considered within the site-specific FRA. No other artificial sources of flood risk have currently been identified as affecting this site.

14.3 Managing Flood Risk

14.3.1 Conclusions

The site is located in Flood Zones 2 and 3a and therefore a site-specific FRA is required in accordance with the NPPF. A Sequential Test is required for the development.

14.3.2 Recommendations

The following flood risk mitigation measures are recommended for this site:

- More vulnerable development should be sequentially allocated to areas of the site at lower relative risk of flooding (Flood Zone 2 and lower hazard areas), with more flood compatible development (such as parking or open space) located in areas at the highest risk.
- No basement dwellings should be permitted within the site.
- To mitigate against residual tidal flood risk, Finished Floor Levels should be raised 300 mm above the 2100 year maximum water level anticipated through a breach of the River Thames defences.
- Site specific emergency evacuation procedures must be in place to ensure that the risk to life is minimised should a breach of the River Thames defences occur. Safe access and egress routes should be provided above the 2100 breach flood level and lead to higher ground within Flood Zone 1. For residential developments where this is not feasible, a dedicated 'safe haven' can be provided above the flood level to enable rapid escape should defence failure occur. This may be provided in the form of a sheltered communal space within the building, accessed via internal stairs and sufficient in size to safely house all residents.
- Flood resilient construction techniques should be employed to reduce damage and increase the speed of recovery should any flooding events occur.
- Ground conditions should be confirmed through site investigation and dewatering of excavations and basement waterproofing implemented where required.
- The site is partially located within a Critical Drainage Area and therefore robust surface water management will therefore be critical for the development. SuDS should be implemented to manage surface water flood risk and restrict post-development runoff to greenfield rates. Geological data indicates that the majority of the site is unsuitable for infiltration, excepting certain areas along the southern boundary. The drainage system should provide sufficient capacity to cater for up to the 1 in 100 year storm event, incorporating the latest guidance regarding climate change.
- The development site is located adjacent to a dock system so consideration should be given to the recommendations of the TE2100 plan with respect to future dock wall raising and advice sought from the EA at an early stage.

15 Marsh Wall West

15.1 Overview

Marsh Wall West is located on Marsh Wall and entirely within Flood Zone 3a (Figure 15-1). The site has an area of 6.83 ha and is currently occupied by offices, retail, and a hotel. The development proposal comprises redevelopment for housing and commercial uses, including employment. Other infrastructure requirements have been identified as a primary school, small open space and a health facility.

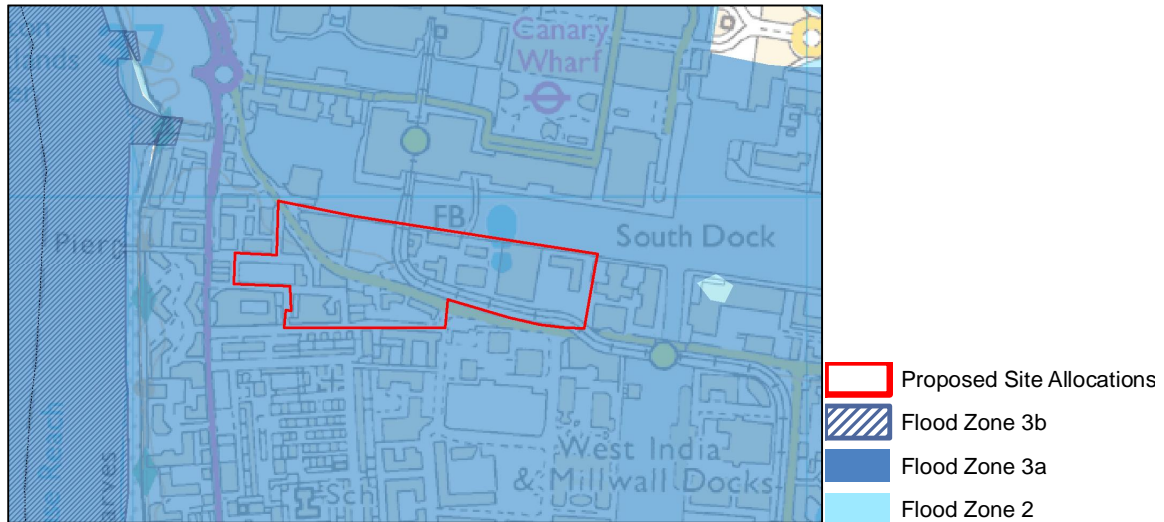


Figure 15-1: Marsh Wall West – Flood Zone classification (© Crown Copyright and database right [2016])

The acceptability of the proposed land uses, and requirement for justification in accordance with the NPPF, is summarised in Table 15-1 below.

Table 15-1 – Requirement for justification of proposed land uses

Proposed Use	Vulnerability Classification	NPPF Flood Zone Compatibility	Sequential Test Required?
Housing	More vulnerable	Exception Test Required	Yes
Employment	Less vulnerable	ü	Yes
Health facility	More vulnerable	Exception Test Required	Yes
Primary school	More vulnerable	Exception Test Required	Yes
Open Space	Water compatible	ü	Yes

KEY:

✓ Development is appropriate

15.2 Assessment of Flood Risk

15.2.1 Flood History

The site is located within the extent of historic tidal flooding from the River Thames.

15.2.2 Fluvial and Tidal Flood Risk

The site is located within Flood Zone 3a, associated with the Tidal Thames, and therefore at risk of flooding for tidal events with a 1 in 200 or greater annual probability (>0.5% AEP).

The Flood Zone classification represents the tidal flood risk ignoring the presence of the Thames Tidal Defences, which provide protection against tidal flooding up to the 1 in 1000 year event (0.1% AEP). The risk of flooding from this source is therefore residual, associated with failure or breach of flood defences.

The distribution of maximum flood hazard across the site, as modelled during a 2100 year breach scenario is indicated in Figure 15-2.

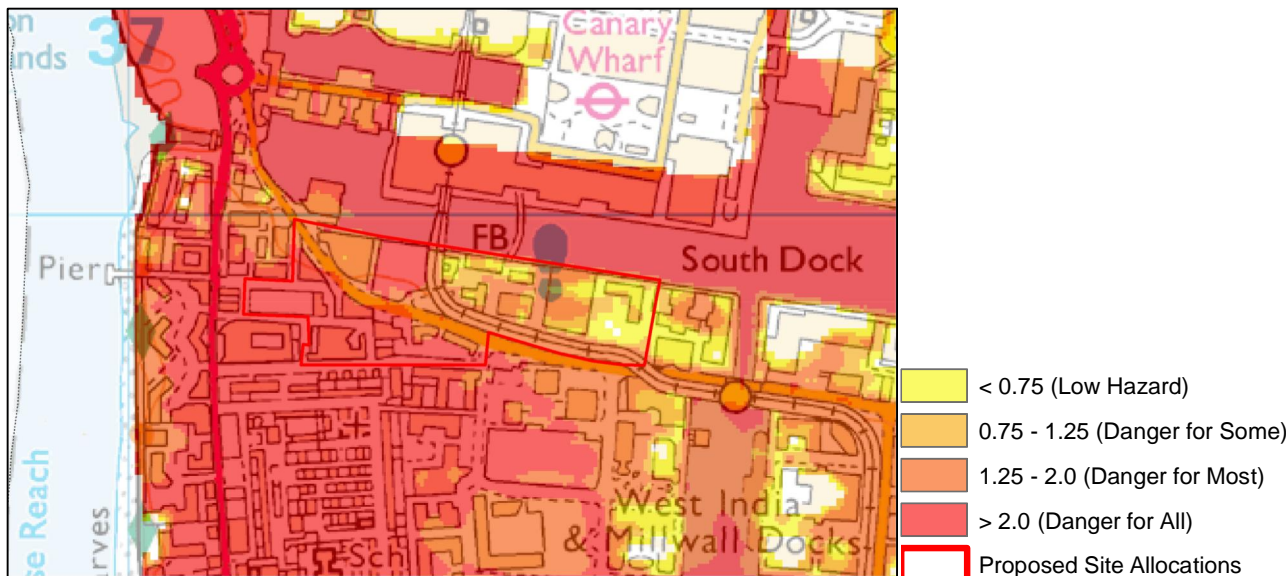


Figure 15-2: 2100 year breach flood hazard (© Crown Copyright and database right [2016])

15.2.3 Pluvial Flood Risk

The site is generally shown to be at low risk of surface water flooding; however, it is also partially located within a Critical Drainage Area, indicating a high susceptibility to surface water flooding towards the western extent of the site (Figure 15-3).

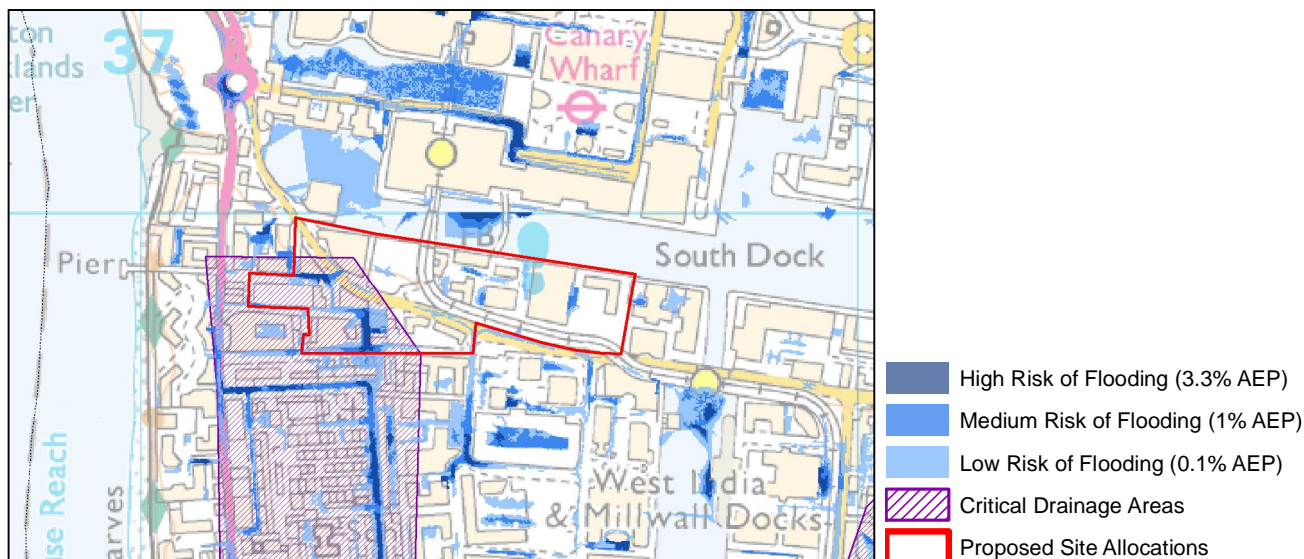


Figure 15-3: Risk of surface water flooding (© Crown Copyright and database right [2016])

15.2.4 Sewer Flood Risk

No information on sewer flood risk has been identified for the site.

15.2.5 Groundwater Flood Risk

Based on geological indicators, the majority of the site is unlikely to be susceptible to groundwater flooding, apart from a small area adjacent to the eastern boundary which is suggested to have the potential for groundwater flooding to occur below ground level (Figure 15-4).

