

London Borough of Tower Hamlets
Level 2 Strategic Flood Risk Assessment

Volume 2 – Flood Risk Management at Key
Development Sites



CAPITA SYMONDS

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Executive Summary

Capita Symonds has been commissioned to prepare a Level 2 Strategic Flood Risk Assessment (SFRA) on behalf of the London Borough (LB) of Tower Hamlets. This assessment builds upon the findings of the Level 1 SFRA completed in August 2008. The purpose of the SFRA is to support the borough's Local Development Framework (LDF). This has been done in response to the guidance in 'Planning Policy Statement 25 – Development and Flood Risk' that states that a sequential risk based approach should be applied to decision making at all levels of the planning process. The principle stages being the Regional Level (London Plan), the Local Level (this assessment) and the site level (planning applications).

The fundamental concepts that underpin the SFRA are outlined in PPS 25. The guidance provided in this document requires local authorities and those responsible for development decisions to demonstrate that they have applied a risk based, sequential approach in preparing development plans and consideration of flooding through the application of a Sequential Test, and Exception Test (where applicable). Failure to demonstrate that such a test has been undertaken at this level potentially leaves planning decisions and land allocations open to challenge during the planning process.

The underlying objective of the risk based sequential allocation of land is to reduce the exposure of new development to flooding and reduce the reliance on long-term maintenance of built flood defences. Within areas at risk from flooding, it is expected that development proposals will contribute to a reduction in the magnitude of the flood risk.

SFRAs are essential to enable a strategic and proactive approach to be applied to flood risk management. The assessment allows us to understand current flood risk on a wide-spatial scale and how this is likely to change in the future.

The principle objective of the Level 2 SFRA is to facilitate application of the Sequential and Exception Tests. More detailed information is required where there is deemed to be development pressure in areas that are at medium or high probability of flooding and there are no other suitable alternative areas for development after applying the Sequential Test. This more detailed study considers the detailed nature of the flood hazard, taking account of the presence of flood risk management measures such as flood defences. This will allow a sequential approach to site allocation to be adopted within a flood zone (paragraphs 17 and D4 of PPS25). It will also allow the policies and practices required to ensure that development in such areas satisfies the requirements of the Exception Test, and informs the relevant Local Development Documents of the Local Development Framework.

This SFRA describes the outcome of a 'Level 2' assessment, in accordance with paragraph E6 of PPS 25 and Section 3.59 of the PPS 25 Practice Guide. It contains a general assessment of risk from all sources over the whole study area and also detailed analysis for locations where flood risk is a significant issue (i.e. key development sites). The specific aims of the assessment are to:

- Inform policies and plans to ensure future developments, where appropriate, have been subjected rigorously to the applications of the Sequential and Exception Tests, satisfying PPS 25.
- Identify strategies to limit flood risks and adapt to climate change.
- Ensure the safety of new development.

The SFRA has been divided into two volumes:

- Volume 1 – Guidance
- Volume 2 – Flood Risk Management at Key Development Sites

This report is Volume 2 of the assessment and the structure is shown below.

The SFRA is a live document that is intended to be updated as new information and guidance becomes available. The outcomes and conclusions of the SFRA may not be valid in the event of future changes to legislation, policy, revised government guidance on flood risk, the data or the baseline flooding situations. It should be noted that at the time of writing this document, central government is undertaking a substantial review of PPS 25 and it is likely that it will be replaced by the 'National Planning Policy Framework' (NPPF). A draft NPPF is currently available and it does not propose significant change to the established PPS 25 processes for the Sequential and Exception Tests.

Decisions also require the inclusive assessment of wider planning issues and the user should be aware that changes to decision making principles affecting other planning issues can potentially affect the outcome of the risk based Sequential Test. It is the responsibility of the user to ensure they are using the best available information.

Volume 1: Main body of Level 2 SFRA Report

Chapter 1 Introduction

Chapter 2 How to Use This Document

Chapter 3 Flood Risk in Tower Hamlets

Chapter 4 Policy Guidance and Recommendations

Chapter 5 References

Volume 2: Flood Risk Management at Key Development Sites

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1.0 Flood Risk at Key Development Sites

1.1 INTRODUCTION

The London Borough of Tower Hamlets contains localised areas that are prone to flooding from a range of sources including:

- Flooding from rivers
- Flooding from the sea (tidal and coastal)
- Flooding from groundwater
- Flooding from surface water
- Flooding from sewers
- Flooding from artificial sources (docks, canals, reservoirs, lakes).

Each source of flooding has been analysed in detail in Volume 2 of the Level 1 SFRA. A summary of the findings from this assessment and the discussion of updates to any of the key datasets are included in Volume 1 of this Level 2 SFRA.

This assessment has shown that there are large areas of Tower Hamlets shown to be at risk of flooding from one (or more) of these sources. Where sites are allocated for development in Flood Zone 2 or 3, Tower Hamlets must be prepared to provide evidence to demonstrate that there are no reasonably available sites in areas of lower flood risk suitable for the development proposed. Tower Hamlets should maintain a body of evidence documenting the process of applying the Sequential Test and justifying the decisions made.

Development pressures across Tower Hamlets are likely to mean that some development is required in Flood Zone 2 or 3. It is therefore necessary for Tower Hamlets to consider whether potential development sites in the Flood Zones need to, and can, pass the Exception Test. In accordance with the PPS 25 Practice Guide, the SFRA should provide the local authority with the information to assess compliance with part c of the Exception Test, at the borough scale.

The information in the SFRA can then be used by local authorities to determine whether a potential development location can pass the Exception Test in the context of PPS 12: Core Strategy - demonstrating that any infrastructure critical to the delivery of the Core Strategy has a reasonable prospect of delivery. This includes any necessary flood risk infrastructure to enable development to remain 'safe' in compliance with PPS 25 and the Practice Guide.

The following section provides a summary of the flood risk to 31 key development sites in Flood Zones 1, 2, or 3 being considered for inclusion within the Core Strategy and LDDs. The assessment considers flood risk from all sources based on the strategic scale information collated in the LB of Tower Hamlets Level 1 SFRA and this Level 2 SFRA. The types of measures potentially required to manage flood risk on each site are also identified.

This assessment does not remove the need for planning applications to be supported by a detailed flood risk assessment. The flood risk management measures identified are a guide only. As stated in Chapter 2 Volume 1, it is recommended that developers consult with the Environment Agency, LB of Tower Hamlets, and Thames Water early in the development of site proposals to agree appropriate measures, informed by more detailed analysis where necessary.

In order to demonstrate that reasonable alternatives have been considered, Tower Hamlets could perform a

similar process on all the potential allocation sites in the borough, as well as for windfall sites in Flood Zone 2 or 3. When working through the site allocation process it is important that Tower Hamlets document their decision making process.

