

Flood Risk and the Core Strategy

General Sequential Test

August 2009

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This report was prepared by members of the London Borough of Tower Hamlets Strategic Planning Team.

Background

Planning Policy Statement (PPS) 25 - Development and Flood Risk requires that Tower Hamlets' Core Strategy is informed by the Strategic Flood Risk Assessment (SFRA). The SFRA is an important element of the Local Development Framework (LDF) Evidence Base and in producing it, Tower Hamlets has confirmed that it has taken full account of flooding in its area, as required by the government guidance. Following on from this, information in the SFRA is used to locate development sequentially. The Core Strategy gives broad locations for strategic development. All developments have to undergo a Sequential test to ensure that location is appropriate to development and vice versa in terms of flood risk and in line with the Environment Agency's (EA) flood zones. The Sequential Test outlined in this document is carried out in accordance with Tables D.1, D.2 and D.3 of Annex D of PPS25, and is of a general nature, related to the identified places of the borough. A more detailed site specific sequential test will be carried during the development of the Site Allocations DPD.

The Core Strategy

The Core Strategy is the primary document in the borough's Local Development Framework. It sets out the council's spatial vision which incorporates and builds on the Community Plan's 2020 vision, and strategic priorities. The Core Strategy identifies the overarching strategy for how our places will contribute to delivering the vision, by providing the spatial framework for managing growth and change in the borough to 2020 and beyond. Consideration of flood risk would allow the Core Strategy to be in compliance with the guidance-PPS 1, 12 and essentially PPS25.

To apply the SFRA to the Core Strategy, the council has adopted a 'Places' approach. This provides the basis for a more spatially defined examination that sets a coherent and realistic framework which relates to actual live places, allowing the Sequential Test of these areas to be carried out in accordance with PPS25. This avoids imprecise blanket assumptions. The Sequential Test will provide decisive information for development options, within the realms of proactive pragmatism, in the areas and places of the borough.

Sources of flooding and mitigation measures

Tower Hamlets is situated on the north side of the River Thames and covers approximately 20sqkm and has the longest Thames frontage of any London borough (more than 10km). The River Lea to the east forms the boundary between the borough and the London Borough of Newham; parts of Tower Hamlets lie within the Lower Lea Regeneration Area and within the application area for the Olympic facilities. Olympic Parks works have been required to contribute to modifying flood risk conditions and a Flood Risk Assessment has been submitted. In essence, the River Lea which has connections in its lower reaches to a number of canals

including the Limehouse Cut, Hertford Union Canal and the River Lea Navigational Canal. The river is also part of the Bow Back River System. Tower Hamlets is protected from fluvial flooding by the River Lea and tidal flooding from the Thames, by the River Lea defences and the Thames tidal defence, including the Thames Barrier.

The actual risk of flooding in Tower Hamlets has been assessed in the borough's SFRA for defended scenario assuming that all defences are in place and fully maintained and operational. The residual risk has also been assessed for defended scenario assuming all defences are in place and fully maintained and operational. Additionally in the Tower Hamlets' SFRA, seven breach scenarios have been assessed, to consider the potential flood hazard created if there is a 'hole' in the existing defences during a flood event.

Fluvial flooding

A large proportion of Tower Hamlets lies within Flood Zones 2 and 3a with a medium to high probability of flooding. The area of the borough within fluvial Flood Zones 2 and 3 is not extensive but does include the Lower Lea Valley Area of Opportunity, which is a key focus by government for growth.

Tidal

The actual risk of flooding in Tower Hamlets is much reduced by the presence of the Thames Tidal defences including the Thames Barrier. There is however, a residual risk of flooding in the borough from an extreme surge event. Although the probability of residual flooding caused by a breach in existing defence is low, the consequences of a breach are potentially high. There are areas in Tower Hamlets where the predicted hazard rating in a breach event is classed as extreme and a danger to all.

Groundwater

Much of Tower Hamlets is shown at medium risk of groundwater flooding, indicating a potential risk of groundwater emerging due to geology, soils, elevation and the presence of shallow aquifers. Most at risk will be deep foundations, basements and underground infrastructure.