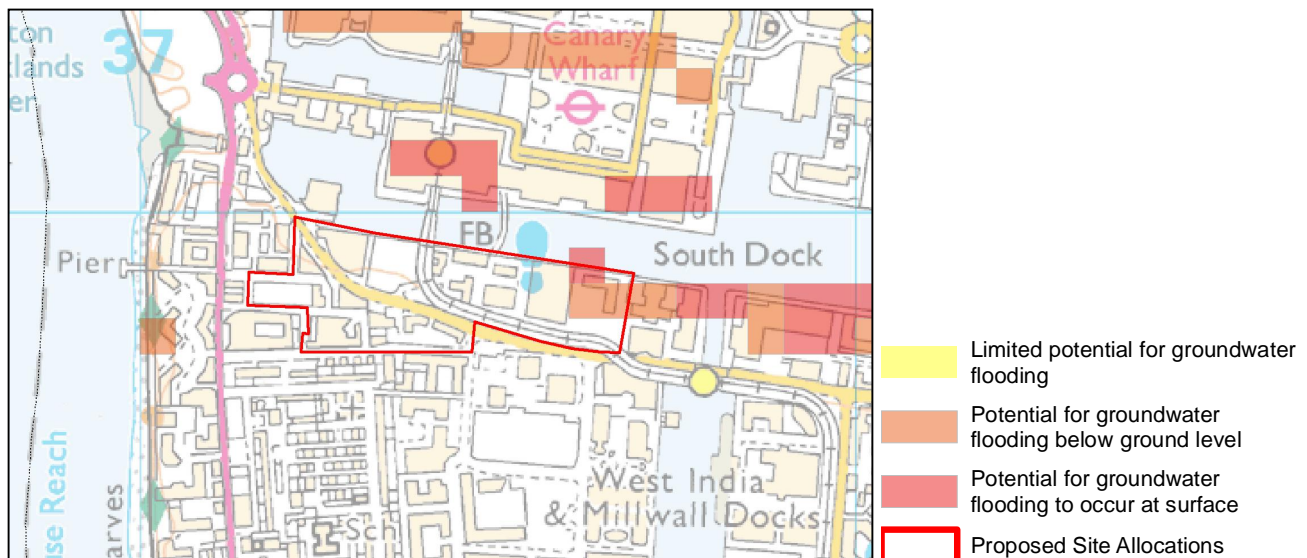


Figure 15-4: Susceptibility to groundwater flooding (© Crown Copyright and database right [2016])

15.2.6 Reservoirs and Artificial Sources of Flood Risk

The site is located immediately adjacent to a dock system and flood risk from this source should be considered within the site-specific FRA. No other artificial sources of flood risk have currently been identified as affecting this site.

15.3 Managing Flood Risk

15.3.1 Conclusions

The site is located in Flood Zone 3a and therefore a site-specific FRA is required in accordance with the NPPF. A Sequential Test is required for the development.

15.3.2 Recommendations

The following flood risk mitigation measures are recommended for this site:

- More vulnerable development should be sequentially allocated to areas of the site at lower relative risk of flooding (considering the flood hazard distribution across the site), with more flood compatible development (such as parking or open space) located in areas at the highest risk.
- No basement dwellings should be permitted within the site.
- To mitigate against residual tidal flood risk, Finished Floor Levels should be raised 300 mm above the 2100 year maximum water level anticipated through a breach of the River Thames defences.
- Site specific emergency evacuation procedures must be in place to ensure that the risk to life is minimised should a breach of the River Thames defences occur. Safe access and egress routes should be provided above the 2100 breach flood level and lead to higher ground within Flood Zone 1. For residential developments where this is not feasible, a dedicated 'safe haven' can be provided above the flood level to enable rapid escape should defence failure occur. This may be provided in the form of a sheltered communal space within the building, accessed via internal stairs and sufficient in size to safely house all residents.
- Flood resilient construction techniques should be employed to reduce damage and increase the speed of recovery should any flooding events occur.
- Ground conditions should be confirmed through site investigation and dewatering of excavations and basement waterproofing implemented where required.
- The site is partially located within a Critical Drainage Area and therefore robust surface water management will therefore be critical for the development. SuDS should be implemented to manage surface water flood risk and restrict post-development runoff to greenfield rates. Geological data indicates

that the majority of the site is potentially suitable for bespoke infiltration SuDS. The drainage system should provide sufficient capacity to cater for up to the 1 in 100 year storm event, incorporating the latest guidance regarding climate change.

- The development site is located adjacent to a dock system so consideration should be given to the recommendations of the TE2100 plan with respect to future dock wall raising and advice sought from the EA at an early stage.

16 Millharbour

16.1 Overview

The site is located at 2 Millharbour and is entirely within Flood Zone 3a (Figure 16-1). The site has an area of 5.05 ha and is currently occupied by a car sales centre, offices and a private primary and nursery. The development proposal comprises redevelopment for housing and commercial uses, including employment. Other infrastructure requirements have been identified as a primary school, open space and a health facility.

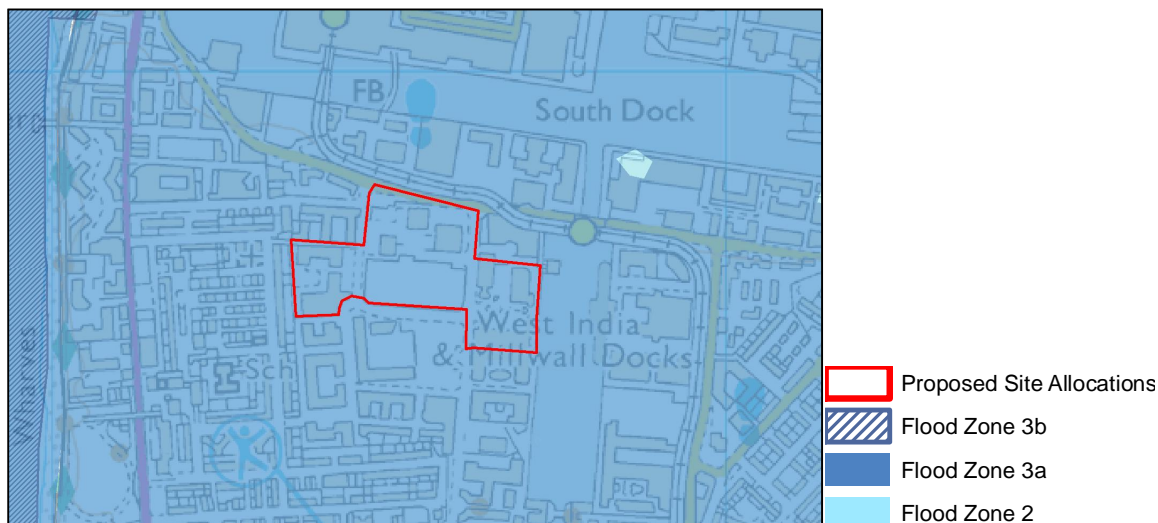


Figure 16-1: Millharbour – Flood Zone classification (© Crown Copyright and database right [2016])

The acceptability of the proposed land uses, and requirement for justification in accordance with the NPPF, is summarised in Table 16-1 below.

Table 16-1 – Requirement for justification of proposed land uses

Proposed Use	Vulnerability Classification	NPPF Flood Zone Compatibility	Sequential Test Required?
Housing	More vulnerable	Exception Test Required	Yes
Primary school	More vulnerable	Exception Test Required	Yes
Open space	Water compatible	ü	Yes
Health facility	More vulnerable	Exception Test Required	Yes
Employment	Less vulnerable	ü	Yes

KEY:

✓ Development is appropriate

16.2 Assessment of Flood Risk

16.2.1 Flood History

The site is located within the extent of historic tidal flooding from the River Thames.

16.2.2 Fluvial and Tidal Flood Risk

The site is located within Flood Zone 3a, associated with the Tidal Thames, and therefore at risk of flooding for tidal events with a 1 in 200 or greater annual probability (>0.5% AEP).

The Flood Zone classification represents the tidal flood risk ignoring the presence of the Thames Tidal Defences, which provide protection against tidal flooding up to the 1 in 1000 year event (0.1% AEP). The risk of flooding from this source is therefore residual, associated with failure or breach of flood defences.

The distribution of maximum flood hazard across the site, as modelled during a 2100 year breach scenario is indicated in Figure 16-2.

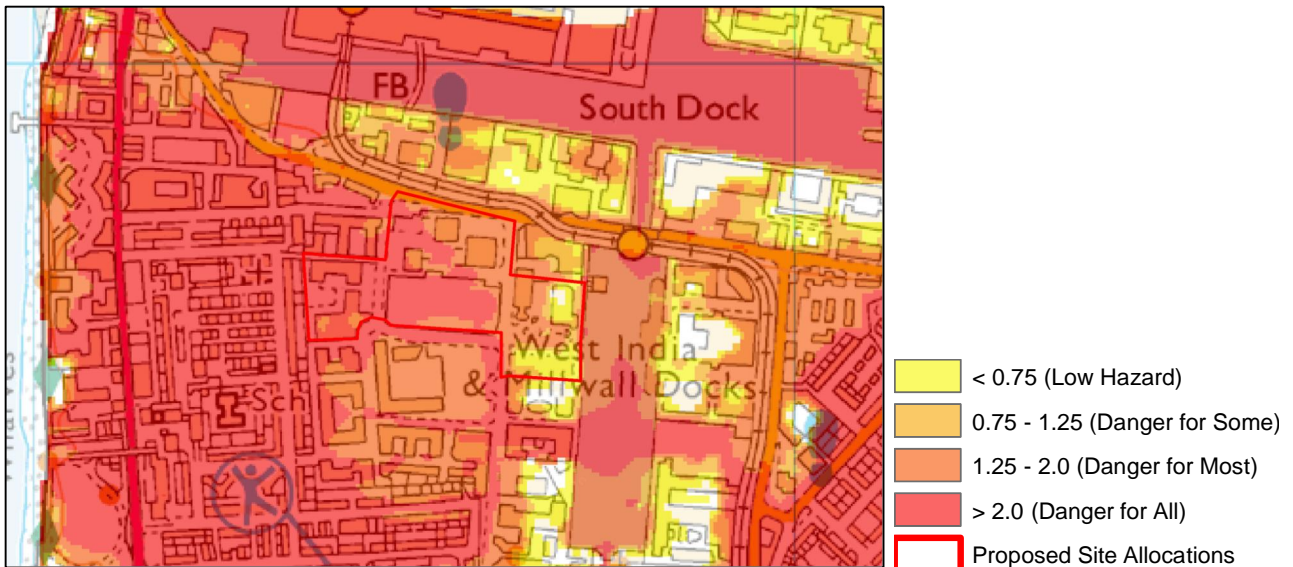


Figure 16-2: 2100 year breach flood hazard (© Crown Copyright and database right [2016])

16.2.3 Pluvial Flood Risk

The site is generally shown to be at low risk of surface water flooding with localised areas of high risk. The site is also partially located within a Critical Drainage Area, indicating a high susceptibility to surface water flooding, particularly towards the western extent of the site (Figure 16-3).

