

TFL_PSF_9131 SITE INVESTIGATIONS: SMALL SITES INITIATIVE LAND AT NEWHAM WAY, LONDON, E13 8PF

Flood Risk Review

FEBRUARY 2019



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LAND AT NEWHAM WAY, LONDON, E13 8PF

Flood Risk Review

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APPENDIX A

1 Introduction

1.1 Background

Arcadis Consulting (UK) Limited ('Arcadis') has been commissioned by Transport for London (TfL) 'the Client' to undertake a number of technical surveys for a site known as Newham Way, located north of Newham Way between Egham Road and Salomons Road in the London Borough of Newham ('the Site').

TfL is aiming to divest a number of small sites to enable regeneration. The objective of the Small Sites Initiative is to provide robust and pragmatic advice that sensibly de-risks each of the sites such that unreasonable 'abnormal' development costs are not incurred by developers.

The aim of this Flood Risk Review is to assess the flood risk status of the Site and investigate its suitability for various forms of development on the Site.

1.2 Scope of Works

Specific objectives of the Flood Risk Review are to:

- Collect and review Environment Agency (EA) and London Borough of Newham (LBN) flood maps and other related documents (listed in detail in section 3);
- Assess flood risk from all relevant sources (the sea, rivers, groundwater, surface water, sewers and artificial sources) and assign a risk value for each form of flooding (high, medium or low);
- Confirm the EA Flood Zone and designation and the acceptability of accommodating residential or other forms of development in accordance with National Planning Policy Framework (NPPF) (Ref. 1) requirements, including the need for application of the NPPF Sequential and Exception Tests; and
- Provide recommendations for further study or necessary flood risk mitigation measures to facilitate development.

1.3 Terminology

Flood risk is a product of both the likelihood and consequence of flooding. Throughout this report, flood events are defined according to their likelihood of occurrence. Floods are described according to an 'annual chance', meaning the chance of a particular flood occurring in any one year. This is directly linked to the probability of a flood. For example, a flood with an annual chance of 1 in 100 (a 1 in 100 chance of occurring in any one year on average), has an annual exceedance probability (AEP) of 1%.

1.4 Limitations

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This report has been compiled from several sources, which Arcadis believes to be trustworthy. However, Arcadis is unable to guarantee the accuracy of information provided by others. The report is based on information available at the time. Consequently, there is a potential for further information to become available, which may change this report's conclusion and for which Arcadis cannot be responsible.

2 Site Overview

2.1 Site Description

The Site occupies a plot of land at the corner of the junction of Newham Way and Salomons Road, Newham, in a generally urban setting surrounded by residential buildings.

The Site is approximately 0.1ha in area and is shown in Figure 1. The site is centred on National Grid Reference (NGR) TQ 40994 81778 and the nearest postcode is E13 8PF. The Site is currently covered by a landscaped area (grass/borders) crossed by hard-surfaced paths. The buildings immediately to the north and west of the Site are residential dwellings. The road immediately to the south of the Site is a slip-road of Newham Way.

The Royal Docks are approximately 1km south of the Site and the Thames Barrier is 2km south.

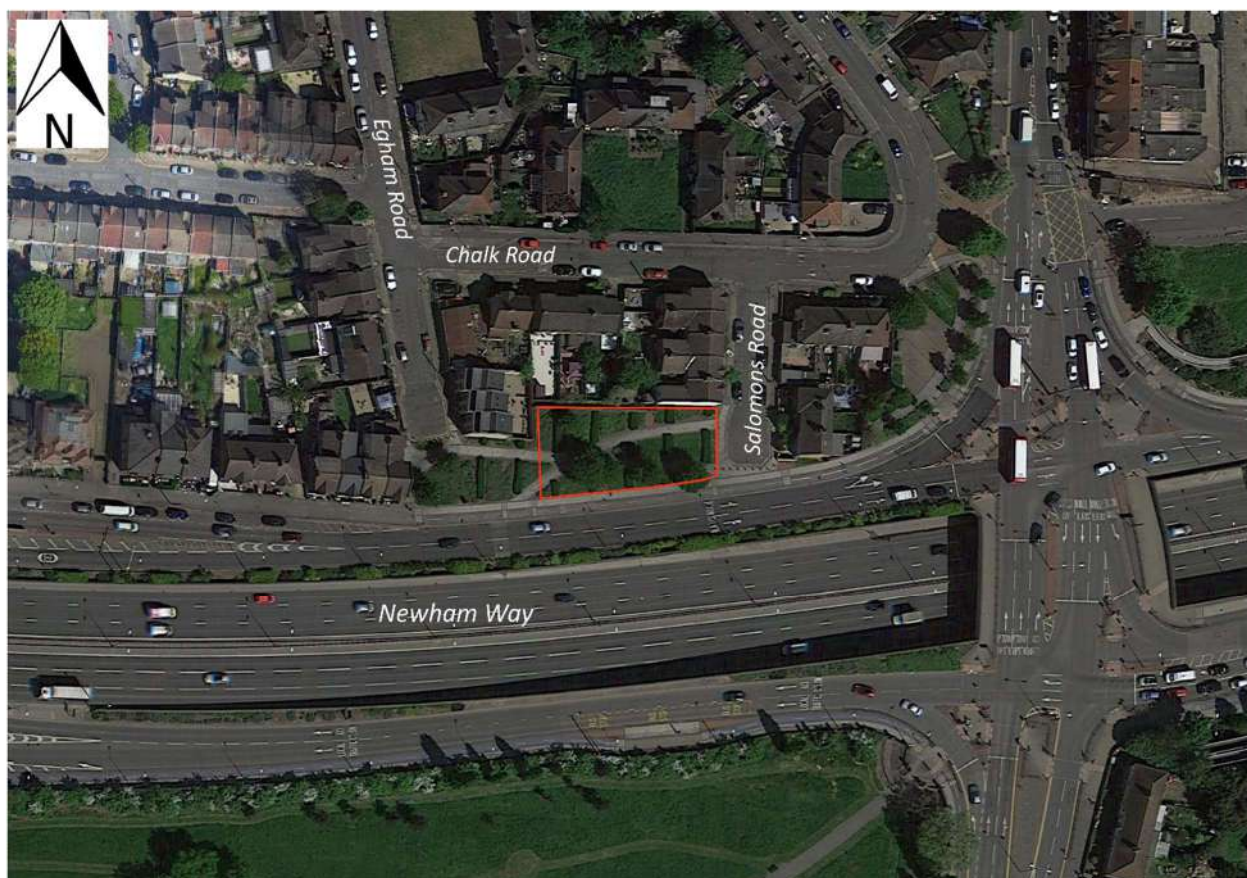


Figure 1: Site Location. Site boundary outlined in red.

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2.2 Site Topography

Topographical information for the Site has been collected from a topographical survey undertaken by 40Seven in January 2019, as well as publicly-available lidar topographic data (Ref. 2). The Site is predominantly flat with ground levels between approximately 1.65mAOD and 2.00mAOD. To the north of the Site, the surrounding area is generally flat and the slip-road of Newham Way, immediately south of the Site, has a slightly lower elevation than the Site. The main carriageway of Newham Way, further to the south, is between 2 and 6 m lower than the Site.

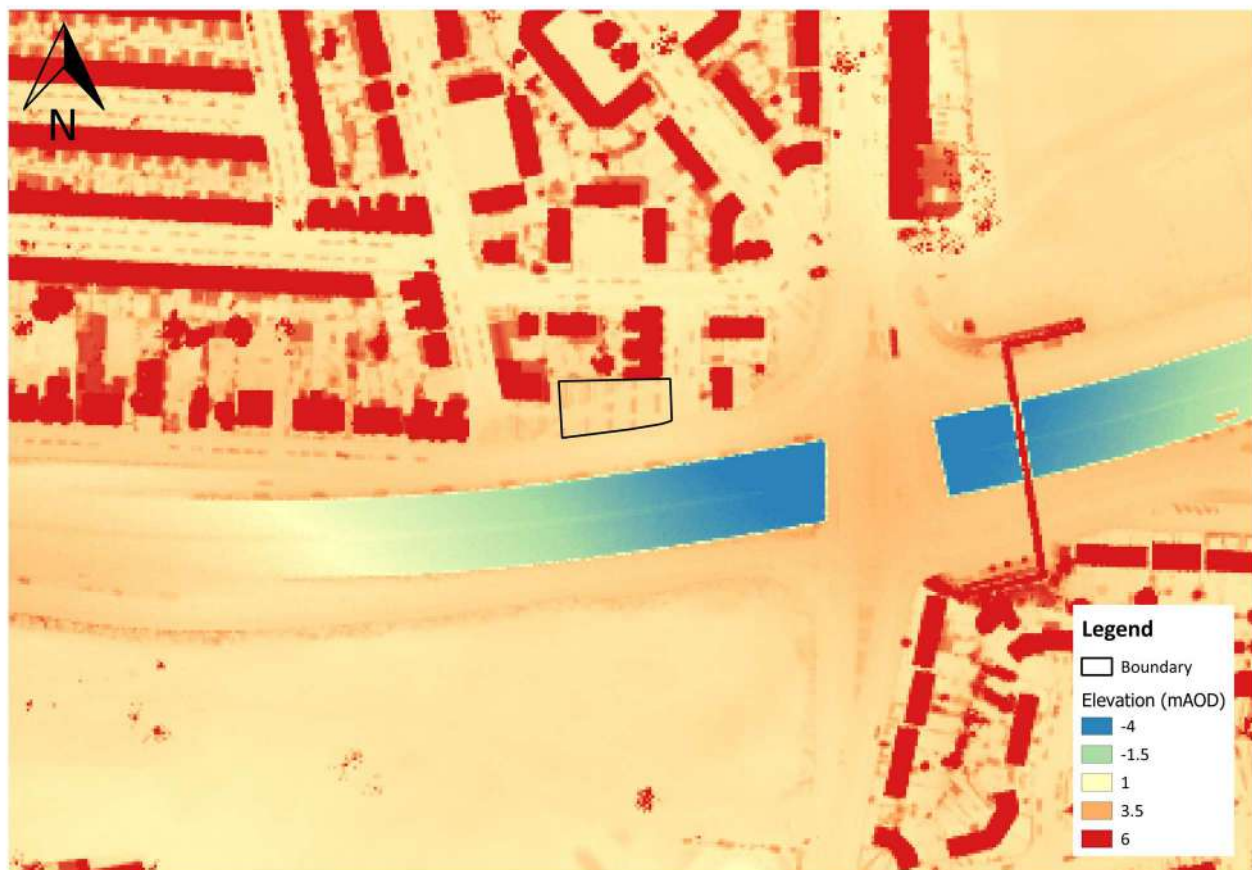


Figure 1: Site Topography.

