Local Flood Risk Management Strategy

London Borough of Tower Hamlets 2016 -2022

TOWER HAMLETS

Contents

Revision History

v1	2016
v1.1: Updates to Chapter 3, 4 and 5	September 2017
v1.2: Draft Strategy for statutory consultee review	October 2017
v1.3: Updates following statutory consultation comments	November 2017

Executive Summary

The London Borough of Tower Hamlets (LBTH), a Lead Local Flood Authority (LLFA) as designated by the Flood and Water Management Act 2010 (the Act), is responsible for the management of surface water, groundwater and Ordinary Watercourses ('local flood risk'). LBTH has a requirement under the Act to develop, maintain, apply and monitor a Local Flood Risk Management Strategy (the Strategy).

LBTH's Strategy is designed to provide guidance and information for residents, businesses and developers to help understand and better manage flood risk within the borough. This strategy aims to provide an overview of flood risk within the borough and work that is being undertaken to minimise local flood risk in the borough.

LBTH has undertaken a surface water modelling study in 2014, which was concluded in 2017 and redefined the understanding of flood risk in the borough 5 new CDAs. The results of this study will be published on LBTH's website and align with the Environment Agency's Risk of Flooding from Surface Water map.

The Strategy lists the Risk Management Authorities that are partners with LBTH and their responsibilities they have under the Act to manage flood risk in the borough.

The strategy sets out LBTH's six overarching objectives to effectively manage flood risk:

1. **Improve knowledge and understanding of flood risk within the borough -** To provide up to date information on the levels of flood risk in Tower Hamlets taking into account the impacts of climate change.
2. **Maintain flood risk management and drainage assets -** Actively maintain and manage flood risk management and drainage assets following best practice principles to reduce the risk of flooding.
3. **Deliver sustainable drainage systems –** To continue to promote and implement sustainable drainage systems in the public realm to mitigate the risk of flooding and attain wider benefit.
4. **Ensure new developments reduce the risk of flooding -** Ensure new development is safe from flooding and does not increase flood risk elsewhere.
5. **Work with Risk Management Authorities and partners to manage flood risk -** To work collaboratively with Risk Management Authorities and partners to manage flood risk effectively though coordinated action.
6. **Respond effectively to flooding emergencies -** To respond effectively in the event of a flooding emergency.

Each objective entails a series of different measures that will be implemented by the LLFA to aid its achievement. The estimated cost and benefits of each measure have been included, alongside potential funding and resource requirements.

The Strategy also provides an overview of the main environmental benefits of the objectives. Along with this document, a Strategic Environmental Assessment (Scoping Report) and a Habitats Regulations Assessment (Screening Report) have been developed. These assess the impact the Strategy may have on the environment through the identification of local protected sites and environmental issues.

1 Introduction

1.1 Why this Strategy is being produced

The London Borough of Tower Hamlets (LBTH), a Lead Local Flood Authority (LLFA) as designated by the Flood and Water Management Act 2010 (the Act), is responsible for the management of surface water, groundwater and Ordinary Watercourses ('local flood risk').

All LLFAs have a requirement under the Act to develop, maintain, apply and monitor a Local Flood Risk Management Strategy (the Strategy).

1.2 Purpose of this strategy

This LBTH Strategy is an important tool designed to provide guidance and information for residents, businesses and developers to help understand and better manage flood risk within the borough. The aims of this Strategy are:

- Provide an overview of flood risk within the borough
- Flood risk management work being undertaken and planned in the Borough
- Explain how partners are working together to reduce flood risk
- Set out which organisations are responsible for different types of flooding in the Borough.

LBTH is responsible for the management of local flood risk. Local flood risk is defined as the risk of flooding from surface water, ground water and ordinary watercourses.

Surface water flooding happens when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead.[1]

Flooding from ground water can happen when the level of water within the rock or soil that makes up the land surface (known as the water table) rises. When the water table rises and reaches ground level, water starts to emerge on the surface and flooding can happen.[2]

Ordinary watercourses include small open channels and culverted urban watercourses (which receive most of their flow from the urban areas) can either exceed their capacity and cause localised flooding of an area or can be obstructed (through debris or illegal obstruction) and cause localised out of bank flooding of nearby low lying areas.[3]

This strategy aims to minimize the risks of flooding from surface water, ground water and ordinary watercourse in the borough, which is aligned with 'A great place to live', an aspiration identified in the Tower Hamlets Partnership Community Plan. Flood risks including tidal and fluvial still remains the responsibility of the Environmental Agency and partners. Updated information on various flood risks are shared among the risk management authorities, including Environmental Agency and LBTH, through regular meetings.

LBTH have completed a number of studies which provide details of the flood risks in the borough. To date five critical drainage areas (CDAs) have been identified within Tower Hamlets. This means, the areas are predicted to be at an increased risk of flooding relative to the rest of the Borough. It is expected that during a heavy rainfall event such as

[1] https://flood-warning-information.service.gov.uk/long-term-flood-risk/#x=357683&y=355134&scale=2

[2] Environmental Agency, *Flooding from ground water*, 2011, p. 3.

[3] Surface Water Management Plan,2011, p.9

a 1 in 100 year rainfall event (This means the event has a 1% chance of occurring in a year) there is a risk flooding which may affect residential properties, business and infrastructure. The CDAs have been identified as result of a surface water study, concluded in 2017

1.3 How this strategy is being developed

Key stakeholders and general public were consulted on the draft Local Flood Risk Management Strategy from 27th April 2015 until 18th May 2015. The draft strategy was published on the Council website, an advert was posted on the council's paper and paper copies were also provided at public buildings.

Feedback provided in the draft consultation has been addressed and incorporated in the strategy. The Strategy has since been partially updated in 2017 to ensure it fulfils all of the requirements of the Act and is up to date with associated legislation. The updated Strategy and its associated Strategic Environmental Assessment (SEA) and Habitats Regulations Assessment (HRA) were submitted in October 2017 for review by the three Statutory Agencies with environmental responsibilities in England: the Environment Agency, Historic England and Natural England . The responses from the consultation have been incorporated into the Strategy and the SEA and HRA.

The following Strategy objectives are developed based on our knowledge on the local flood risks and in line with the national flood risk management objectives as required by the Act to effectively manage flood risk.

