

LONDON BOROUGH OF BARKING AND DAGENHAM STRATEGIC FLOOD RISK ASSESSMENT

LEVEL 2

August 2017



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LONDON BOROUGH OF BARKING AND DAGENHAM STRATEGIC FLOOD RISK ASSESSMENT (SFRA) LEVEL 2

London Borough of Barking and Dagenham

Job Number 3514006A

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GLOSSARY

CFMP	Catchment Flood Management Plans. A CFMP is a high level strategic planning tool which explores and defines long-term sustainable policies for flood risk management.
Core Strategy	The Core Strategy is the primary document in the Barking and Dagenham Local Plan and sets out the Councils long-term vision, spatial strategy and core policies for shaping the future development of Barking and Dagenham up to 2025.
Critical Drainage Area (CDA)	A discrete geographical area (usually a hydrological catchment) where multiple and interlinked sources of flood risk (surface water, groundwater, sewer, main river and/or tidal) cause flooding during severe weather thereby affecting people, property or local infrastructure.
DCLG	Department for Communities and Local Government
De facto Flood Defence	A structure that provides a flood defence function, however has not been built and/or maintained for this purpose (e.g. boundary wall).
Defra	Defra (Department for Environment, Food and Rural Affairs) is a UK Government Department. The overarching challenge for Defra is to enable everyone to live within our environmental means by tackling climate change internationally and through domestic action to reduce greenhouse gas emissions, and to secure a healthy, resilient, productive and diverse natural environment.
Development	The carrying out of building, engineering, mining or other operations, in, on, over or under land, or the making of any material change in the use of a building or other land.
Development Plan Document (DPD)	DPD's are a series of documents that form the Local Plan for Barking and Dagenham. They set out the planning policies of the Borough and are subject to independent examination.
DG5 Register	A water-company held register of properties which have experienced sewer flooding due to hydraulic overload, or properties which are 'at risk' of sewer flooding more frequently than once in 20 years.
Drain London	Forum founded in 2007 to assess flood risks associated predominantly with surface water flooding across all London Boroughs.
DTM	Digital Terrain Modelling. DTMs are topographic models of the bare earth that can be manipulated by computer programs. DTM files contain elevation data of terrain in a digital format that relates to a rectangular grid. Vegetation, buildings and other cultural features are removed digitally - leaving just the underlying terrain.
Flood and Water Management Act 2010	Part of the UK Government response to Sir Michael Pitt's report on the Summer 2007 floods, the aim of which is to clarify the legislative framework and responsibilities for managing flood risk in England.
Flood Risk Regulations 2009	Transposition of the EU Floods Directive into UK law. The EU Floods Directive is a piece of European Community (EC) legislation to specifically address flood risk by prescribing a common framework for its measurement and management.

Flood Map for Planning Rivers and Sea) Flood Zone Map	Defines flood zones based on annual probability of flooding from fluvial and tidal sources to inform development planning and flood risk assessment. Nationally consistent delineation of 'high', 'medium' and 'low' flood risk updated by the Environment Agency as deemed appropriate, typically on a quarterly basis.
Flood Zone 1 Low Probability	This zone comprises land assessed as having less than a 1 in 1000 (0.1%) annual probability of flooding from rivers or the sea in any year.
Flood Zone 2 Medium Probability	This zone comprises land assessed as having between a 1 in 100 (1%) and 1 in 1000 (0.1%) annual probability of flooding from rivers, or between a 1 in 200 (0.5%) and 1 in 1000 (0.1%) annual probability of flooding from the sea in any year.
Flood Zone 3a High Probability	This zone comprises land assessed as having a 1 in 100 (1%) or greater annual probability of flooding from rivers or a 1 in 200 (0.5%) or greater annual probability of flooding from the sea in any year.
Flood Zone 3b Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. SFRAs should identify this flood zone as land that would typically flood with an annual probability of 1 in 20 (5%) or greater in any year, or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the local planning authority and the Environment Agency, including water conveyance routes.
Fluvial	Of, relating to, or inhabiting a river or stream.
Formal Flood Defence	A structure built and maintained specifically for flood defence purposes
Greater London Authority (GLA)	A strategic citywide government for London consisting of a directly elected Mayor and a separately elected Assembly. It has strategic regional authority, with powers over transport, policing, economic development and fire and emergency planning.
Greenfield Land	Undeveloped land in an urban or rural area either used for agriculture, landscape design, or left to evolve naturally.
Habitable Room	A room used as living accommodation within a dwelling but excludes bathrooms, toilets, halls, landings or rooms that are only capable of being used for storage. All other rooms, such as kitchens, living rooms, bedrooms, utility rooms and studies are counted.
LDS	Local Development Scheme. The Local Development Scheme is a public statement of the Council's programme for the preparation of Local Development Documents that will form the Local Development Framework (LDF).
Lead Local Flood Authority (LLFA)	Local Authority responsible for taking the lead on local flood risk management as defined within the Flood and Water Management Act.
Local Development Framework (LDF)	Consists of a number of documents which together form the spatial strategy for development and the use of land.
Local Flood Risk Management Strategy	Document that sets out the way in which the LLFA will manage the local flood risks for the whole of their administrative area to meet the requirements of the Flood and Water Management Act.