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2.3 Catchment Description

The Site is located within the catchment of the River Thames, a designated 'Main River'. The River Thames flows on a broadly west to east axis over 1.5km south of the Site and Bow Creek. Bow Creek, a tidal estuary of the River Lea/Lee (also an EA designated Main River) is located approximately 1.6km to the south-west. The River Thames is also tidally-dominated in the study area, with the tidal limit located at Teddington, approximately 33km upstream of the Site.

2.4 Ground Conditions and Aquifers

Soils underlying the Site are described as loamy and clayey soils of coastal flats with naturally high groundwater (Ref. 3).

The superficial geology consists of Alluvium - clay, silt, sand and peat (Ref. 4). The bedrock geology consists of London Clay Formation - clay, silt and sand. The superficial and bedrock geology do not support any significant aquifers (Ref. 4).

3 Data Sources

Information has been drawn from the web-based and published sources outlined below, as well as having been collected through consultation with the LBN as the Lead Local Flood Authority (LLFA) and the EA who provided site specific flood risk information (Ref. 5) (See Appendix A).

Web-bases sources:

- Flood Estimation Handbook (FEH) Web-Service (Ref. 6);
- EA Long Term Flood Risk, Interactive Maps (Ref. 7);
- EA Flood Map for Planning (Ref. 8);
- Cranfield Soil and AgriFood Institute, Soilscales Viewer (Ref. 3);
- British Geological Survey, Geology of Britain Viewer (Ref. 4).

Published documents:

- LBN Level 1& 2 Strategic Flood Risk Assessment (SFRA) (Ref. 9);
- LBN Preliminary Flood Risk Assessment (PFRA) (Ref. 10);
- LBN Local Flood Risk Management Strategy (LFRMS) (Ref. 11);
- Surface Water Management Plan (SWMP) for LBN (Ref. 12);
- Thames Estuary 2100 (TE2100) Plan (Ref. 13).

4 Relevant Planning Policies & Designations

4.1 NPPF and Flood Risk

With regard to flood risk and surface water drainage, the NPPF (Ref. 1) and its accompanying flood risk and coastal change Planning Practice Guidance (PPG) (Ref. 14) set out the Government's planning policy for England and advises on '*how to take account of and address the risks associated with flooding and coastal change in the planning process*'. The principal aim of the NPPF is to achieve sustainable development by accounting for flooding at all stages of the planning process, avoiding inappropriate development in areas at risk of flooding and directing development away from areas where risks are highest. Where development is necessary in areas at risk of flooding, the NPPF aims to ensure it is safe, without increasing flood risk to third parties. Early adoption of, and adherence to, the principles set out in the NPPF with respect to flood risk, can ensure that detailed designs and plans for development take due account of flood risk and the need for appropriate mitigation, if required.

4.2 The Sequential and Exception Tests

The PPG identifies four Flood Zone classifications, detailed in Table 1 below.

Table 1 Flood Zones (Source: Flood Risk and Coastal Change PPG)

Flood Zone	Annual Probability of Flooding
1 – Low Probability	Fluvial and Tidal <0.1% AEP
2 – Medium Probability	Fluvial 0.1-1.0% AEP Tidal 0.1-0.5% AEP
3a – High Probability	Fluvial > 1.0% AEP Tidal > 0.5% AEP
3b – The Functional Floodplain	Fluvial and Tidal >5.0% AEP *Starting point for consideration. Local planning authorities should identify Functional Floodplain, which should not be defined solely by rigid probability parameters.

The NPPF specifies that the suitability of all new development in relation to flood risk should be assessed by applying the Sequential Test to demonstrate that there are no reasonably available sites in areas with a lower probability of flooding that would be appropriate to the type of development proposed. The PPG provides guidance on the compatibility of each land use classification in relation to each of the Flood Zones, as summarised in Table 2.

Table 2 Flood Risk Vulnerability Classification (Source: Table 3 Flood Risk and Coastal Change PPG)

Flood Zone	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception Test required	✓	✓
Zone 3a	Exception Test required	✓	X	Exception Test required	✓
Zone 3b	Exception Test required	✓	X	X	X
Key:	✓ Development is appropriate		X Development should not be permitted		

When the Exception Test is triggered, this requires the development proposals to demonstrate wider sustainability benefits to the community that outweigh flood risk, and that the development will be safe for its lifetime, without increasing flood risk elsewhere and where possible reduce overall flood risk.

The Site has been assessed against these planning tests in Section 6 of this report.

5 Flood Risk Sources and Flooding History

5.1 Overview

In line with best practice, flood risk from the range of possible sources listed in Table 3 has been considered.

Table 3 Potential Sources of Flooding

Source of Flooding	Description
1. Flooding from the sea (Tidal)	Flooding originating from the sea or a connected waterbody when seawater overflows onto land through extreme tidal conditions, storm surge or breach.
2. Flooding from rivers (Fluvial)	Floodwater originating from a nearby watercourse when the amount of water exceeds the channel capacity of that watercourse.
3. Flooding from land (Surface Water)	Flooding caused by intense rainfall exceeding the available infiltration and/or drainage capacity of the ground.
4. Flooding from groundwater	Flooding caused when groundwater levels rise above ground level typically following prolonged rainfall.
5. Flooding from reservoirs, canals, other artificial sources and sewers	Failure of infrastructure that retains or transmits water or controls its flow.

5.2 Historical Flooding

Historical flood records provided by the EA identify the Site as having no history of flooding from coastal, fluvial or surface water sources.

The SFRA provides maps showing areas where flooding from sewers has occurred. No specific location information is provided, instead sewer flooding incidents are defined based on post code. For the E13 8P postal district between four and seven internal sewer flooding incidents were reported to Thames Water between 2007 and 2017 and two external sewer flooding incidents were reported in the same decade. It is possible that these records do not represent all of the flood events which have occurred.

The PFRA reports on two records of groundwater flooding in Newham, neither of which had any significant harmful consequences. These incidents consisted of standing water emergence in Upton Park and Plaistow in January 2003, which are both located over 1.5 km from the Site.

5.3 Flood Defences

The River Thames is tidally dominated through London, with the most severe flood risks associated with flooding from the sea. However, land within the Thames tidal floodplain is defended via a combination of raised banks, river walls and tidal barriers, most notably the Thames Barrier, known collectively as the Thames Tidal Defences.

The Thames Tidal Defences were designed to provide a high standard of protection for London and will protect against a 1 in 1,000 (0.1%) flood event until the year 2030. In future, climate change is expected to result in sea level rise that will slowly reduce the standard of protection provided unless further action is taken.

The Site is located in the 'Royal Docks' policy unit of action zone 3 in the approved Thames Estuary 2100 (TE2100) Plan, which includes the Thames Barrier. When the barrier is closed against high tides, there is a difference in water level of up to 2m either side of the barrier. To accommodate this difference in water levels, the flood defences downstream of the Thames Barrier are approximately 2m higher than those

upstream. The crest level of the defences immediately upstream of the barrier is 5.18 mAOD and immediately downstream is 7.2 mAOD(Ref. 5). The EA describes the condition of these defences in proximity to the Site as 'Good'.

Through the combination of the operation of the Thames Barrier and the presence of river walls and other structures, it is considered that the Site is well defended against flooding to a standard in excess of an annual chance of flooding of 1 in 1000 (0.1%).

The TE2100 Plan sets out recommendations for flood risk management for London and the River Thames to 2100 to address climate change impacts. The policy direction for the study area is to undertake future raising of the river walls on the River Thames to a minimum level of 6.20mAOD upstream of the barrier and 8.80mAOD downstream of the barrier by 2100 in order to maintain standards of flood protection in the face of climate change.

5.4 Flooding from the Rivers and the Sea

The tidal nature of the River Thames through central London means that a tidal flood for any given flood frequency results in significantly higher water levels than an equivalent fluvial flood originating upstream. There is significant capacity for the tidal River Thames to convey fluvial flow such that the risk of flooding from rivers is not considered further in this review, and the remainder of this section focuses on the risk of flooding caused by high tides and storm surges originating at sea.

The EA Flood Map for Planning (Figure 3) identifies the Site as in an 'area benefitting from flood defences'. This designation identifies areas that benefit from formal flood defences that protect to a minimum of a 1 in 200 (0.5%) standard from the sea. The residual flood risk to the Site, ignoring the presence of flood defences, identifies the Site in Flood Zone 3. This zone denotes land at high flood risk (having a greater than 1 in 200 (0.5%) annual probability of flooding from the sea). There is therefore a high residual flood risk to the Site from the River Thames in the unlikely event of a failure or breach of the defences.



Figure 2: EA Flood Map for Planning. Site boundary outlined in red.

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Modelled water levels for the Site have been supplied by the EA, extracted from the TE2100 Plan. The TE2100 Plan provides values for the maximum likely floodwater level (1 in 1,000 year (0.1%) annual exceedance probability) for a present-day scenario (2008) and two future scenarios (2065 and 2100), which incorporate allowance for climate change. Flood levels were provided for a model node (2.46ad) located on the River Thames upstream of the barrier (approximately 2 km south-west of the Site) and a model node (a3.1) downstream of the barrier (approximately 2.3 km south of the Site). See Appendix A for a plan showing the node locations. For the upstream node (2.46ad), the TE2100 Plan estimates extreme water levels of 4.66 mAOD (present day, 2008) and design water levels of 5.15 mAOD (future, 2065) and 5.63 mAOD (future, 2100). For the downstream node (a3.1), the TE2100 Plan estimates extreme water levels of 6.04 mAOD (present day, 2008) and, for the future, 6.44 mAOD (2070); 6.76 mAOD (2100) and 7.49 (2170). For the upstream node, these flood levels would result in overtopping of the current installed defences in the future 2100 scenario. For the downstream node, these flood levels would result in overtopping of the current installed defences in the future 2170 scenario.