Local Flood Risk Management Strategy Objectives

1. **Improve knowledge and understanding of flood risk within the borough -** To provide up to date information on the levels of flood risk in Tower Hamlets taking into account the impacts of climate change.
2. **Maintain flood risk management and drainage assets -** Actively maintain and manage flood risk management and drainage assets following best practice principles to reduce the risk of flooding.
3. **Deliver sustainable drainage systems –** To continue to promote and implement sustainable drainage systems in the public realm to mitigate the risk of flooding and attain wider benefit.
4. **Ensure new developments reduce the risk of flooding -** Ensure new development is safe from flooding and does not increase flood risk elsewhere.
5. **Work with Risk Management Authorities and partners to manage flood risk -** To work collaboratively with Risk Management Authorities and partners to manage flood risk effectively though coordinated action.
6. **Respond effectively to flooding emergencies -** To respond effectively in the event of a flooding emergency.

The strategy is a living document which will be updated to reflect advances in understanding and assessment of flood risk and emergency policy at national and local level. Therefore, the strategy will be reviewed and updated periodically.

1.4 Legislative Context

This section sets out some of the key legislation which forms the backdrop to the Strategy. This is a combination of European, national, regional, and local statutory documents; of particular relevance are the Flood Risk Regulations 2009 and the Flood and Water Management Act 2010

Prior to 2007 the primary focus of flood risk fell on river and coastal flooding, with surface water not perceived as high risk source of flooding. The summer floods of 2007 changed this view. Due to the surface water flooding,

thousands of homes were flooded, critical infrastructure damaged and unfortunately life was lost. The economic repercussions were said to cost around £ 4 billion[4]

In response to the flooding, the Government commissioned Sir Michael Pitt to undertake a review of flood risk management. The review and subsequent reviews suggested that different organisations take responsibilities to manage increased risk of flooding.

The Flood Risk Regulations 2009 and the Flood and Water Management Act 2010 (the Act), which responds to the Pitt reviews' recommendations, make provision for unitary authorities and county councils, including all London Boroughs, as Lead Local Flood Authorities (LLFAs). Based on the Act and Regulations, LBTH is responsible for the risk management of surface water, groundwater and ordinary watercourses.

Flood Risk Regulations (2009)

The Flood Risk Regulations (FRR) (2009) are designed to aid in implementing the requirements of the European Floods Directive 2007, which aims to provide a consistent approach to flood risk management across Europe. The approach is based on a six year cycle of planning and includes the development of Preliminary Flood Risk Assessment (PFRA) and also Flood Risk Management Plans (FRMP). The PRFA was updated in 2017. LBTH proposed the extension of the indicative London FRA extent to cover the whole of CDA 4 following the 2017 Surface Water Study Update. This is currently being reviewed by the EA. It will be finalised and submitted to the European Commission by December 2017. The Environment Agency and Natural Resources Wales also had to prepare FRMPs for main rivers, the sea and reservoirs covering the whole of England and Wales. LBTH completed a FRMP jointly with the Environment Agency in 2015, which fed in the actions identified in the draft LFRMS.

As part of the Flood Risk Regulations the Environment Agency has a requirement to produce Flood Hazard and Risk Maps of flooding for England. The Environment Agency produced an updated Risk of Flooding from Surface Water map in 2017, and is available on their website.[5]

Flood and Water Management Act (2010)

The Flood and Water Management Act (2010) (FWMA) sets out the delivery of the recommendation from the Pitt Review and provides a more comprehensive management of flood risk. The FWMA designated that all upper tier Councils and Unitaries were to become Lead Local Flood Authorities (LLFA). This means that as the LLFA for its area, Tower Hamlets Council is responsible for surface water, groundwater and ordinary watercourses, with the Environment Agency responsible for the River Thames and River Lea and Thames Water Utilities responsible for the sewer network. Within the FWMA there are many deliverables that LLFAs should complete and comply with, one of which is producing a Local Flood Risk Management Strategy (Appendix 1 – Article 9 of the Act).

To complete the picture of water management and legislation governing water management, all of the above must also feed into the Water Framework Directive (WFD) 2003, in which European Union Member States must aim to reach good chemical and ecological status in inland and coastal waters by 2015. The WFD is designed to enhance status and prevent further deterioration of waters, promote the sustainable use of water and reduce pollution. In relation to Tower Hamlets the main outcome from the WFD is the Thames River Basin Management Plan (RBMP),

[4] Chartterton, J. et al., 2010, *Delivering benefits through evidence: The Cost of the summer 2007 floods in England*, Environmental Agency.

[5] https://flood-warning-information.service.gov.uk/long-term-flood-risk/map

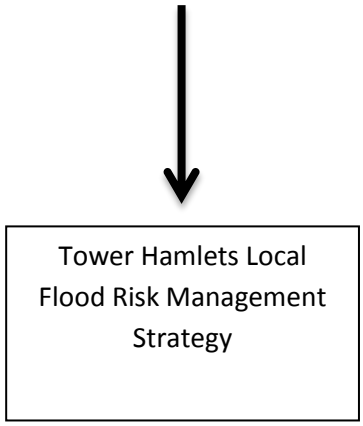
which will outline the current and projected ecological status of the catchment. This work is being undertaken by the Environment Agency and LBTH continues to give consideration to the WFD and have responsibilities to help achieve its aims.

1.5 Related Documents

There are a number of related documents that provide details on the assessment and management of flood risk and form and integral part of the evidence base of the local flood risk management strategy. The figure below shows the studies and plans that should be considered and read in conjunction with Tower Hamlets Local Flood Risk Management Strategy:

Table 1.1 Related Legislation Documents

Legislation	Associated Document
Flood Risk Regulations (2009)	Preliminary Flood Risk Assessment
	Flood Risk Management Plans
Pitt Review (2007)	Surface Water Management Plans
Water Framework Directive	Thames River Basin Management Plan
	Thames Catchment Flood Management Plan
Civil Contingencies Act (2004)	Multi Agency Flood Plan
National Planning Policy Framework (2012)	Local Plans
	Strategic Flood Risk Assessment
Flood and Water Management Act (2010)	Environment Agency National Strategy
	Thames Estuary 2100 Plan (TE2100)
Greater London Authority Act (1999)	The London Plan



The following documents are specific to LBTH and key in the preparation of this Strategy. A summary of the documents is provided below:

Preliminary Flood Risk Assessment (PFRA)

A high-level study of the flood risk to the borough from all sources using all available information past and present. They are a requirement of the Flood Risk Regulations 2009 and must be produced every 6 years. LBTH's most recent version was drafted in 2017 and is presently being reviewed by the Environment Agency. All PFRAs are to be finalised and submitted to the European Commission by December 2017.