Local Flood Risk Zone (LFRZ)	Term used in Barking and Dagenham Surface Water Management Plan to refer to flooding 'hot spots' that were identified within the Borough.
London Plan	The overall strategic plan for London. It sets out a fully integrated economic, environmental, transport and social framework for the development of London to 2036. It forms part of the Development Plan for Greater London.
LiDAR	Light Detection and Ranging. LiDAR is a technology that employs an airborne scanning laser rangefinder to produce detailed and accurate topographic surveys. LiDAR can be used to accurately measure the topography of the ground, even where overlying vegetation is quite dense.
Main River	Main rivers are usually larger streams and rivers, but also include smaller watercourses of strategic drainage importance. A main river is defined as a watercourse shown as such on the Flood Map for Planning (Rivers and Sea), and can include any structure or appliance for controlling or regulating the flow of water in, into or out of a main river. Main rivers are under the jurisdiction of the Environment Agency who have powers to carry out flood defence works to main rivers.
National Flood and Coastal Erosion Risk Management Strategy for England	This strategy outlines a national framework for managing the risk of flooding and coastal erosion. It aims to help risk management authorities and communities understand their roles and responsibilities and is particularly relevant to Lead Local Flood Authorities.
NPPF	National Planning Policy Framework. NPPF, published in March 2012 and supported by the on-line resource, Planning Practice Guidance 'Flood Risk and Coastal Change', that replaces previous guidance PPS25 Development and Flood Risk and provides the framework by which local authorities in England inform local planning policy and take decisions regarding planning and development within their administrative boundaries.
Ordinary Watercourse	An ordinary watercourse is every river, stream, ditch, drain, cut, dyke, sluice, sewer (other than a public sewer) and passage through which water flows that does not form part of a main river. The Lead Local Flood Authority, or Internal Drainage Board where relevant, has powers for ordinary watercourses that are similar to those held by the Environment Agency for main rivers.
OD (Ordnance Datum)	Ordnance Datum, or OD, is a vertical datum used by Ordnance Survey as the basis for deriving altitudes on maps. In Great Britain, the datum point against which all heights and altitudes are referenced is the mean sea level (MSL) at Newlyn, Cornwall, between 1915 and 1921.
One Dimensional River Model	A One Dimensional river model presumes that a river flows in a single plane, i.e. in a straight line. This is a simplistic approach to river modelling, but in most rural areas, one-dimensional models give good results.
Perched Groundwater Table	A perched water table is where groundwater 'sits on top' of an impermeable layer, normally as a result of rainfall directly onto a location.
Pluvial (flooding)	In hydrology, pluvial refers to any water that is brought about by precipitation. Pluvial flooding is usually associated with high intensity rainfall events (typically >30mm/h) but can also occur with lower intensity rainfall or melting snow where the ground is saturated, frozen, developed or otherwise has low permeability resulting in surface water flow and ponding in depressions in the topography.