However, the TE2100 Plan provides recommendations for continuous improvement of the Thames Tidal Defences, including their raising and repair, in line with predicted climate change impacts. It is therefore anticipated that the Thames flood defences will be maintained to provide a 0.1% standard of protection over the lifetime of any proposed development at the Site.

It is therefore considered highly unlikely that the Thames Tidal Defences will be overtopped, instead the greatest tidal flood risk from the River Thames corresponds to a failure (breach) of the defences.

The EA *Thames Tidal Upriver Breach Modelling 2017 Map* (included in Appendix A), provides outlines for the predicted inundation areas following a breach of the River Thames' flood defences coinciding with a 1 in 1,000 year (0.1%) annual exceedance probability flood event. Outlines are provided for 2014 (present day) and 2100 (future) scenarios. Land along the southern boundary of the Site and Newham Way (immediately to the south of the Site) are located within the flood outline for both scenarios. The central part of the Site is not located in the flood outlines for either scenario. The maximum predicted flood levels and depths for the Site are shown in Table 4 below. While the consequence of a breach could be significant inundation at the site, the likelihood of a breach is relatively low, especially considering the TE2100 recommendation for the continuous improvement and maintenance of these assets. Overall, therefore, the residual risk of flooding is considered to be low. Nevertheless, accounting for potential consequences of a breach is an important consideration should the site be redeveloped.

Table 4 Thames Tidal Breach Modelling Flood Levels and Flood Depths

Minimum Ground Elevation (mAOD)	2014 Scenario			2100 Scenario		
	Maximum Flood Level (mAOD)	Maximum Flood Depth on Site (m)	% of Site area flooded	Maximum Flood Level (mAOD)	Maximum Flood Depth on Site (m)	% of Site area flooded
1.77	2.09	0.32	10%	2.31	0.54	40%

Overall, it is considered that the Site has a very low risk of flooding from rivers and the sea, due to the protection afforded by the Thames Tidal Defences. A residual risk of flooding exists should these defences be breached during a flood event, but the low likelihood of this occurring means the residual risk is similarly low.

5.5 Flooding from Surface Water

The SWMP and LFRMS identify that surface water flooding poses a significant flood risk in Newham. This risk has been exacerbated by rapid urbanisation and the subsequent increase in paved and impermeable surfacing. Most rainfall drains and is piped away via the combined sewer system. However, the sewer

system has limited capacity and in response to intense or heavy rainstorms topographical low points are at risk of surface water flooding.

The SWMP identifies 13 Critical Drainage Areas (CDAs) in the Borough. The Site is not located within a CDA, the closest of which incorporates the main carriageway of Newham Way and extends from 300m west of the Site to 500m east of the Site.

The EA *Flood Risk from Surface Water map* (Figure 4) identifies that the Site itself has a very low risk of surface water flooding, equivalent to an annual chance less than 1 in 1,000 (0.1%). Newham Way, immediately to the south of the Site, and Salomons Road, immediately to the east, are shown to experience localised relatively shallow flooding in 'low' likelihood and 'medium' likelihood surface water flood events, with an annual chance of 1 in 1,000 (0.1%) and 1 in 100 (1%) respectively, albeit floodwater in these events is not predicted to extend to the site.

It is considered that the Site is at a very low risk of surface water flooding.

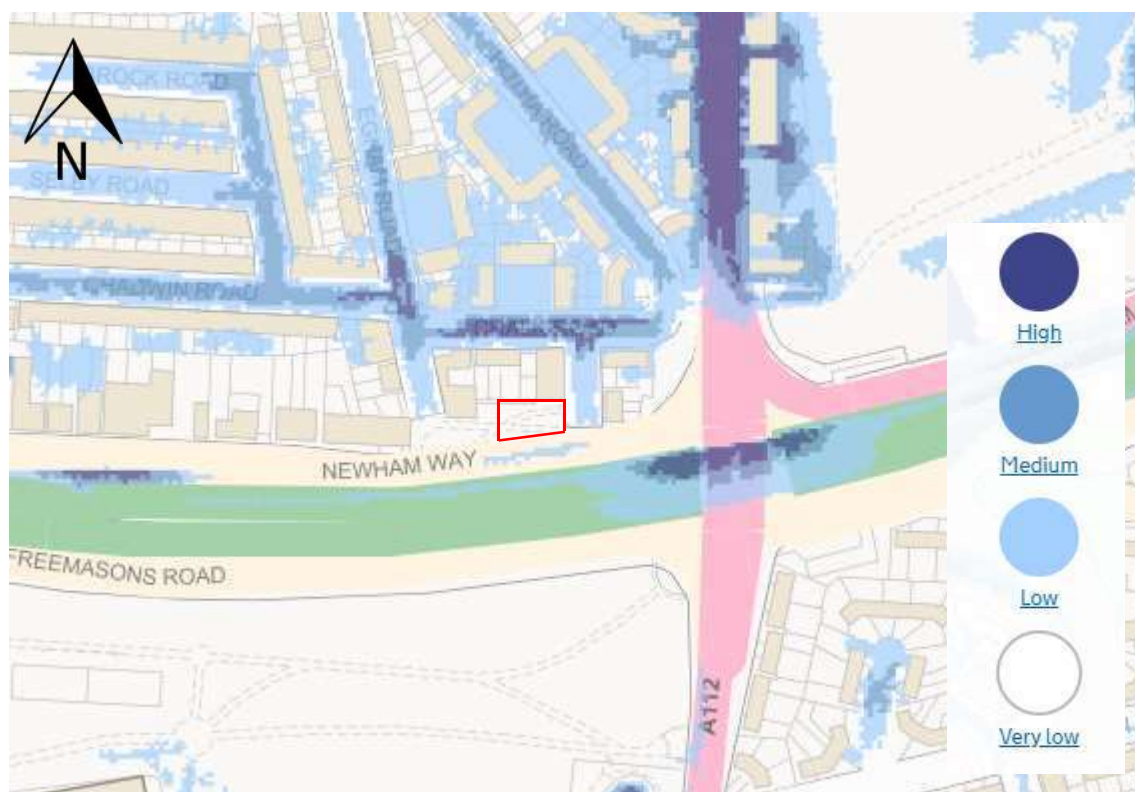


Figure 3: EA Risk of Flooding from Surface Water. Site boundaries outlined in red.

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5.6 Flooding from Sewers

As past sewer flooding incidents are reported by postcode in the SFRA no Site-specific information is available. Although there are records of flooding from sewers occurring in the E13 8P postal district, it is not known whether the Site was affected.

The SFRA states that there have been a greater number of sewer flooding incidents in the north of Newham and suggest this area is at greater risk of flooding from sewers. This means the Site, which is in the south of the Borough is perceived by LBN to be at lower risk of this source of flooding.

The sewer network mainly consists of combined sewers, and sewer flood risk is therefore intrinsically linked to surface water flood risk, which is low. The absence of significant above-ground surface water flooding within the vicinity of the site suggests there are no local low spots or flow pathways that could give rise to an increased risk of sewer flooding over and above that experienced in any urban area.

Overall, it is considered that the Site is at low risk of sewer flooding, however it is recommended that consultation with Thames Water should be undertaken to understand the capacity of the local network serving the Site.

5.7 Flooding from Groundwater

The SFRA mapping shows that the Site is not considered to be prone to groundwater flooding.

There are no recorded incidents of groundwater flooding at the Site and according to the LBNC PFRA, the nearest incidents of groundwater flooding to the Site occurred over 1.5 km away. The absence of permeable strata beneath the site suggests that the overall risk of groundwater emergence is low.

It is considered that the Site is at low risk of groundwater flooding.

5.8 Flooding from Artificial Sources

The EA *Risk of Flooding from Reservoirs* map indicates that the Site is located within the maximum extent of reservoir flooding should large reservoirs fail and release the water that they hold. The SFRA considers that the risk of flooding from reservoirs in Newham Borough is minimal assuming all large reservoirs are inspected regularly in accordance with the Reservoirs Act 1975. Furthermore, it is noted that the coarse modelling that informs the Risk of Flooding from Reservoirs Map does not account for the increased capacity within the River Thames to convey flow from upstream caused by the Thames Tidal Defences.

The management of the Royal Docks, which are located 1 km south of the Site, is undertaken by the Royal Docks Management Authority Limited (RODMA). Water levels in the Docks are controlled by lock gates and are independent of water levels in the Thames. The SFRA states: *'there is a residual risk of a breach or failure of the lock gates during a tidal surge which could result in overtopping of the dock walls and flooding of the surrounding area'*. However, this risk is included as part of the Thames Tidal Breach Modelling study, the results of which for the Site are reported in section 5.4. In the absence of tidal flooding conditions, the dock infrastructure does not pose a risk to the site on account of normal water levels being retained below surrounding ground levels.

This review has not identified any other sources of artificial flooding, such as canals, within the vicinity of the site.

Overall, it is considered that the Site is at low risk of flooding from artificial sources, with a very low residual risk of flooding from reservoirs in the unlikely event of reservoir failure (breach).

6 Risk Ratings & Recommendations for Further Investigation

6.1 Risk Ratings

Following an assessment of flood risk to the Site, it is considered that there is a **Low** or **Very Low** risk of flooding from all of the sources assessed. The degree of tidal and fluvial flood risk is dependent on the installed defences on the River Thames. These defences protect the Site up to the 0.1% flood event in the present day from both tidal storm surge and fluvial flooding. In accordance with TE2100 policy these assets should be maintained to provide the same level of protection into the future, accounting for the predicted effects of climate change.

Table 7 Flood Risk Sources

Source of Flooding	Flood Risk
1. Flooding from the sea (Coastal and Tidal)	Very Low (Low Residual)
2. Flooding from rivers (Fluvial)	Very Low
3. Flooding from land (Surface Water)	Very Low
4. Flooding from groundwater	Low
5. Flooding from reservoirs, canals and other artificial sources	Low (Low Residual)
6. Flooding from sewers	Low

6.2 NPPF Planning Tests

In line with the NPPF and PPG, the Sequential Test should be applied to proposed to redevelop the site. To satisfy the Sequential Test, it should be demonstrated that no other sites, at lower risk of flooding, could accommodate the proposed development. In practice, with much of the borough of Newham shown to be located in Flood Zone 3, and those areas protected by a high standard by significant flood defence infrastructure, it is likely to be relatively straightforward to demonstrate that land outside of Flood Zones 2 and 3 within the borough cannot solely accommodate the borough's redevelopment needs. This is referred to in para. 3.4 of Newham's Sequential Test document (Ref. 15) undertaken during preparation of the Local Plan Review.