Strategic Flood Risk Assessment (SFRA)

Local Authorities are required to produce a SFRA under the National Policy Framework. The SFRA provides an overview of flood risk across the borough and is an important tool to guide planning policy and land use development. LBTH's Level 1 and Level 2 SFRA was updated in 2016.

Surface Water Management Plan (SWMP)

SWMPs were a key recommendation from The Pitt Review and extends the scope of the PFRA. The Study was undertaken in consultation with key local partners who are responsible for surface water management and drainage in the London area – including Thames Water, the Environment Agency and Transport for London. The Partners have worked together to understand the causes and effects of surface water flooding and agree the most cost effective way of managing surface water flood risk for the long term and sets out an Action Plan for future work. LBTH's 2011 SWMP Action Plan helped shape this Strategy's actions and objectives.

2 Roles & Responsibilities

The Flood and Water Management Act (2010) formalised different organisations' flood risk management responsibilities by designating them as Risk Management Authorities. The following organisations have a legal responsibility for managing flood risk, although a number of other organisations also play a critical role in the management of flood risk in the Borough.

- Tower Hamlets Council as the Lead Local Flood Authority (LLFA)
- The Environment Agency
- Thames Water as the sewerage and Water company
- Tower Hamlets Council as the Highways Authority
- Transport for London as the Highways Authority
- Neighbouring Boroughs as Lead Local Flood Authorities.

2.1 Risk Management Authorities

As a Lead Local Flood Authority, LBTH now have a duty to lead on local flood risk management and have the following powers:

Powers:

- Decision making responsibility for whether third party works on ordinary watercourses by third parties, that may affect water flow, can take place; and
- Powers to request information from any person in connection with the authority's flood risk management functions and a duty to co-operate with other flood risk authorities;
- Power to do works to manage flood risk from surface water runoff or groundwater;
- Power to designate structures and features that effect flood risk.

All risk management authorities have a duty to cooperate with each other when exercising their flood risk management functions.

Table 2.1 below details the roles and responsibilities of the various risk management authorities and key partners.

Table 2.1 – Risk Management Authorities

Risk Management Authority	Role	Responsibilities
LBTH	Lead Local Flood Authority (LLFA)	• Local Flood Risk Management Strategy - Develop, maintain, apply and monitor a local flood risk management strategy for its area. • Investigate Flood Incidents - A duty to investigate and record details of flood events (where appropriate and necessary) identifying the relevant risk management authorities and what they have done or intend to with respect to the incident and publishing the results of any investigations carried out. • Maintain Asset Register - A duty to maintain a register

Risk Management Authority	Role	Responsibilities
		of structures or features that have a significant effect on flood risk; • Strategic leadership of local flood risk management authorities - A duty to lead on local flood risk management and establish partnerships with risk management authorities
	Highway Authority	• Duty to maintain the highway and associated drainage
	Category 1 responder under the Civil Contingencies Act	• Ensuring that systems and processes are in place to provide emergency response to flooding
	Statutory consultee on surface water management	• Provide comment and input to the planning process with regard to surface water management
	Local Planning Authority	• Ensuring that new development is safe from flooding and does not increase flood risk elsewhere
Environment Agency	Strategic Role	• National strategic responsibility for overseeing flood risk actions with regard to the Flood Risk Regulations 2009 and the Flood and Water Management Act 2010
	Operational Role	• Responsible for overseeing maintenance of flood defences such as the River Lee Flood Relief Channel • Management of flooding from reservoirs, main rivers and the sea • Advisory Emergency Planning role in assessment of Multi-Agency Flood Plans • Advisory Planning role in assessment of flood risk associated with planning policy and development
	Category 1 responder under the Civil Contingencies Act	• Assess the risk of emergencies occurring and use this to inform contingency planning • Ensuring that the systems and processes are in place to provide emergency response to flooding
Thames Water	Sewerage Undertaker	• Responsible for provision and maintenance of the sewer network • Upgrade of sewer network to facilitate increased drainage capacity requirements
Transport For London	Transport infrastructure provider	• Responsible for provision and maintenance of strategic road network and London Underground and bus networks ensuring their resilience to flood risk
Highways Agency	Highway Authority	• Responsible for the effectual drainage of surface water from the A12 and A13. • Responsible for ensuring that drains on the A12, A13 including kerbs, road gullies and ditches and the pipe network which connect to the sewers, are maintained.

Risk Management Authority	Role	Responsibilities
Neighbouring Boroughs	LLFAs	• Strategic role in overseeing the management of local flood risk in their areas and liaison with other LLFAs affected

The following key partners (Table 2.2) are not formally defined as Risk Management Authorities. Nonetheless they play critical roles in the management of flood risk in Tower Hamlets.

Table 2.2 Authorities that play a critical flood risk role but are not classified as Risk Management Authorities

Authority	Role	Responsibilities
Canal and Rivers Trust	Watercourse management	• Responsible for the Limehouse Cut, Lee Navigation, Hertford Union Canal and Regents Canal.
Network Rail	Transport infrastructure provider	• Responsible for provision and maintenance of railway network serving mainline stations and their resilience to flood risk
Greater London Authority	Drain London	• Facilitation of co-ordinated working on flood risk across London including provision of guidance and information
Businesses and residents	Property owners	• Responsible for flood resistance and resilience, and emergency and contingency planning associated with properties
Utility companies	Utility providers	• Responsible for provision and maintenance of utility infrastructure – electricity, gas telecommunications, etc. and ensuring its resilience to flood risk
Emergency Services	Emergency response	• Responsible for minimising the impact of extreme flood events and responding to emergency situations

In London, the Drain London Project, set up by the Greater London Authority (GLA) in response to the Mayor of London's Regional Flood Risk Appraisal, works to improve our knowledge of the surface water drainage system and identify areas of London at risk of surface water flooding. The Project also aims to seek potential solutions to reduce or manage that risk. The Drain London Forum includes the 33 London boroughs, the Environment Agency, Thames Water, and Transport for London.

3 Assessment of Flood Risk

This section outlines the current understanding of the local flood risk in the Borough contributed by various flood risk assessments. This section also provides an overview of the roles of various flood risk authorities.

3.1 Local Flood Risk

Local flood risk, which LBTH is responsible for, is defined as flooding risk from surface water, ground water and ordinary watercourses.