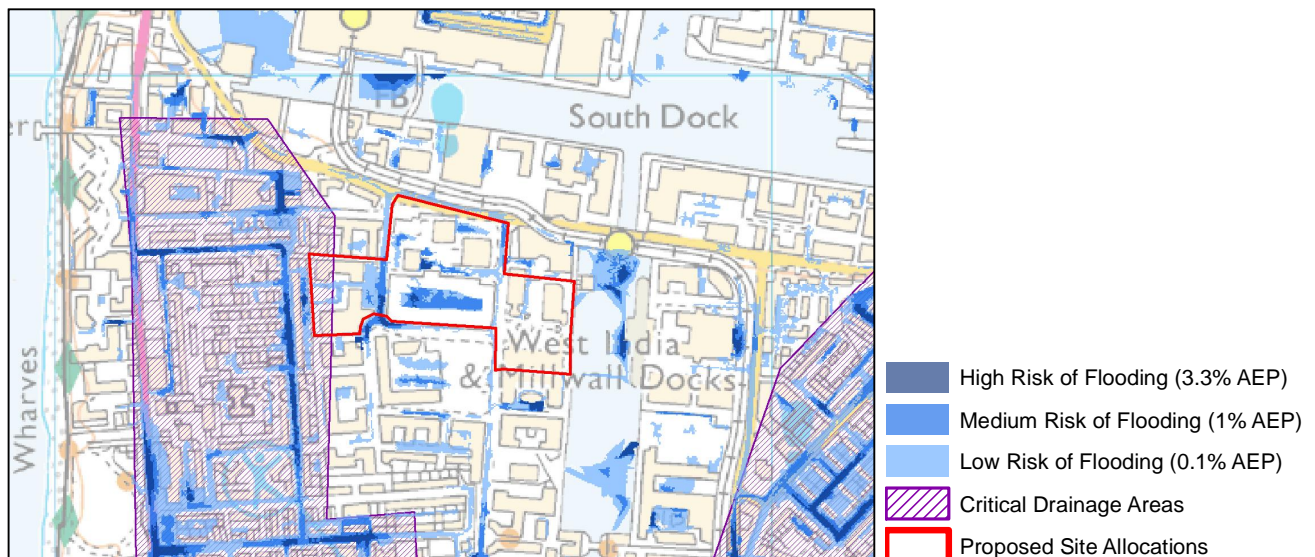


Figure 16-3: Risk of surface water flooding (© Crown Copyright and database right [2016])

16.2.4 Sewer Flood Risk

No information on sewer flood risk has been identified for the site.

16.2.5 Groundwater Flood Risk

Based on geological indicators, the site is unlikely to be susceptible to groundwater flooding (Figure 16-4).

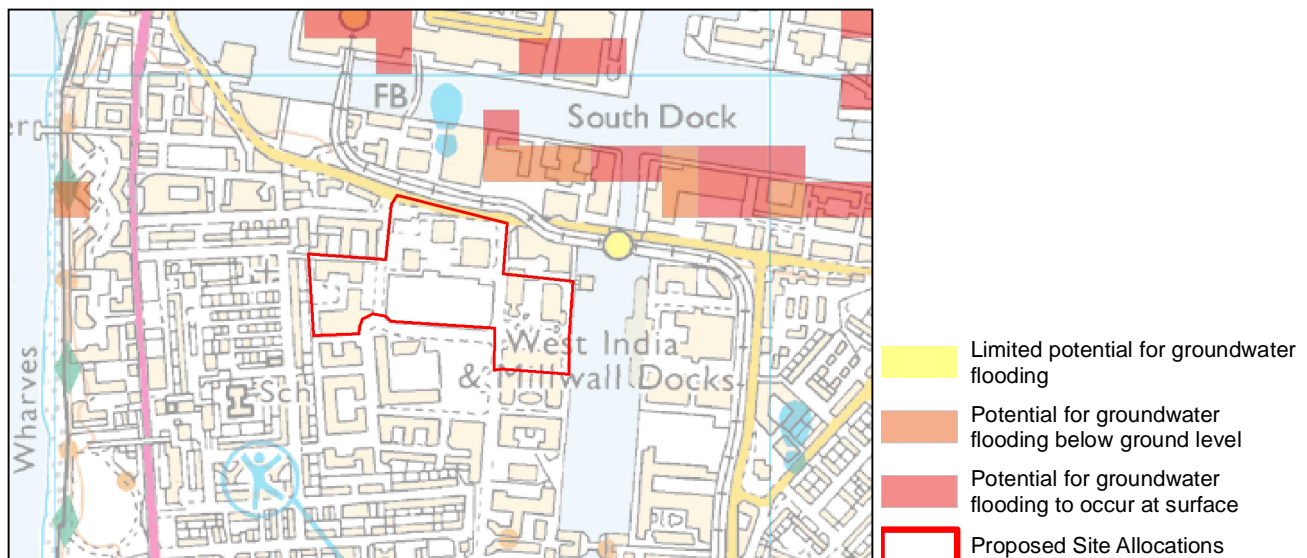


Figure 16-4: Susceptibility to groundwater flooding (© Crown Copyright and database right [2016])

16.2.6 Reservoirs and Artificial Sources of Flood Risk

The site is located immediately adjacent to a dock system and flood risk from this source should be considered within the site-specific FRA. No other artificial sources of flood risk have currently been identified as affecting this site.

16.3 Managing Flood Risk

16.3.1 Conclusions

The site is located in Flood Zone 3a and therefore a site-specific FRA is required in accordance with the NPPF. A Sequential Test is required for the development.

16.3.2 Recommendations

The following flood risk mitigation measures are recommended for this site:

- More vulnerable development should be sequentially allocated to areas of the site at lower relative risk of flooding (considering the flood hazard distribution across the site), with more flood compatible development (such as parking or open space) located in areas at the highest risk.
- No basement dwellings should be permitted within the site.
- To mitigate against residual tidal flood risk, Finished Floor Levels should be raised 300 mm above the 2100 year maximum water level anticipated through a breach of the River Thames defences.
- Site specific emergency evacuation procedures must be in place to ensure that the risk to life is minimised should a breach of the River Thames defences occur. Safe access and egress routes should be provided above the 2100 breach flood level and lead to higher ground within Flood Zone 1. For residential developments where this is not feasible, a dedicated 'safe haven' can be provided above the flood level to enable rapid escape should defence failure occur. This may be provided in the form of a sheltered communal space within the building, accessed via internal stairs and sufficient in size to safely house all residents.
- Flood resilient construction techniques should be employed to reduce damage and increase the speed of recovery should any flooding events occur.
- The site is partially located within a Critical Drainage Area and therefore robust surface water management will therefore be critical for the development.
- SuDS should be implemented to manage surface water flood risk and restrict post-development runoff to greenfield rates. Geological data indicates that the site is potentially suitable for bespoke infiltration SuDS.

The drainage system should provide sufficient capacity to cater for up to the 1 in 100 year storm event, incorporating the latest guidance regarding climate change.

- The development site is located adjacent to a dock system so consideration should be given to the recommendations of the TE2100 plan with respect to future dock wall raising and advice sought from the EA at an early stage.

17 North Quay

17.1 Overview

North Quay is located on Upper Bank Street and is predominately located in Flood Zone 3a with part of the site located in Flood Zone 2 (Figure 17-1). The site has an area of 2.22 ha and is currently vacant. The development proposal comprises redevelopment for housing, strategic employment and a small open space.

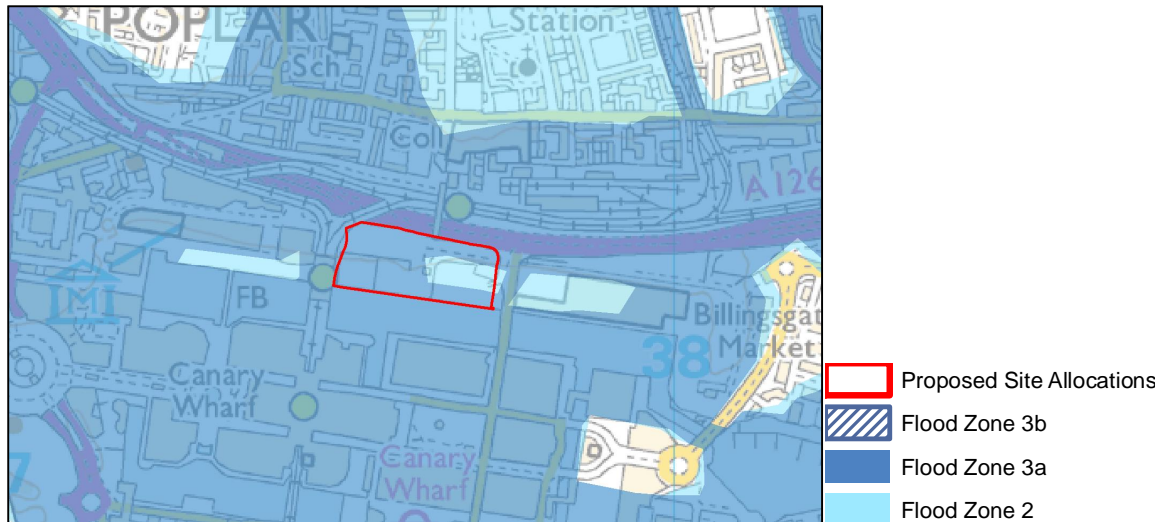


Figure 17-1: North Quay – Flood Zone classification (© Crown Copyright and database right [2016])

The acceptability of the proposed land uses, and requirement for justification in accordance with the NPPF, is summarised in Table 17-1.

Table 17-1 – Requirement for justification of proposed land uses

Proposed Use	Vulnerability Classification	NPPF Flood Zone Compatibility	Sequential Test Required?
Employment	Less Vulnerable	Ü	Yes
Open space	Water compatible	Ü	Yes
Housing	More Vulnerable	Exception Test Required	Yes

KEY:

✓ Development is appropriate

17.2 Assessment of Flood Risk

17.2.1 Flood History

No historic flood events have been identified within this site.

17.2.2 Fluvial and Tidal Flood Risk

The site is at risk from tidal flood event less than or equal to the 1 in 200 year event (greater than 0.5% annual probability). The site is predominately located in Flood Zone 3a as associated with the Tidal Thames, and therefore at risk of flooding for tidal events with a 1 in 200 or greater annual probability (>0.5% AEP). A portion of the site is Flood Zone 2, deemed at risk of flooding from tidal events between 1 in 200 and 1 in 1000 annual probability (1% – 0.1% AEP).

The Flood Zone classification represents the tidal flood risk ignoring the presence of the Thames Tidal Defences, which provide protection against tidal flooding up to the 1 in 1000 year event (0.1% AEP). The risk of flooding from this source is therefore residual, associated with failure or breach of flood defences.

The distribution of maximum flood hazard across the site, as modelled during a 2100 year breach scenario is indicated in Figure 17-2.

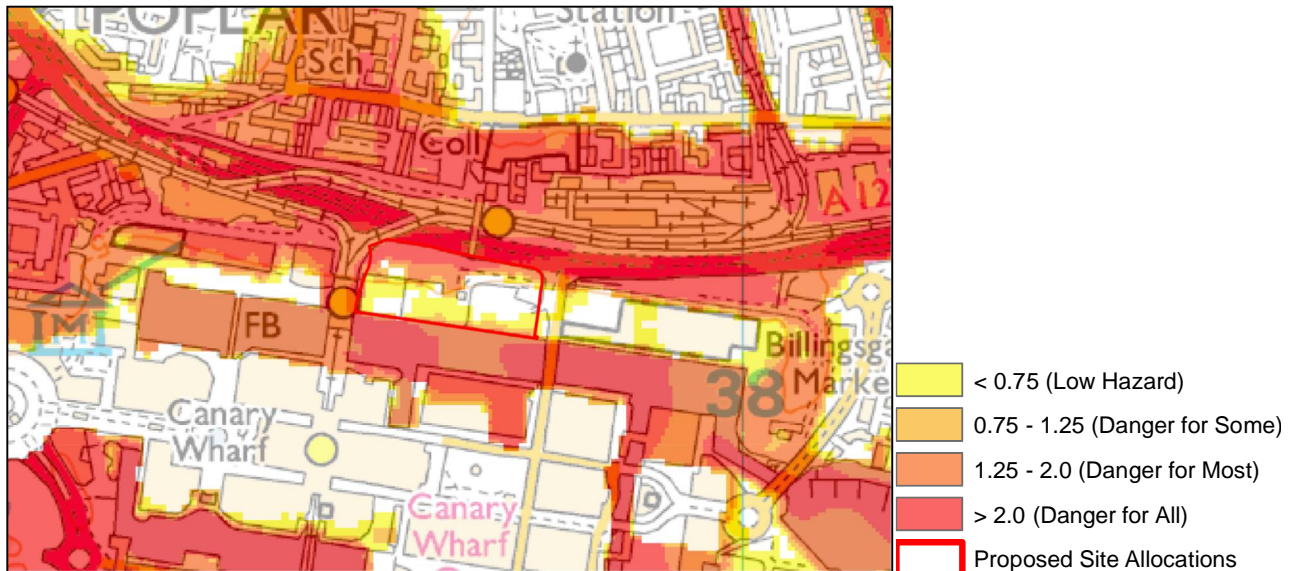


Figure 17-2: 2100 year breach flood hazard (© Crown Copyright and database right [2016])

17.2.3 Pluvial Flood Risk

The site is generally shown to be at low risk of surface water flooding, with localised areas at higher risk towards the north western corner (Figure 17-3).