1.2 SUMMARY OF ALLOCATION SITES/PROPOSED DEVELOPMENT AREAS

There is significant development and regeneration proposed in Tower Hamlets in the future. It is crucial that the allocation of development consider flood risk early in the planning process. Future development in the borough is concentrated in the Lower Lea Valley and within the Isle of Dogs, meaning flood risk could be a constraint on development. The 31 areas reviewed as part of this SFRA are listed below and shown on Figure B.7 in Appendix B.

Table 1-1 Suggested Sites within the London Borough of Tower Hamlets

Site Number	Site Name	Proposed Use
1	Bishopsgate Goods Yard	Large-scale housing development Strategic open space Idea Store District heating facility
2	Hollybush Gardens	Idea Store
3	Marian Place gas works and The Oval	Large-scale housing development Strategic open space District heating facility
4	Goodman's Fields	Large-scale housing development Health facility District heating facility
5	Royal London Hospital	Health facility District heating facility
6	John Orwell Sports Centre & Vaughan Way	Leisure facility District heating facility
7	News International	Large-scale housing development District heating facility
8	St. George's Pools	Leisure facility District heating facility
9	Fish Island Area Action Plan	Large-scale housing development Primary school Secondary school Combined primary & secondary school Strategic open space Health facility Waste management / district heating facility
10	Mile End Hospital	Health facility District heating facility
11	Southern Grove Lodge	Primary school District heating facility
12	Toby Lane Depot and 11-13 Solebay Street	Primary school

Site Number	Site Name	Proposed Use
13	Bow Locks	Secondary school District heating facility
14	Bromley-by-Bow Redevelopment	Large-scale housing development Primary School Idea Store Strategic open space District heating facility
15	Bow Common gas works	Large-scale housing development District heating facility
16	Chrisp Street town centre	Large-scale housing development District heating facility
17	Cording Street	Primary school
18	Poplar Baths	Leisure facility
19	Ailsa Street	Large-scale housing development Primary school Secondary school Combined primary & secondary school Waste management facility District heating facility
20	Leven Road gas works	Large-scale housing development Strategic open space District heating facility
21	Sorrel Lane	Primary school District heating facility
22	Leamouth Peninsula	Large-scale housing development District heating facility
23	Reuters LTD	Large-scale housing development District heating facility
24	Blackwall Reach Regeneration Project	Large-scale housing development Primary school District heating facility
25	Aspen Way	Large-scale housing development District heating facility
26	Wood Wharf	Large-scale housing development Idea Store Health facility District heating facility
27	Billingsgate Market	Large-scale housing development District heating facility
28	Millennium Quarter	Large-scale housing development District heating facility
29	Westferry Printworks	Large-scale housing development Primary school Secondary school Combined primary & secondary school District heating facility
















Site Number	Site Name	Proposed Use
30	Crossharbour town centre	Large-scale housing development Idea Store Leisure facility District heating facility
31	Marshwall East	Large-scale housing development District heating facility

The assessment of each site identifies:

- The site location and broad development proposals;
- Risk Assessment – an assessment of flood risk from all sources, for the lifetime of the development;
- Risk Management – an identification of the potential measures to manage flood risk on site in accordance with the PPS 25 Flood Risk Management Hierarchy;
- Exception Test Summary – will development increase flood risk, and can it reduce flood risk overall?

Table 1-2 provides a standardized key for the figures included in each of the site assessments, consistent with the mapping legends used for the figures in Appendix B. The included maps are of varying scales dependent on the location and detail of flooding information available. They should be used as a guide only.

Table 1-2 Site Assessment Mapping Legend

Mapping Legend			
Flood Zones	 Environment Agency Flood Zone 3  Environment Agency Flood Zone 2	Hazard Rating	 Low  Moderate  Significant  Extreme
Site Boundary		Surface Water Flood Depth	Flood Depth
Increased Potential for Elevated Groundwater			 < 0.1m  0.1m to 0.25m  0.25m to 0.5m  0.5m to 1.0m  1.0m to 1.5m  > 1.5m
Reservoir Breach Extent			

2.0 Bishopsgate Goods Yard

Site Number:	1
Site Location:	Shoreditch High Street / Sclater Street
Grid Reference:	533684, 182206

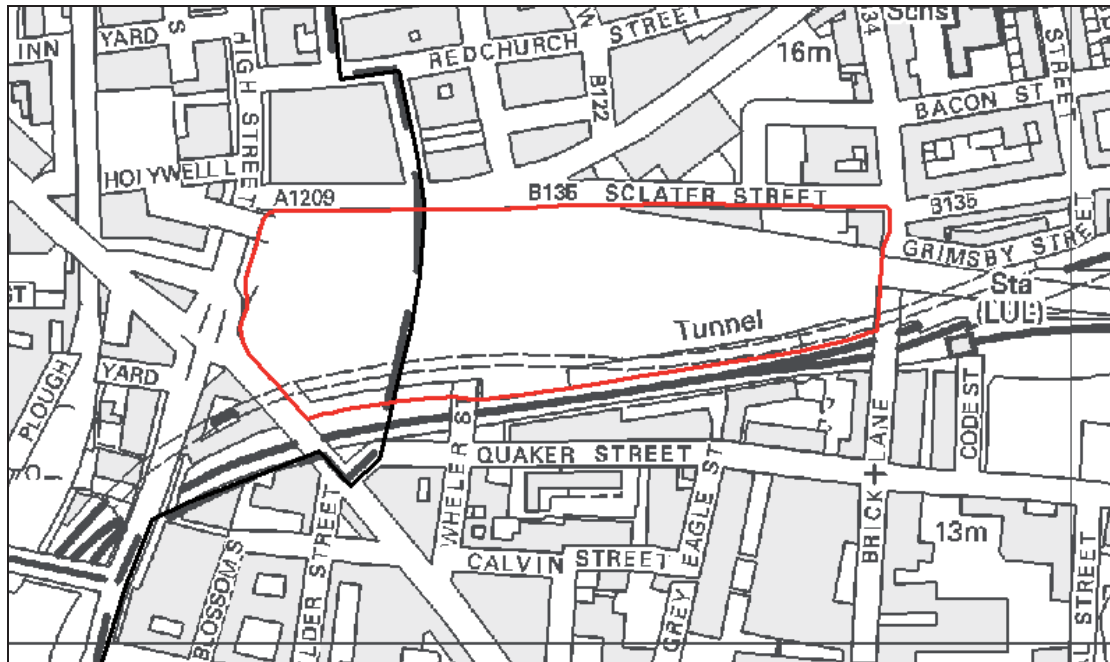


Figure 2-1: Bishopsgate Goods Yard Site

2.1 SITE DESCRIPTION

The Bishopsgate Goods Yard occupies 4.24Ha of land and is currently vacant. The elevated London Overground line is located along the southern boundary of the site. The topography varies between 14mAOD and 23mAOD, with higher ground levels located in the southern portion of the site. The proposed use is for a mixed use development which includes a large-scale housing development, open spaces, an idea store, and a district heating facility.