Given its location in Flood Zone 3, the Site would be suitable for '*Water Compatible*' and '*Less Vulnerable*' development types but would trigger application of the Exception Test for '*More Vulnerable*' (which includes residential land use) and '*Essential Infrastructure*' uses. The Site would not be appropriate for '*Highly Vulnerable*' development types (which notably include basement dwellings). It is further noted that the EA advises against the placement of sleeping accommodation at ground floor level in areas potentially affected by flooding following a breach in the Thames Tidal Defences, as such, ground floor self-contained flats are unlikely to be acceptable at the site.

6.3 Recommendations

As a defended Site, with a residual risk of flooding, any future planning application for development of the Site would need to be informed by a Flood Risk Assessment (FRA). The FRA would present a more detailed assessment than is provided by this Flood Risk Review and would need to be specific to the type and layout/configuration of development that is proposed. The FRA should demonstrate that any proposed development would not be subject to an unreasonable risk of flooding and would not increase flood risk to third parties. If proven, this would satisfy the Exception Test.

It is considered that currently there is a low risk of surface water flooding and sewer flooding, however increasing urbanisation in the Borough and the predicted effects of climate change are acting to increase this risk. Surface water drainage and runoff from the Site, including available connections with and capacity of the local sewer network, should be further investigated in consultation with Thames Water. Further investigation should include the calculation of current rainfall-runoff rates and volumes, greenfield runoff rates for the Site and confirmation of the available capacity of the local and wider sewer networks. This should be undertaken as part of a Drainage Strategy designed to meet the London Plan (Ref. 16, Policy 5.15) requirement that developers should aim to achieve greenfield runoff rates and use SuDS unless there are practical reasons for not

A Drainage Strategy should be developed in consultation with LBN, detailing methods to manage runoff from the Site. According to Newham Council's SFRA, there are potentially '*opportunities for bespoke infiltration SuDS*' at the Site.

Overall it is considered that, except for a restriction on basement dwellings and sleeping accommodation at the ground floor level, subject to appropriate sustainable drainage design and suitable FRA, the Site is appropriate for residential uses and most other forms of development.

7 References

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APPENDIX A

Environment Agency Flood Product 4 and Flood Product 8 Data Packs

Product 4 (Detailed Flood Risk) for: Land at Newham Way, London, E13 8SD

Reference: HNL113414 BC

Date: 29/01/2019

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- Flood Map for Planning (Rivers and Sea)
- Flood Map Extract
- Thames Estuary 2100 (TE2100)
- Thames Tidal Upriver Breach Inundation Modelling 2017
- Thames Tidal Upriver Breach Inundation Modelling Map
- Site Node Locations Map
- Defence Details
- Recorded Flood Events Data
- Recorded Flood Events Outlines Map
- Additional Information

The information provided is based on the best data available as of the date of this letter.

You may feel it is appropriate to contact our office at regular intervals, to check whether any amendments/ improvements to the data for this location have been made. Should you re-contact us after a period of time, please quote the above reference in order to help us deal with your query.

Please refer to the [Open Government Licence](#) which explains the permitted use of this information.

Flood Map for Planning (Rivers and Sea)

The Flood Map:

Our Flood Map shows the natural floodplain for areas at risk from river and tidal flooding. The floodplain is specifically mapped ignoring the presence and effect of defences. Although flood defences reduce the risk of flooding they cannot completely remove that risk as they may be over topped or breached during a flood event.

The Flood Map indicates areas with a 1% (0.5% in tidal areas), Annual Exceedance Probability (AEP) - the probability of a flood of a particular magnitude, or greater, occurring in any given year, and a 0.1% AEP of flooding from rivers and/or the sea in any given year. In addition, the map also shows the location of some flood defences and the areas that benefit from them.

The Flood Map is intended to act as a guide to indicate the potential risk of flooding. When producing it we use the best data available to us at the time and also take into account historic flooding and local knowledge. The Flood Map is updated on a quarterly basis to account for any amendments required. These amendments are then displayed on the internet at <https://www.gov.uk/check-flood-risk>

At this Site:

The Flood Map shows that this site lies within Flood Zone 3 - with a 0.5% chance of flooding from the sea (tidal flooding) in any given year.

Enclosed is an extract of our Flood Map which shows this information for your area.

Method of production

The Flood Map at this location has been derived using detailed modelling of the tidal River Thames through the Thames Tidal Defences Study completed in 2006 by Halcrow Ltd.

Thames Estuary 2100 (TE2100)

You have requested in-channel flood levels for the tidal river Thames. These have been taken from the Thames Estuary 2100 study completed by HR Wallingford in 2008. The modelled node closest to your site is **2.46ad**; the locations of nearby nodes are also shown on the enclosed map.

Details about the TE2100 plan

The TE2100 plan is now live and within it are a set of levels on which the flood risk management strategy is based. The plan is the overarching flood management strategy for the Thames Estuary and therefore any development planning should be based on the same underlying data.

Details about the TE2100 in-channel levels

The TE2100 in-channel levels take into account operation of the Thames Barrier when considering future levels. The Thames Barrier requires regular maintenance and with additional closures the opportunity for maintenance will be reduced. When this happens, river levels – for which the Barrier would normally shut for the 2008 epoch – will have to be allowed through to ensure that the barrier is not shut too often. For this reason, levels upriver of the barrier will increase and the tidal walls will need to be heightened to match.

Why is there no return period for levels upriver of the barrier?

The levels upriver of the barrier are the highest levels permitted by the operation of the Thames Barrier. If levels and flows are forecast to be any higher, the Thames Barrier would shut, ensuring that the tide is blocked and the river maintained to a low level. For this reason the probability of any given water level upriver of the Barrier is controlled and therefore any associated return period becomes irrelevant. The Thames Barrier and associated defence system has a 1 in 1000 year standard which means it ensures that flood risk is managed up to an event that has a 0.1% annual probability. The probability of water levels upriver is ultimately controlled by the staff at the Thames Barrier.

TE2100 2008 levels:

Levels downriver of the Thames Barrier are 0.1% AEP (1 in 1000) and levels upriver are the highest levels permitted by the Thames Barrier, described as the Maximum Likely Water Levels (MLWLs). The defence levels (left defence, right defence) are the minimum levels to which the defences should be built.

Location	Node	Easting	Northing	Extreme water level (m)	Left defence (m)	Right defence (m)	Allow for future defence raising to a level of...	
							Left Bank (m)	Right Bank (m)
Greenwich	2.46au	539436	180390	4.66	5.18	5.18	6.20	6.20
	2.46ad	539528	180320	4.66	5.18	5.18	6.20	6.20
	2.47	539826	179982	4.65	5.18	5.18	6.20	6.20
	2.48	540347	179492	4.64	5.18	5.18	6.20	6.20
Barrier	a2.49	541357	179535	4.63	5.18	5.18	6.20	6.20

Downstream

Location	Node	Easting	Northing	Extreme water level (m)	Left defence (m)	Right defence (m)	Allow for future defence raising to a level of...	
							Left Bank (m)	Right Bank (m)
Barrier	a3.1	541634	179578	6.04	7.20	7.20	8.80	8.80

TE2100 climate change levels:

Location	Node	Easting	Northing	2065 to 2100		2100	
				Design water level	Defence level (both banks)	Design water level	Defence level (both banks)
Greenwich	2.46au	539436	180390	5.15	5.70	5.64	6.20
	2.46ad	539528	180320	5.15	5.70	5.63	6.20
	2.47	539826	179982	5.14	5.70	5.62	6.20
	2.48	540347	179492	5.13	5.70	5.61	6.20
Barrier	2.49	541357	179535	5.12	5.70	5.60	6.20

Downstream

Location	Node	Easting	Northing	1000-year design water levels					
				2000	2040	2070	2100	2120	2170
Barrier	a3.1	541634	179578	6.04	6.25	6.44	6.76	6.97	7.49

Thames Tidal Upriver Breach Inundation Modelling – 2017

The map attached displays site-specific modelled flood levels at your site. These have been taken from the Thames Tidal Upriver Breach Inundation Modelling Study 2017 completed by Atkins Ltd. in May 2017.

We have developed a modelling approach where all upriver breach locations along the Thames are equitably modelled, to ensure a consistent approach across London. This modelling simulates 5679 continuous tidal breaches along the entire extent of the Thames from Teddington to the Thames Barrier. For hard and composite defences breaches are set at 20 m wide; for soft defences, breaches are 50 m wide. In both cases, the defence breach scour distance was assumed to extend into the floodplain by the same distance as the breach width.

For breaches upriver of the Thames Barrier, there is no return period for modelled levels as the levels are controlled by barrier closures. The levels used are referred to as Maximum Likely Water Levels (MLWLs). Therefore 2014 and 2100 epochs were modelled on that basis.

Defence Details

The design standard of protection of the flood defences in this area of the Thames is 0.1% AEP; they are designed to defend London up to a 1 in 1000 year **tidal** flood event. The defences are all raised, man-made and privately owned. It is the riparian owners' responsibility to ensure that they are maintained to a crest level of **7.2m** AODN (the Statutory Flood Defence Level in this reach of the Thames). We inspect them twice a year to ensure that they remain fit for purpose. The current condition grade for defences in the area is **2 (good)**, on a scale of 1 (very good) to 5 (very poor). For more information on your rights and responsibilities as a riparian owner, please see our document 'Living on the edge' found on our website at:

<https://www.gov.uk/government/publications/riverside-ownership-rights-and-responsibilities>

There are no planned improvements in this area. Please see the 'Thames Estuary 2100' document on our website for the short, medium and long term Flood Risk Management strategy for London:

<https://www.gov.uk/government/publications/thames-estuary-2100-te2100>

Areas Benefiting from Flood Defences

This site is within an area benefiting from flood defences, as shown on the enclosed extract of our Flood Map. Areas benefiting from flood defences are defined as those areas which benefit from formal flood defences specifically in the event of flooding from rivers with a 1% (1 in 100) chance in any given year, or flooding from the sea with a 0.5% (1 in 200) chance in any given year.