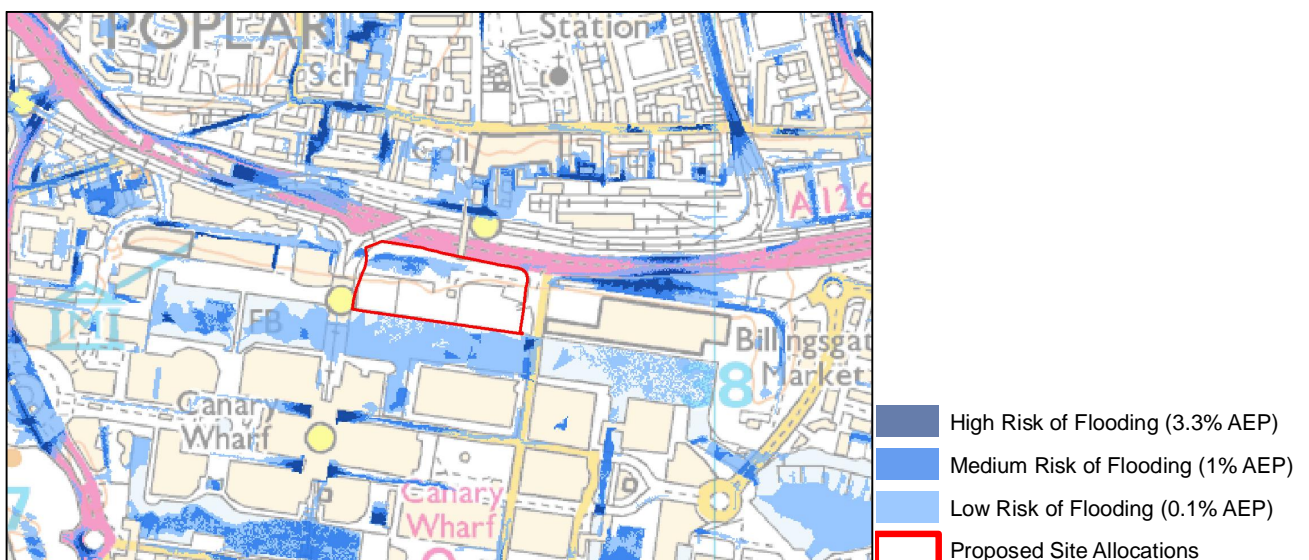


Figure 17-3: Risk of surface water flooding (© Crown Copyright and database right [2016])

17.2.4 Sewer Flood Risk

No information on sewer flood risk has been identified for the site.

17.2.5 Groundwater Flood Risk

Based on geological indicators, the site is unlikely to be susceptible to groundwater flooding (Figure 17-4).

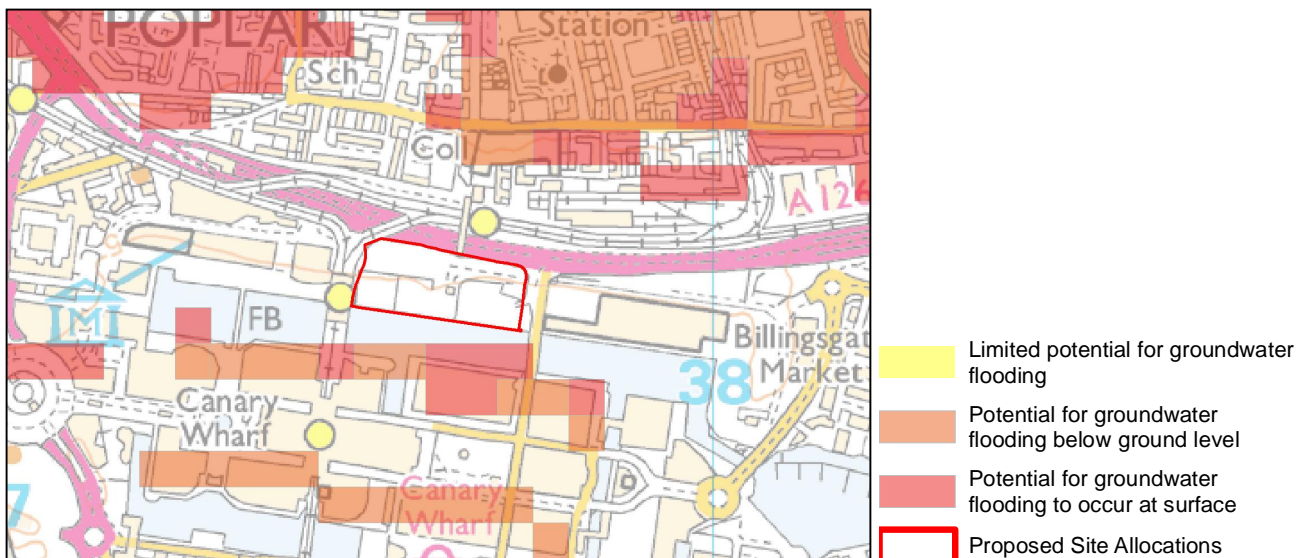


Figure 17-4: Susceptibility to groundwater flooding (© Crown Copyright and database right [2016])

17.2.6 Reservoirs and Artificial Sources of Flood Risk

The site is located immediately adjacent to a dock system and flood risk from this source should be considered within the site-specific FRA. The site is adjacent to the extent of flooding anticipated through breach or failure of upstream reservoirs; however, this is not anticipated to enter the site boundary (Figure 17-5). No other artificial sources of flood risk have currently been identified within this site.

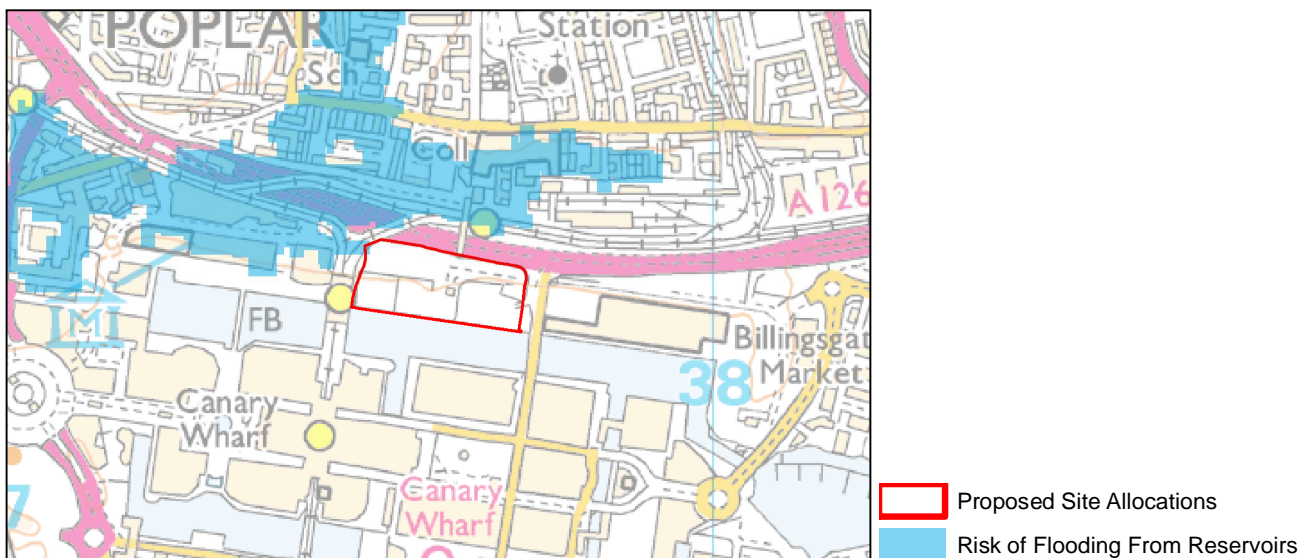


Figure 17-5: Risk of Reservoir Flooding (© Crown Copyright and database right [2016])

17.3 Managing Flood Risk

17.3.1 Conclusions

The site is located in Flood Zones 2 and 3a and therefore a site-specific FRA is required in accordance with the NPPF. A Sequential Test is required for the development.

17.3.2 Recommendations

The following flood risk mitigation measures are recommended for this site:

- More vulnerable development should be sequentially allocated to areas of the site at lower relative risk of flooding (Flood Zone 2 and lower hazard areas), with more flood compatible development (such as parking or open space) located in areas at the highest risk.
- No basement dwellings should be permitted within Flood Zone 3a. They might be possible in Flood Zone 2 provided the Exception Test is passed.
- To mitigate against residual tidal flood risk, Finished Floor Levels should be raised 300 mm above the 2100 year maximum water level anticipated through a breach of the River Thames defences.
- Site specific emergency evacuation procedures must be in place to ensure that the risk to life is minimised should a breach of the River Thames defences occur. Safe access and egress routes should be provided above the 2100 breach flood level and lead to higher ground within Flood Zone 1.
- Flood resilient construction techniques should be employed to reduce damage and increase the speed of recovery should any flooding events occur.
- SuDS should be implemented to manage surface water flood risk and restrict post-development runoff to greenfield rates. Geological data indicates that the site is potentially suitable for bespoke infiltration SuDS. The drainage system should provide sufficient capacity to cater for up to the 1 in 100 year storm event, incorporating the latest guidance regarding climate change.
- The development site is located adjacent to a dock system so consideration should be given to the recommendations of the TE2100 plan with respect to future dock wall raising and advice sought from the EA at an early stage.

18 Reuters Ltd

18.1 Overview

Reuters Ltd is located on Paul Julius Close and entirely within Flood Zone 3a (Figure 18-1). The site has an area of 2.71 ha and is currently occupied by offices and associated car parking. The development proposal comprises strategic employment and housing. Other infrastructure requirements have been identified as a primary school and small open space.

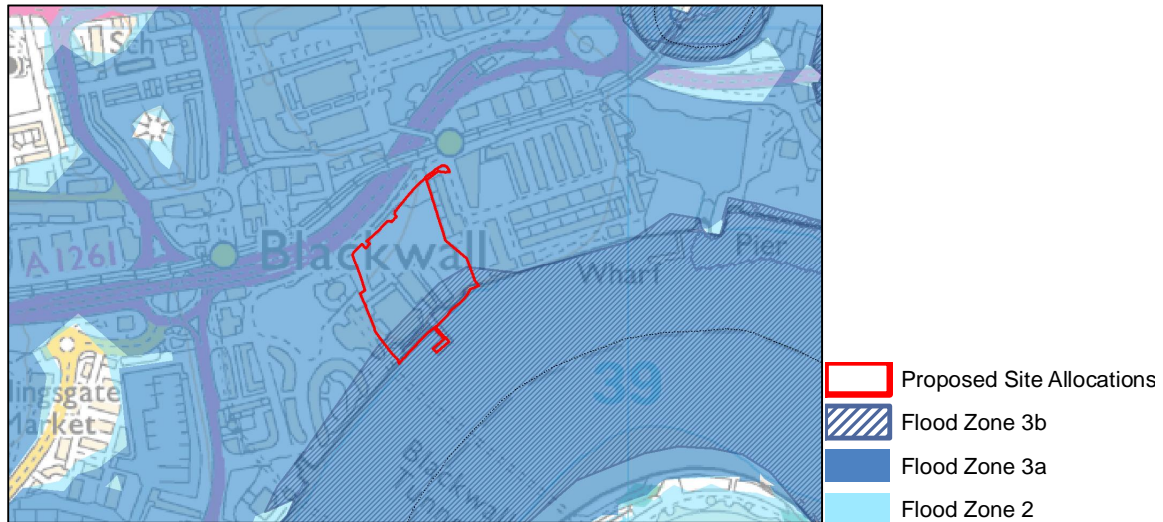


Figure 18-1: Reuters Ltd – Flood Zone classification (© Crown Copyright and database right [2016])

The acceptability of the proposed land uses, and requirement for justification in accordance with the NPPF, is summarised in Table 18-1.