In accordance with Table D2 of PPS 25, the classifications of the proposed uses are as follows:

Proposed Land Use	Vulnerability Classification
Housing development	More vulnerable
Open Space	Water-compatible development
Idea store	More vulnerable
District heating facility	Less vulnerable

2.2 SUMMARY OF FLOOD RISK

2.2.1 FLOOD ZONE MAPS

The site is shown to be located within Flood Zone 1. All of the proposed land uses for this site are compatible with this flood zone.

2.3 SOURCES OF FLOODING

2.3.1 TIDAL

Actual Risk

The site is defended from tidal inundation during the 0.5% AEP tidal event by the existing Thames Tidal Flood Defences (including the Thames Barrier) for the lifetime of the development. The site is considered to be at low risk of tidal flooding.

Residual Risk

There is a residual risk of tidal flooding from an extreme surge event. The site is defended against inundation from the River Thames during a 0.1% AEP tidal event and is considered as having a low probability of the defences overtopping.

A breach of the tidal defences is unlikely to result in flooding of the site as the topography of the site is above the predicted peak tidal levels.

2.3.2 FLUVIAL

Actual Risk

The site is located outside of the 1% AEP event with climate change flood extent of the River Lee. The site elevations are approximately 10m higher than the floodplain of the River Lee and is also located over 2km away (to the west) of the river. The site is concluded as being at a low risk of actual fluvial flooding.

Residual Risk

The site is located outside of the 0.1% AEP event flood extent of the River Lee.

The risk of a breach in the fluvial defences is unlikely to result in inundation of the site due to its distance from the watercourse and the sites elevation. The site is concluded as being at a low risk of residual fluvial flooding..

2.3.3 SURFACE WATER/SEWER

The site is predicted to be at risk of surface water flooding. Surface water runoff is observed to pond behind the natural ridge (higher elevation) within the site. Surface water modelling results for the 1% AEP indicate that depths of water are predicted to reach 0.2m within a large proportion of the site with some areas being predicted to flood by up 1m.

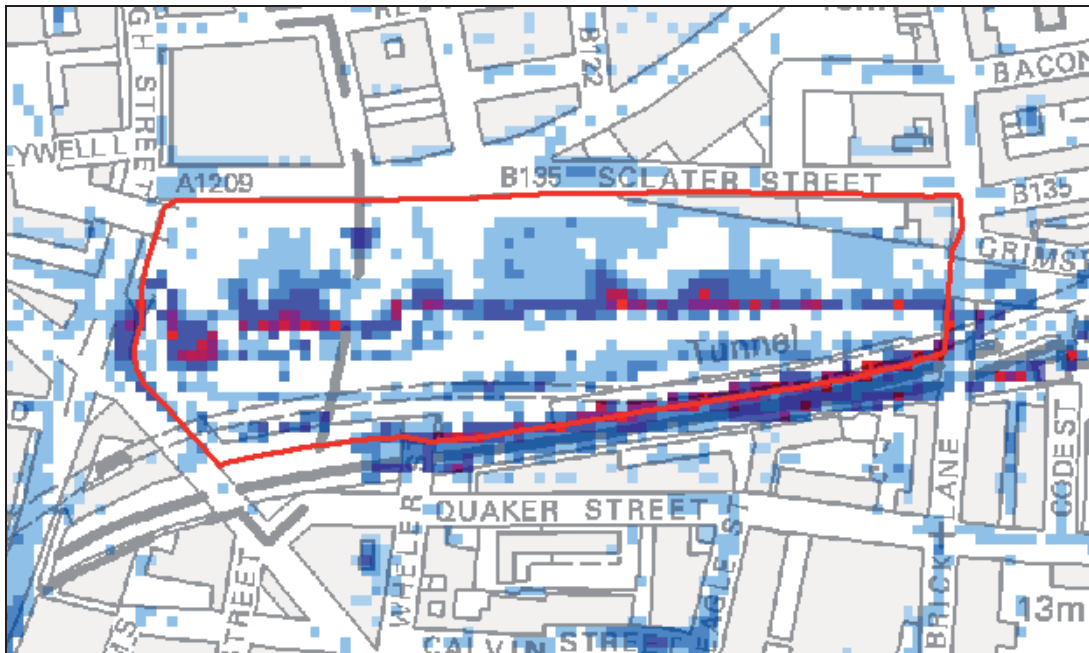


Figure 2-2: Maximum depth in a 1% AEP at the Bishopsgate Goods Yard Site

2.3.4 GROUNDWATER

The site is largely shown to be at low risk of groundwater flooding. Areas surrounding the site, particularly to the east and west are shown to have an increased potential of elevated groundwater.

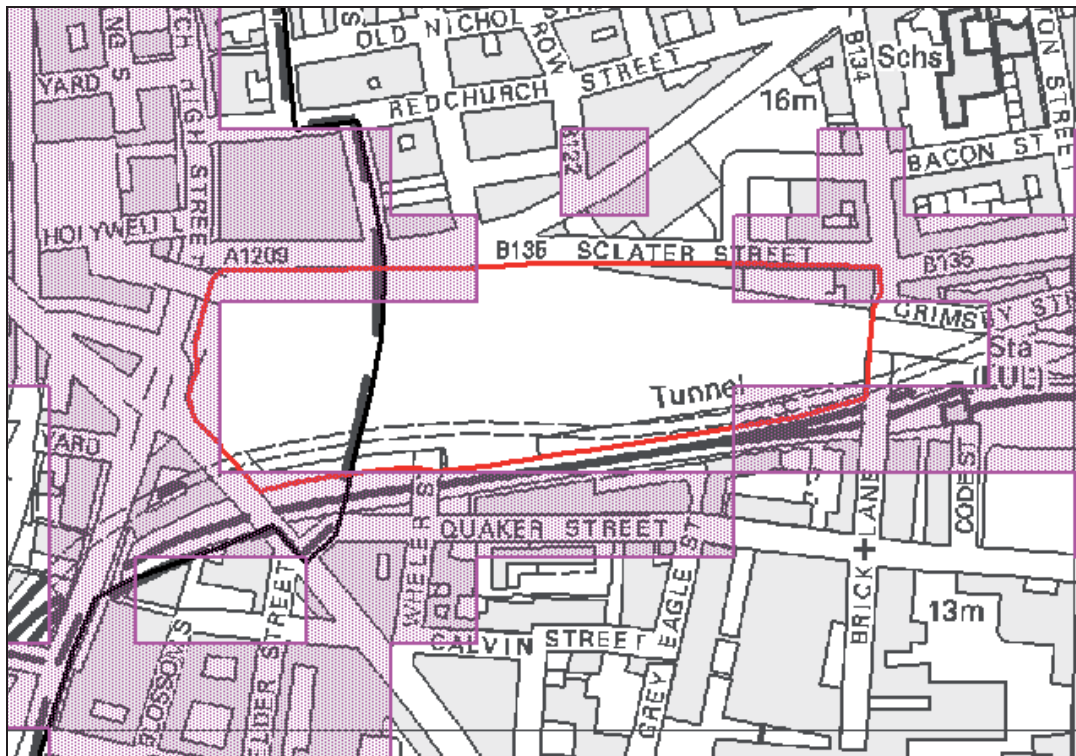


Figure 2-3: Increased Potential of Elevated Groundwater at the Bishopsgate Goods Yard Site

2.3.5 ARTIFICIAL SOURCES

There are no artificial sources near to the site.

