APPENDIX F

THAMES ROAD

THAMES ROAD

Area Name: Thames Road
Location: Barking
River Catchment: River Roding/River Thames
NPPF Flood Zone (majority of area): Flood Zone 3a
NPPF Flood Zone (worst case): Flood Zone 3a

Introduction

The Thames Road strategic development site is approximately 0.26 km^2 in area and is located in the south-west of Barking and Dagenham (see Appendix A). The area is bounded by residential properties and a school in the north, Estuary Close in the east, the Barking Riverside strategic development site in the south and River Road in the west.

The existing land use in the area is predominantly industrial and consists of the Riverside Industrial Estate. It is proposed to rezone this area for the development of c. 2,000 residential properties.

Description of Flood Risk

Fluvial and Tidal

The primary sources of flood risk to the Thames Road strategic development site are tidal flooding from the River Thames and fluvial flooding from the River Roding. The entirety of the Thames Road site is located within Flood Zone 3a. Analysis of local topography and Flood Zones indicates the flood depths are expected to reach up to 2.5m in areas of Flood Zone 3a.

Fluvial and tidal flooding within the Thames Road strategic development site is illustrated in Figures F1 and F2A.

Surface Water

The Environment Agency Risk of Flooding from Surface Water map indicates that the Thames Road strategic development site is generally at low risk of surface water flooding.

The most significant surface water flood risk within the strategic development site is along Thames Road with areas near the junctions with Crossness Road and Marine Drive predicted to flood to depths of up to 0.6m during the 1 in 100 (1%) annual probability rainfall event, which has an associated flood hazard rating of 'moderate' (Danger for some). River Road, which provides the main access route into the site from the west, is also indicated to have a moderate surface water flood risk.

Flood hazards associated with surface water flooding during the 1 in 100 (1%) annual probability event are illustrated in Figure F3.

Groundwater

The increased Potential for Elevated Groundwater map (iPEG), developed for the Barking and Dagenham SWMP, indicates that Thames Road is not within the area identified as having an increased potential for groundwater to interact with or rise to within 2m of the ground surface.

Defence or Reservoir Failure

The Thames Road strategic development site benefits from flood defence walls on the River Roding and from the Thames tidal defences, including the Barking Barrier. The entire site is identified as benefiting from existing defences, as illustrated in Figures F4 and F5, but noting that these do not take the potential effects of climate change into account.

The Lower Roding Flood Risk Mapping study (undertaken by Capita Symonds in 2009) indicates that the defences along the River Roding provide a Standard of Protection (SoP) to Thames Road equivalent to a 1 in 200 (0.5%) annual probability fluvial flood. This study only assessed the fluvial flood risk from

the River Roding and no assessment was undertaken of a fluvial flood event occurring when the Barking Barrier is closed or when tide levels in the River Thames are high.

The River Thames tidal defences provide a present day SoP equivalent to a 1 in 2000 (0.05%) annual probability tidal flood event. It is believed that by 2030 the SoP will decrease to approximately 1 in 1000 (0.1%).

Site-specific flood risk assessments for developments within the areas benefitting from the defences along the River Roding and the River Thames should include an assessment of the risk of overtopping of the defences, as well as the risk of a breach in the defences. This should also consider the condition of flood defences as discussed in the Level 1 SFRA.

The Environment Agency River Thames breach analysis published in 2017, and the breach analysis undertaken for the Barking and Dagenham SFRA published in 2008, indicates that the degree of flood hazard in all of the Thames Road strategic development site would be 'very high' (Danger for all) should a breach in the Barking Creek or River Thames defences occur.

Mapped outputs of breach analysis relevant to the Thames Road strategic development site are provided in Figures F6 to F9.

Review of the available breach mapping indicates that following a breach of the flood defences along the Barking Creek, flooding would occur rapidly through the majority of the Thames Road site, with a predicted rate of inundation of less than 5 hours. Similarly following a breach of the River Thames tidal defences, the rate of inundation of Thames Road strategic development site would be rapid with flooding expected to occur in less than 5 hours of a breach occurring.