Table 18-1 – Requirement for justification of proposed land uses

Proposed Use	Vulnerability Classification	NPPF Flood Zone Compatibility	Sequential Test Required?
Primary School	More vulnerable	Exception Test Required	Yes
Open space	Water compatible	ü	Yes
Employment	Less vulnerable	ü	Yes
Housing	More vulnerable	Exception Test Required	Yes

KEY:

✓ Development is appropriate

18.2 Assessment of Flood Risk

18.2.1 Flood History

The site is located within the extent of historic tidal flooding from the River Thames.

18.2.2 Fluvial and Tidal Flood Risk

The site is located within Flood Zone 3a, associated with the Tidal Thames, and therefore at risk of flooding for tidal events with a 1 in 200 or greater annual probability (>0.5% AEP).

The Flood Zone classification represents the tidal flood risk ignoring the presence of the Thames Tidal Defences, which provide protection against tidal flooding up to the 1 in 1000 year event (0.1% AEP). The risk of flooding from this source is therefore residual, associated with failure or breach of flood defences.

The distribution of maximum flood hazard across the site, as modelled during a 2100 year breach scenario is indicated in Figure 18-2.

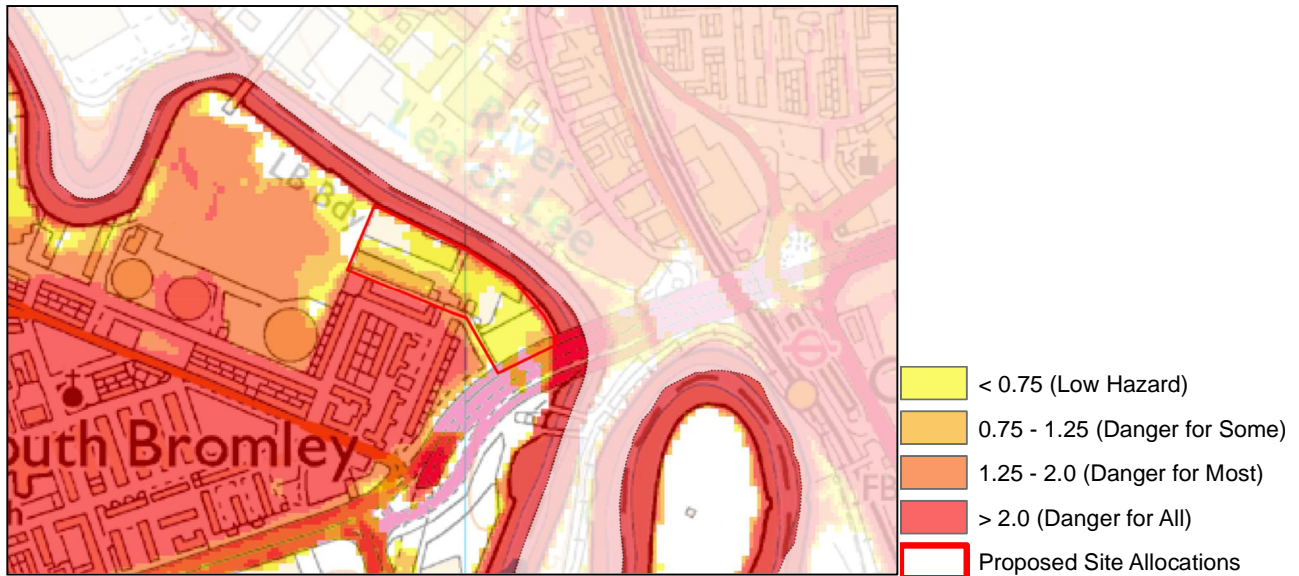


Figure 18-2: 2100 year breach flood hazard (© Crown Copyright and database right [2016])

18.2.3 Pluvial Flood Risk

The site is generally shown to be at low risk of surface water flooding, with localised areas of higher risk towards the north western corner (Figure 18-3).

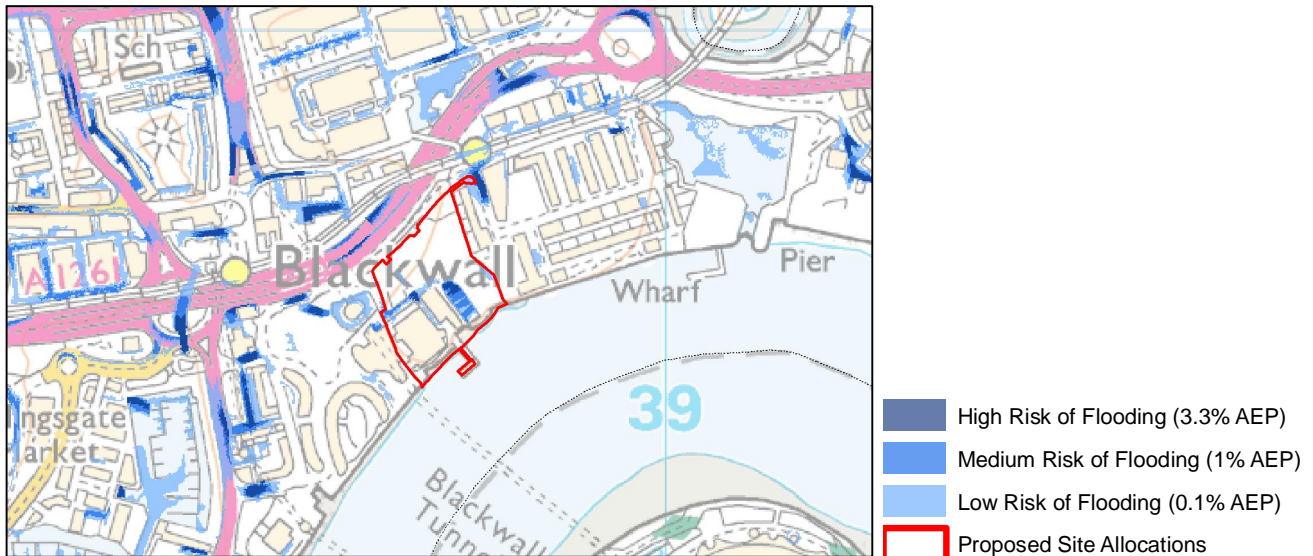


Figure 18-3: Risk of surface water flooding (© Crown Copyright and database right [2016])

18.2.4 Sewer Flood Risk

No information on sewer flood risk has been identified for the site.

18.2.5 Groundwater Flood Risk

Based on geological indicators, the site is unlikely to be susceptible to groundwater flooding (Figure 18-4).

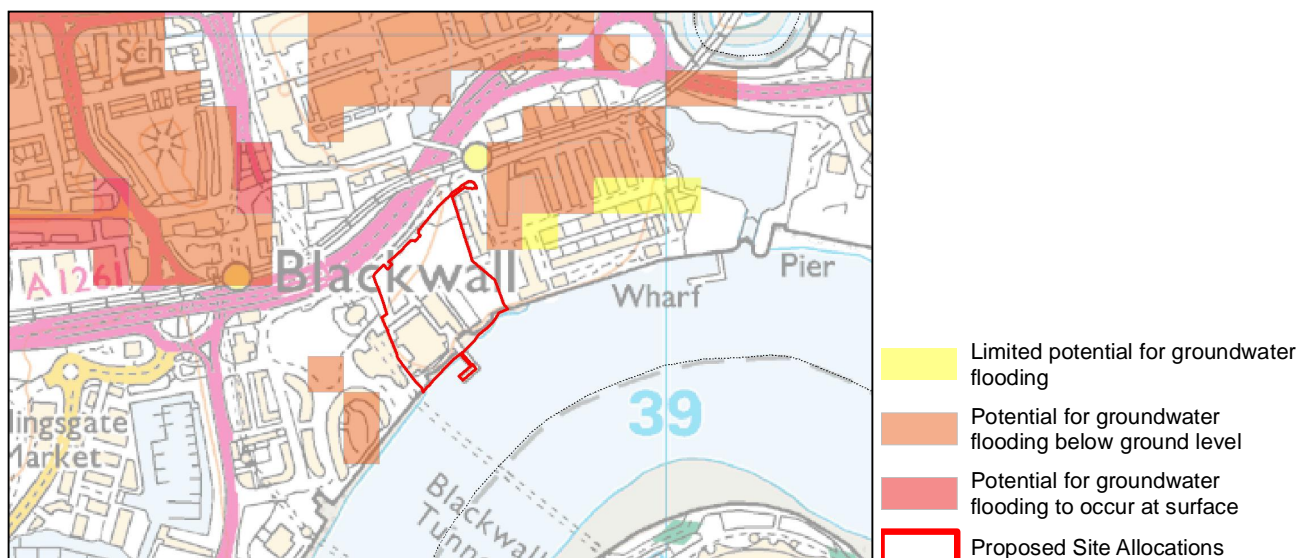


Figure 18-4: Susceptibility to groundwater flooding (© Crown Copyright and database right [2016])

18.2.6 Reservoirs and Artificial Sources of Flood Risk

No artificial sources of flood risk have currently been identified as affecting this site.

18.3 Managing Flood Risk

18.3.1 Conclusions

The site is located in Flood Zone 3a and therefore a site-specific FRA is required in accordance with the NPPF. A Sequential Test is required for the development.

18.3.2 Recommendations

The following flood risk mitigation measures are recommended for this site:

- More vulnerable development should be sequentially allocated to areas of the site at lower relative risk of flooding (considering the flood hazard distribution across the site), with more flood compatible development (such as parking or open space) located in areas at the highest risk.
- No basement dwellings should be permitted within the site.
- To mitigate against residual tidal flood risk, Finished Floor Levels should be raised 300 mm above the 2100 year maximum water level anticipated through a breach of the River Thames defences.
- Site specific emergency evacuation procedures must be in place to ensure that the risk to life is minimised should a breach of the River Thames defences occur. Safe access and egress routes should be provided above the 2100 breach flood level and lead to higher ground within Flood Zone 1. For residential developments where this is not feasible, a dedicated 'safe haven' can be provided above the flood level to enable rapid escape should defence failure occur. This may be provided in the form of a sheltered communal space within the building, accessed via internal stairs and sufficient in size to safely house all residents.
- Flood resilient construction techniques should be employed to reduce damage and increase the speed of recovery should any flooding events occur.
- The development site is located directly adjacent to the River Thames and a 16 m buffer strip must be maintained along the river corridor. Demonstration will be required that the associated flood defences will be safe over the lifetime of the development, including any required maintenance and improvements. Consideration should be given to the recommendations of the TE2100 plan and advice sought from the EA at an early stage.
- SuDS should be implemented to manage surface water flood risk and restrict post-development runoff to greenfield rates. Geological data indicates that the site is potentially suitable for bespoke infiltration SuDS.

The drainage system should provide sufficient capacity to cater for up to the 1 in 100 year storm event, incorporating the latest guidance regarding climate change.