Flooding from Artificial Sources

There are a number of canals, docks and basins within Tower Hamlets that are potential sources of flooding in the borough. Assessment by British Waterways concludes that, due to active management and regular maintenance of the structures, there is a very low risk of flooding from the identified artificial sources.

Regional and Local Growth Demands

Tower Hamlets plays a vital role in delivering Greater London's and the government's spatial strategies. The Mayor has focused London's growth on east London. In this respect there is recognition of the important management and place-shaping role the council has, in ensuring that development is sustainable, not least in terms of flood risk.

The scale of growth directed to Tower Hamlets in the London Plan was 31,500 new homes and 150,000 new jobs in the borough as a whole, and most of these new jobs are expected to be created in the Isle of Dogs. For example, the banking and financial sector centred on the Isle of Dogs, represents approximately 40% of all employment in the borough. In the Lower Lea Valley covering Newham, Hackney and Tower Hamlets, approximately 30,000 new homes are planned. Revision of job numbers and volume of other development activities might have to be made in view of the current (2009) global financial downturn. Nonetheless, there is still a high level of planned growth. This combination requires significant public interventions both in terms of policies and actions.

Significant regeneration is proposed in Tower Hamlets and there are a number of areas/places identified for change in the borough. The borough is a completely urban area of mixed commercial, residential and some industrial land uses. The built- form is mixed but consists of largely post-war housing estates that are undergoing regeneration, traditional terraced house and increasingly a mix of modern, high density mixed use development. There are areas of parkland and open spaces including Victoria Park in the north and Mile End Park stretching down the middle and Mudchute Park in the south, otherwise majority of the borough is developed. Locally the council has developed a model to estimate and plan for adequate social infrastructure to support housing growth and the mix of developments.

Outcome of sub-regional SFRA

The council has contributed to the East London Strategic Flood Risk Assessment project which was managed by the London Thames Gateway Partnership. An additional SFRA was undertaken to inform the Lower Lea Valley Area Planning Framework by the GLA .Some of the key messages from that study include:

1. The majority of the area was in Flood Zone 3, however most of the regeneration is protected by existing flood defences
2. The SFRA identifies parts of the Sub-Areas of Leyton, Hackney Wick, Stratford and West Ham within the Regeneration Area, as lying at 'Actual Flood Risk'
3. Potential mitigation options are identified including strategic land rising behind defences and flood storage.

Environment Agency's Flood Zones maps and Tables 1 and D2 of PPS25 give indications of what land use is acceptable within each zone and their degree of vulnerability.

Population Change and Associated Responses

The total population of the borough is approximately 226,550 (provided by the GLA), and it is one of the most ethnically diverse London boroughs. Population records shows increases of varying proportions across the borough, but highest figures are recorded for Millwall and Blackwall and Cubitt Town areas of the Isle of Dogs. Spatial indication of the changes and the likely demand consequences of these are reflected in the extreme contrasts within the Docklands regeneration area adjacent to areas of acute poverty. The pattern of population increases, when projected from 2010 to 2025, shows little sign of abating. Estimates show that by 2025, the borough's population will be 301400.

Opportunities are being sought to provide/ deliver additional housing, business spaces and necessary support social infrastructures, in areas where, analysis of population projections covering the period from 2001 to 2011, show significant increases. Areas such as Bow, Bromley -by- Bow, Poplar, Shadwell, Limehouse, Millwall, Blackwall and Cubitt Town are representative of the growth in population numbers. Clearly this imposes demand pressures for more housing and infrastructure support.

Evidence from planning applications approved, submitted and proposals begun over the last five years, illustrates vividly the council's active attempts to explore opportunities to encourage sustainable development across the borough. As growth continues, it is not possible for the council to identify sufficient land particularly brownfield land as directed by PPS3, for the location of housing, in areas of lower probability of flooding. Tower Hamlets' high housing targets, set in the London Plan, are based on the availability of a large provision of brownfield land for housing. The majority of brownfield land that has been identified comprises former employment/industrial land which lies next to waterways, including canals, the River Lea or the docks. Moreover two of the opportunity areas for growth in Tower Hamlets, identified in the London Plan (being Lower Lea Valley and the Isle of Dogs) are within areas identified as affected by residual flood risk.