If the defences were not there, these areas would be flooded. An area of land may benefit from the presence of a flood defence even if the defence has overtopped, if the presence of the defence means that the flood water does not extend as far as it would if the defence were not there.

Recorded Flood Events Data

We hold records of historic flood events from rivers and the sea. Information on the floods that may have affected the area local to your site are provided in the enclosed map.

Due to the fact that our records are not comprehensive, we would advise that you make further enquiries locally with specific reference to flooding at this location. You should consider contacting the relevant Local Planning Authority and/or water/sewerage undertaker for the area.

We map flooding to land, not individual properties. Our historic flood event record outlines are an indication of the geographical extent of an observed flood event. Our historic flood event outlines do not give any indication of flood levels for individual properties. They also do not imply that any property within the outline has flooded internally.

Please be aware that flooding can come from different sources. Examples of these are:

- from rivers or the sea;
- surface water (i.e. rainwater flowing over or accumulating on the ground before it is able to enter rivers or the drainage system);
- overflowing or backing up of sewer or drainage systems which have been overwhelmed,
- groundwater rising up from underground aquifers

Currently the Environment Agency can only supply flood risk data relating to the chance of flooding from rivers or the sea. However you should be aware that in recent years, there has been an increase in flood damage caused by surface water flooding and drainage systems that have been overwhelmed.

Other Sources of Flood Risk

The Lead Local Flood Authority for your area are responsible for local flood risk (i.e. surface runoff, ground water and ordinary watercourse) and may hold further information .

You may also wish to consider contacting the appropriate relevant Local Planning Authority and/or water/sewerage undertaker for the area. They may be able to provide some knowledge on the risk of flooding from other sources.

Additional Information

Use of Environment Agency Information for Flood Risk / Flood Consequence Assessments

Important

If you have requested this information to help inform a development proposal, then we recommend that you undertake a formal pre-application enquiry using the form available from our website:-

<https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion>

Depending on the enquiry, we may also provide advice on other issues related to our responsibilities including flooding, waste, land contamination, water quality, biodiversity, navigation, pollution, water resources, foul drainage or Environmental Impact Assessment.

In **England**, you should refer to the Environment Agency's Flood Risk Standing Advice, the technical guidance to the National Planning Policy Framework and the existing PPS25 Practice Guide for information about what flood risk assessment is needed for new development in the different Flood Zones. These documents can be accessed via:

<https://www.gov.uk/flood-risk-standing-advice-frsa-for-local-planning-authorities>

<https://www.gov.uk/government/publications/national-planning-policy-framework-technical-guidance>

<https://www.gov.uk/government/publications/development-and-flood-risk-practice-guide-planning-policy-statement-25>

You should also consult the Strategic Flood Risk Assessment produced by your local planning authority.

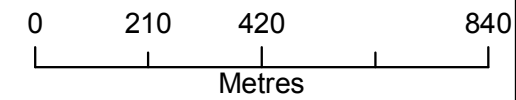
You should note that:

1. Information supplied by the Environment Agency may be used to assist in producing a Flood Risk / Consequence Assessment (FRA / FCA) where one is required, but does not constitute such an assessment on its own.
2. This information covers flood risk from main rivers and the sea, and you will need to consider other potential sources of flooding, such as groundwater or overland runoff. The information produced by the local planning authority referred to above may assist here.
3. Where a planning application requires a FRA / FCA and this is not submitted or deficient, the Environment Agency may well raise an objection.
4. For more significant proposals in higher flood risk areas, we would be pleased to discuss details with you ahead of making any planning application, and you should also discuss the matter with your local planning authority.

Detailed FRA/FCA for: Land at Newham Way, London, E13 8SD -29/01/2019 - HNL113414 BC



Environment Agency
Alchemy,
Bessemer Road,
Welwyn Garden City,
Hertfordshire,
AL7 1HE



Legend

- Main Rivers
- Site location
- TE2100Nodes
- 1707 Flood Outline
- 1928 Flood Outline
- 1953 Flood Outline
- Areas Benefiting from Flood Defences
- Areas Benefiting from Flood Defences
- Flood Zone 3
- Flood Zone 2

Flood Map for Planning (assuming no defences)

Flood Zone 3 shows the area that could be affected by flooding:

- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

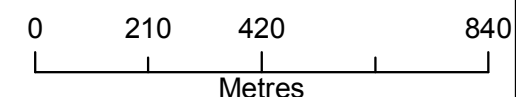
Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

Produced by:
Partnerships & Strategic Overview,
Hertfordshire & North London

Detailed FRA/FCA for: Land at Newham Way, London, E13 8SD -29/01/2019 - HNL113414 BC



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AL7 1HE



Legend

- Main Rivers
- Site location

TTD Defences SDL (mAODN) SDL

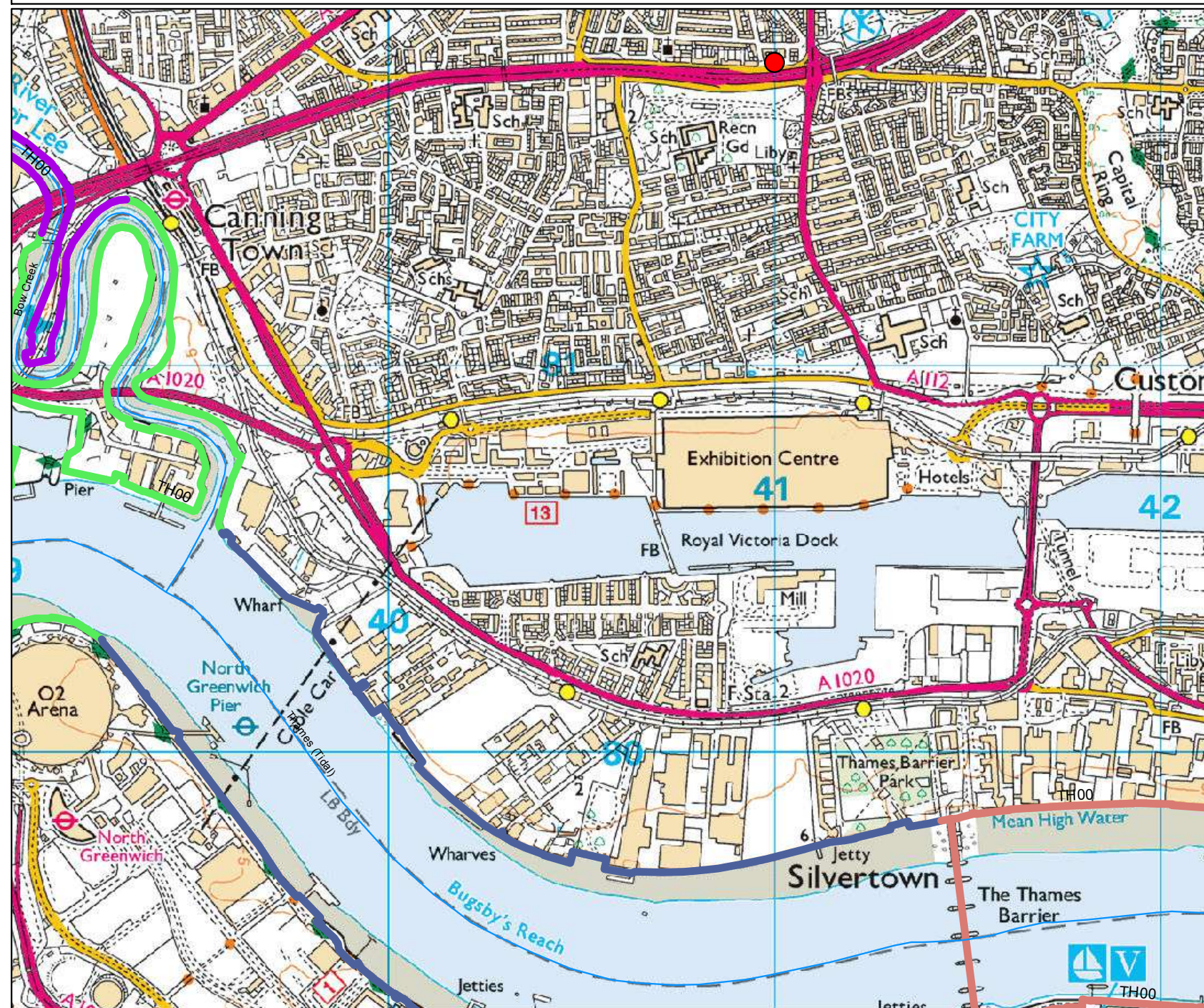
- 5.18
- 5.23
- 5.28
- 7.2

Flood Map for Planning (assuming no defences)

Flood Zone 3 shows the area that could be affected by flooding:
- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

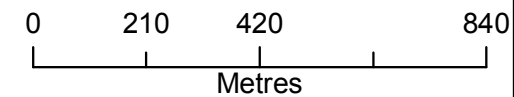
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Breach Modelling Map for: Land at Newham Way, London, E13 8SD -29/01/2019 - HNL113414 BC