Preliminary Flood Risk Assessment (PFRA)	A high level screening exercise to identify areas of significant flood risk and summarise the probability of harmful consequences of past (historical) and future (potential) flooding.
Previously Developed (Brownfield) Land	Land that is or was occupied by a building (excluding those used for agriculture and forestry). It also includes land within the curtilage of the building, for example, a house and its garden would be considered to be previously developed land.
Residual Risk	The risks remaining after applying the sequential approach and taking mitigating actions are known as the residual risks.
Risk of Flooding from Reservoirs Map	This map shows the area that could be flooded if a large reservoir were to fail and release the water it holds. A large reservoir is defined as one that holds over 25,000 m ³ of water.
Risk of Flooding from Surface Water Map	Defines areas at risk of flooding from surface water. The map defines areas based on the probability of a flood occurring in any given year and is based on the Environment Agency 'updated Flood Map for Surface Water' (uFMfSW) dataset.
SEA	Strategic Environmental Assessment. An SEA analyses the environmental effects of development policies, plans, programmes and other proposed strategic actions.
SUDS	Sustainable Drainage Systems. SUDS use techniques to control surface water runoff as close to its origin as possible, before it enters a watercourse or sewerage system. This involves moving away from traditional piped drainage systems to solutions that mimic natural drainage processes i.e. permeable and porous pavements.
Sustainable Drainage Systems – Non-statutory Technical Standards for Sustainable Drainage Systems	The non-statutory technical standards for sustainable drainage systems, published by Defra in March 2015, sets out the technical standards to which sustainable drainage systems should be designed and constructed. They should be used in conjunction with NPPF.
SoP	Standard of Protection. The SoP that a flood defence offers is expressed in terms of the likelihood of a particular flood event (or level) being equalled or exceeded in any given year. Therefore, if a flood defence offers a SoP of 1 in 50, it will take a 1 in 50 (or greater) flood event to overtop it.
Supplementary Planning Document (SPD)	Provides supplementary guidance to policies and proposals contained within Development Plan Documents. They do not form part of the development plan, nor are they subject to independent examination.
Surface Water Management Plan (SWMP)	A plan that assesses the risk of flooding from surface water flooding and outlines the preferred surface water management strategy in a given location. In this context surface water flooding describes flooding from sewers, drains, groundwater, and runoff from land, small watercourses and ditches that occurs as a result of heavy rainfall.

TE2100 Project	The Thames Estuary 2100 (TE2100) Project, led by the Environment Agency, was formed to develop a comprehensive action plan to manage flood risk for the Tidal Thames.
Threshold	The lowest point of the door entrance to the house.
Two Dimensional River Model	When studying urban and some particularly flat rural areas one-dimensional models may not prove accurate. They lack the ability to model flood patterns and the fact that flooding reacts in different ways to common features of the urban landscape. In such cases, a two-dimensional mathematical model should be used, which is capable of analysing flood patterns in more than one plane.
uFMfSW	The updated Flood Map for Surface Water is the third national surface water map produced Environment Agency. The uFMfSW assesses flooding due to rainfall for the 1 in 30 (3.33%), 1 in 100 (1%) and 1 in 1000 (0.1%) annual probability events and provides information relating to the likely flood extent, depth, velocity and hazard.
UKCIP	United Kingdom Climate Impacts Programme. UKCIP assists organisations, sectors and governments adapt to the changing climate through practice-based research, and by providing support and advice. UKCIP's work falls into three main categories: decision-making for adaptation; exchanging knowledge and ideas and creative adaptation.
Water Framework Directive	Introduces a holistic approach to the management of water quality and establishes a system for the protection and improvement of all aspects of the water environment including rivers, lakes, estuaries, coastal waters and groundwater.

EXECUTIVE SUMMARY

This SFRA has been commissioned by the London Borough of Barking and Dagenham to update the Level 2 SFRA published in 2008. Since 2008 new flood risk mapping information has been published by the Environment Agency and there have been significant changes to planning policies and guidance relevant to the management of flood risk, principally the NPPF and the supporting Planning Practice Guidance. This report builds on the information gathered for the Level 1 SFRA and provides a detailed assessment of the flood risk at the 13 strategic development sites identified by the Council which form part of the updated Barking and Dagenham Local Plan, which will set out the future planning of the Borough up to 2033.

The Level 2 SFRA provides advice on appropriate development control measures for each strategic development site which could satisfy the first part of the Exception Test, and on the requirements that would be necessary for a site-specific flood risk assessment to support a planning application to satisfy the second part of the Exception Test.

The Level 2 SFRA has been developed in accordance with the NPPF and in consultation with both the Council and the Environment Agency. It assesses the risk of flooding from all sources, now and in the future, taking account of the impacts of climate change. Specifically the SFRA will be used to:

- Determine the variations in risk from all sources of flooding at each of the development sites;
- Provide guidance on the application of the Sequential Test and, where necessary, the Exception Test when determining land use allocations;
- Identify the requirements for site-specific flood risk assessments in particular locations, including those at risk from sources other than river and sea flooding;
- Set out the recommended approach to the management of flood risk at each development site that can be applied through the design and planning;
- Consider opportunities to reduce flood risk to existing communities and developments.

For each development site an individual assessment has been produced including site specific flood risk maps. For ease of use these assessments are provided in the report appendices.