Major Development Proposals and Activities

A number projects are either currently underway or in the borough development pipeline and these include:

- Royal London Hospital;

- Crossrail;
- Wood Wharf redevelopment;
- Lower Lea Valley Regeneration projects;
- Redevelopment of the Leamouth peninsula;
- Bishopsgate Goodsyrd redevelopment; and
- Aldgate transformation.
-

The picture of development activities is one of redevelopment and regeneration proceeding at a fast pace and at high volumes within established urban areas. There are development opportunities, mostly through estate renewal, infill development on pockets of former industrial areas in the northern part of the borough, to the northern-most tip in Fish Island East. The physical expansion of Canary Wharf is continuing, with more jobs including the development of Wood Wharf and new mixed-use residential communities in Millennium Quarter providing 2000 to 5000 new homes. Southwest of the borough, about 1500 new homes and tourism initiatives are proposed around Wapping and Tower of London. Close to the City fringe, intensification of Whitechapel with Royal London Hospital project and Crossrail are planned. These will have significant effect on the area and surrounding places. In the City fringe proper, the aim is to encourage intensification as knowledge economy and employment area, with plans for around 6000 new homes in the fringes of the City to the north western tip.

Both the Government and the Mayor endorse the council's view, which is supported in numerous studies, that the 2012 Olympic Games, considered the biggest regeneration project in the country and its legacy, will have far-reaching impact on Tower Hamlets' regeneration. Post-2012 Olympic Games, the council will be involved in managing the provision of 5000 new homes through wider regeneration in Lower Lea Valley. Other related changes such as enhancing the major green spaces of Mile End Park and Victoria Park form part of the wide range of development initiatives. The potential exists for large scale housing estate renewal and new development and the development of high density residential area on former industrial land.

The significant targets for new jobs (approximately 100,000) and new homes in Tower Hamlets, are expected to be accommodated through growth in Canary Wharf and the City Fringe areas and through supporting economic activity. The statutory target numbers for new households for all London boroughs is defined by the London Plan. For Tower Hamlets the figure is 31,500 between 2007-2016 or 3150 per year. Population figures showing that the number of households in Tower Hamlets is projected to increase, mean additional dwellings every year in order to achieve the Mayor's objective of meeting this need. Housing development invariably responds to and follows the demand created by the high population increases.

There are three designated opportunity areas within Tower Hamlets identified by the Mayor in the London Plan. The City Fringe area (including parts of Wapping, Aldgate, Whitechapel, Spitalfields and Shoreditch), Isle of Dogs, and Lower Lea Valley, are all identified as areas of opportunity which are key to contributing to the overall aims of the London Plan. Work undertaken on the Opportunity Area Planning Framework, which includes the Olympic Park, anticipate that the area should accommodate between 30000 to 40000 new homes and significant number of jobs. It is made clear that all the growth expectations need to be adequately supported by infrastructure including public transport, schools, health facilities and open space.

The Sequential Test

The attached table in Appendix 1 is based on Tables D.1, D.2 and D.3 of Annex D- Flood Zones, Flood Risk Vulnerability Classification and Flood Risk Vulnerability and Flood Zone 'Compatibility' (where the tables indicate the need to apply the Zones reference and acceptable uses) and shows the Sequential test which has been carried out applying the 'Places' approach. This gives a more spatially identifiable and accessible geographic definition to the borough.

The Sequential Testing of the Core Strategy is carried out in broad terms to create the basis for site by site testing and allocations, with all the necessary information obtained from the SFRA within the firm context of the technical steps specified in PPS 25.

Tower Hamlets' SFRA has been prepared in advance of the application of the Sequential and Exception Tests and the preparation of new policies on flood risk and land allocation by the council. It has been prepared to support the LDF Core Strategy in response to PPS25- to ensure that a risk -based approach is applied to all planning decisions. The council currently makes decisions by applying the 1998 UDP and the Interim Planning Guidance (IPG) which contains the most up-to-to-date information and evidence in conformity with the London Plan.