Flood Risk is a combination of the probability (likelihood) of flooding and potential consequences. The probability of flooding is, for example, '1 in 100 chance of flooding in an area in any given time. To quantify risk, this probability is multiplied by the impact of flooding. The consequences of flooding is, however, not easily quantifiable, in particular, in a case of the social impacts of displacement, loss and fear of repeat events. The consequence of flooding is often related to the extent of damage to property or disruption to infrastructure.

3.2 Sources of Flooding

Table 3.1 outlines several sources of flooding and the Risk Management Authorities that are responsible for each of the source. It should be noted that all the sources are interrelated and can concoct complex flooding mechanism. As the strategy shows, the Risk Management Authorities liaise with each other to tackle such complex flood incident.

Table 3.1 – Sources of Flooding

Flood Source	Definition	Risk Management Authority
Surface Water Runoff	Any form of precipitation that is on the ground and has not entered a watercourse or drainage system leads to ponding and overland flows	Tower Hamlets Council
Groundwater	Water stored underground in areas of permeable rocks,	Tower Hamlets Council
Ordinary Watercourses	Flooding caused by rivers, streams or ditches that are not classed as main rivers	Tower Hamlets Council
Sewers	Water flows out of sewers due to blockages or lack of capacity	Thames Water Utilities Ltd
Burst Pipes & Water Mains	Water supply or drainage infrastructure fails	Thames Water Utilities Ltd
Main Rivers	Flooding caused by overtopping of banks or defences, main rivers are defined by the Environment Agency and are considered to be capable of causing significant flooding	Environment Agency
Tidal	Flooding from the sea or tidal rivers	Environment Agency
Reservoirs	Reservoir failure leads to sudden inundation of downstream areas	Environment Agency

3.3 Borough-wide Flood Risks

LBTH has completed a number of studies which provide details of the predicted flood risks in the Borough.

Five critical drainage areas (CDAs) have been identified within Tower Hamlets following 2017 Surface Water Study Update. These areas are predicted to be at an increased risk of flooding relative to the rest of the Borough. It is expected that during a 1 in 100 year rainfall event, properties businesses and infrastructures are at risk of flooding.

The key studies that this strategy draws and builds on include:

- **Preliminary Flood Risk Assessment** (PFRA) – A high-level study of the flood risk to the borough from all sources using all available information past and present. PFRAs are a requirement of the Flood Risk Regulations 2009 and must be produced every 6 years.

- **Strategic Flood Risk Assessment** (SFRA) – Local Authorities are required to produce a SFRA under the National Planning Policy Framework. The SFRA provides an overview of flood risk across the borough and is an important tool to guide planning policy and land use development.

- **Surface Water Management Plan** (SWMP)[6] – SWMPs were a key recommendation from The Pitt Review and extends the scope of the PFRA by assessing options for reducing flood risk and sets out an Action Plan for future work. Critical drainage areas (CDAs) were identified as areas predicted to be at greater risk of surface water flooding, relative to the rest of the borough. Following recent updated modelling, there are presently five CDAs within Tower Hamlets.

3.3.1 Preliminary Flood Risk Assessment (PFRA)

Under the Flood Risk Regulations 2009, LBTH was required to carry out a Preliminary Flood Risk Assessment (PFRA). This is a high level screening exercise to identify areas of significant flood risk within a given study area. The flooding could be caused by surface water, groundwater, Ordinary Watercourses or canals. The PFRA involved collecting information on past and future (potential) floods, assembling the information into a PFRA report, and identifying Flood Risk Areas.

The PFRA report for LBTH provides a high level summary of significant flood risk, based on available and readily derivable information, describing both the probability and harmful consequences of past and future flooding. This information is used as the basis for action to prevent future flooding or to mitigate its impact.

The outcomes from the PFRA were extremely important to understand what the main sources of flooding are in the borough and where Tower Hamlets should focus its resources efficiently, to mitigate flood risk. The Flood Map for Planning in the Appendix (Map 2) describes fluvial flooding that could occur if there were no flood defences along the River Thames and River Lee. The map is used in planning policy to ensure any development that takes place in a flood risk zones 2 (Medium Probability)[7] and 3 (High Probability)[8] is resilient to flooding and does not adversely contribute to the flood risk.

[6] These are available at: www.towerhamlets.gov.uk/lgnl/environment_and_planning/flood_risk_management.aspx

[7] Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding

[8] Land having a 1 in 100 or greater annual probability of river flooding

Part of the PFRA highlighted areas of future development within the borough that would benefit from a more detailed assessment of the local flood risk.

Surface Water Flood Risk

Surface water flooding is thought to pose the most significant risk of flooding within the borough. Map 4 in Appendix B depicts the Environment Agency's Risk of Flooding from Surface Water as of July 2017. Through urbanisation, most of the surfaces in the borough are paved and surface water runoff from rainfall is drained away via piped systems and into the combined sewer system. The sewer system was built in the Victorian period its capacity for rainwater is limited. Furthermore topographical low points and underground infrastructure, such as tunnels and underpasses, pose a further risk to surface water flooding.

Fluvial and Tidal Flood Risk

Fluvial and tidal flood risk is considered to be low when flood defences are taken into account. The high level of flood protection provided by the Thames Barrier and associated tidal defence walls, embankments and gates on the River Thames and River Lee provide Tower Hamlets (and the rest of London) with a world class standard of tidal flood protection of 1 in 1000 (0.1% chance in any year). There is a residual risk of flooding from breaches of the tidal defences caused by human interference or through defence failure. The Environment Agency has undertaken breach modelling which maps this risk. The TE2100 Plan manages tidal flood risk in the Thames Estuary for the next 100 years[9]. There remains some risk of fluvial flooding from the River Lee in the Hackney Wick area of Tower Hamlets around White Post Lane and Dace Road. Map 3 in the Appendix illustrates the Environment Agency's Risk of Flooding from Rivers and Sea as of March 2017 (latest update at the time of developing the document).