It is considered that there are feasible mitigation solutions available for all proposed strategic development sites within the London Borough of Barking and Dagenham, ensuring the sustainability and safety of the areas (and surrounding land) from a flooding perspective. It is important that the development control process emphasises the critical importance of flood risk, influencing the design process accordingly.

It should be acknowledged that some strategic development sites that fall within defended areas of the London Borough of Barking and Dagenham can still be exposed to a considerable residual risk of flooding, whereby the flood defences could be subject to breach, blockage or overtopping. This fact should always be considered when making planning decisions and be reflected in the allocation, layout and management of development. This conservative approach raises the awareness of flood risk in defended areas and helps to ensure that it is not discounted as part of development but is managed appropriately.

SECTION 1

INTRODUCTION

1 INTRODUCTION

1.1 Overview

1.1.1 Parsons Brinckerhoff was appointed by the London Borough of Barking and Dagenham to prepare a Level 2 Strategic Flood Risk Assessment (SFRA). The Level 2 SFRA has been completed in accordance with the National Planning Policy Framework (NPPF) and the supporting Planning Practice Guidance and provides a detailed assessment of the flood risk at the strategic development sites identified by the Council.

1.1.2 The Level 2 SFRA provides a more detailed assessment of the flood risk, principally for where it is not possible to allocate all proposed development and infrastructure in accordance with the Sequential Test described in the NPPF. In these cases the Level 2 SFRA applies the Exception Test in accordance with the NPPF.

1.1.3 The strategic development sites identified by the Council within Barking and Dagenham are:

- Barking Town Centre;
- Barking Riverside;
- Creekmouth;
- Thames Road;
- Dagenham Dock;
- Ford Stamping Plant (including Chequers Corner) and Beam Park;
- Chadwell Heath Local Significant Industrial Site (Freshwater Road);
- Wantz Industrial Estate Local Significant Industrial Site;
- Dagenham East;
- Rippleside Commercial Area;
- Dagenham Leisure Park;
- Barking and Dagenham College;
- Marks Gate including Green Belt to north of Billet Lane and to east of Whalebone Lane North.

1.1.4 The location of the strategic development sites can be seen in Appendix A.

1.1.5 The Barking and Dagenham Level 1 SFRA was updated in August 2017 and assesses the risk of flooding throughout Barking and Dagenham from all sources, now and in the future, taking account of climate change. The Level 1 SFRA provides the basis for the application of the Sequential Test and, where required, the Exception Test.

1.2 The Sequential and Exceptions Tests

1.2.1 The risk of flooding is most effectively addressed through avoidance, which in very simple terms equates to guiding future development (and regeneration) away from areas at risk.

1.2.2 The aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding. In summary, development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in

areas with a lower probability of flooding. Development should be steered to Flood Zone 1 in the first instance, and only if there are no reasonably available sites located in Flood Zone 1 should sites be considered in Flood Zones 2 and 3.

1.2.3

The process for applying the Sequential Test to inform the preparation of the Local Plan is illustrated in Figure 1.1, recreated from the NPPF Planning Practice Guidance.