The aim of the council is to deliver long-term reduction in flood risk so that there is a sustainable adaptation to the effects of climate change. PPS25 requires that the council demonstrates how it has applied a risk-based, sequential approach in preparing development plans and consideration of flooding through the application of a sequential test. Preparing the Strategic Flood Risk Assessment is the formal response to this requirement. The contents of Tower Hamlets' Strategic Flood Risk Assessment are also dependent on the outcome of the Regional Flood Risk Assessment. Information from the Strategic Flood Risk Assessment will be used to inform the Tower Hamlets' Sustainability Appraisal, as well as policies and land allocations.

The Strategic Flood Risk Assessment has revealed that there is no Functional Floodplain (Zone 3b-highest probability) in Tower Hamlets but large parts of the identified growth areas lie within High Risk Flood Zone 3. Although the City Fringe seem to be mainly Zone1, there is the issue that Wapping in the opportunity area, is in Zone 3 –High flood risk zone, similar to the Isle of Dogs and Leaside (Lower Lea Valley) which are predominantly Zone3. These areas are expected to contribute to the overall aims of the London Plan by:

- Exceeding the minimum guidelines for housing and the indicative estimates for employment
- maximising and improving access by public transport
- Promoting social inclusion and relate development to any nearby Area for Regeneration.
- Supporting growth by the provision of infrastructure including public transport, schools, health facilities and open spaces.

As Areas of Opportunity are identified to contribute to meeting stated strategic/regional and local needs, the emerging range of planned uses are of the mixed type, and includes new jobs and houses.

All types of land uses are appropriate in Flood Zone 1 and the places/areas to the West, Central parts of the borough and City Fringe, with the exception of Wapping. The zone has a low risk of flooding from either fluvial or tidal sources. A very small part of the south of the City Fringe is in Flood Zones 2 and 3 and has a high risk of tidal flooding ignoring the presence of defences.

Set against the enormity of strategic and local requirements that have to be fulfilled, Zone 1, Central places and the City Fringe would have been examined for their ability to accommodate the range of uses. Already the areas have been subjected to an open sequential test to identify what Zones they fall in and what types of development are appropriate.

Even when the presence of defences is considered, there is actual risk of flooding in Leaside during a fluvial flood event on the Lower Lea catchment. This residual risk is increased in the southern parts of Leaside, if there is a breach in the Thames Tidal Defences. Breaches in this area may present an extreme hazard to people. 'More vulnerable' land uses will be avoided in such areas. Leaside is earmarked to accommodate much of the government's Thames Gateway 'Sustainable Communities'. Within the southern end of the borough lies the area of most intense development. The area is firmly in Zone 3 and it remains the part of the borough which has not only high population projections but is expected to continue to accommodate development possibly by the council applying the Exception test.

Updating information on the Sequential Test

For consistency, conformity and relevance, the information used to apply the Sequential test must be up-to-date. The Sequential test carried out on the places of the emerging Core Strategy in November 2008 was based on the evidence provided by the Tower Hamlets' Strategic Flood Risk Assessment (SFRA), itself published in August 2008. The SFRA was prepared in compliance with the government's guidance, PPS25- Development and Flood Risk. From the outset, in preparing spatial policies, the places –based Sequential test has been derived from the requirements within the guidance to ensure that the Core Strategy took flood risk into consideration.

The Core Strategy takes account of the SFRA and is informed by the assessment. As the Sequential test is now almost a year old, it is appropriate to examine the information upon which its conclusions are based, to ensure continuing relevance. There are currently heightened concerns over the effects of climate change, the global economic crisis, increasing population levels and greater demands for alternative solutions or ideas on place-making and managing development better.

A constant factor in considering flood risk is the Environment Agency's (EA) Flood Risk Zones. There is no change to the Zones as illustrated in the Flood Map. With this background, the council has supplied the information on population, housing targets and development growth aspirations updated for 2009. The places sequential test is now up-to-date and is in synch with the emerging Core Strategy.

Notwithstanding the current status of the Sequential Test, the council is aware of a number of government decisions and subsequent publications that might have impact on Tower Hamlets' SFRA. In recent months, there have been a number publications which include the following:

- Climate Change Act;
- Pitt Review;
- River Basin Management Plan;
- Thames Estuary TE2100 Plan;
- Draft Flood and Water Management Bill.