Groundwater Flood Risk

There have been no reports of groundwater flooding, therefore the risk from groundwater flooding in Tower Hamlets is considered low. There are localised areas in Tower Hamlets that were noted as having more permeable substrate/ground, and as such a higher potential for groundwater flooding. However this would only occur if numerous factors such as ceasing of groundwater abstraction, back to back seasons of prolonged rainfall or barriers to groundwater flow occurring coincide

3.3.2 Strategic Flood Risk Assessment (SFRA)

Subsequent to the recommendation of the PFRA, a Level 2 Strategic Flood Risk Assessment (SFRA) was produced. The SFRA focused on development sites such as the Millennium Quarter, Crossharbour Bishops Gate Good Yard, The Oval, Fish Island, Wapping, Leven Road Gas works, Leamouth, Blackwall and Wood Wharf. The purpose of the SFRA was to support the Tower Hamlets Local Development Framework, and also the National Planning Policy Framework and Planning Policy Guidance. The SFRA provides guidance, so that a risk based, sequential approach is used in developing development plans and that the Sequential and Exception Tests are facilitated to minimise flood risk in the future.

3.3.3 Surface Water Management Plan (SWMP)

As part of the Drain London Project a Surface Water Management Plan (SWMP) was produced in 2011 for Tower Hamlets. It was completed in conjunction with SWMPs for neighbouring boroughs. The SWMP describes the predicted surface water flooding for a series of rainfall events (for instance a 1 in 100 year event, which means the event has a 1% chance of occurring in a year). The results of this computer modelling identified Critical Drainage Areas (CDAs) within Tower Hamlets, areas where there was thought to be a greater risk of flooding to residential properties, businesses and infrastructure. Within CDAs there are areas that are thought to have a more significant

[9] https://www.gov.uk/government/publications/thames-estuary-2100-te2100

flood risk, these are classed as Local Flood Risk Zones (LFRZs). It is expected that during a heavy rainfall event such as a 1 in 100 year rainfall event, there would be property flooding and potentially sewer flooding in a LFRZs. The SWMP identified 14 CDAs in Tower Hamlets, but those CDA were since changed by a Surface Water Modelling Study started in 2014 and finalised in 2017.

3.3.4 Initial CDAs

Initially, the main mechanisms of flooding were identified as topographical low lying areas and points, railway cuttings and embankments, underpasses and finally areas where sewer surcharging was identified. Of the CDAs identified, nine were related to Transport for London's (TfL) road network, London Overground and Docklands Light Railway network. The remaining five CDAs related to the public highway and therefore LBTH have greater responsibility for the management of the risk as the Highways Authority. These five CDAs were:

- Group 4_013. White's Row
- Group 4_021. Beaumont Square
- Group 4_074. Tredegar Road
- Group 4_025. Upper North Street to Grundy Street
- Group 4_011. Plevna Street and Launch Street

To address the flood risk in these five CDAs, further hydrological modelling of the CDAs was completed. The CDA in Spitalfields, Group 4_013, White's Row, was modelled by the City of London, as part of its Strategic Flood Risk Assessment and the advanced modelling showed that even in an intense rainfall event there was no significant risk posed by surface water flooding in this area. The result for this is available at the City of London's website.[10]

The final four CDAs have been remodelled by Tower Hamlets Council along with the GLA as part of Drain London in a surface water flood modelling study which began in 2014. The objective was to define the current flood risk and investigate possible mitigation options and to this end the whole of Tower Hamlets was remodelled. To improve the precision of the computer modelling, a smaller grid size was employed (2m by 2m) and the trunk Thames Water sewer system was added in order to account for sewer capacity. Additional model enhancements included the addition of land use, kerb heights and the highway drainage system (highway gullies).

3.3.5 Revised CDAs

Following the surface water flood modelling study, new CDAs were identified and most of the existing ones were declassified. From the four remaining highway-related CDAs previously identified, only Group 4_011, Plevna Street and Launch Street remained classified as a CDA after the initial re-modelling, and became CDA 4. The flooding in the other three CDAs had reduced significantly or completely disappeared following the more detailed modelling.

Through the remodelling work, surface water flooding was noted in the Isle of Dogs and thus four new CDAs were identified. These and CDA 4 are depicted in Appendix B (Maps 4 and 5). Most of the CDAs now lie within the Isle of Dogs, a low lying area and the lowest part of the catchment. The surface water runoff typically exceeds the capacity of the drainage network, overwhelming the sewers and surcharging onto the streets above. Potential solutions to alleviate future flooding in the CDAs are explored in Chapter 4.

The five CDAs contribute to the same combined sewer network, which flows north through Abbey Mills pumping station and onto Beckton. The generally low lying nature of the Isle of Dogs relative to the tidally influenced River Thames means water is generally unable to discharge freely by gravity to the River Thames. At present, it can discharge into the River Thames via the pumped Combined Sewer Overflow (CSO), however foul water is discharged

[10] https://www.cityoflondon.gov.uk/services/environment-and-planning/planning/design/Pages/flood-risk.aspx

into the River Thames, which is detrimental to the River Thames and an unsustainable way of managing with surface water. Removal of water in the sewers is thus wholly reliant on the pumped drainage network through Abbey Mills and the pump station is not designed to provide sufficient capacity during more extreme rainfall events, such as a 1 in 100 year event (a pump station large enough to manage this volume of sewer surcharging would not be economically viable).

The area south of Limehouse Cut was modelled with less than 10% of the existing Thames Water sewer network because of the low quality of the sewer asset data of the area. In comparison, the rest of the borough was modelled with 80-90% of the combined sewer network included. While this initially raised concern on the reliability of the model results for the new identified CDAs, which are all south of Limehouse Cut, the study concluded that the integrated model provided the best representation of the area, and that the representation of minor sewers would not have an impact on the general flood pattern in extreme flood events because the sewer capacity would be exceeded quickly.

4 Mitigation of Flood Risk

The LLFAs are now designated as a statutory consultee on surface water management for all major planning applications. We are required to review the surface water drainage proposals for major developments in accordance with the London Plan and the Non-Statutory Technical Standards for Sustainable Drainage Systems. This strengthens the requirement for new developments to incorporate SuDS to help reduce the risk of surface water flood risk to and from the sites, and should include the provision of long term maintenance plans and procedures.

The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these are expected to be applied, and is supported by the Planning Practice Guidance (PPG). It constitutes guidance for Local Planning Authorities to develop policies to manage flood risk from all sources, taking into account advice from the Environment Agency and other relevant risk management bodies.

The NPPF is clear that development should not make flood risk worse elsewhere and inappropriate development in areas at risk of flooding should be avoided. Local Plans therefore must take into account the NPPF and PPG in the preparation of Local and Neighbourhood Plans and makes flood risk a material consideration in planning decisions. Tower Hamlets have applied this guidance to steer new development to areas at low risk of flooding through a sequential risk based approach.