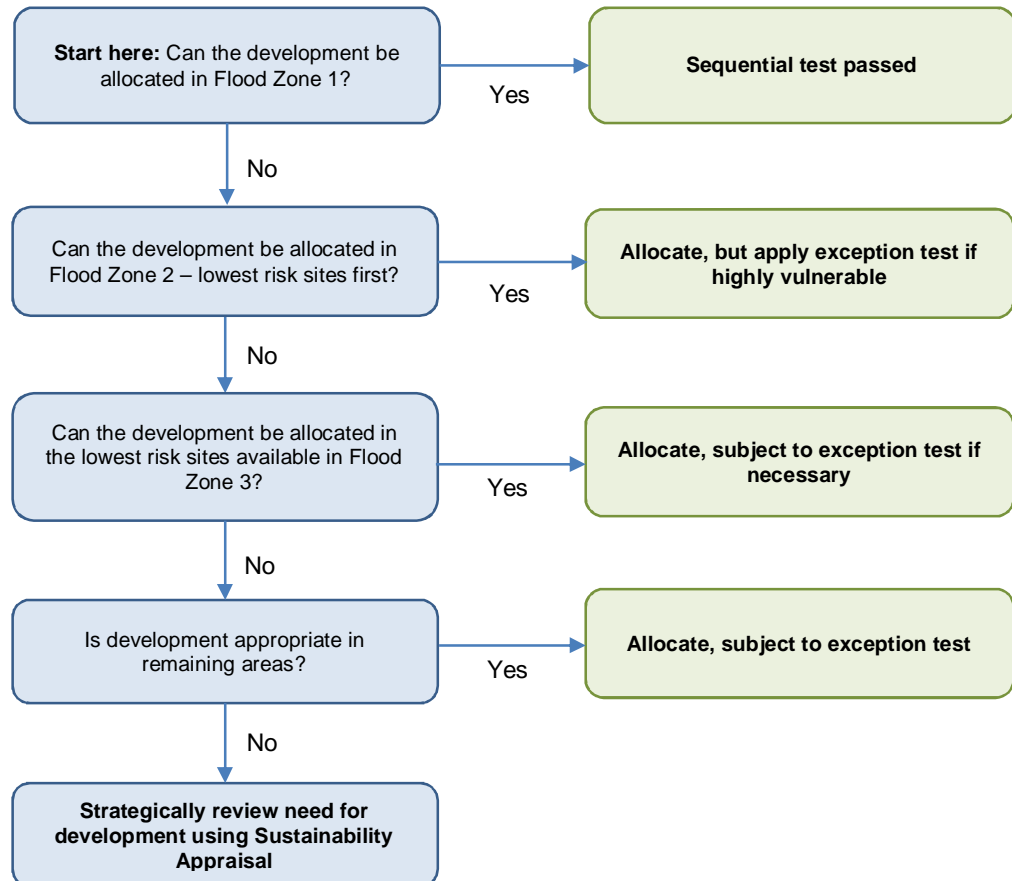


Figure 1.1 Application of the Sequential Test for Local Plan preparation

1.2.4

If, following application of the Sequential Test, it is not possible for the development to be located in zones with a lower probability of flooding, the Exception Test can be applied if appropriate. Table 3 of the Planning Practice Guidance to NPPF provides recommendations on the compatibility of different types of development based on their vulnerability classification within each of the mapped fluvial and tidal Flood Zones and summarises where the Exception Test will be required, as shown in Table 1.1.

Table 1.1 Flood risk vulnerability and flood zone compatibility

EA Flood Zone	Essential Infrastructure	Water Compatible	Highly Vulnerable	More vulnerable	Less vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception test required	✓	✓
Zone 3a	Exception test required	✓	✗	Exception test required	✓
Zone 3b	Exception test required	✓	✗	✗	✗

✓ Development considered acceptable

✗ Development considered unacceptable

1.2.5 The majority of the development proposed within the strategic development sites comprises residential and industrial development. In accordance with Table 2 of the Planning Practice Guidance to NPPF, residential development would typically be classified as 'more vulnerable' development and industrial development would typically be classified as 'less vulnerable' development.

1.2.6 It is, however, important to note that even where development is considered acceptable, a sequential approach should also be used to locate the most vulnerable areas of a development to those areas of the site that are at least flood risk. Similarly, the redevelopment of previously developed sites should aim to relocate vulnerable development to areas at lesser flood risk, using the redevelopment of the site to reduce existing flood risk. Consideration should also be given to other local sources of flood risk including surface water, groundwater, surcharging of sewers, reservoirs and any other artificial sources.

1.2.7 For the Exception Test to be passed:

- It must be demonstrated that the development provides wider sustainability objectives to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and
- A site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

1.2.8 Figure 1.2, recreated from the NPPF Planning Practice Guidance, summarises the application of the Exception Test in the preparation of a Local Plan.