These publications will be fed into the current flood and water management process and the likelihood is that, they might affect and change the existing guidance, PPS25. Until such changes are required, the EA has assured Tower Hamlets that its SFRA, and by implication, the places Sequential test and the eventual Sequential test on Sites allocation in the immediate future remain relevant and in conformity.

Appendix 1 – LBTH Sequential test for the Places of Tower Hamlets- Using the Flood Risk Vulnerability Classification.

Development is classified in PPS25 according to their vulnerability. Five vulnerability classifications are defined, these are:

- Essential Infrastructure(includes transport and strategic utility infrastructures)
- Highly Vulnerable(includes police station and basement dwellings)
- More Vulnerable(includes hospitals, residential institutions, dwelling houses and educational establishments)
- Less Vulnerable(includes shops, offices and non-residential institutions)
- Water-compatible Development(includes flood control infrastructure, water-based recreation, docks and amenity open space)

The traffic light colour identification system refers to:

1. **Flood Zone 1 - Green** - Low probability of flooding (All sustainable development possible but with SUDS)
2. **Flood Zone 2 - Yellow** - Medium probability of flooding (Some development possible, highly vulnerable uses require sequential test.
3. **Flood Zone 3 - Red** -High probability of flooding(All development require sequential test and in most cases Exception Test

Places	Flood Risk Zone	Traffic light	Existing Flood Defences and Protection Afforded	Existing Uses	Proposed Uses	Level of growth to 2025	Flood Vulnerability	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Shore ditch	1		Thames Barrier and Defences			Extension of East London Line; delivery of over 2000 homes and population	Low probability, less vulnerable	Developmt appropriate; must incorporate SUDS	Developmt appropriate; must incorporate SUDS	Developmt appropriate; must incorporate SUDS	Developmt appropriate ; must incorporate SUDS	Developmt appropriate ; must incorporate SUDS

Places	Flood Risk Zone	Traffic light	Existing Flood Defences and Protection Afforded	Existing Uses	Proposed Uses	Level of growth to 2025	Flood Vulnerability	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
						projection of +3350						
Bethnal Green	1		Thames Barrier and raised river walls and locks	Industrial and mixed uses areas	Area of potential change. Limited number of potential development sites for residential and mixed uses	Redevelopment of a number of industrial areas for residential use, housing estate renewal over 1200 homes with population projection of +1650	Less vulnerable, low flood probability	Development appropriate; must incorporate SUDS	Development appropriate; must incorporate SUDS	Development appropriate; must incorporate SUDS	Development appropriate; must incorporate SUDS	Development appropriate; must incorporate SUDS
Globe Town	1		Thames Barrier and Defences	Low density light industrial uses	Area of potential change	Housing growth around the canal and Meath Gardens area; over 100 homes with a population projection of +1650	Less vulnerable, low flood probability	Development appropriate; must incorporate SUDS	Development appropriate; must incorporate SUDS	Development appropriate; must incorporate SUDS	Development appropriate; must incorporate SUDS	Development appropriate; must incorporate SUDS

Places	Flood Risk Zone	Traffic light	Existing Flood Defences and Protection Afforded	Existing Uses	Proposed Uses	Level of growth to 2025	Flood Vulnerability	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
						n projection of over 2000						
Bow	1(but close to the northern tip which is Zone 2		Raised river walls, and locks(Grand Union Canal) and Thames Barrier and Defences	Mainly residential with retail/ commercial activity and major leisure and cultural activities	Regeneration with emphasis on retail/commercial uses and accommodating the Olympic 2012 games in the form of the Olympic Boulevard	Infill development and improved connection to Fish Island; projected population reduction by 400	Low probability Development of less and more vulnerable uses appropriate. On the		Developmt appropriate; must incorporate SUDS	Exception test might be required where development is close to the northern tip by River Lea/Fish Island in Flood Zone2	Developmt appropriate ; must incorporate SUDS	Developmt appropriate ; must incorporate SUDS
Victoria Park	1, but eastern boundary in Zone2		Raised river walls, and locks(River Lea and Regents Canal)	Leisure, biodiversity functions, amenity and metropolitan significance of open space	Enhancement for access, safety, biodiversity green chains and tackling climate change	Parks improvement; the population around the park projected to reduce by 200; part of Olympic live site	Low probability	Developmt appropriate; must incorporate SUDS/ (subject to dedesignation order)	Developmt appropriate; must incorporate SUDS	Exception test required(subject to dedesignation order)	Developmt appropriate ; must incorporate SUDS (subject to dedesignation order)	Developmt appropriate ; must incorporate SUDS (subject to dedesignation order)
Fish Island	2 and 3		Raised river walls and locks	Mainly industrial with sprinkling of residential uses	Designated Strategic Industrial Location in the	Delivery of 2400 homes, with sixth	Meduim to high probability of flooding; risk	Developmt appropriate; must incorporate	Developmt appropriate; must incorporate	Exception test is required. In Zone 3	Developmt appropriate ; must incorporate	Developmt appropriate ; must incorporate