LBTH undertake a number of workstreams to mitigate and manage the risk of local flooding. The key strategic roles can be categorised as**:**

- Creation of Critical Drainage Areas (CDAs)
- Incorporation of sustainable drainage systems (SuDS) and update of local planning policies where necessary
- Working with partners in flood risk mitigation
- Emergency response to flooding

These practices to mitigate the local flood risk are summarised in this section. Possible further mitigation measures are also included.

4.1 Creation of Critical Drainage Areas (CDAs)

The 2017 surface water study improved the understanding of surface water flood risk within Tower Hamlets and identified five CDAs. This built upon the earlier Surface Water Management Plan (see section 3.3.3) and the results of the 2017 study will aid the LLFA in developing new policies and intervention.

4.1.1 Possible Interventions

In the five CDAs, the majority of the local drainage network is made up of combined sewers. Combined sewers take both surface water runoff and foul water from properties. Once surface water enters such a network, it becomes contaminated and cannot be stored or managed via any Sustainable Urban Drainage Systems (SuDS). Combined sewers typically have insufficient capacity for large rainfall events, therefore strategically placed SuDS features such as raingardens, permeable paving and green or blue roofs can help remove and/or reduce surface water runoff before it enters the network. This reduces the amount of runoff getting into the combined system, reducing treatment costs, and helps alleviate the overcapacity issues of the system.

The surface water modelling undertaken has considered the impact Abbey Mills has on the areas south of Limehouse Cut. The study concluded that even by increasing the capacity at Abbey Mills the five CDAs would still be at risk of flooding.

The surface water study also concluded that due to the space constraints within the study area, potentially affected properties could be best protected by raising kerbs, fitting property level protection, and increasing the amount of SuDS features being constructed, for example raingardens and permeable paving. To reduce the pressure on the overall network, new developments within CDAs will be required to adopt flood risk mitigation measures including SuDS. In areas of higher flood risk the greater importance of SuDS should warrant further consideration.

The Thames Estuary TE2100 Plan, which seeks to manage tidal risk to end of the century and beyond, will also continue to be implemented. This will be more achievable as opportunities arise to improve flood defences in the borough through flood risk resilient developments.

4.1.2 Flood Mapping

The Environment Agency, through close working with Lead Local Flood Authorities, has a duty to produce flood risk and flood hazard maps under the Flood Risk Regulations 2009. The Risk of Flooding from Surface Water (RoFSW) map represents the best available information on surface water flood risk for the borough. Over time it is LBTH's intention to incorporate its more refined and realistic localised mapping into this national dataset. The outputs of the surface water modelling study undertaken by LBTH will be provided to the Environment Agency to update future versions of the RoFSW thus providing the most up to date information on flood risk for the borough.

4.1.3 London Borough of Tower Hamlets SFRA

A Strategic Flood Risk Assessment (SFRA) provides information relating to flood risk from all sources in the borough. New fluvial flood risk modelling has recently been completed for the River Lee, and new tidal breach data has been released which takes into account Thames Estuary 2100 Plan. Alongside the most recent version of the RoFSW mapping, and to support the preparation of a new Local Plan (which currently in consultation phase), LBTH undertook a new Level 1 and Level 2 SFRA in 2016. This forms part of the evidence base for the new Local Plan and takes into account the new modelling and impacts of climate change, thereby providing an up to date assessment of the flood risks within the borough.

4.1.4 Flood Incident Register

Since 2010, LBTH has maintained a detailed flood incident register. The register is designed to record all flooding incidents in the Borough, and is available to view on LBTH's web page.[11] The flood incident register will record instance of flooding where appropriate.

Two flood incidents (at Tredegar Road and Coate Street) have been recorded in the Borough since the introduction of the 2010 Act. Both incidents were surface water flooding which occurred in summer 2014 and were caused by an excessive amount of water surpassing the gully capacity and blocked gullies. Both lasted for one hour and resulted in flooding of approximately 30cm and 3cm depths respectively.

It is vital to collect and record detailed information when flood incidents occur. Flooding in this context is defined as an inundation by water that causes damage to property or disruption to services. Recording flood incidents enhances understanding of flood risk and can be used to validate and improve models. Through the detailed investigation and recording of flooding incidents, areas which are susceptible to flooding can be identified and alleviation measures can be taken where deemed most necessary.

[11] https://www.towerhamlets.gov.uk/lgnl/environment_and_planning/flood_risk_management.aspx

4.1.5 Flood Incident Investigations

The Flood and Water Management Act 2010 requires LLFAs to investigate reported flood incidents to the extent it considers necessary or appropriate. LBTH will carry out an investigation and prepare a report where 'significant' flooding occurs. The Council considers 'significant' flooding as:

- highway flooding which requires a temporary road closure
- property flooding which occurs more than once within a year

4.1.6 Asset Register

As part of the Flood and Water Management Act (2010) all LLFAs have a duty to maintain an Asset Register. The register lists all structures which are considered significant flood risk management assets. Through the population of the register, LBTH is able to highlight these structures as key infrastructure relating to flood risk and increase the inspection rate accordingly as deemed necessary.

It is up to individual LLFAs to define what a significant flood risk management asset is. LBTH considers any asset that has the potential to cause flooding through individual failure to be significant. Therefore, large assets such as pumping stations are considered to be significant whereas individual highway gullies are not. However, LBTH is focused on repairing highway drainage systems and all highway gullies are cleaned annually. Those within Town Centres or sensitive areas, such as market places, are cleaned on a quarterly basis. Records of cleansing and repairs are kept for each gully to aid the identification of areas which may have recurring problems requiring further investigation.

LBTH has worked closely with other London Drainage Engineers Group (LoDEG) members to develop new web-based software, known as FloodStation, for the asset register duty. This system allows LLFAs to record information about assets and significant flood incidents. FloodStation is currently being reviewed by LoDEG and once the conclusions have been given LBTH may use it to hold further drainage asset information.

Monitoring the condition of significant flood assets enables LBTH to identify and manage risks and prioritise resources effectively, consequently reducing risks to communities, property and infrastructure.

Maintenance of flood risk management assets is the responsibility of the asset owner. Some Main River assets may have an established inspection regime that is overseen by the Environment Agency. We will work with the EA to implement the TE2100 Plan to improve flood risk management assets through the planning process and otherwise.

4.2 Incorporation of Sustainable Drainage Systems (SuDS) and update of local planning policies where necessary

Sustainable Drainage Systems (SuDS) are a modern way of dealing with surface water run-off, with the aim of mimicking natural drainage, thus relieving the pressure on the sewer system and consequently mitigating flood risk.