2.4 GENERAL FLOOD RISK MANAGEMENT

The site is located within Flood Zone 1. All of the proposed uses are appropriate for this site.

The site is shown to be a risk of surface water flooding. Depths of water are generally shallow at 0.2m, however, small pockets of deeper water (up to 1m) are predicted in a 1% AEP events. It is recommended that flood resistance / resilience measures are incorporated into buildings to reduce the impacts of a flood event. Where possible, electrical fittings and appliances should be raised above the results of the 1% AEP flood level. Development layout should consider surface water flow routes. 'At source' control measures such as green roofs, rainwater harvesting and water butts should be included in the design. Permeable paving should be incorporated within car parking and hard landscape areas.

It is recommended that further detailed analysis of the surface water flood risk to the site is undertaken to verify the results of the Tower Hamlets SWMP modelling.

The site is located within close proximity to areas identified as having an increased potential to elevated groundwater. It is recommended that the susceptibility of groundwater flooding is investigated.

Will development increase flood risk elsewhere?
<ul style="list-style-type: none"> Unlikely. Development layout must consider surface water flow routes and manage runoff on site sustainably with a target to achieve Greenfield runoff rates.
How can development reduce flood risk overall?
<ul style="list-style-type: none"> Include 'at source' SUDS control measures to reduce existing site runoff in accordance with London Plan and local policy.
How can the development be made safe?
<ul style="list-style-type: none"> Incorporation of flood resistance / resilience measures up to the predicted 1% AEP surface water flood levels.
Is there a reasonable prospect of compliance with part c of the Exception Test?
N/A

3.0 Hollybush Gardens

Site Number:	2
Site Location:	456-463 Bethnal Green Road
Grid Reference:	534850, 182780

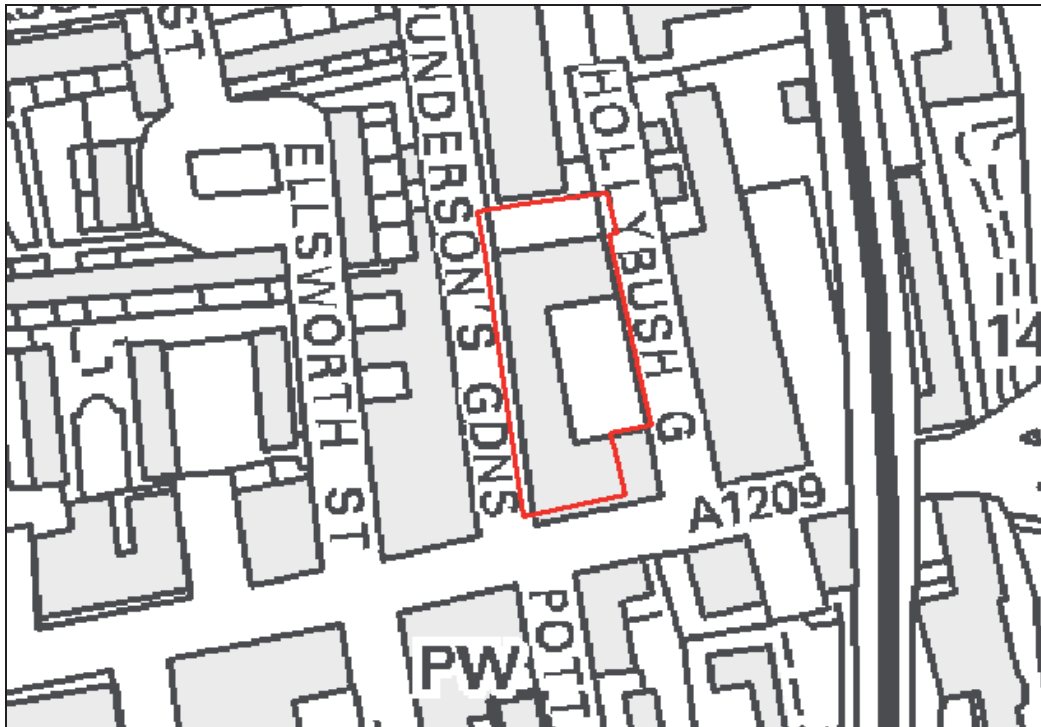


Figure 3-1: Hollybush Gardens Site

3.1 SITE DESCRIPTION

The Hollybush Gardens site occupies an area of 0.3ha and is currently the location of shops and residential housing. It is bounded by Hollybush Gardens to the east, Punderson Gardens to the west and Bethnal Green Road to the south. The proposed land use of the site is for an Idea Store.

In accordance with Table D2 of PPS 25, the classifications of the proposed uses are as follows:

Proposed Land Use	Vulnerability Classification
Idea Store	More Vulnerable

3.2 SUMMARY OF FLOOD RISK

3.2.1 FLOOD ZONE MAPS

The entirety of the site is shown to be located within Flood Zone 1. All of the proposed land uses for this site are compatible with this flood zone.

3.3 SOURCES OF FLOODING

3.3.1 *TIDAL*

Actual Risk

The site is defended from tidal inundation during the 0.5% AEP tidal event by the existing Thames Tidal Flood Defences (including the Thames Barrier) for the lifetime of the development. The site is considered to be at low risk of tidal flooding.

Residual Risk

There is a residual risk of tidal flooding from an extreme surge event. The site is defended against inundation from the River Thames during a 0.1% AEP tidal event and is considered as having a low probability of the defences overtopping.

A breach of the tidal defences is unlikely to result in flooding of the site as the topography of the site is above the predicted peak tidal levels.

3.3.2 *FLUVIAL*

Actual Risk

The site is located outside of the 1% AEP event with inclusion of climate change flood extent of the River Lee. The site is located on ground approximately 10m higher than the floodplain of the River Lee and is located over 3km away to the west. The site is concluded as being at a low risk of actual fluvial flooding.

Residual Risk

The site is located outside of the 0.1% AEP event flood extent of the River Lee.

The risk of a breach in the fluvial defences is unlikely to result in inundation of the site due to its distance from the watercourse and its location on much higher ground. The site is concluded as being at a low risk of residual fluvial flooding.