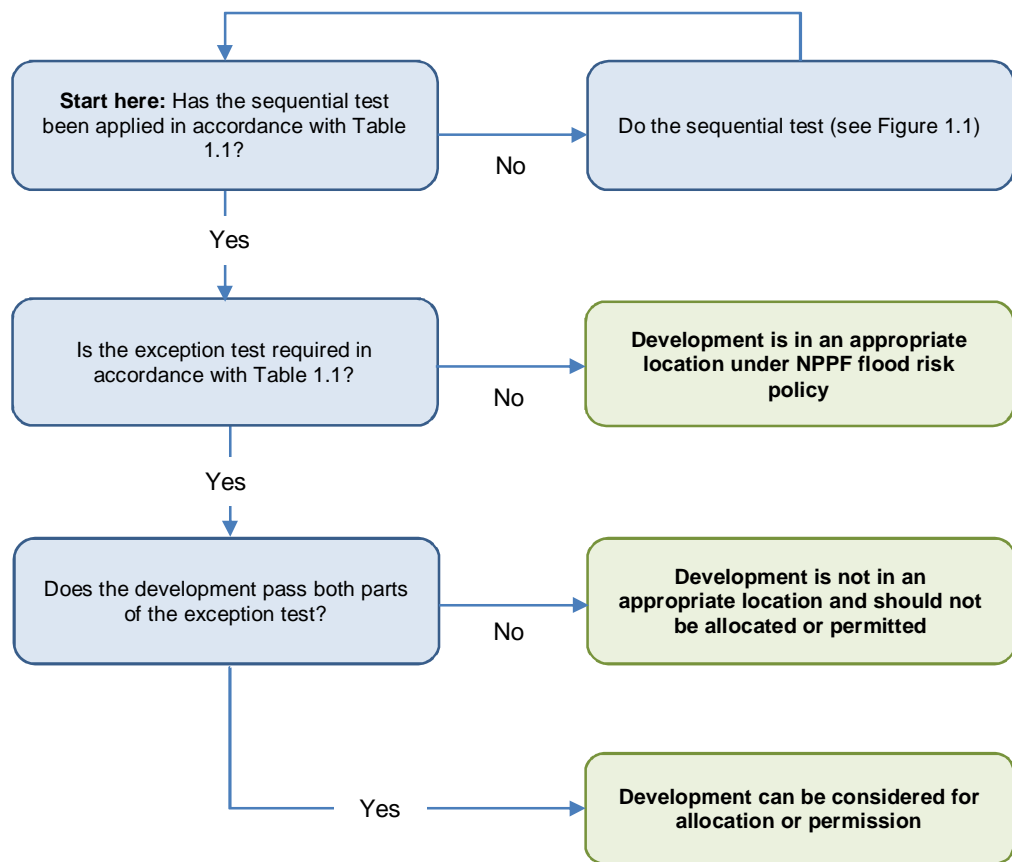


Figure 1.2 Application of the Exception Test for Local Plan preparation

1.2.9 A detailed explanation of spatial planning requirements as set out within NPPF and its supporting Planning Practice Guidance is provided within Section 7 of the Level 1 SFRA.

1.3 Matrix of Areas

1.3.1 The strategic development sites have been overlaid onto the adopted NPPF Flood Zones provided within the Level 1 SFRA. A matrix of areas is provided in Appendix B and summarises:

- The broad locality of each nominated area;
- The worst and predominant Flood Zone within which that area falls; and
- The restrictions that flood risk may place upon the future development of the area.

With respect to the latter, a 'traffic light' system has been adopted to mirror Table 3 of the NPPF Planning Practice Guidance, which identifies the compatibility between the vulnerability of development type and the fluvial / tidal Flood Zone. It should be noted that the Flood Zone identified in Appendix A and the corresponding 'traffic light' colours reflect the 'worst case' Flood Zone identified in the area and that this Flood

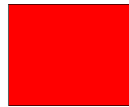
Zone may not necessarily cover the whole area. The table should be interpreted in accordance with the following legend:



Development type is permissible under NPPF. A site based Flood Risk Assessment (FRA) may be required, in accordance with Section 7.5 of the Level 1 SFRA



Development type is permissible under NPPF, only if Exception Test is passed. It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk. A site-specific FRA is required, in accordance with Section 7.5 of the Level 1 SFRA



Development type is not considered appropriate under NPPF

SECTION 2

LEVEL 2 SFRA APPROACH

2 LEVEL 2 SFRA APPROACH

2.1 The Need for the SFRA

2.1.1 The London Borough of Barking and Dagenham are required to prepare a Strategic Flood Risk Assessment in accordance with National Planning Policy Framework (NPPF) to support their Local Plan and inform development control within the Borough.

2.1.2 Barking and Dagenham are currently reviewing their Local Plan which will set out the future planning of the Borough up to 2033 responding to the opportunity that Barking and Dagenham has some of the most untapped potential for growth in London. The Local Plan will promote development at the strategic development sites discussed in Section 1.3, subject to review of constraints and opportunities, as well as set out objectives and policy requirements for all other development in the Borough including other windfall sites that may come forward.

2.1.3 The Level 2 SFRA builds on the information gathered for the Level 1 SFRA and provides a detailed assessment of the flood risk at the strategic development sites identified by the Council. The Level 2 SFRA provides advice on appropriate policies for each strategic development site which could satisfy the first part of the Exception Test, and on the requirements that would be necessary for a site-specific flood risk assessment supporting a planning application for a particular application to pass the second part of the Exception Test.