Individual SuDS cannot be expected to provide significant relief to major flooding. However, they provide a means to capture surface water where it falls and prevent it from contributing to overwhelming of the sewerage system or to flooding in low-lying areas downstream. LBTH is playing its part in building a stock of SuDS in the borough focusing on where they can be most effective and/or where they can be delivered most efficiently.

LBTH has a policy of installing SuDS in the Public Realm and along the Public Highway to absorb surface water and has been a lead borough in their installation on roads. To date there have been multiple SuDS schemes in the

borough led by LBTH on the Public Highway including, rain gardens and tree pits on Bethnal Green Road, Grundy Street and Bygrove Street together with an innovative SuDS scheme on Derbyshire Street which encompasses six SuDS, rain gardens tree pits, small scale green roofs, attenuation rain water planters, permeable paving and a swale (Figure 4.1).

Figure 4.1 – Examples of SuDS in Tower Hamlets

Swale, Derbyshire Street

Permeable Paving, Derbyshire Street

Green Roof Shelter, Derbyshire Street

Stockholm Tree Pits, Bethnal Green Road

LBTH will focus on installing SuDS in highways in relatively low-lying basins where surface water tends to pool and will also take the opportunity to install them where other work on the highways is already taking place and where SuDS can thus be installed relatively cheaply. This work will continue in the coming years, with the aim of making SuDS in highways schemes normal, not novel, practice. These works will be funded through Section 278 and 106 agreements and (when implemented) the Community Infrastructure Levy (CIL). Where general highway maintenance, major planned highways works and greening of streets is taking place, such as tree planting, the use of SuDS will be considered.

New development also provides the opportunity to reduce flood risk by implementing SuDS as effective drainage is an integral part of flood risk management. LBTH's Managing Development Document (MDD) includes policies that require new developments to reduce water usage, runoff and discharge from the site through the use of SuDS techniques. This policy is further supported by the London Plan and NPPF. LBTH has also produced a SuDS guidance document which provides further information regarding the use of SuDS, with specific reference to local geographical conditions.

There are multiple additional benefits of using SuDS rather than conventional drainage systems, such as the creation of green space and green corridors, improved biodiversity, improvements in water quality and air quality, to name but a few. The use of SuDS is not only linked to flood risk but also other LBTH strategies and London wide documents, listed in Table 4.1.

The Tower Hamlets SuDS Guidance has been produced in response to the unacted Schedule 3 of the Flood and Water Management Act (2010) and the increasing use of SuDS by LBTH and developers. The document was created in house with technical expertise sought from Sustainability Centre at The University of East London. The guidance not only provides the legislative background on flood management but also outlines six key SuDS features that are highly applicable for use within the borough; these are green roofs and small scale green roofs, engineered tree pits, rain gardens, swales, attenuating planters and permeable/porous paving. Additionally, the guidance also has information on calculating the water storage capacity of SuDS.

Table 4.1 Additional SuDS Guidance

Document	Link
The Tower Hamlets Local Biodiversity Action Plan	http://www.towerhabitats.org/archive/5/Tower%20Hamlets%20Local%20Biodiversity%20Action%20Plan%202014-19.pdf
Tower Hamlets Local Plan (New Local Plan currently under consultation)	http://towerhamlets-consult.objective.co.uk/portal/planning/newlp/nlpr18/reg18
The Mayors for London's Air Quality Strategy (2010)	https://www.london.gov.uk/sites/default/files/air_quality_strategy_v3.pdf
London Environment Strategy - Draft for public consultation (2017)	https://www.london.gov.uk/WHAT-WE-DO/environment/environment-publications/draft-london-environment-strategy-have-your-say
The London Plan	https://www.london.gov.uk/sites/default/files/the_london_plan_2016_jan_2017_fix.pdf
LBTH SuDS Guidance	http://www.towerhamlets.gov.uk/Documents/Environmental-protection/Monitoring/LBTH-SuDS-Guidance-up-to-date.pdf

4.3 Working with Partners in Flood Risk Mitigation

Partnership working is required to manage the risk of flooding within the borough. It is important as collaborative working is maintained to tackle the risk effectively.

Table 4.2 Partners in flood risk mitigation

Partner	Collaborative Actions
Tower Hamlets Council	There are regular meetings of the Flood Group comprising of Tower Hamlets officers who work on planning policy and on development control, environmental health, emergency planning, and highways implementation together with an officer from Environment Agency. We discuss and monitor progress on the implementation of the Surface Water Management Plan and the SuDS Guidance document.
Neighbouring Boroughs	Tower Hamlets officers meet with officers from the London Boroughs of Newham, Hackney, Waltham Forest, Haringey and Enfield, along with representatives of Thames Water and the Environment Agency in Drain London Group 4 meetings. These are used to share joint responsibility for issues within the Lea Valley catchment but also to provide a forum for peer support to tackle more effectively duties and problems that are common to all boroughs. On a London-wide level, we attend Drain London meetings and LoDEG to share knowledge, solutions and work.
Transport for London (TfL)	Within the borough, we work with partners who also have clear responsibility for mitigating flooding and its impact. Transport for London has responsibility for dealing with the flooding that is predicted to occur on their property, for example, in subways, along the Red Route Network and railway cuttings. We have made them aware of the CDAs in which this is an issue and we await their advice to us of their proposed action.
Statutory Undertakers	Statutory undertakers have been asked of the impact of flood water on their equipment and service delivery. They have been requested to advise LBTH of the measures they have to protect their services and/or what they will do if it's damaged by flooding.
The Environment Agency	The Environment Agency has a strategic overview of all sources of flooding and coastal erosion (as defined in the Flood and Water Management Act 2010). This includes setting the direction for managing the risks through strategic plans; providing evidence and advice to inform Government policy and support others; working collaboratively to support the development of risk management skills and capacity and providing a framework to support local delivery. Working in partnership with the Met Office, the Environment Agency aids in providing flood forecasts and warnings. It must also look for opportunities to maintain and improve the environment for people and wildlife while carrying out all of its duties. It has powers to undertake maintenance, carry out improvement works and to issue consents for 3rd party works. However, it only has a duty to carry out maintenance on its own structures. Responsibility for watercourse and defence maintenance generally rests with the riparian owner. In Tower Hamlets the Environment Agency is responsible for managing, inspecting and maintaining in

Partner	Collaborative Actions
	emergencies the Rivers Thames and River Lee.
Canal and River Trust	The Canal and River Trust (C&RT) are responsible for the Limehouse Cut, Lee Navigation, Hertford Union Canal and Regents Canal. The Limehouse Cut and Lee Navigation are classified as main rivers; however, they are owned and maintained by the C&RT.
Thames Water	Thames Water has a major role in flood mitigation as the organisation is responsible for the operation and maintenance of the sewerage system that transports away waste water and surface water.
Private Sector and Housing Associations	We have yet to identify any private sector partners who have a role in flood mitigation but expect that this will happen when we identify specific properties that need protection and thereby have specific landowners and property occupiers with whom to work. Tower Hamlets officers meet with Housing Associations annually to share new information on flood risk and the implementation of SuDS throughout the borough

4.4 Emergency Response to Flooding

Under the requirements of the Civil Contingencies Act 2004, the Council is responsible for preparing plans for emergency response and business continuity.