During the most recent inspections undertaken by the Environment Agency in 2015-2016, generally, the flood defence assets protecting Barking and Dagenham are in good condition; of the 120 flood defence assets surveyed, 105 were classified as being 'Good' or 'Very Good'. However, four of the surveyed flood defence assets were classified as being 'Poor' or 'Very Poor'.

Two of the flood defence assets on the River Roding, approximately 6.5km upstream from the confluence with the Thames, were assessed as being in 'Poor' condition, (Environment Agency asset numbers 8742 and 15371). A failure of flood defence asset no. 15371 would be likely to affect the Thames Road strategic development site.

Part of the flood defences on the River Thames were also assessed as being in 'Poor' and 'Very Poor' condition during the Environment Agency's last inspections. These are located at the confluence with the River Beam (Environment Agency asset number 7391) and approximately 2.2km downstream of the confluence with the River Roding (Environment Agency asset number 14860) respectively. A failure of the 'Very Poor' flood defence asset (no. 14860) would be likely to affect the Thames Road strategic development site.

The Environment Agency Risk of Flooding from Reservoirs map indicates that Thames Road is not at risk of reservoir flooding.

Flood Warning Areas

The areas identified as being at fluvial or tidal flood risk within the Thames Road strategic development site are within the Environment Agency 'Tidal Thames from Mar Dyke to Barking Creek' Flood Warning Area.

Flood Warnings are issued to specific areas when flooding is expected. Flood Warnings apply to fluvial and tidal flooding, not to flooding from other sources such as sewer and surface water flooding.

Areas of the Thames Road strategic development site which benefit from Environment Agency Flood Warnings are illustrated in Figure F10.

Impact of Climate Change

Updated guidance for considering the potential effects of climate change for the 1 in 100 (1%) annual probability event has been considered within the fluvial modelling of the Mayes Brook located approximately 500m north of the site. The mapping, provided in Figure F2B, indicates that the Thames Road strategic development site is partially located within Flood Zone 2 of the Mayes Brook flood extents, but is not affected by the potential effects of climate change during the 1 in 100 (1%) annual probability event.

Updated climate change analysis has not yet been undertaken for the Lower Roding that also affects the Thames Road strategic development site. This is expected to be published by the Environment Agency in December 2017. Review of the mapped extents of the present day Flood Zones 2 and 3, as well as the mapped extents of flood defence breach that considers climate change effects indicates that the impact of climate change on the extent of fluvial and tidal flood risk within the vicinity of the development site will be small, albeit potentially to a greater depth. However, users of this SFRA should undertake their own analysis (in accordance with the detailed and intermediate approach outlined in Section 6.4 of the Level 1 SFRA) of climate change effects if necessary.

The effects of climate change will not only increase the risk of flooding posed to property as a result of river and/or tidal flooding, but it will also potentially increase the frequency and intensity of surface water flood risk within the Borough. A comparison of the Environment Agency 1 in 100 (1%) annual probability and 1 in 1000 (0.1%) annual probability predicted surface water flood extents, provided in the Level 1 SFRA report, indicates that flooding of the roads through the site may be exacerbated but the increased risk of from surface water flooding elsewhere will generally be small, except at the western extent of the site where the flood risk may be increased.

Planning Recommendations

Spatial Planning and Development Control

Development of the site should be undertaken in accordance with the principles as set out within Section 1 of this report and Section 7 of the Level 1 SFRA. It is understood that the proposed development within the Thames Road strategic development site comprises residential development of c. 2,000 homes.

The entirety of this development site is located within the high probability Flood Zone 3a. Residential development may be acceptable in the high risk Flood Zone 3a following the successful application of the Exception Test. It will be necessary to demonstrate that the suitability of all other sites at lower flood risk has been considered and, if so, that the location of development in Flood Zone 3a provides wider sustainability benefits to the community that outweigh flood risk. This may include the redevelopment of derelict sites, wider benefits to the local economy and the need to meet demanding housing needs.