19 Riverside South

19.1 Overview

Riverside South is located on Westferry Circus and entirely within Flood Zone 3a (Figure 19-1). The site has an area of 2.17 ha and is currently vacant. The proposal comprises redevelopment for housing and strategic employment, with a small open space identified as an additional infrastructure requirement.

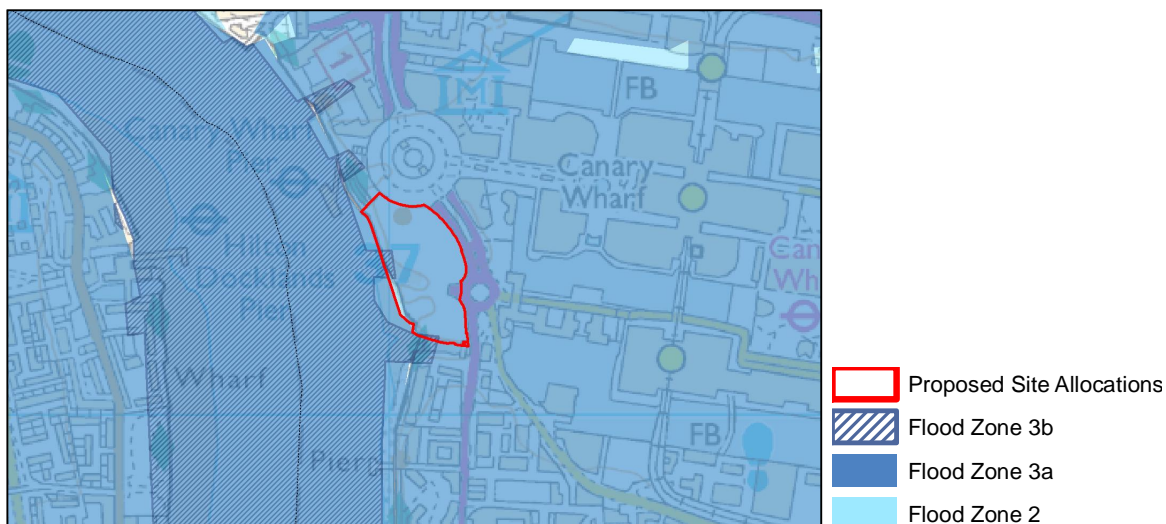


Figure 19-1: Riverside South – Flood Zone classification (© Crown Copyright and database right [2016])

The acceptability of the proposed land uses, and requirement for justification in accordance with the NPPF, is summarised in Table 19-1.

Table 19-1 – Requirement for justification of proposed land uses

Proposed Use	Vulnerability Classification	NPPF Flood Zone Compatibility	Sequential Test Required
Employment	Less vulnerable	ü	Yes
Open Space	Water compatible	ü	Yes
Housing	More vulnerable	Exception Test Required	Yes

KEY:

✓ Development is appropriate

19.2 Assessment of Flood Risk

19.2.1 Flood History

No historic flood events have been identified within this site.

19.2.2 Fluvial and Tidal Flood Risk

The site is located within Flood Zone 3a, associated with the Tidal Thames, and therefore at risk of flooding for tidal events with a 1 in 200 or greater annual probability (>0.5% AEP).

The Flood Zone classification represents the tidal flood risk ignoring the presence of the Thames Tidal Defences, which provide protection against tidal flooding up to the 1 in 1000 year event (0.1% AEP). The risk of flooding from this source is therefore residual, associated with failure or breach of flood defences.

The distribution of maximum flood hazard across the site, as modelled during a 2100 year breach scenario is indicated in Figure 19-2.

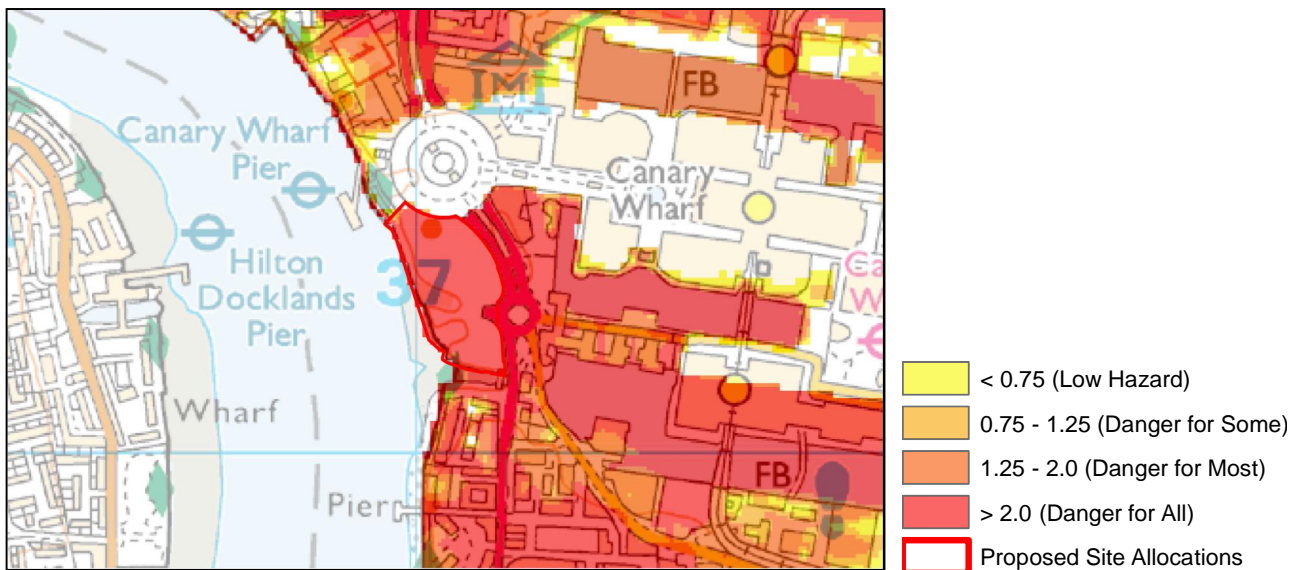


Figure 19-2: 2100 year breach flood hazard (© Crown Copyright and database right [2016])

19.2.3 Pluvial Flood Risk

The site is generally shown to be at low risk of surface water flooding, with localised areas of higher risk (Figure 19-3).

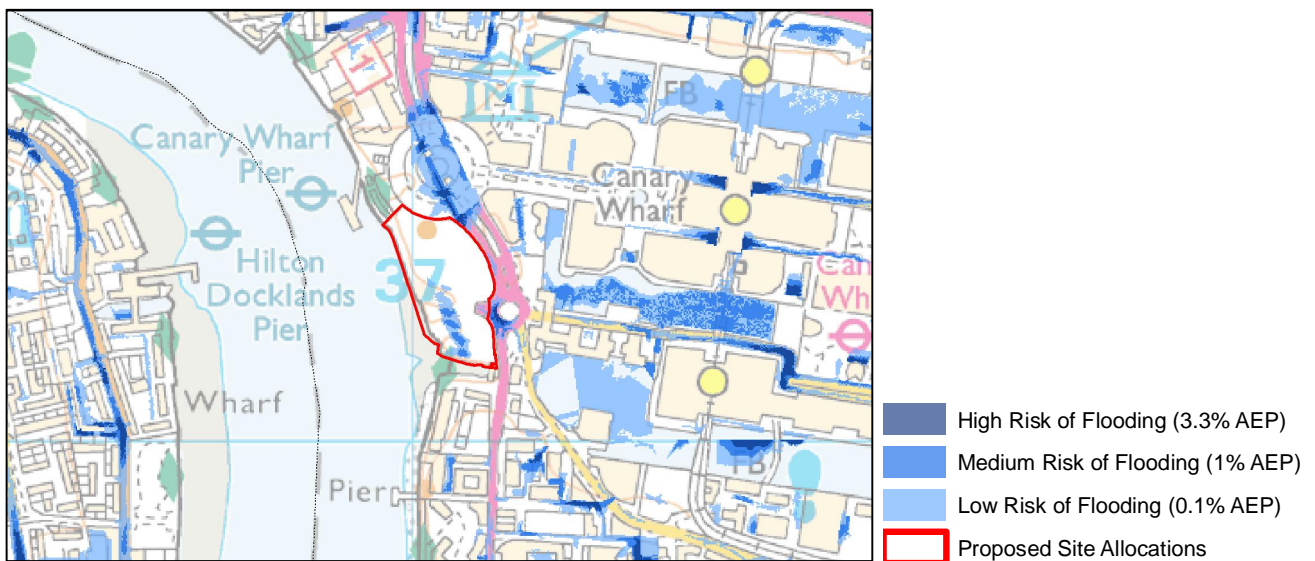


Figure 19-3: Risk of surface water flooding (© Crown Copyright and database right [2016])

19.2.4 Sewer Flood Risk

No information on sewer flood risk has been identified for the site.

19.2.5 Groundwater Flood Risk

Based on geological indicators, the site is unlikely to be susceptible to groundwater flooding (Figure 19-4).

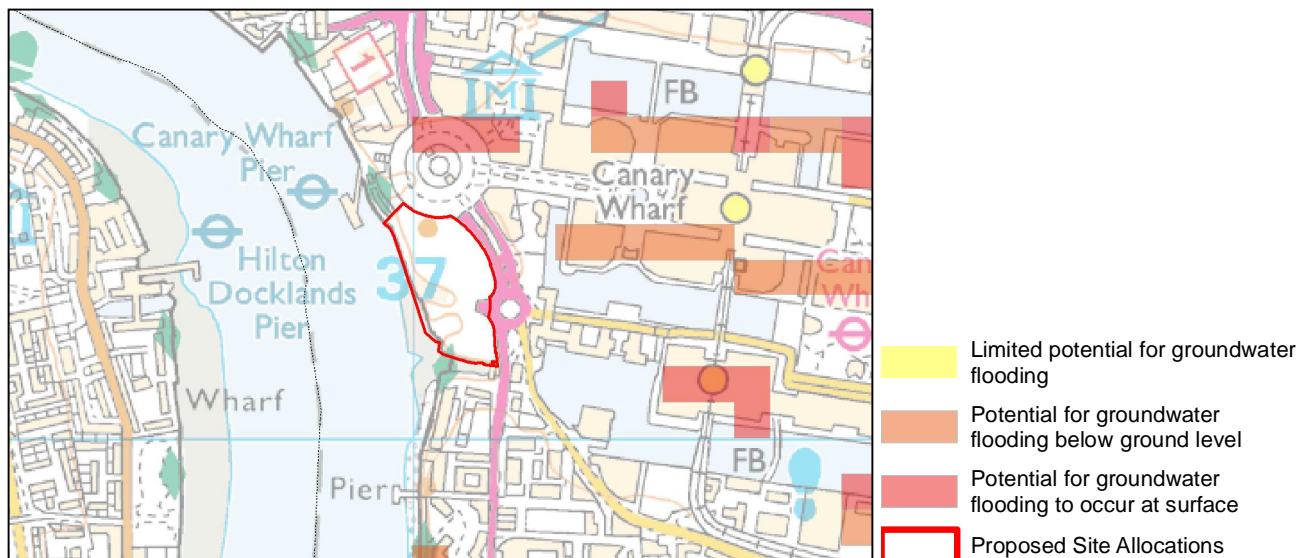


Figure 19-4: Susceptibility to groundwater flooding (© Crown Copyright and database right [2016])

19.2.6 Reservoirs and Artificial Sources of Flood Risk

No artificial sources of flood risk have currently been identified as affecting the site.

19.3 Managing Flood Risk

19.3.1 Conclusions

The site is located in Flood Zone 3a and therefore a site-specific FRA is required in accordance with the NPPF. A Sequential Test is required for the development.