2.2 Approach to Completing the SFRA

2.2.1 This SFRA was completed via the key tasks as listed below:

- Review of changes in key national, regional and local planning policy and strategies that are relevant to the management of flood risk within Barking and Dagenham;
- Consultation with relevant authorities for the purpose of discussing current and future flood risk, obtaining relevant datasets, and understanding development control and flood management requirements;
- Review of available data sets to understand historic, current and future flood risks at each of the strategic development sites;
- Interpretation of available data to understand the risk of flooding to people and property for the purpose of informing development control;
- Recommendation of measures to ensure the sustainable management of flood risk at each of the strategic development sites.

2.2.2 A considerable amount of knowledge has been collated to inform the analysis (and delineation) of flood risk throughout the London Borough of Barking and Dagenham, including (but not limited to):

- Historical river flooding information;
- Information relating to localised flooding issues (surface water, groundwater and/or sewer related), collated in consultation with the Council, Environment Agency and Thames Water;
- Locality and condition of raised flood defences;
- Environment Agency Flood Maps;

- Detailed hydraulic modelling studies for the Lower Roding, Beam, Ingerbourne and Mayes Brook, and Thames Breach Modelling;
 - Surface Water Management Plan (SWMP);
 - Preliminary Flood Risk Assessment (PFRA); and
 - Topography (LiDAR).
- 2.2.3 A more detailed description of the sources of data used to inform the Level 1 and Level 2 SFRA is provided within Section 4 of the Level 1 SFRA. The same data sets have been used to inform the Level 2 SFRA.
- 2.2.4 The information provided within the SFRA is the best available at the time of writing. More up to date information may be available and contact should always be made with the Environment Agency and London Borough of Barking and Dagenham at an early stage of any development planning to ensure that the detailed site based flood risk assessment is using the most current datasets. It is the developer's responsibility to ensure that the most up to date datasets are being used to inform their proposed development.
- 2.2.5 Each of the strategic development sites is discussed within a site-specific appendix to this report to enable appendices to be updated independently if required.
- 2.2.6 The SFRA has been reviewed and approved by the Environment Agency as a statutory consultee under NPPF.
- 2.3 Impacts of Climate Change**
- 2.3.1 In February 2016 the Environment Agency published updated climate change advice to be taken into account in site-specific and strategic flood risk assessments¹. This provides recommended national precautionary sensitivity ranges for changes to peak rainfall intensities, river flows, sea level rise, offshore wind speed and extreme wave height resulting from climate change for the next 100 years.
- 2.3.2 A summary of the latest guidance is provided within Section 6.4 of the Level 1 SFRA and should be considered when reviewing the potential risk of flooding in future years within Barking and Dagenham. Reference should also be made to the www.gov.uk website¹.
- 2.3.3 The hydraulic models of the Mayes Brook, Gores Brook, Beam River and Wantz Stream have been updated to reflect the changes that these recommendations have on fluvial flood extents within Barking and Dagenham. The Environment Agency are due to update their hydraulic model of the Lower Roding and Loxford Water in December 2017 and, as such, updated modelling of these watercourses has not been undertaken at this time.
- 2.3.4 All new developments in Barking and Dagenham must consider the potential impacts of climate change on flood risk in accordance with the Environment Agency recommendations and over the lifetime of the development. For design purposes, it is recommended that for residential development a minimum of 100 years is considered, and that for commercial and industrial development a minimum of 60 years in considered.

¹ <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

- 2.3.5 Where no modelling data is available or manipulation of an existing model is not proportionate to the size and/or vulnerability of the development, a qualitative approach to the assessment of the potential impact of climate change may be adopted where appropriate. This should be agreed on a case-by-case basis with the Environment Agency and Council, but in the absence of an agreed approach, recommendations are provided within Section 5.5 of the Level 1 SFRA of how climate change could be considered. Section 5.5 of the Level 1 SFRA also provides a summary of how to consider climate change with regards to surface water flood risk.

SECTION 3

OUTCOMES

3 OUTCOMES

3.1 Summary

3.1.1 The Level 2 SFRA has considered the risk that flooding poses to property and life at each potential development area. The primary purpose of this assessment is to consider whether or not it is feasible to mitigate this risk in a safe and sustainable manner through design.