Development in Flood Zone 3

A site-specific flood risk assessment is required to support any planning application in the Thames Road strategic development site. The site-specific flood risk assessment should be undertaken in accordance with Section 7.5 of the Level 1 SFRA.

The assessment of flood risk in areas that benefit from flood defences should include an assessment of risk following a breach in the flood defences, as informed by breach analysis completed by the Environment Agency.

It is recommended that floor levels within new development are situated a minimum of 0.3m above the predicted 1 in 100 (1%) annual probability design flood level for fluvial flooding scenarios, including an allowance for climate change effects. Within tidal areas, this should be taken as the 1 in 200 (0.5%) annual probability design flood level, including an allowance for climate change effects, calculated assuming a breach of the raised flood defences.

All development within the Thames Road strategic development site may be at risk from sudden inundation following a breach of the flood defences, with an associated 'very high' flood hazard due to the predicted depth and velocity of flood waters in some areas. If it is not possible to locate the ground floor level of the development above the predicted 1 in 100 (1%) annual probability fluvial flood level or 1 in 200 (0.5%) annual probability tidal flood level, it is recommended that the developer strives to reduce the rate of inundation (i.e. through raising ground levels as high as practicable) to 10 hours or greater to provide sufficient time to facilitate evacuation of the site.

Dry access should be provided above the 1 in 100 (1%) annual probability fluvial flood level or 1 in 200 (0.5%) annual probability tidal flood level, calculated assuming a breach of the raised flood defences in those areas benefitting from flood defences. Where this is not possible, safe access with 'very low' flood hazard should be demonstrated. Only where neither of these is feasible, a dedicated 'safe haven' should be provided. This may be provided in the form of a sheltered communal space within the building, accessed via internal stairs. It will be necessary to ensure that the safe haven is sufficient in size to safely house all residents/users of the building.

Development proposed within the Thames Road strategic development site, including that within areas identified to benefit from flood defences, should be supported by a flood evacuation plan and/or emergency response plan prepared in consultation with the local emergency planning department and emergency services.

Basements in the defended Flood Zone 3a where the rate of inundation is less than 5 hours are not considered appropriate. This is applicable to all of this strategic development area.

Sustainable Drainage Systems

SUDS techniques as discussed in Section 7.7 of the Level 1 SFRA should be promoted wherever possible. The site should seek opportunities to integrate SUDS within the design of the site and provide an exemplar of best practice techniques including good use of green space to accommodate a variety of SUDS features in order to control and treat runoff from the site.

The development of the Thames Road strategic development site is likely to be completed in phases as plots of land are made available for development. The type of drainage system(s) adopted at the site may be constrained by the size of the development sites brought forward at different times, the contamination risks posed by the site's current and historic industrial heritage, and possible high ground water levels due to the site's proximity to the River Thames and low elevation. However it is deemed likely that given the size of the development site there will be opportunities to provide a system that demonstrates exemplar SUDS within the larger development sites and/or that serves multiple smaller developments within the site by implementing an overall drainage strategy.

As this site is previously developed it should strive to achieve betterment over existing discharge rates. Minimum betterment of 20% is considered appropriate whilst also taking the potential effects of climate change into consideration, with developers striving to achieve pre-developed greenfield rates as far as practicable. A higher discharge rate may be acceptable where the outfall is directly into the tidal Barking Creek, although the effects of tide locking must be considered up to the 1 in 100 annual probability event.

Barking & Dagenham Borough Boundary

Key regeneration Sites

Main Rivers

Flood Zone 3b (defended)

Flood Zone 3a (undefended)

Flood Zone 2 (undefended)

0 0.125 0.25 0.5

Kilometres

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BS2 0HQ

Tel: 44-(0)117-9306200

Client:

London Borough of Barking & Dagenham

Site/Project:

STRATEGIC FLOOD RISK ASSESSMENT (SFRA) LEVEL 2

Title:

FLUVIAL AND TIDAL FLOOD RISK (ZONE 3a, 3b & 2)
THAMES ROAD

Drawn: JSdS		Checked: CS	
Designed: DF		Approved: JG	
Date: 13/08/2015	Scale: As Shown A3	Sheet:	
Project Number:		Drawing Number:	Revision:
3514006A-SSR		FIGURE F1	