Places	Flood Risk Zone	Traffic light	Existing Flood Defences and Protection Afforded	Existing Uses	Proposed Uses	Level of growth to 2025	Flood Vulnerability	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
					London Plan. However, regeneration agenda to create urban quarter on the edge of the Olympic Park.Space for 2012 Olympic facilities. Location of waste transfer station.	highest population projection of over 5000	of fluvial flooding at Old Ford lock	SUDS /(if definitely Zone2). In zone 3,Exception test is required; nothing should be developed here because of actual flood risk	SUDS	development will not be permitted	SUDS /(if Zone 3, Exception test is required)	SUDS
Spital-fields	1		Thames Barrier and Defences	Commercial ,retail and tourism	Significant regeneration potential identified as an Opportunity Area in the London Plan-main focus of commercial office development, enhanced tourist destination	Development in commercial, hospitality and residential sectors; over 2850 homes with population projection of +4700	Low probability; fluvial along the canal	Development appropriate; must incorporate SUDS	Development appropriate; must incorporate SUDS	Development appropriate; must incorporate SUDS	Development appropriate ; must incorporate SUDS	Development appropriate ; must incorporate SUDS
White chapel	1		Thames Barrier and Defences	Commercial and residential, with major social and	Regeneration around the Royal London Hospital,	Development of Crossrail Station	Low probability	Development appropriate; must incorporate	Development appropriate; must incorporate	Development appropriate; must incorporate	Development appropriate ; must incorporate	Development appropriate ; must incorporate

Places	Flood Risk Zone	Traffic light	Existing Flood Defences and Protection Afforded	Existing Uses	Proposed Uses	Level of growth to 2025	Flood Vulnerability	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
				community facilities	developing a major retail hub and responding to the intense pressure for growth	and redevelopment of the Royal London Hospital; delivery of 1350 homes and population projection of +2250		SUDS	SUDS	SUDS	SUDS	SUDS
Mile End	1		Thames Barrier and Defences	Residential	Redevelopment of the Mile End Underground station, St Clements Hospital, Southern Grove Lodge and expansion of Queen Mary College	Eric and Bede Estates regeneration and expansion of Queen Mary's College; 1750 new homes and population projection of +2600	Low probability	Development appropriate; must incorporate SUDS	Development appropriate; must incorporate SUDS	Development appropriate; must incorporate SUDS	Development appropriate; must incorporate SUDS	Development appropriate; must incorporate SUDS
Bromley-by-Bow	2 and 3		River walls and locks	Residential uses to the west; industrial	Area of considerable change, within	Massive regeneration with	Medium to high probability	Development appropriate; must	Development appropriate; must	Exception test required	Development appropriate; must	Development appropriate; must