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Legend

- Main Rivers
- Site location

Upstream Breach Outlines

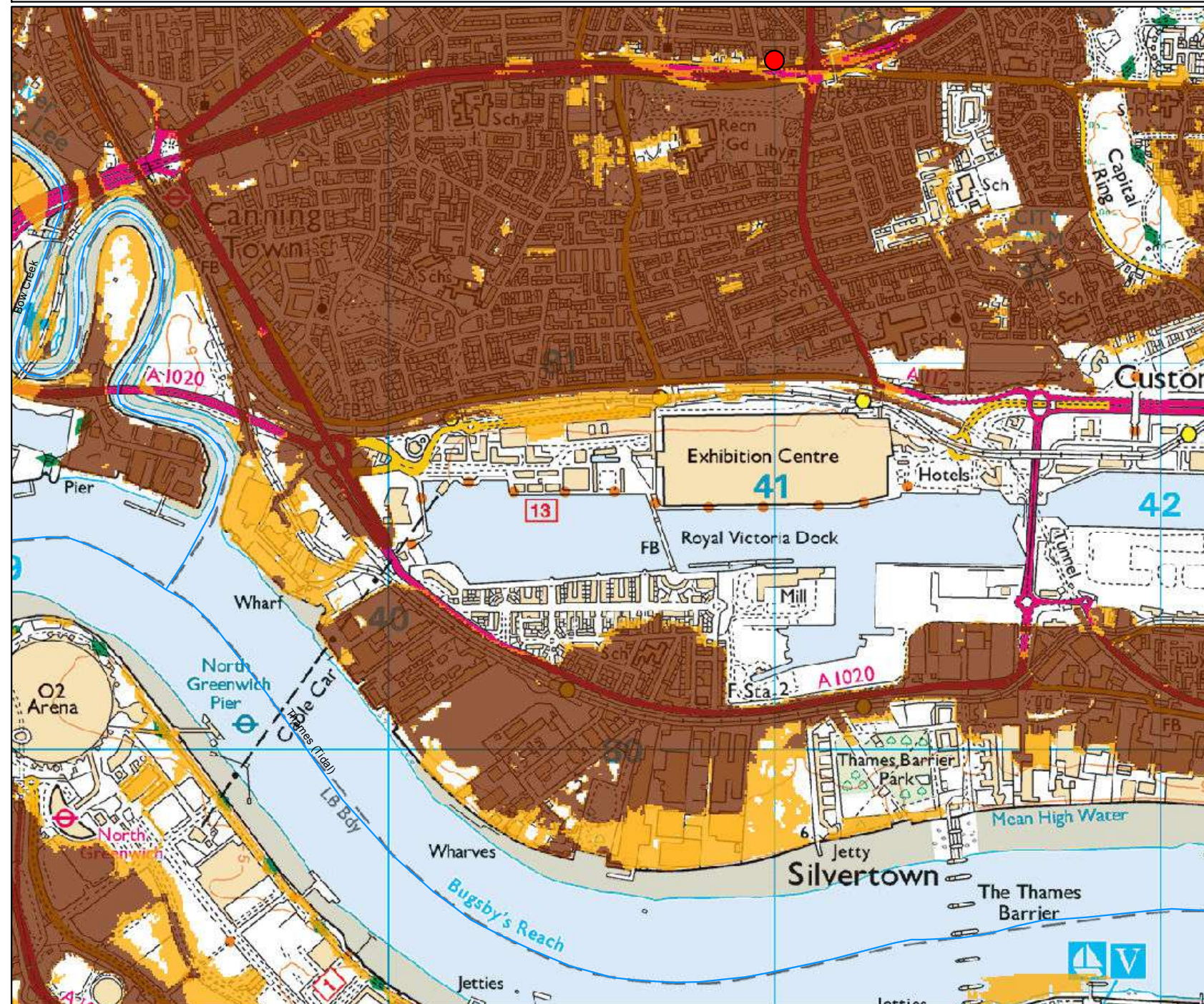
Epoch

- 2005
- 2100

Thames Tidal Upriver Breach Inundation
Modelling 2017

A modelled representation of all upriver tidal breach locations along the Thames from Teddington to the Thames Barrier, based on low floodplain topography. For hard and composite defences breaches are set at 20 m wide; for soft defences, breaches are 50 m wide. In both cases, the defence breach scour distance was assumed to extend into the floodplain by the same distance as the breach width. The modelling is based on the 2008 TE2100 in-channel levels, with an allowance for climate change for epoch 2100.

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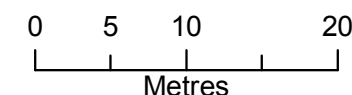


Modelled Flood Levels For:

Land at Newham Way, London, E13 8SD -29/01/2019 - HNL113414 BC



Environment Agency
Alchemy,
Bessemer Road,
Welwyn Garden City,
Hertfordshire,
AL7 1HE



Legend

- Main Rivers
- Site location

- Thames Tidal Breach Nodes 2014

Thames Tidal Upriver Breach Inundation
Modelling 2017

A modelled representation of all upriver tidal breach locations along the Thames from Teddington to the Thames Barrier, based on low floodplain topography. For hard and composite defences breaches are set at 20 m wide; for soft defences, breaches are 50 m wide. In both cases, the defence breach scour distance was assumed to extend into the floodplain by the same distance as the breach width. The modelling is based on the 2008 TE2100 in-channel levels, with an allowance for climate change for epoch 2100.

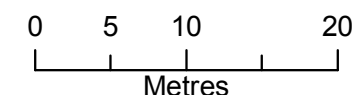
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Modelled Flood Levels For:

Land at Newham Way, London, E13 8SD -29/01/2019 - HNL113414 BC



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Legend

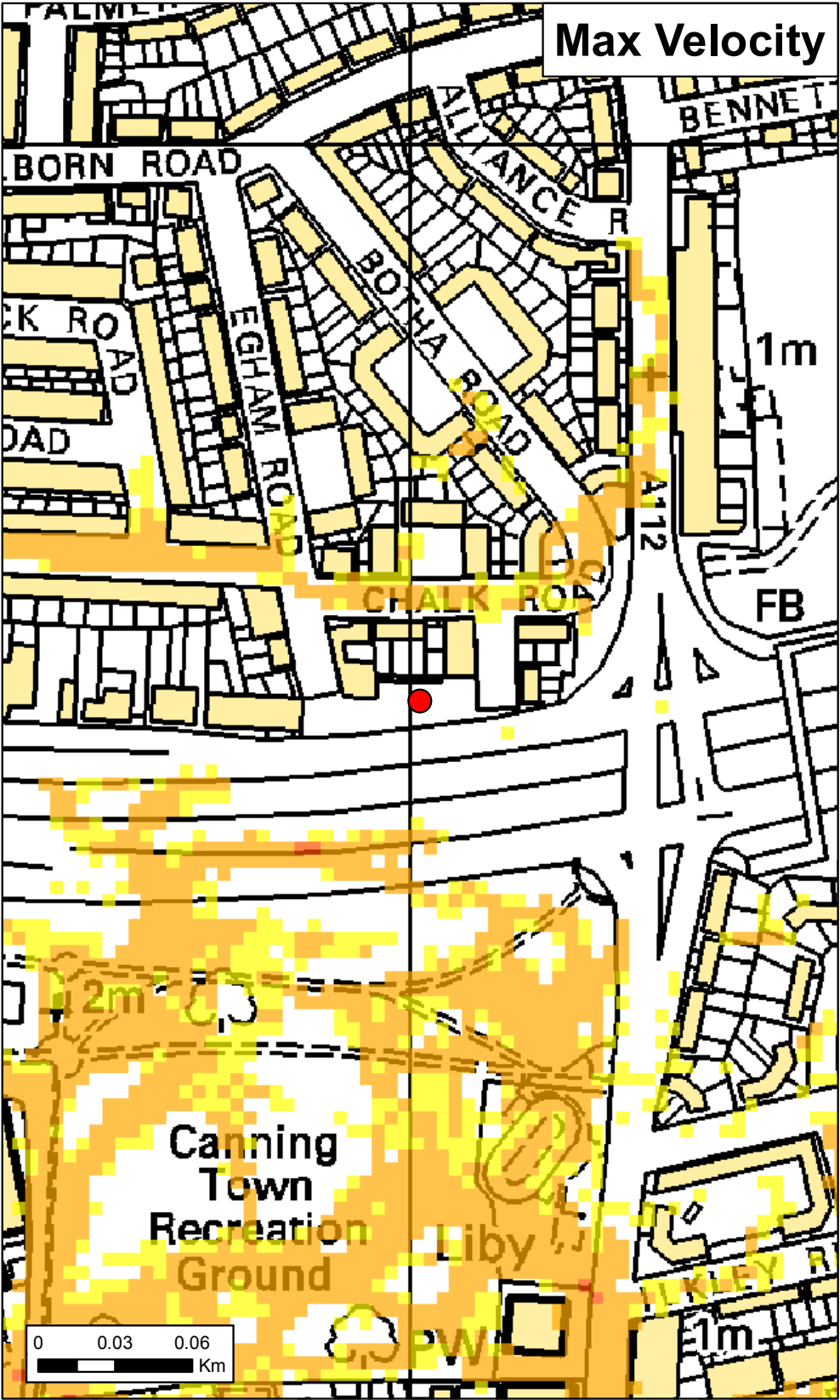
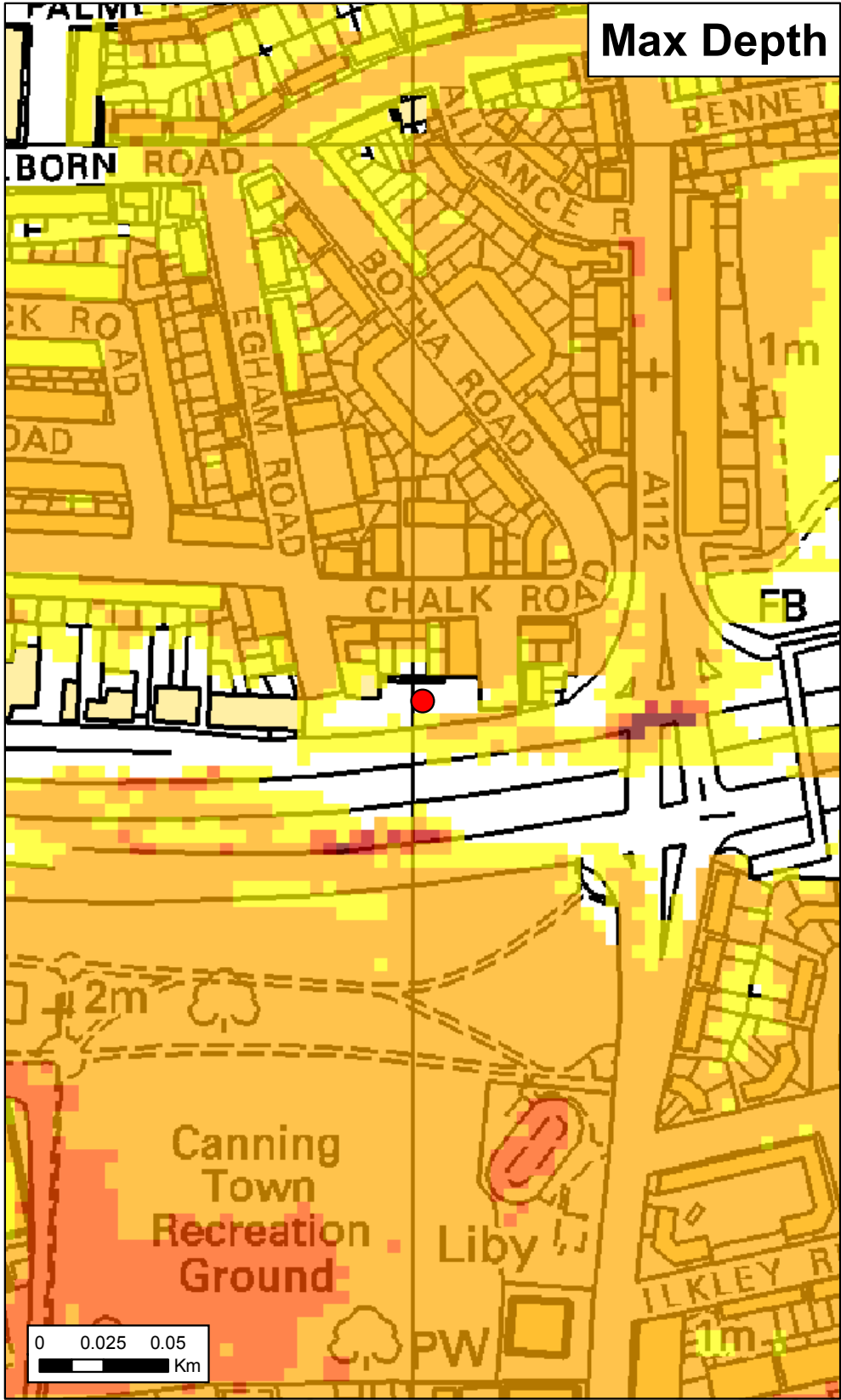
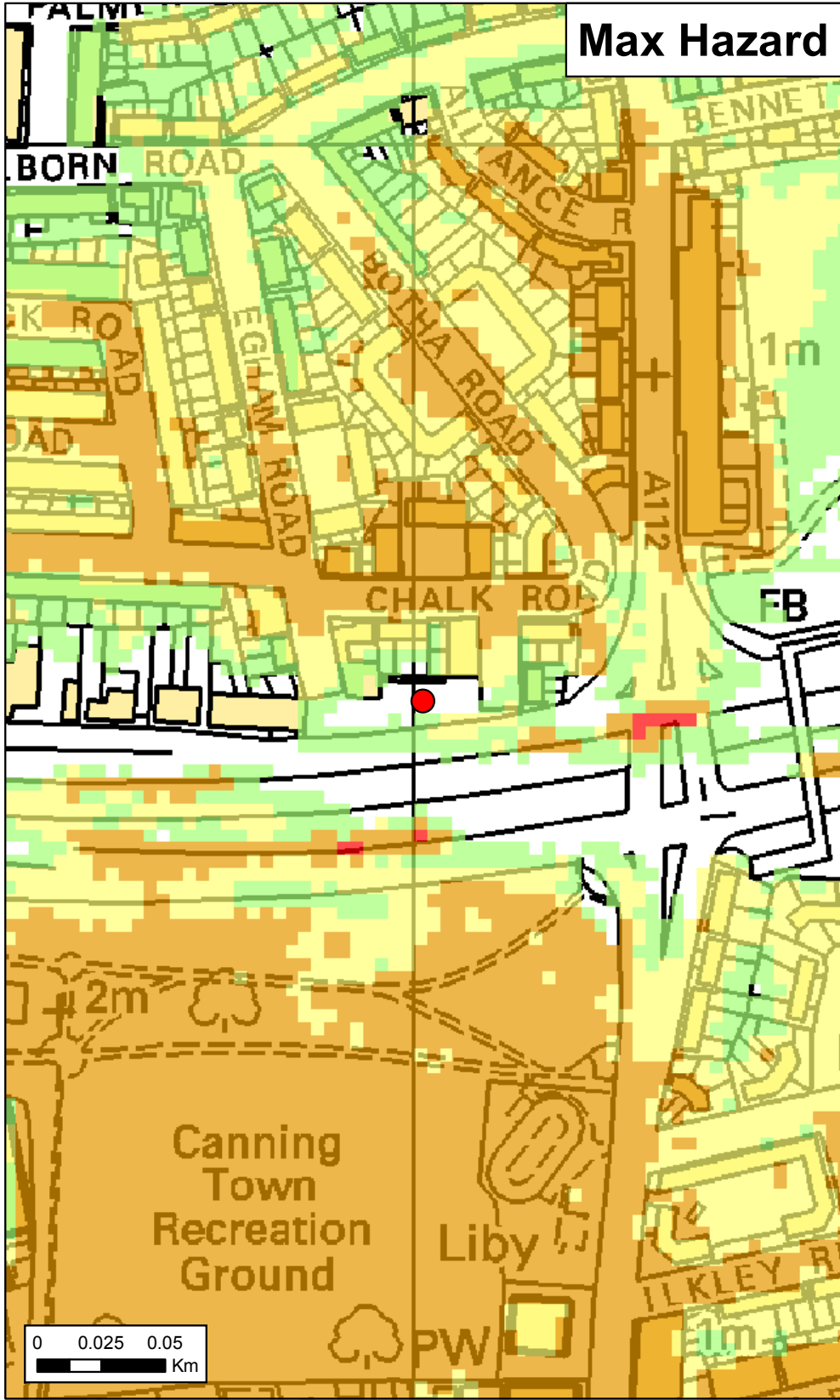
— Main Rivers
● Site location

● Thames Tidal Breach Nodes 2100

Thames Tidal Upriver Breach Inundation
Modelling 2017

A modelled representation of all upriver tidal breach locations along the Thames from Teddington to the Thames Barrier, based on low floodplain topography. For hard and composite defences breaches are set at 20 m wide; for soft defences, breaches are 50 m wide. In both cases, the defence breach scour distance was assumed to extend into the floodplain by the same distance as the breach width. The modelling is based on the 2008 TE2100 in-channel levels, with an allowance for climate change for epoch 2100.

Produced by:
Partnerships & Strategic Overview,
Hertfordshire & North London



Max Hazard		Max Depth (m)		Max Velocity (m/s)	
	Less than 0.75 (Low Hazard)		0 - 0.25		0 - 0.3
	Between 0.75 and 1.25 (Danger for Some)		0.25 - 1.00		0.3 - 1.0
	Between 1.25 and 2.00 (Danger for Most)		1.00 - 1.50		1.0 - 1.5
	Greater than 2.00 (Danger for All)		1.50 - 2.00		1.5 - 2.5
			> 2.00		> 2.5
Date Printed	29/01/2019	Scenario year	2014	Scenario Annual Chance	0.1% (1 in 1000)

This map shows the level of flood hazard to people (called a hazard rating) if our flood defences are breached at certain locations, for a range of scenarios. The hazard rating depends on the depth and velocity of floodwater, and maximum values of these are also mapped.

The map is based on computer modelling of simulated breaches at specific locations. Each breach has been modelled individually and the results combined to create this map. Multiple breaches, other combinations of breaches, different sized tidal surges or flood flows may all give different results.

The map only considers the consequences of a breach, it does not make any assumption about the likelihood of a breach occurring. The likelihood of a breach occurring will depend on a number of different factors, including the construction and condition of the defences in the area. A breach is less likely where defences are of a good standard, but a risk of breaching remains.