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Login: desouzaj

Plot Date: 13/08/2015

Barking & Dagenham Borough Boundary

Key regeneration Sites

Main Rivers

Flood Zone 3b (defended)

Flood Zone 3a (undefended)

Flood Zone 2 (undefended)

0 0.125 0.25 0.5

Kilometres

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Client: London Borough of Barking & Dagenham

Site/Project: STRATEGIC FLOOD RISK ASSESSMENT (SFRA) LEVEL 2

Title: FLUVIAL FLOOD RISK (ZONES 3a, 3b & 2) THAMES ROAD

Drawn:	JSdS	Checked:	CS
Designed:	DF	Approved:	JG
Date:	03/03/2017	Scale: As Shown A3	Sheet:

Project Number:	Drawing Number:	Revision:
3514006A-SSR	FIGURE F2A	

File Name:: \\uk.wspgroup.com\central data\Projects\62103xxx\62103473 - Barking and Dagenham SFRAE Models and Drawings\GIS\Mxd\Level 2\3514006A-SSR-Fluvial Flood Risk-F2A.mxd
Login: UKSLF003
Plot Date: 03/03/2017

Barking & Dagenham Borough Boundary

Key regeneration Sites

Main Rivers

Flood Zone 3b (defended)

1 in 100 year plus 25% Climate Change (undefended)

1 in 100 year plus 35% Climate Change (undefended)

1 in 100 year plus 70% Climate Change (undefended)

Flood Zone 2 (undefended)

0 0.125 0.25 0.5

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Client: London Borough of Barking & Dagenham

Site/Project:
STRATEGIC FLOOD RISK ASSESSMENT (SFRA) LEVEL 2

Title:
MAYES BROOK FLUVIAL FLOOD RISK WITH 25%, 35% AND 70% CLIMATE CHANGE THAMES ROAD

Drawn: SF		Checked: PH	
Designed: DF		Approved: JG	
Date: 03/03/2017	Scale: As Shown	A3	Sheet:
Project Number:		Drawing Number:	Revision:
3514006A-SSR		FIGURE F2B	

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Login: UKSLF003
Plot Date: 03/03/2017

Barking & Dagenham Borough Boundary

Key regeneration Sites

Main Rivers

Surface water flood hazard

Very Low - Caution

Moderate - Danger for some

Significant - Danger for most

Very High - Danger for all

Mast
Drain
Depot
Travelling Cranes
Depot
3m
Depot
Travelling Cranes
Rippleside Commercial Estate
Subway
FB
ALFRED'S WAY (EAST HAM AND BARKING BY-PASS)
Drain
CLARKSON ROAD
MAYDAY ROAD
IVANHOE ROAD
ROX LANE
ROYCRAFT AVENUE
PW
2m
FARR AVENUE
RAY GDNS
HOLBROOK WAY
ELMER CRESCENT
CROUCH AVENUE
STERN CLOSE
WAVERLEY GARDENS
WESTMINSTER GARDENS
CRAVEN GARDENS
Path
Hall
School
School
Playing Field
STANLEY AVENUE
CURZON CRESCENT
ALBERMAN AVENUE
BLESSING WAY
RENWICK ROAD
WANDERER DRIVE
Depot
SI
Wharf
Mud
Warehouse
Wks
Business Centre
Warehouse
ESTUARY CLOSE
Works
HAMES
Works
Factory
Drain
City Farm and Ecological Park
Depots
Long Reach Wharf
Wks
Mud
Warehouses
FB
Drain
SEAGULL CLOSE
GALLEONS DRIVE
ATLANTIS CLOSE
MARINE DRIVE
Works
Depots
Factory
Allotment Gardens
LONG REACH ROAD
Wharves
MHW
Drain
Drain
Drain
Drain
Drain
Power Station (disused)
Track
Track
Sewage Works
Boro Const & LB Bdy
Barking Creek
Trafalgar Business Centre
Creekmouth
Timber Yard
Timber Yards