Places	Flood Risk Zone	Traffic light	Existing Flood Defences and Protection Afforded	Existing Uses	Proposed Uses	Level of growth to 2025	Flood Vulnerability	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
				uses to the east of the A12; to the south industrial	the Leaside. Massive regeneration creating mixed-uses in the north and new industrial uses to the south.	new homes, schools ,health centres, green spaces, transport improvements;new town centre;85 0 new homes and population projection of +3900		incorporate SUDS /(parts in Zone 3 Exception test required	incorporate SUDS /(parts in Zone3 as well)	(for parts in Zone 3 development should not be permitted)	incorporate SUDS (for parts in Zone 3 Exception test required)	incorporate SUDS /(parts in Zone 3 as well)
Aldgate	1		Thames Barrier and Defences	Commercial office	Regeneration to create business quarter and transport improvements	Parks and public realm improvements;1259 new homes and population projection of +2200	Development appropriate; must incorporate SUDS	Development appropriate; must incorporate SUDS	Development appropriate; must incorporate SUDS	Development appropriate; must incorporate SUDS	Development appropriate ; must incorporate SUDS	Development appropriate ; must incorporate SUDS
Shadwell	2 and 3		Thames Barrier and	Residential north, with	Estate regeneration;	About 700 new	Medium to high	/(where Zone 3, Exception	Development appropriate;	Exception test	/(where Zone	Development appropriate

Places	Flood Risk Zone	Traffic light	Existing Flood Defences and Protection Afforded	Existing Uses	Proposed Uses	Level of growth to 2025	Flood Vulnerability	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
			Defences	industrial uses to the south	area of potential change; seeking opportunities to provide housing and mixed uses	homes and population projection of +500		tesr required)	must incorporate SUDS	required(where Zone 3 developme nt should not be permitted)	3,Exceptio n test required)	; must incorporate SUDS
Stepney	1		Thames Barrier and Defences	Largely residential	Major regeneration programmes; seeking opportunities to provide housing and mixed uses	Regenarati on of Ocean Estate and delivery of 450 new homes; populatio n of +1000	Low probability	Develpmt appropriate; must incorporate SUDS	Develpmt appropriate; must incorporate SUDS	Develpmt appropriate; must incorporate SUDS	Develpmt appropriate ; must incorporate SUDS	Develpmt appropriate ; must incorporate SUDS
Bow Common	1		Thames Barrier and Defences, raised river walls and locks	Residential and mix of industrial uses	Regeneration programme; seeking opportunities to provide housing and mixed uses	Estate regenerat ion, newhealth facilities, schoolsre building and newhousi ng with delivery	Low probability	Develpmt appropriate; must incorporate SUDS	Develpmt appropriate; must incorporate SUDS	Develpmt appropriate; must incorporate SUDS	Develpmt appropriate ; must incorporate SUDS	Develpmt appropriate ; must incorporate SUDS

Places	Flood Risk Zone	Traffic light	Existing Flood Defences and Protection Afforded	Existing Uses	Proposed Uses	Level of growth to 2025	Flood Vulnerability	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
						of 1900 homes; population projection of +3950						
Poplar Riverside	3		Raised river walls, locks and Thames Barrier and Defences	Residential and industrial	Major redevelopment and estate renewal programmes; seeking opportunities to provide housing and mixed uses	Major residential improvements and development with delivery of 1850 new homes; new school, new open space in the Leven Road proposal; population projection of +3450	High probability; fluvial, extreme breach rating	Exception test required	Development appropriate; must incorporate SUDS	Development should not be permitted	Exception test required	Development appropriate; must incorporate SUDS
Wapping	3		Thames Barrier and Defences	Residential and some commercial	Low volume of development activity	Redevelopment of the News International and	High probability; tidal, sign of breach	Exception test required	Development appropriate; must incorporate SUDS	Development should not be permitted	Exception test required	Development appropriate; must incorporate SUDS

Places	Flood Risk Zone	Traffic light	Existing Flood Defences and Protection Afforded	Existing Uses	Proposed Uses	Level of growth to 2025	Flood Vulnerability	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
						Tobacco Dock sites to provide employment, leisure and residential uses; delivery of 1450 new homes with a population projection of +1950						
Lime house	2 and 3		Thames Barrier and Defences, river walls and locks	Mainly residential and some industrial	Area of change with some redevelopment ; seeking opportunities to provide housing and mixed uses	Redevelopment of old industrial sites for businesses, mixed uses and delivery of 1800 new homes; population	Medium to high probability; tidal ,sign of breach	Development appropriate; must incorporate SUDS/ (in Zone 3 area Exception test required	Development appropriate; must incorporate SUDS	Exception test required(in Zone 3 development should not be permitted	/ (in Zone 3 Exception test required	Development appropriate ; must incorporate SUDS