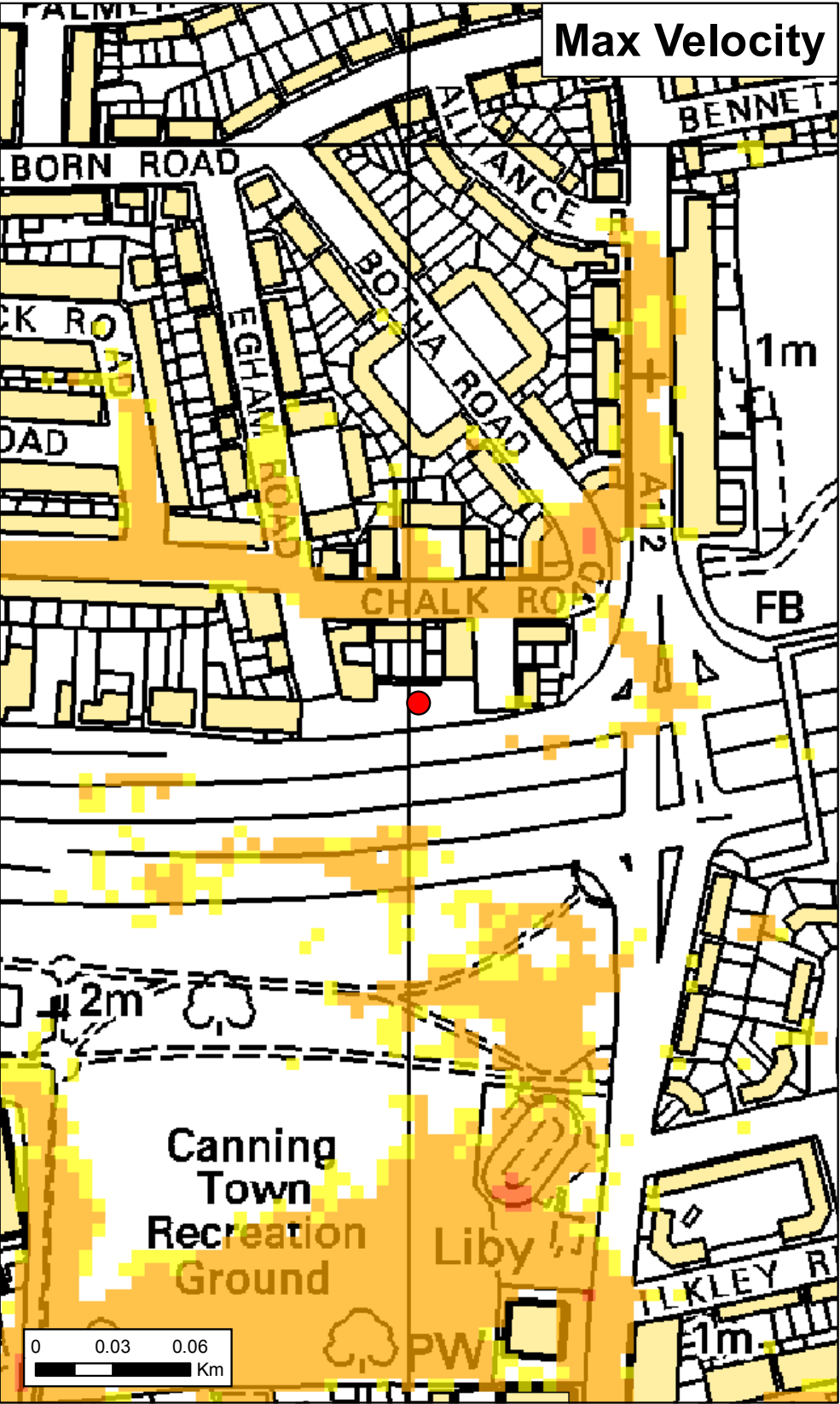
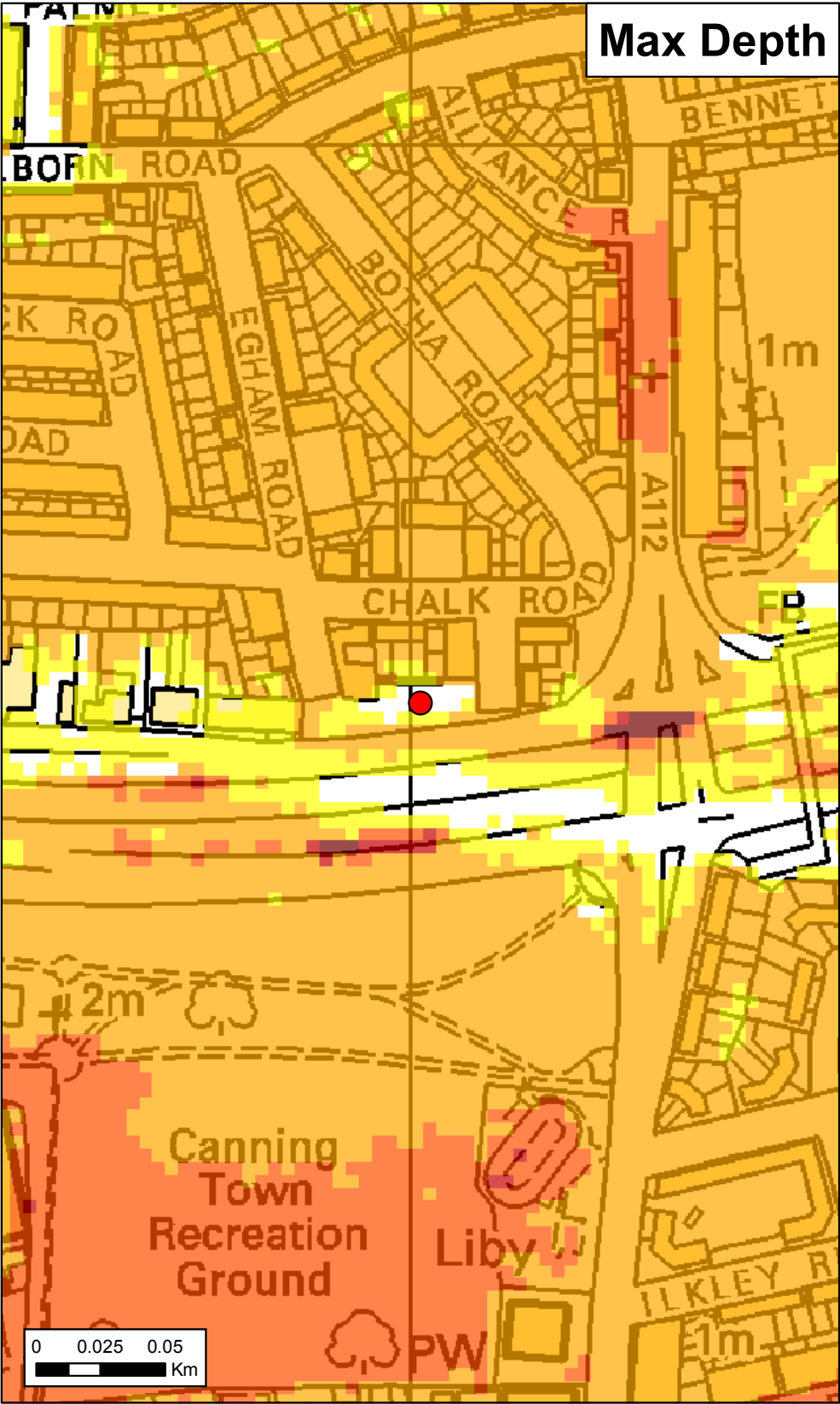
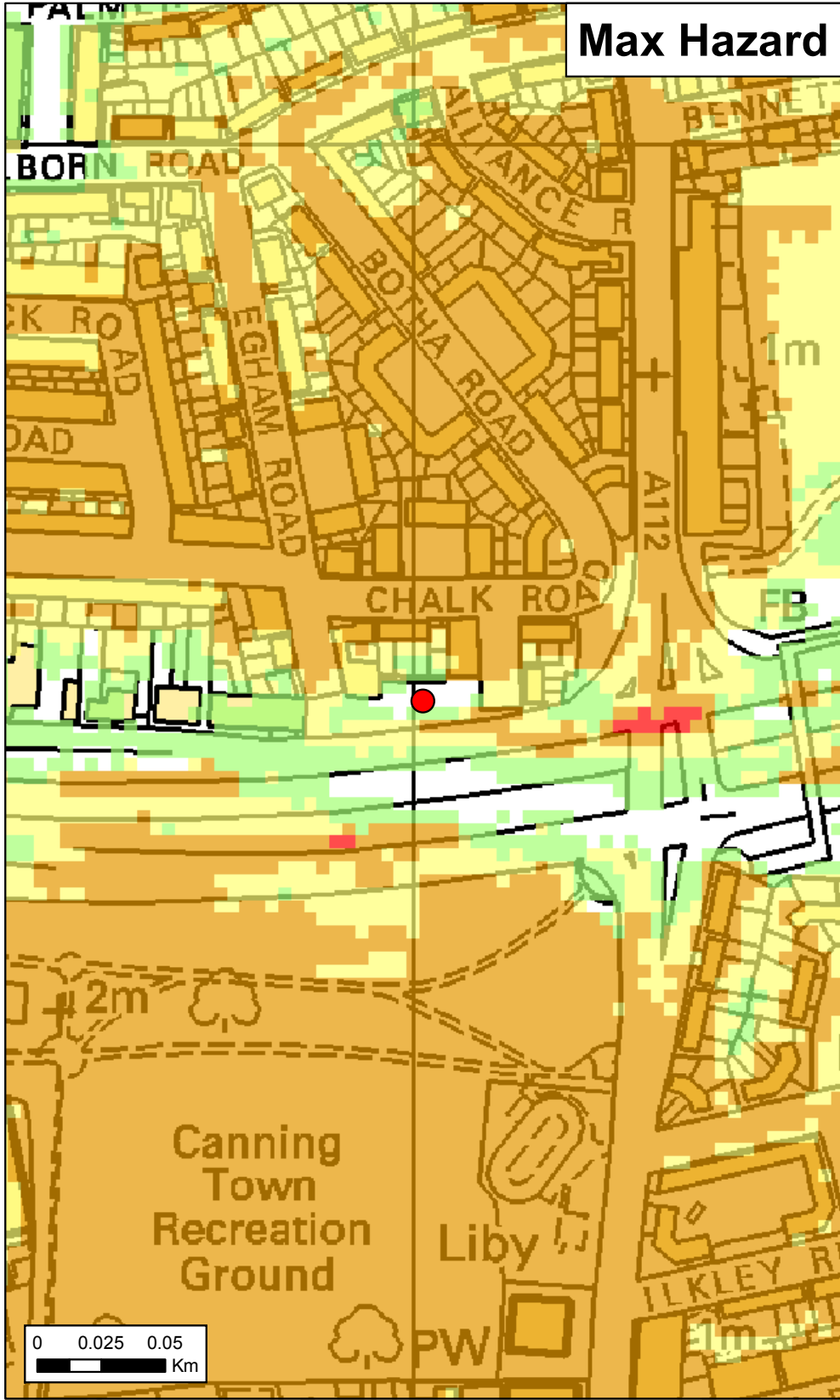
Please contact the Environment Agency for further information on emergency planning associated with flood risk in this area.















General Enquiries No: 03708 506 506. Weekday Daytime calls cost 5p plus up to 6p per minute from BT Weekend Unlimited. Mobile and other providers' charges may vary

Thames Tidal Breach Hazard Mapping

Map Centred on 541004, 181783

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Max Hazard		Max Depth (m)		Max Velocity (m/s)	
	Less than 0.75 (Low Hazard)		0 - 0.25		0 - 0.3
	Between 0.75 and 1.25 (Danger for Some)		0.25 - 1.00		0.3 - 1.0
	Between 1.25 and 2.00 (Danger for Most)		1.00 - 1.50		1.0 - 1.5
	Greater than 2.00 (Danger for All)		1.50 - 2.00		1.5 - 2.5
			> 2.00		> 2.5
Date Printed	29/01/2019	Scenario year	2100	Scenario Annual Chance	0.1% (1 in 1000)


This map shows the level of flood hazard to people (called a hazard rating) if our flood defences are breached at certain locations, for a range of scenarios. The hazard rating depends on the depth and velocity of floodwater, and maximum values of these are also mapped.

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General Enquiries No: 03708 506 506. Weekday Daytime calls cost 5p plus up to 6p per minute from BT Weekend Unlimited. Mobile and other providers' charges may vary

 **Environment Agency**

Thames Tidal Breach Hazard Mapping

Map Centred on 541004, 181783

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