0 0.125 0.25 0.5
Kilometres

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Client: London Borough of Barking & Dagenham

Site/Project:
STRATEGIC FLOOD RISK ASSESSMENT (SFRA) LEVEL 2

Title:
SURFACE WATER FLOODHAZARD (1 IN 100 YEAR)
THAMES ROAD

Drawn: JSdS		Checked: CS	
Designed: DF		Approved: JG	
Date: 13/08/2015	Scale: As Shown	A3	Sheet:
Project Number: 3514006A-SSR		Drawing Number: FIGURE F3	Revision:

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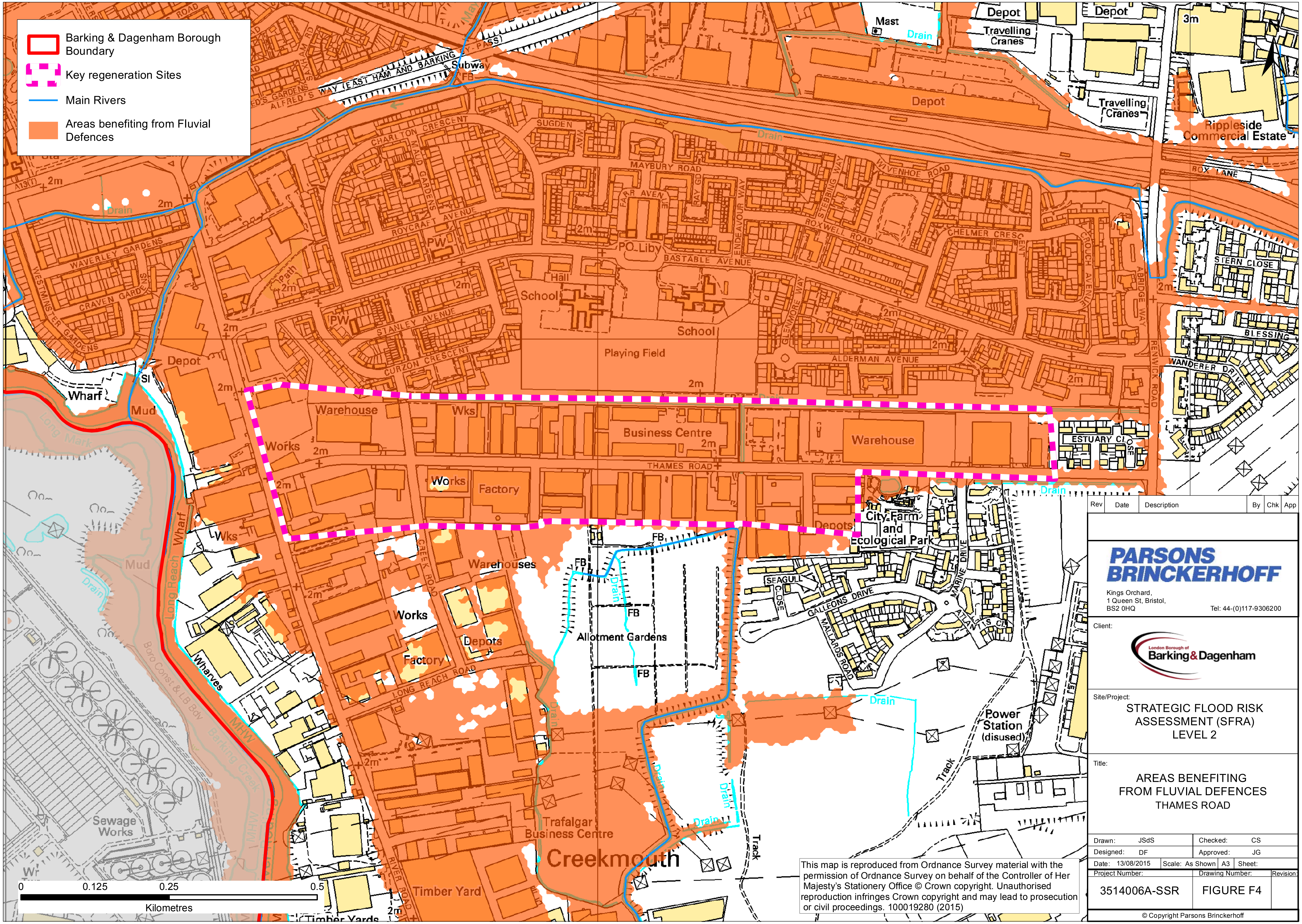
Login: desouzaj
Plot Date: 13/08/2015