Places	Flood Risk Zone	Traffic light	Existing Flood Defences and Protection Afforded	Existing Uses	Proposed Uses	Level of growth to 2025	Flood Vulnerability	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
						projection of +3350						
Blackwall	3/ precautionary principle to be applied since zone is 2 but wholly surrounded by 3		Thames Barrier and Defences, raised river walls and locks	Residential with pockets of industrial uses	Area of transition; seeking opportunities to provide housing and mixed uses	Figures for the delivery of new homes and population projection are combined with Leamouth's	Some areas of medium probability otherwise mainly high; fluvial and tidal- sign of breach	/ (in Zone 3 Exception test required	Developmt appropriate; must incorporate SUDS	Exception test required(in parts that are 3 developme nt should not be permitted	/(in Zone 3 areas Exception test required)	Developmt appropriate ; must incorporate SUDS
Lea-mouth	3		Thames Barrier and Defences, raised river walls and locks	Former industrial and new residential	Residential and commercial redevelopments	Delivery of 4050 new homes; population projection of +8000	High probability;fluvial	Exception test required	Developmt appropriate; must incorporate SUDS	Developme nt should not be permitted	Exception test required	Developmt appropriate ; must incorporate SUDS
Canary Wharf	3		Thames Barrier and Defences	Predominantly commercial and retail	Redevelopment and expansion of area; seeking opportunities to provide housing and mixed uses	Residential growth with 2650 new homes expansion through Wood Wharf developm	High probability; tidal ,sign of breach	Exception test required	Developmt appropriate; must incorporate SUDS	Developme nt should not be permitted	Exception test required	Developmt appropriate ; must incorporate SUDS

Places	Flood Risk Zone	Traffic light	Existing Flood Defences and Protection Afforded	Existing Uses	Proposed Uses	Level of growth to 2025	Flood Vulnerability	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
						ent; population projection of +4850						
Millwall	3		Thames Barrier and Defences, raised river walls and locks	Residential, commercial and a wide range of mix uses	Major redevelopment programmes; seeking opportunities to provide housing and mixed uses	More conversions of docks to residential use, Millennium Quarter development; 6150 new homes and population projection of +11200	High probability; tidal, sign of breach	Exception test required	Developmt appropriate; must incorporate SUDS	Developme nt should not be permitted	Exception test required	Developmt appropriate ; must incorporate SUDS
Cubitt Town	3		Thames Barrier and Defences	Residential and a wide range of mix uses	Major redevelopment programmes; seeking opportunities to provide housing and mixed uses	Delivery of 4200 homes, expanded town centre; population projection of +7750	High probability; tidal, sign of breach	Exception test required	Developmt appropriate; must incorporate SUDS	Developme nt should not be permitted	Exception test required	Developmt appropriate ; must incorporate SUDS
Tower of	3		Thames	Commercial	World Heritage	Delivery	High	Exception test	Developmt	Developme	Exception	Developmt

Places	Flood Risk Zone	Traffic light	Existing Flood Defences and Protection Afforded	Existing Uses	Proposed Uses	Level of growth to 2025	Flood Vulnerability	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
London			Barrier and Defences		Management Plan works	of 100 new homes with virtually static population	probability; tidal	required	appropriate; must incorporate SUDS	nt should not be permitted	test required	appropriate ; must incorporate SUDS
Poplar	2 and 3		Thames Barrier and Defences, raised river wall and locks	Residential and industrial uses	Regeneration programmes; seeking opportunities to provide housing ,leisure and mixed uses but Chrisp Street is likely to be affected by the flood ratings	Large scale regenerat ion in partnershi p with Poplar Harca ,deliverin g an expanded town centre and 1650 new homes; populatio n projection of +3150	Medium to high probability; tidal and fluvial	Develpmt appropriate; must incorporate SUDS /(in Zone3 Exception test required	Develpmt appropriate; must incorporate SUDS	Exception test required(in Zone 3 developme nt should not be permitted	Develpmt appropriate ; must incorporate SUDS /(in Zone 3 Exception test required)	Develpmt appropriate ; must incorporate SUDS