3.3.3 *SURFACE WATER/SEWER*

The site is not shown to be at risk of surface water flooding. Isolated areas of shallow flooding are observed in the near vicinity.

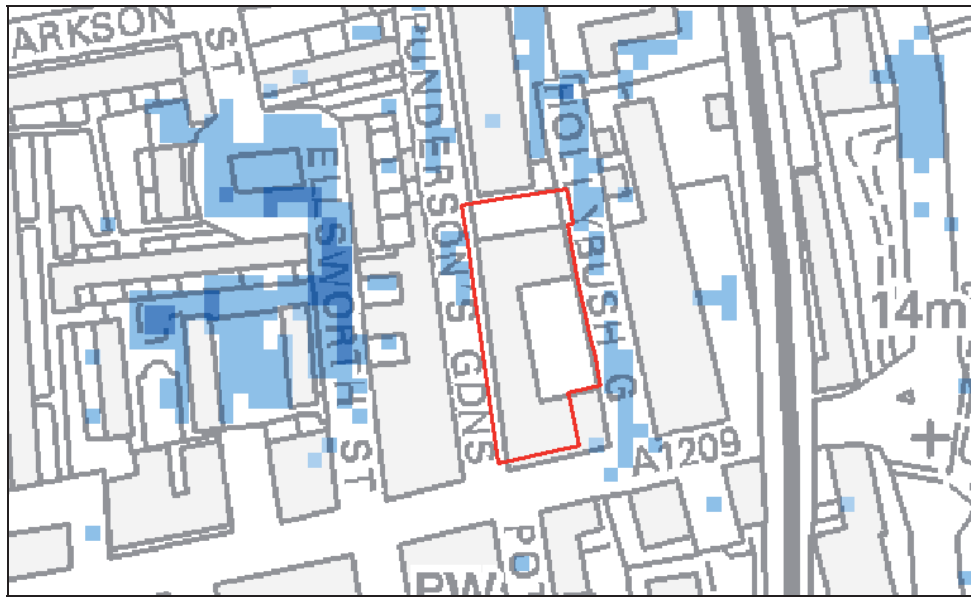


Figure 3-2 Maximum Depth of Surface Water in a 1% AEP Rainfall Event at the Hollybush Gardens Site

3.3.4 GROUNDWATER

The site is located in an area shown to have an increased potential of elevated groundwater. Development proposals will need to consider site ground conditions and groundwater levels in this location over the lifetime of the development. In particular the design of any underground structures or services and foundations.

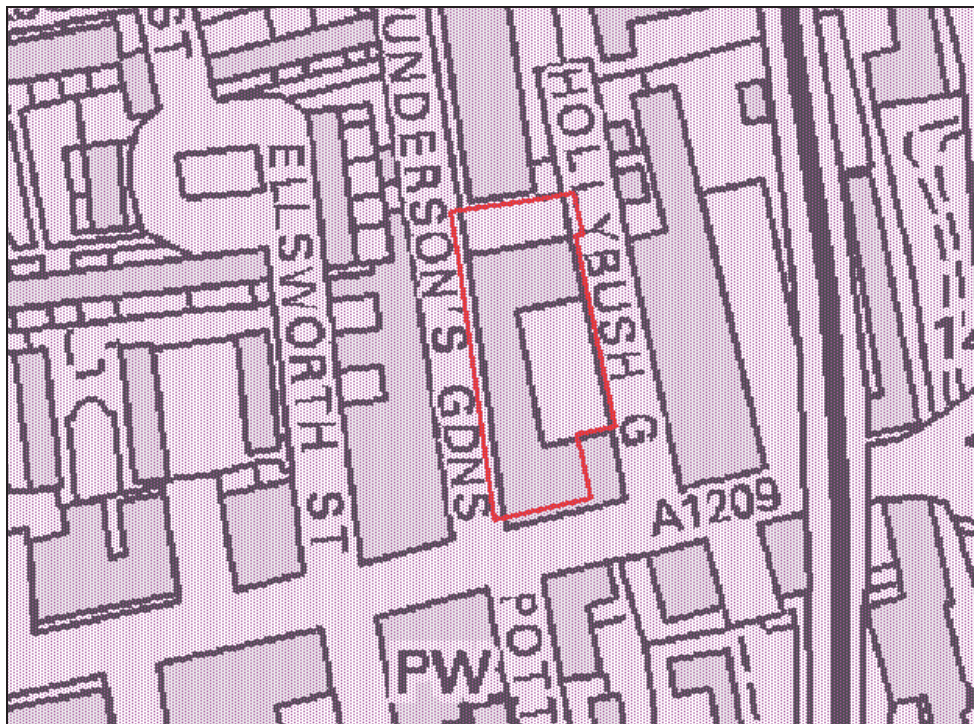


Figure 3-3 Increased Potential of Elevated Groundwater at the Hollybush Gardens Site

3.3.5 ARTIFICIAL SOURCES

There are no artificial sources in close proximity to the site.

3.4 GENERAL FLOOD RISK MANAGEMENT

The site is located within Flood Zone 1. All of the proposed uses are appropriate for this site.

The site has an increased potential of elevated groundwater. It is recommended that groundwater levels are monitored as part of a geo-environmental site investigation to determine the depth to groundwater. Depending on the results of the groundwater monitoring, any underground structures in the development may require mitigation using impermeable materials.

Will development increase flood risk elsewhere?
<ul style="list-style-type: none"> Unlikely. Development layout must consider surface water flow routes and manage runoff on site sustainably with a target to achieve Greenfield runoff rates.
How can development reduce flood risk overall?
<ul style="list-style-type: none"> Include 'at source' SUDS control measures to reduce existing site runoff in accordance with London Plan and local policy.
How can the development be made safe?
<ul style="list-style-type: none"> Design of development to consider mitigating the risk of groundwater flooding with use of impermeable materials
Is there a reasonable prospect of compliance with part c of the Exception Test?
N/A

4.0 Marian Place Gas Works and The Oval

Site Number:	3
Site Location:	Emma Street / The Oval
Grid Reference:	534640, 183400