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Client:

London Borough of Barking & Dagenham

Site/Project:

STRATEGIC FLOOD RISK ASSESSMENT (SFRA) LEVEL 2

Title:

AREAS BENEFITING FROM FLUVIAL DEFENCES THAMES ROAD

Drawn: JSdS		Checked: CS	
Designed: DF		Approved: JG	
Date: 13/08/2015	Scale: As Shown	A3	Sheet:
Project Number: 3514006A-SSR		Drawing Number: FIGURE F4	Revision:

File Name:: N:\Water Engineering\3514006A - LBBD SFRA_WORKING FOLDER\GIS\Mxd\Phase II\3514006A-SSR-Fluvial_defences.mxd
Plot Date: 13/08/2015
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Barking & Dagenham Borough Boundary

Key regeneration Sites

Main Rivers

Areas benefiting from Fluvial & Tidal Defences

0 0.125 0.25 0.5

Kilometres

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Client: London Borough of Barking & Dagenham

Site/Project:

STRATEGIC FLOOD RISK ASSESSMENT (SFRA) LEVEL 2

Title:

AREAS BENEFITING FROM FLUVIAL & TIDAL DEFENCES
THAMES ROAD

Drawn: JSdS		Checked: CS	
Designed: DF		Approved: JG	
Date: 13/08/2015	Scale: As Shown	A3	Sheet:
Project Number:		Drawing Number:	Revision:
3514006A-SSR		FIGURE F5	

File Name: N:\Water Engineering\3514006A - LBBD SFRA_WORKING FOLDER\Y GIS\MxdPhase II\3514006A-SSR-Fluvial_Tidal_defences.mxd

Login: desouzaj

Plot Date: 13/08/2015

Barking & Dagenham Borough Boundary

Key regeneration Site

Breach location

Main Rivers

Flood Hazard Rating

Very Low - Caution

Moderate - Danger for some

High - Danger for most

Very High - Danger for all

N

0 0.125 0.25 0.5

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Site/Project:
STRATEGIC FLOOD RISK ASSESSMENT (SFRA) LEVEL 2

Title:
FLUVIAL AND TIDAL BREACH FLOOD HAZARD BREACH 1 IN 200 YEAR (2005) THAMES ROAD

Drawn: JSdS		Checked: CS	
Designed: DF		Approved: JG	
Date: 05/05/2016	Scale: As Shown	A3	Sheet:
Project Number: 3514006A-SSR		Drawing Number: FIGURE F6	Revision:

File Name:: N:\Water Engineering\3514006A - LBBD SFRA_WORKING FOLDER\Y GIS\Mxd\April 2016\3514006A-SSR-Phase_II_Flood_Hazard_2005.mxd

Login: DeSouzaJ

Plot Date: 07/06/2016

Barking & Dagenham Borough Boundary

Key regeneration Sites

Breach location

Main Rivers

Flood Hazard Rating

Very Low - Caution

Moderate - Danger for some

High - Danger for most

Very High - Danger for all

N

Climate change data for breaches 4 - 7 is not available and therefore the data from present day simulations has been used in the production of this map.