19.3.2 Recommendations

The following flood risk mitigation measures are recommended for this site:

- Development should be sequentially allocated to areas of the site at lower relative risk of flooding (considering the flood hazard distribution across the site), with more flood compatible development (such as parking or open space) located in areas at the highest risk.
- To mitigate against residual tidal flood risk, Finished Floor Levels should be raised 300 mm above the 2100 year maximum water level anticipated through a breach of the River Thames defences.
- Site specific emergency evacuation procedures must be in place to ensure that the risk to life is minimised should a breach of the River Thames defences occur. Safe access and egress routes should be provided above the 2100 breach flood level and lead to higher ground within Flood Zone 1.
- Flood resilient construction techniques should be employed to reduce damage and increase the speed of recovery should any flooding events occur.
- The development site is located directly adjacent to the River Thames and a 16 m buffer strip must be maintained along the river corridor. Demonstration will be required that the associated flood defences will be safe over the lifetime of the development, including any required maintenance and improvements. Consideration should be given to the recommendations of the TE2100 plan and advice sought from the EA at an early stage.
- SuDS should be implemented to manage surface water flood risk and restrict post-development runoff to greenfield rates. Geological data indicates that the site is potentially suitable for bespoke infiltration SuDS. The drainage system should provide sufficient capacity to cater for up to the 1 in 100 year storm event, incorporating the latest guidance regarding climate change.

20 Whitechapel South

20.1 Overview

The site is located on Whitechapel Road and entirely within Flood Zone 1 (Figure 20-1). The site has an area of 12.9 ha and is currently occupied by housing, health facilities and employment space. The development proposal comprises redevelopment for housing, employment and research uses. Other infrastructure requirements have been identified as a health facility (re-provision) and strategic open space.

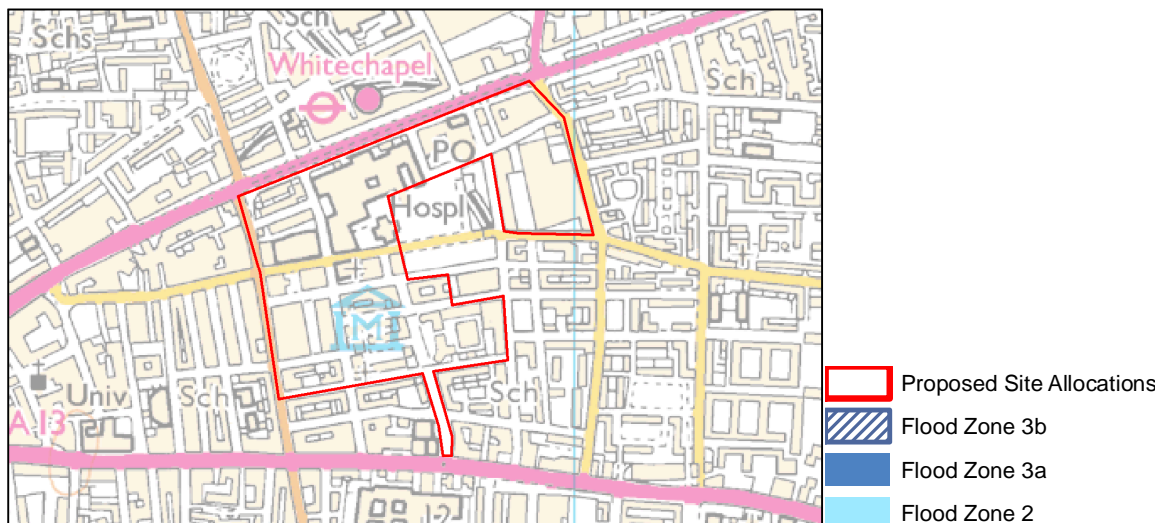


Figure 20-1: Whitechapel South site (© Crown Copyright and database right [2016])

The acceptability of the proposed land uses, and requirement for justification in accordance with the NPPF, is summarised in Table 20-1.

Table 20-1 – Requirement for justification of proposed land uses

Proposed Use	Vulnerability Classification	NPPF Flood Zone Compatibility	Sequential Test Required
Housing	More vulnerable	Ü	No*
Employment (including research)	Less vulnerable	Ü	No*
Health facility	More vulnerable	Ü	No*
Open space	Water compatible	Ü	No*
		Ü	

KEY:

✓ Development is appropriate

*The Sequential Test is also required in Flood Zone 1 where the site is impacted by other sources of flood risk

20.2 Assessment of Flood Risk

20.2.1 Fluvial and Tidal Flood Risk

The site is located outside the extent of fluvial or tidal flood risk.

20.2.2 Pluvial Flood Risk

The site is generally at low risk of surface water flooding; however, some localised areas of higher risk are present within the site (Figure 20-2).

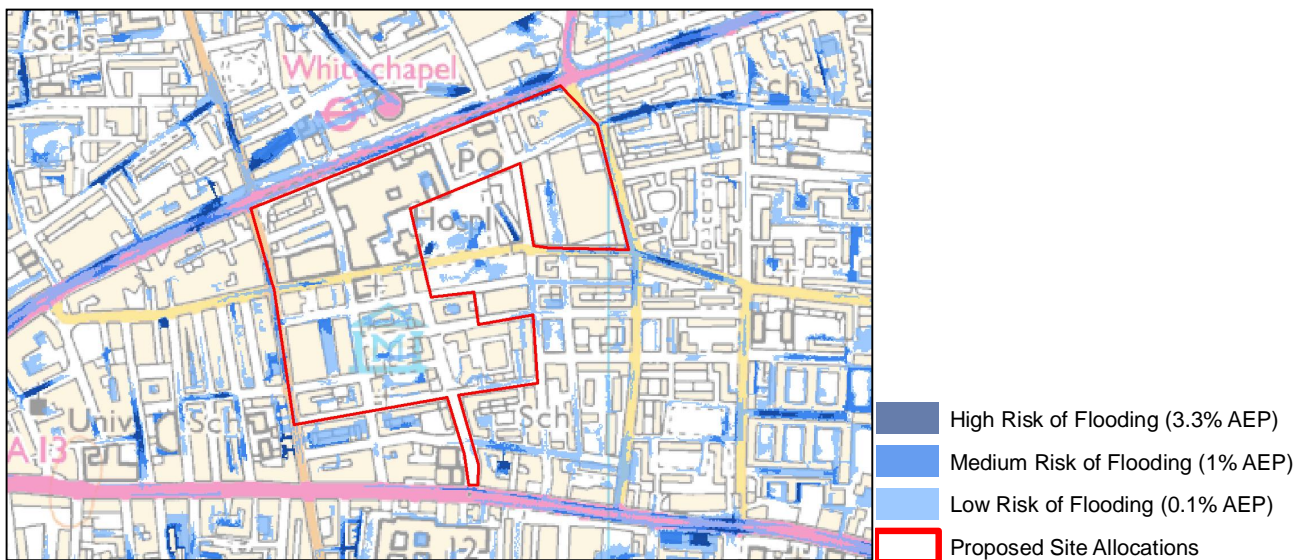


Figure 20-2: Risk of surface water flooding (© Crown Copyright and database right [2016])

20.2.3 Sewer Flood Risk

No information on sewer flood risk has been identified for the site.

20.2.4 Groundwater Flood Risk

Based on geological indicators, the site area has been identified as having potential for groundwater flooding to occur at surface level (Figure 20-3).

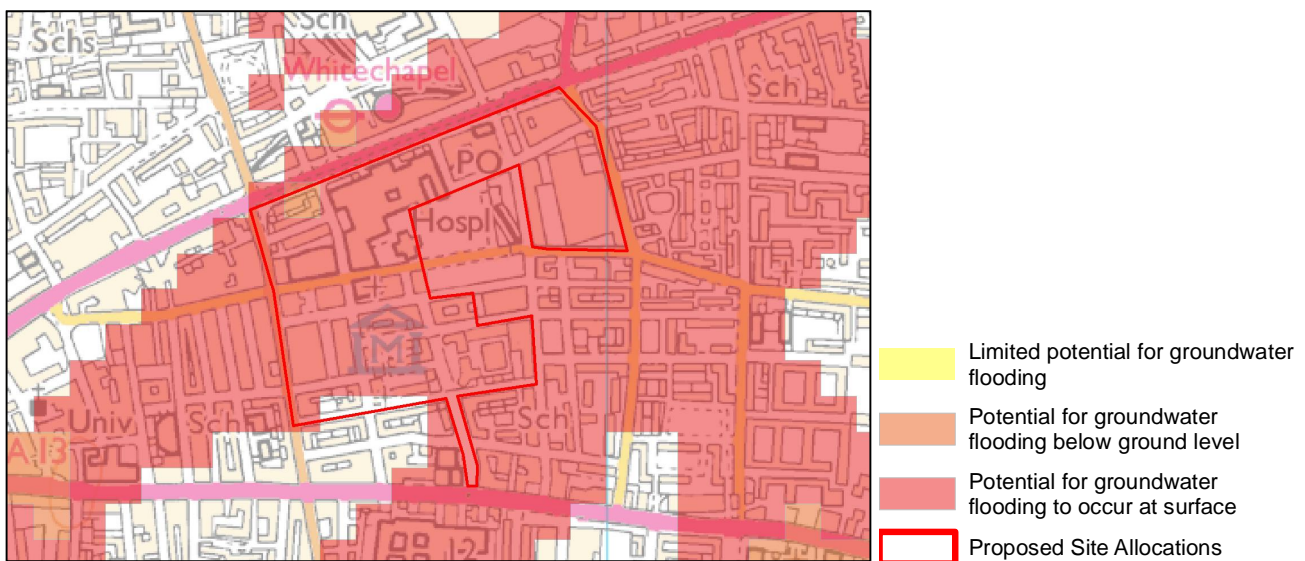


Figure 20-3: Susceptibility to groundwater flooding (© Crown Copyright and database right [2016])

20.2.5 Reservoirs and Artificial Sources of Flood Risk

No artificial sources of flood risk have currently been identified as affecting this site.

20.3 Managing Flood Risk

20.3.1 Conclusions

The site is located in Flood Zone 1 and therefore all planned development is considered appropriate in accordance with the NPPF. However, it is recommended that the Sequential Test is still carried out to confirm that there are no other sites available for development, which are at a lower risk of flooding (from all sources).

As the site is greater than a hectare in size, a site-specific FRA will be required to assess all sources of flood risk.

20.3.2 Recommendations

The following flood risk mitigation measures are recommended for this site:

- Ground conditions should be confirmed through site investigation and dewatering of excavations and basement waterproofing implemented where required.
- SuDS should be implemented to manage surface water flood risk and restrict post-development runoff to greenfield rates. Geological data indicates that the site is unlikely to be suitable for infiltration SuDS so lined attenuation systems may be required. The drainage system should provide sufficient capacity to cater for up to the 1 in 100 year storm event, incorporating the latest guidance regarding climate change.

21 Millharbour South

21.1 Overview

Millharbour South is located on Millharbour and entirely within Flood Zone 3a (Figure 21-1). The site has an area of 4.02 ha. The development proposal comprises redevelopment for housing and commercial uses, including employment, with other infrastructure requirements identified as a primary school, health facility and small open space.