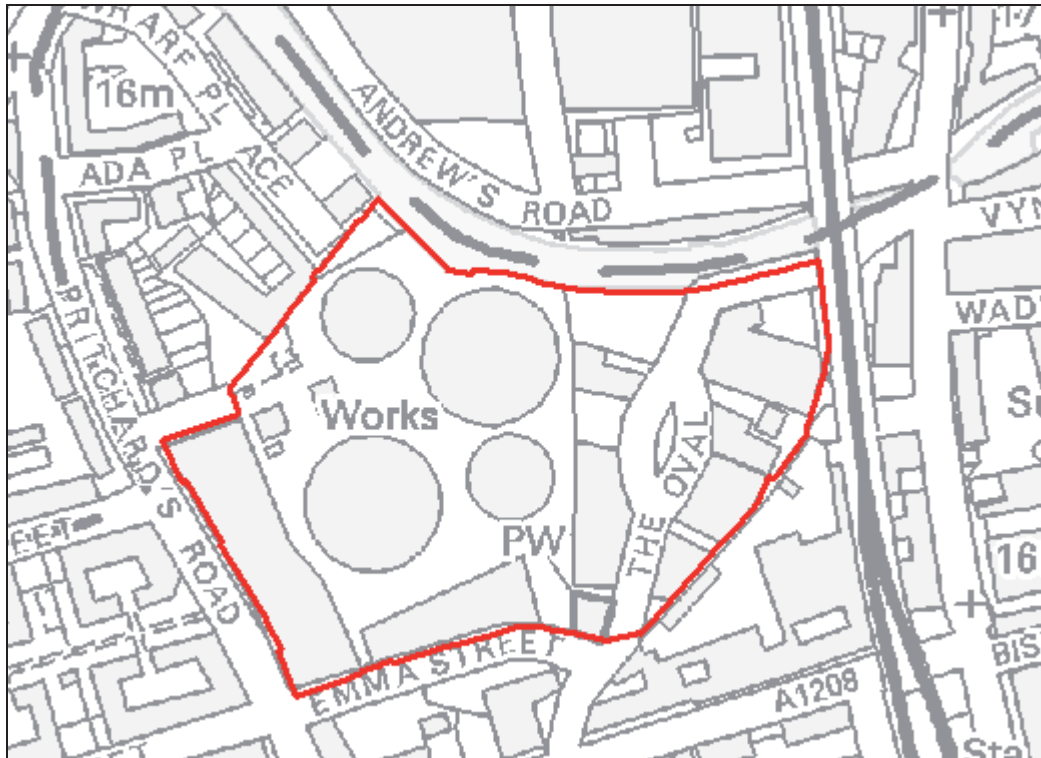


Figure 4-1 Marian Place Gas Works and The Oval Site

4.1 SITE DESCRIPTION

The site occupies an area of 3.75ha and currently contains active gas holders and warehousing. The site is bounded by Regents Canal to the north, Pritchard Road to the west, Emma Street to the south and a railway line to the east. The proposed uses of the site are:-

- Large scale housing development
- Strategic open space
- District heating facility

In accordance with Table D2 of PPS 25, the classifications of the proposed uses are as follows:

Proposed Land Use	Vulnerability Classification
Large scale housing development	More vulnerable
Open Space	Water-compatible development
District Heating Facility	Less vulnerable

4.2 SUMMARY OF FLOOD RISK

4.2.1 FLOOD ZONE MAPS

The entirety of the site is shown to be located within Flood Zone 1. All of the proposed land uses for this site are compatible with this flood zone.

4.3 SOURCES OF FLOODING

4.3.1 TIDAL

Actual Risk

The site is defended from tidal inundation during the 0.5% AEP tidal event by the existing Thames Tidal Flood Defences (including the Thames Barrier) for the lifetime of the development. The site is considered to be at low risk of tidal flooding.

Residual Risk

There is a residual risk of tidal flooding from an extreme surge event. The site is defended against inundation from the River Thames during a 0.1% AEP tidal event and is considered as having a low probability of the defences overtopping.

A breach of the tidal defences is unlikely to result in flooding of the site due to its distance from the Thames and its location on higher ground.

4.3.2 FLUVIAL

Actual Risk

The site is located outside of the 1% AEP event with inclusion of climate change flood extent of the River Lee. The site is located on ground approximately 10m higher than the floodplain of the River Lee and is located over 2.5 km away to the west. The site is concluded as being at a low risk of actual fluvial flooding.

Residual Risk

The site is located outside of the 0.1% AEP event flood extent of the River Lee.

The risk of a breach in the fluvial defences is unlikely to result in inundation of the site due to its distance from the watercourse and its location on much higher ground. The site is concluded as being at a low risk of residual fluvial flooding.

4.3.3 SURFACE WATER/SEWER

The site is shown to be at risk of surface water flooding with shallow depths of water up to 0.25m in a 1% AEP event generally confined to The Oval. In the vicinity of the site, depths of water reach up to 0.5m along Emma Street and Pritchard Road.

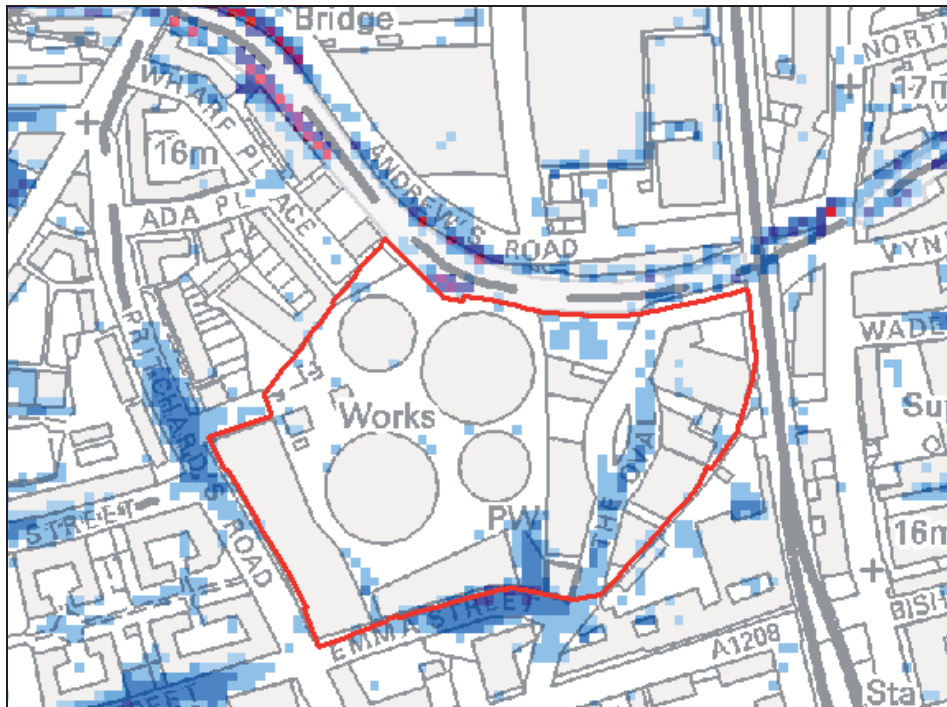


Figure 4-2 Maximum Depth of Surface Water in a 1% AEP Rainfall Event at the Marian Place Gas Works and The Oval Site

4.3.4 GROUNDWATER

The site is located in an area shown to have an increased potential of elevated groundwater. Development proposals will need to consider site ground conditions and groundwater levels in this location over the lifetime of the development. In particular the design of any underground structures or services and foundations.