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Site/Project:

STRATEGIC FLOOD RISK ASSESSMENT (SFRA) LEVEL 2

Title:

FLUVIAL AND TIDAL BREACH
FLOOD HAZARD BREACH
1 IN 200 YEAR (2100)
THAMES ROAD

Drawn:	JSdS	Checked:	CS
Designed:	DF	Approved:	JG
Date:	05/05/2016	Scale: As Shown A3	Sheet:

Project Number:	Drawing Number:	Revision:
3514006A-SSR	FIGURE F7	

0 0.125 0.25 0.5

Kilometres

File Name:: N:\Water Engineering\3514006A - LBBD SFRA_WORKING FOLDER\Y GIS\Mxd\April 2016\3514006A-SSR-Phase_II_Flood_Hazard_2100.mxd

Login: DeSouzaJ

Plot Date: 07/06/2016

Barking & Dagenham Borough Boundary

Key regeneration Sites

Breach Location

Main Rivers

Rate of Inundation

0 to 5 hours

5 to 10 hours

10 to 15 hours

15 to 20 hours

N

0 0.125 0.25 0.5

Kilometres

Inundation data for breaches 4 and 6 is not available. Please refer to Flood Hazard Breach Mapping to review predicted extent.

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London Borough of Barking & Dagenham

Site/Project:

STRATEGIC FLOOD RISK ASSESSMENT (SFRA) LEVEL 2

Title:

FLUVIAL AND TIDAL
RATE OF INUNDATION BREACH
1 IN 200 YEAR (2005)
THAMES ROAD

Drawn: JSdS		Checked: CS	
Designed: DF		Approved: JG	
Date: 07/06/2016	Scale: As Shown	A3	Sheet:
Project Number: 3514006A-SSR		Drawing Number: FIGURE F8	Revision:

File Name:: N:\Water Engineering\3514006A - LBBD SFRA_WORKING FOLDER\Y GIS\Mxd\April 2016\3514006A-SSR-Phase_II_Rate_of_Inundation_2005.mxd

Login: DeSouzaJ

Plot Date: 07/06/2016

Barking & Dagenham Borough Boundary

Key regeneration Sites

Breach Location

Main Rivers

Rate of Inundation

0 to 5 hours

5 to 10 hours

10 to 15 hours

15 to 20 hours

N

Inundation data for breaches 4 and 6 is not available. Please refer to Flood Hazard Breach Mapping to review predicted extent Climate change data for breaches 5 - 7 is not available and therefore the data from present day simulations has been used in the production of this map.

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London Borough of Barking & Dagenham

Site/Project:

STRATEGIC FLOOD RISK ASSESSMENT (SFRA) LEVEL 2

Title:

FLUVIAL AND TIDAL
RATE OF INUNDATION BREACH
1 IN 200 YEAR (2100)
THAMES ROAD

Drawn:	JSdS	Checked:	CS
Designed:	DF	Approved:	JG
Date:	07/06/2016	Scale: As Shown A3	Sheet:
Project Number:		Drawing Number:	Revision:
3514006A-SSR		FIGURE F9	

0 0.125 0.25 0.5

Kilometres

File Name:: N:\Water Engineering\3514006A - LBBD SFRA_WORKING FOLDER\Y GIS\Mxd\April 2016\3514006A-SSR-Phase_II_Rate_of_Inundation_2100.mxd
Login: DeSouzaJ
Plot Date: 07/06/2016

Barking & Dagenham Borough Boundary

Key regeneration Sites

Main Rivers

Fluvial and Tidal Flood Warning Areas

0 0.125 0.25 0.5

Kilometres

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Client: London Borough of Barking & Dagenham

Site/Project:

STRATEGIC FLOOD RISK ASSESSMENT (SFRA) LEVEL 2

Title:

FLOOD WARNING AREAS (FLUVIAL AND TIDAL)
THAMES ROAD

Drawn: JSdS		Checked: CS	
Designed: DF		Approved: JG	
Date: 13/08/2015	Scale: As Shown	A3	Sheet:
Project Number:		Drawing Number:	Revision:
3514006A-SSR		FIGURE F10	

File Name: N:\Water Engineering\3514006A - LBBD SFRA_WORKING FOLDER\Y GIS\Mxd\Phase II\3514006A-SSR-Flood Warning Areas (F&T).mxd

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Plot Date: 13/08/2015