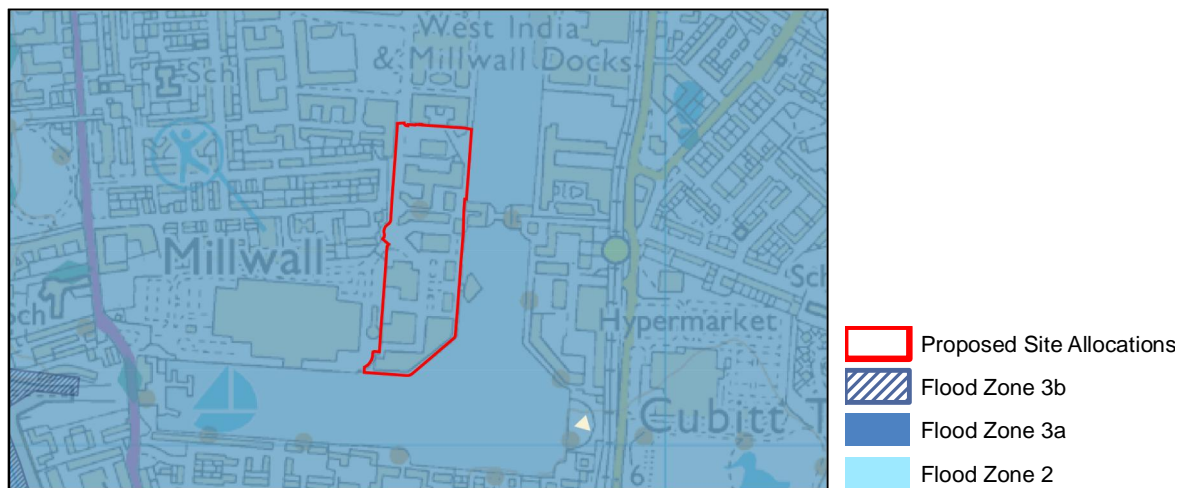


Figure 21-1: Millharbour South – Flood Zone classification (© Crown Copyright and database right [2016])

The acceptability of the proposed land uses, and requirement for justification in accordance with the NPPF, is summarised in Table 21-1.

Table 21-1 – Requirement for justification of proposed land uses

Proposed Use	Vulnerability Classification	NPPF Flood Zone Compatibility	Sequential Test Required?
Housing	More vulnerable	Exception Test Required	Yes
Primary school	More vulnerable	Exception Test Required	Yes
Open space	Water compatible	✓	Yes
Employment	Less vulnerable	✓	Yes
Health facility	More vulnerable	Exception Test Required	Yes

KEY:

✓ Development is appropriate

21.2 Assessment of Flood Risk

21.2.1 Flood History

No historic flood events have been identified within this site.

21.2.2 Fluvial and Tidal Flood Risk

The site is located within Flood Zone 3a, associated with the Tidal Thames, and therefore at risk of flooding for tidal events with a 1 in 200 or greater annual probability (>0.5% AEP).

The Flood Zone classification represents the tidal flood risk ignoring the presence of the Thames Tidal Defences, which provide protection against tidal flooding up to the 1 in 1000 year event (0.1% AEP). The risk of flooding from this source is therefore residual, associated with failure or breach of flood defences.

The distribution of maximum flood hazard across the site, as modelled during a 2100 year breach scenario is indicated in Figure 21-2.

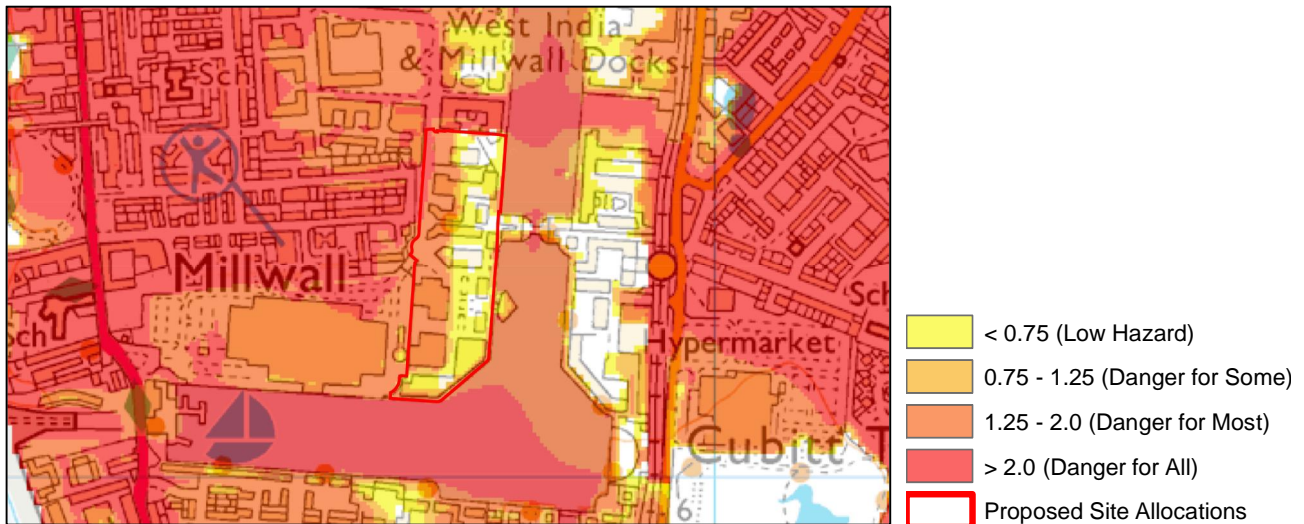


Figure 21-2: 2100 year breach flood hazard (© Crown Copyright and database right [2016])

21.2.3 Pluvial Flood Risk

The site is generally indicated to be at low risk of surface water flooding, with localised areas of higher risk identified along the western border of the site (Figure 21-3).

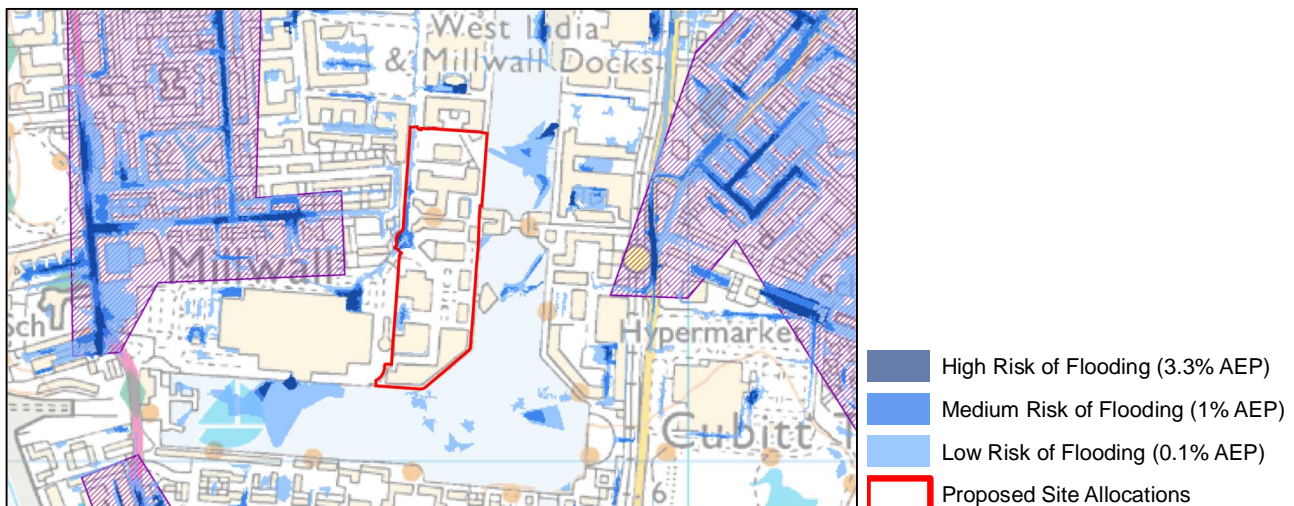


Figure 21-3: Risk of surface water flooding (© Crown Copyright and database right [2016])

21.2.4 Sewer Flood Risk

No information on sewer flood risk has been identified for the site.

21.2.5 Groundwater Flood Risk

Based on geological indicators, the site is not indicated to be susceptible to groundwater flooding (Figure 21-4).

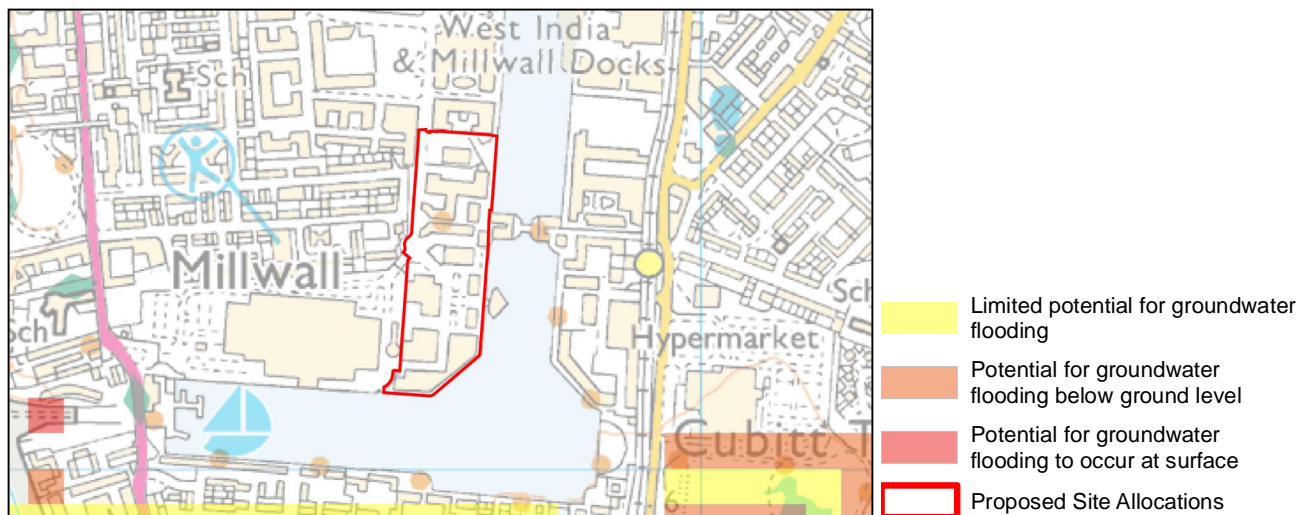


Figure 21-4: Susceptibility to groundwater flooding (© Crown Copyright and database right [2016])

21.2.6 Reservoirs and Artificial Sources of Flood Risk

No artificial sources of flood risk have currently been identified as affecting this site.

21.3 Managing Flood Risk

21.3.1 Conclusions

The site is located in Flood Zone 3a and therefore a site-specific FRA is required in accordance with the NPPF. A Sequential Test is required for the development.

21.3.2 Recommendations

The following flood risk mitigation measures are recommended for this site:

- More vulnerable development should be sequentially allocated to areas of the site at lower relative risk of flooding (considering the flood hazard distribution across the site), with more flood compatible development (such as parking or open space) located in areas at the highest risk.
- No basement dwellings should be permitted within the site.
- To mitigate against residual tidal flood risk, Finished Floor Levels should be raised 300 mm above the 2100 year maximum water level anticipated through a breach of the River Thames defences.
- Site specific emergency evacuation procedures must be in place to ensure that the risk to life is minimised should a breach of the River Thames defences occur. Safe access and egress routes should be provided above the 2100 breach flood level and lead to higher ground within Flood Zone 1. For residential developments where this is not feasible, a dedicated 'safe haven' can be provided above the flood level to enable rapid escape should defence failure occur. This may be provided in the form of a sheltered communal space within the building, accessed via internal stairs and sufficient in size to safely house all residents.
- Flood resilient construction techniques should be employed to reduce damage and increase the speed of recovery should any flooding events occur.
- SuDS should be implemented to manage surface water flood risk and restrict post-development runoff to greenfield rates. Geological data indicates that the site is potentially suitable for bespoke infiltration SuDS. The drainage system should provide sufficient capacity to cater for up to the 1 in 100 year storm event, incorporating the latest guidance regarding climate change.
- The development site is located adjacent to a dock system so consideration should be given to the recommendations of the TE2100 plan with respect to future dock wall raising and advice sought from the EA at an early stage.