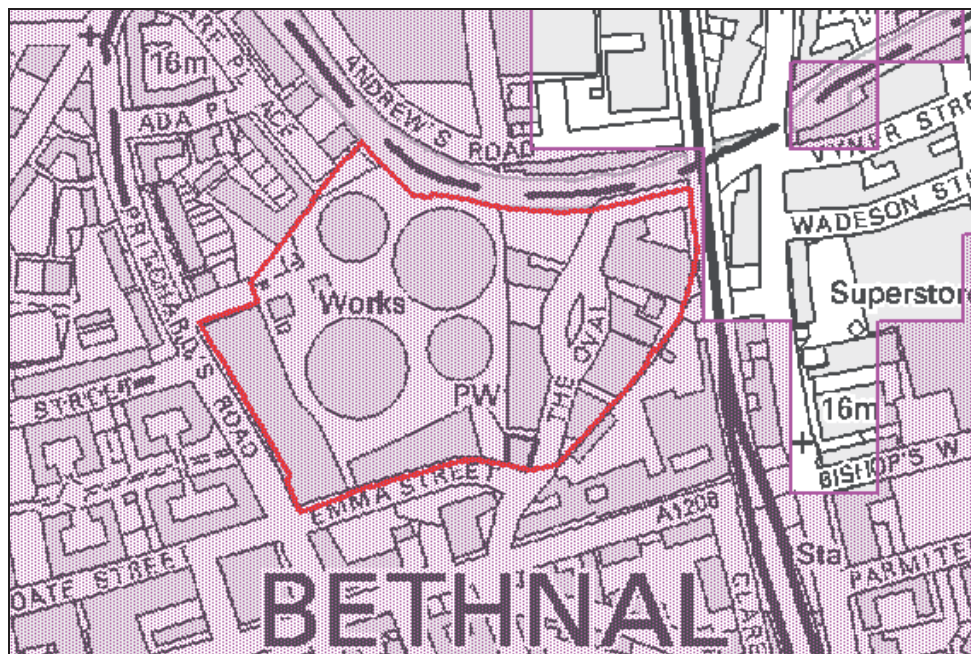


Figure 4-3 Increased Potential of Elevated Groundwater at the Marian Place Gas Works and The Oval Site

4.3.5 ARTIFICIAL SOURCES

The Grand Union Canal lies to the north of the site. The canal is not raised above natural ground level and therefore breaching of the canal embankments is not considered to be a risk of flooding. Information obtained as part of the Level 1 SFRA determined that British Waterways have confirmed there are no flooding issues directly related to this canal.

4.4 GENERAL FLOOD RISK MANAGEMENT

The site is located within Flood Zone 1. All of the proposed uses are appropriate for this site.

The site is shown to be a risk of surface water flooding. Depths of water are generally shallow at 0.25m, with deeper pockets of water (up to 0.5m) predicted in the vicinity of the site in a 1% AEP events. It is recommended that flood resistance / resilience measures are incorporated into buildings to reduce the impacts of a flood event. Where possible, electrical fittings and appliances should be raised above the results of the 1% AEP flood level.

Development layout should consider surface water flow routes. 'At source' control measures such as green roofs, rainwater harvesting and water butts should be included in the design. Permeable paving should be incorporated within car parking and hard landscape areas.

It is recommended that further detailed analysis of the surface water flood risk to the site is undertaken to verify the results of the Tower Hamlets SWMP modelling.

The site has an increased potential of elevated groundwater. It is recommended that groundwater levels are monitored as part of a geo-environmental site investigation to determine the depth to groundwater. Depending on the results of the groundwater monitoring, any underground structures in the development may require mitigation using impermeable materials.

As the site adjoins the Regents Canal a buffer zone of 8m may be required.

Will development increase flood risk elsewhere?
<ul style="list-style-type: none"> Unlikely. Development layout must consider surface water flow routes and manage runoff on site sustainably with a target to achieve Greenfield runoff rates.
How can development reduce flood risk overall?
<ul style="list-style-type: none"> Include 'at source' SUDS control measures to reduce existing site runoff in accordance with London Plan and local policy.
How can the development be made safe?
<ul style="list-style-type: none"> Incorporation of flood resistance / resilience measures up to the predicted 1% AEP surface water flood levels. Design of development to consider mitigating the risk of groundwater flooding with use of impermeable materials
Is there a reasonable prospect of compliance with part c of the Exception Test?
N/A

5.0 Goodman's Fields

Site Number:	4
Site Location:	Alie Street, Gowers Walk, Leman Street Hooper Street
Grid Reference:	534098, 181164



Figure 5-1 Goodman's Fields Site

5.1 SITE DESCRIPTION

The Goodman's Fields site occupies an area of 3.65Ha. The site is located in Whitechapel and is bound by Alie Street in the north, Gower's Walk to the east, Hooper Street to the south, and Leman Street to the west. Ground levels on site vary between 10mAOD and 13mAOD. The site currently consists of vacant buildings and land.

The proposed uses of the site include:

- Large-scale housing development
- Health facility
- District heating facility

In accordance with Table D2 of PPS 25, the classifications of the proposed uses are as follows:

Proposed Land Use	Vulnerability Classification
Large-scale housing development	More vulnerable
Health facility	More vulnerable
District Heating Facility	Less vulnerable

5.2 SUMMARY OF FLOOD RISK

5.2.1 FLOOD ZONE MAPS

The entirety of the site is shown to be located within Flood Zone 1. All of the proposed land uses for this site are compatible with this flood zone.

5.3 SOURCES OF FLOODING

5.3.1 TIDAL

Actual Risk

The site is defended from tidal inundation during the 0.5% AEP tidal event by the existing Thames Tidal Flood Defences (including the Thames Barrier) for the lifetime of the development. The site is considered to be at low risk of tidal flooding.

Residual Risk

There is a residual risk of tidal flooding from an extreme surge event. The site is defended against inundation from the River Thames during a 0.1% AEP tidal event and is considered as having a low probability of the defences overtopping.

A breach of the tidal defences is unlikely to result in flooding of the site due to its distance from the Thames and its location on higher ground.

5.3.2 FLUVIAL

Actual Risk

The site is located outside of the 1% AEP event with inclusion of climate change flood extent of the River Lee. The site is located on ground higher than the floodplain of the River Lee and is located over 4 km away to the west. The site is concluded as being at a low risk of actual fluvial flooding.

Residual Risk

The site is located outside of the 0.1% AEP event flood extent of the River Lee.

The risk of a breach in the fluvial defences is unlikely to result in inundation of the site due to its distance from the watercourse and its location on much higher ground. The site is concluded as being at a low risk of residual fluvial flooding.