3.1.2 In summary, it is considered that there are feasible mitigation solutions available for all proposed strategic development sites within the London Borough of Barking and Dagenham, ensuring the sustainability and safety of the areas (and surrounding land) from a flooding perspective. It is important that the development control process emphasises the critical importance of flood risk, influencing the design process accordingly. A brief overview of the key requirements for future development is provided below:

- All sites must be subjected to the application of the **Sequential Test**. Consideration of future development within areas that are potentially at risk of flooding may only be done once this has been rigorously applied. This applies to the identification of development areas as part of the Core Strategy, each individual site (as part of the Site Allocations within the Local Development Framework) and on a case by case basis for windfall sites.
- Following the application of the Sequential Test, all sites within Flood Zones 2 and 3, and/or exceeding 1ha in area within Zone 1, and/or at risk of flooding from a non-fluvial source within Flood Zone 1, will require a **detailed Flood Risk Assessment** in accordance with Section 7.5 of the Level 1 SFRA.
- The **layout of buildings and access routes should adopt a sequential approach**, steering buildings (and hence people) towards areas of lowest risk within the boundaries of the site. This must also take into consideration flood risk from other sources of flooding such as surface water and groundwater. This will also help towards ensuring that the risk of flooding is not worsened by, for example, the potential impacts of climate change.
- A suite of **development control recommendations** have been set out for all NPPF Flood Zones within Section 7 of the Level 1 SFRA and these should be adhered to. These represent the minimum design standards that will be sought by both the Council and the Environment Agency at the planning application stage.

3.1.3 It should be acknowledged that some strategic development sites that fall within defended areas of the London Borough of Barking and Dagenham can still be exposed to a considerable residual risk of flooding, whereby the flood defences could be subject to breach, blockage or overtopping. This fact should always be considered when making planning decisions and be reflected in the allocation, layout and management of development. This conservative approach raises the awareness of flood risk in defended areas and helps to ensure that it is not discounted as part of development but is managed appropriately.

3.2 Mapped Output

3.2.1 A series of site specific maps have been produced to accompany the strategic site assessments that are provided within the report appendices. Table 3.1 provides a summary of the mapped outputs. For sites located fully within Flood Zone 1, and therefore deemed not to be at fluvial or tidal flood risk, the fluvial and tidal flood risk

maps and any associated maps (for example Areas Benefiting from Defences) have not been produced, however the drawing numbering system remains consistent for all sites assessed.

3.2.2

A discussion of the quality and interpretation of the data used to produce the maps is provided in the SFRA Level 1 report. As previously discussed, the maps have been produced from the best available information at time of writing. It is essential that prospective developers consider the most up to date flood risk information that is available at the time of preparing their development plans. It is the developer's responsibility to ensure that the most up to date datasets are being used.

Table 3.1 Summary of Level 2 SFRA Mapped Outputs

No.	Drawing Title	Comments
1	Fluvial and Tidal Flood Risk	Environment Agency Flood Zones relevant to NPPF. Maps not produced for sites located fully in Flood Zone 1.
2	Fluvial Flood Risk	Environment Agency Flood Zones relevant to NPPF. Mapping of climate change modelling completed for Mayes Brook and Beam River. Maps not produced for sites located fully in Flood Zone 1.
3	Surface Water Flood Hazard	Environment Agency Flood Risk from Surface Water - 1 in 100 (1%) annual probability rainfall event.
4	Areas Benefiting from Fluvial Defences	Maps not produced for sites located fully in Flood Zone 1.
5	Areas Benefiting from Fluvial and Tidal Defences	Maps not produced for sites located fully in Flood Zone 1.
6	Fluvial and Tidal Breach Flood Hazard (Present Day)	Combined maximum flood hazard at the strategic sites following breach of flood defences for Breach Locations 1 – 11 as discussed in SFRA Level 1 report. Maps not produced for sites located fully in Flood Zone 1.
7	Fluvial and Tidal Breach Flood Hazard (With Climate Change)	Combined maximum flood hazard at the strategic sites following breach of flood defences for Breach Locations 1 – 11 as discussed in SFRA Level 1 report. Future flood risk data not available for breach locations 4 – 7 and therefore present day extents used. Maps not produced for sites located fully in Flood Zone 1.
8	Fluvial and Tidal Breach Rate of Inundation (Present Day)	Combined minimum inundation time at the strategic sites following breach of flood defences for Breach Locations 1 – 11 as discussed in SFRA Level 1 report. Rate of inundation data not available for breach locations 4 and 6. Maps not produced for sites located fully in Flood Zone 1.
9	Fluvial and Tidal Breach Rate of Inundation (With Climate Change)	Combined minimum inundation time at the strategic sites following breach of flood defences for Breach Locations 1 – 11 as discussed in SFRA Level 1 report. Rate of inundation data not available for breach locations 4 and 6. Future flood risk data not available for breach locations 4 – 7 therefore present day data has been used for breach locations 5 and 7. Maps not produced for sites located fully in Flood Zone 1.
10	Flood Warning Areas	Maps not produced for sites located fully in Flood Zone 1.