5.4 SURFACE WATER/SEWER

The site is predicted to be at risk of surface water flooding in a 1% AEP rainfall event. Depths of water are predicted between 0.15m and 0.4m across the majority of the site. In addition, ponding water is predicted at the corner of Alie Street and Leman Street, potentially restricting access to the site in the event of a surface water flood event.

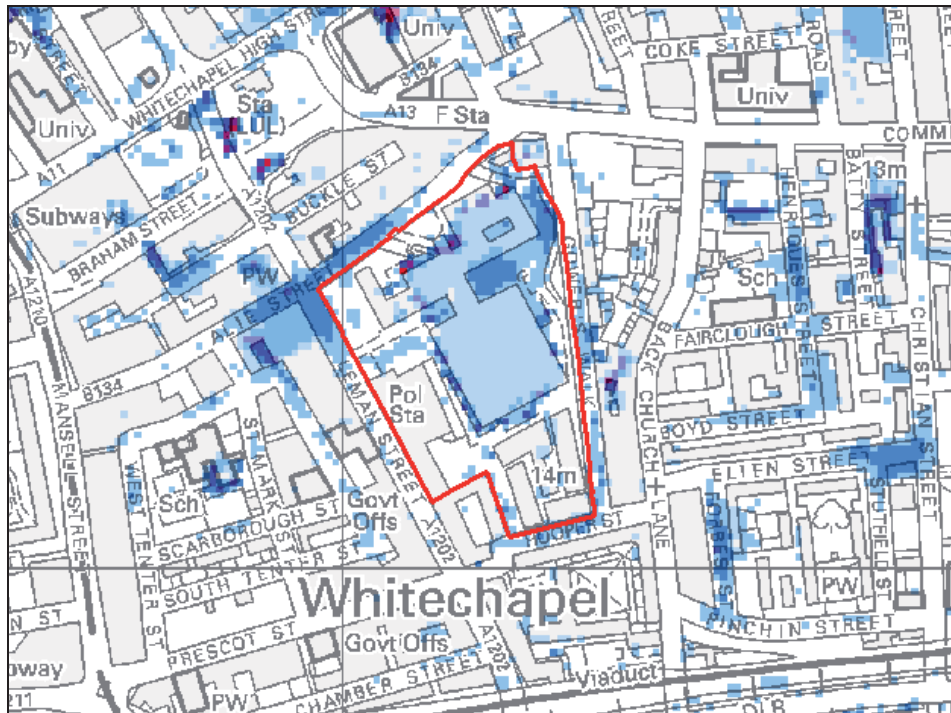


Figure 5-2 Maximum Depth of Surface Water in a 1% AEP Rainfall Event at the Goodman's Fields Site
 5.4.1 GROUNDWATER

The site is located in an area shown to have an increased potential of elevated groundwater. Development proposals will need to consider site ground conditions and groundwater levels in this location over the lifetime of the development. In particular the design of any underground structures or services and foundations.

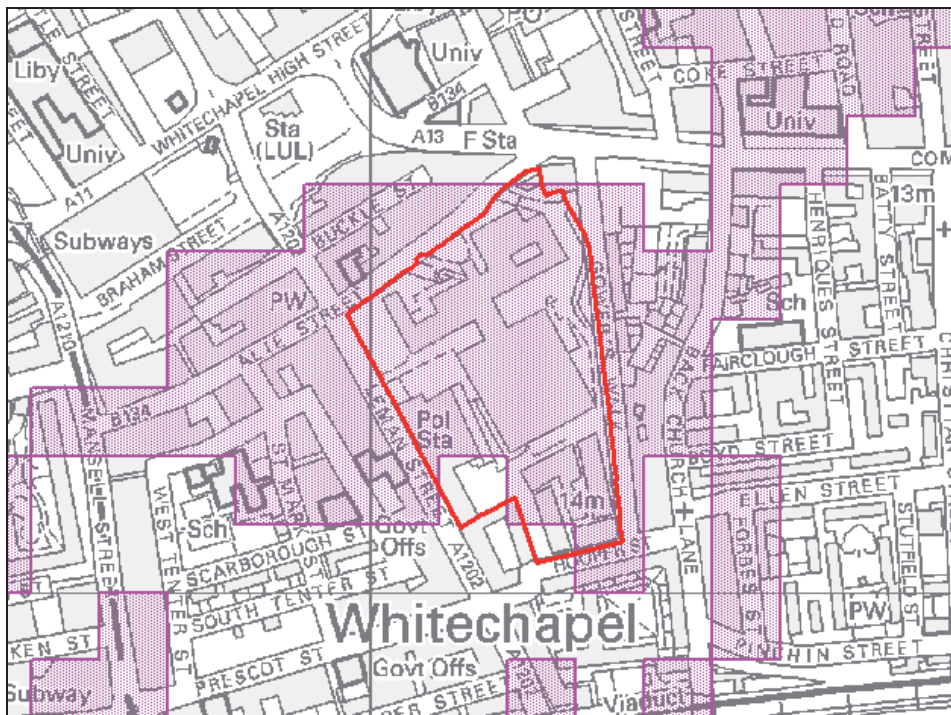


Figure 5-3 Increased Potential of Elevated Groundwater at the Goodman's Fields Site

5.4.2 ARTIFICIAL SOURCES

St Katherine Docks are located 500m to the south of the site. The Docks are maintained and managed by British Waterways. A breach in the dock is unlikely to result in flooding of the site as ground levels are significantly higher.

5.5 GENERAL FLOOD RISK MANAGEMENT

The site is located within Flood Zone 1. All of the proposed uses are appropriate for this site.

The site is shown to be at risk of surface water flooding. It is recommended that flood resistance / resilience measures are incorporated into buildings to reduce the impacts of a flood event. Where possible, electrical fittings and appliances should be raised above the results of the 1%AEP flood level.

Development layout should consider surface water flow routes. 'At source' control measures such as green roofs, rainwater harvesting and water butts should be included in the design. Permeable paving should be incorporated within car parking and hard landscape areas.

It is recommended that further detailed analysis of the surface water flood risk to the site is undertaken to verify the results of the Tower Hamlets SWMP modelling.

Development proposals will need to consider site ground conditions and groundwater levels over the lifetime of the development. In particular the design of any underground structures or services and foundations.

Will development increase flood risk elsewhere?
<ul style="list-style-type: none"> Unlikely. Development layout must consider surface water flow routes and manage runoff on site sustainably with a target to achieve Greenfield runoff rates.
How can development reduce flood risk overall?
<ul style="list-style-type: none"> Include 'at source' SUDS control measures to reduce existing site runoff in accordance with London Plan and local policy.
How can the development be made safe?
<ul style="list-style-type: none"> Incorporation of flood resistance / resilience measures up to the predicted 1% AEP surface water flood levels. Design of development to consider mitigating the risk of groundwater flooding with use of impermeable materials
Is there a reasonable prospect of compliance with part c of the Exception Test?
N/A