Table 4.3 Emergency response actions

Plan	Actions
Multi - Agency Flood Plan	Tower Hamlets Council aims to take action before, during and after flooding in order to mitigate the effects of a flooding event, a framework for which is set out in the Multi-Agency Flood plan. The Multi-Agency Flood Plan allows responding parties to work together in a coordinated manner. The document is prepared by Tower Hamlets Council in partnership with local, external agencies. The plan is currently under review.
Communications	There are a number of ways flood warnings are communicated to residents and businesses. The Environment Agency offers a FloodLine Warnings Direct service for homes and businesses. Flood warning messages (SMS & voice) are sent out to phone numbers registered with this service. The Met Office in partnership with the Environment Agency issue flood guidance statements to category 1 and 2 responders. The council will assist with the dissemination of Environment Agency flood warnings where appropriate. Wherever possible, Council staff will assist the Police, and agencies, in warning the public living or working within the areas likely to be affected. This will include giving advice, assistance and directions regarding the location of any premises that has been opened to provide advice and/or shelter and other facilities. The Council will assist the emergency services with the evacuation of residents from areas that are likely to be, or have already been flooded; where necessary the Council will identify evacuation points where residents may be collected for onward transport to evacuation centres within or outside of the borough. The Council also provides up to date information via its website and the local press to keep residents and businesses informed

Plan	Actions
Emergency Flood Defence Measures	The Council will take action in response to triggers identified in the Multi-Agency Flood Plan. Where properties or business are threatened by flooding, the Council will consider what level of assistance it is able to provide. Tower Hamlets Council maintains a limited supply of flood bags for the purpose of protecting critical infrastructure.

5 Objectives for Managing Local Flood Risk

As per the Flood and Water Management Act 2010 a series of objectives have to be developed to manage local flood risk and the measures to achieve those.

The objectives developed are to be consistent with the following Environment Agency National Flood and Coastal Erosion Risk Management Strategy.

5.1 National Flood Risk Management Objectives

- **Understand the risks -** understanding the risks of flooding and coastal erosion, working together to put in place long-term plans to manage these risks and making sure that other plans take account of them;
- **Prevent inappropriate development** - avoiding inappropriate development in areas of flood and coastal erosion risk and being careful to manage land elsewhere to avoid increasing risks;
- **Manage the likelihood** - building, maintaining and improving flood and coastal erosion management infrastructure and systems to reduce the likelihood of harm to people and damage to the economy, environment and society;
- **Help people to manage their own risk** - increasing public awareness of the risk that remains and engaging with people at risk to encourage them to take action to manage the risks that they face and to make their property more resilient;
- **Improve flood prediction, warning and post flood recover** - improving the detection, forecasting and issue of warnings of flooding, planning for and co-ordinating a rapid response to flood emergencies and promoting faster recovery from flooding.

5.2 Local Flood Risk Management Strategy Objectives

The following Strategy objectives are developed based on our knowledge on the local flood risks and in line with the national flood risk management objectives as required by the Act to effectively manage flood risk.

1. **Improve knowledge and understanding of flood risk within the borough -** To provide up to date information on the levels of flood risk in Tower Hamlets taking into account the impacts of climate change.
2. **Maintain flood risk management and drainage assets -** Actively maintain and manage flood risk management and drainage assets following best practice principles to reduce the risk of flooding.
3. **Deliver sustainable drainage systems –** To continue to promote and implement sustainable drainage systems in the public realm to mitigate the risk of flooding and attain wider benefit.
4. **Ensure new developments reduce the risk of flooding -** Ensure new development is safe from flooding and does not increase flood risk elsewhere.
5. **Work with Risk Management Authorities and partners to manage flood risk -** To work collaboratively with Risk Management Authorities and partners to manage flood risk effectively though coordinated action.
6. **Respond effectively to flooding emergencies -** To respond effectively in the event of a flooding emergency.

Risks and barriers to achieve the objectives:

It is considered that the following may pose significant risk to the achievement of the objectives:

- Significant reduction of the Flood Defence Grant in Aid (FDGiA) and/or annual LLFA Revenue Support Grant funding from DEFRA and DCLG respectively.
- Significant increase in the demand for planning application assessments.

LBTH will closely monitor the situation to respond to any significant changes.

5.3 How the Objectives will be Achieved

The table below details the local objectives and associated measures that will be progressed by LBTH.

It is important to note that managing flood risk requires a multi-agency response and not all actions fall under the responsibility of LBTH, and in many cases partner organisations will play an important role.

Table 5.1: Local Objectives and associated measures

Objective	Measures	Lead	Timeframe	Cost	Benefits	Funding
Improve knowledge and understanding of flood risk within the borough	Improve our understanding of flood risk within the borough by undertaking detailed modelling so that Critical Drainage Areas are accurately identified along with the nature and extent of the flood risk and to identify potential areas where schemes could be developed to reduce flood risk	Highways Asset Management	Ongoing	10k-100k	Develop effective flood mitigation schemes	Drain London LLFA FDGiA Local Levy
	Provide the Environment Agency with outputs from local studies to update Risk of Flooding from Surface Water mapping	Highways Asset Management	2017- 2018	0-10k	Make up to date information available to Flood Risk Management partners to aid public mapping data	LLFA
	Investigate and record details of flood incidents to improve understanding and	Highways Asset Management	Ongoing	0-10k	Better validation of surface water flood studies and	LLFA

Objective	Measures	Lead	Timeframe	Cost	Benefits	Funding
	build-up an evidence base				investigations	
	Provide up to date information regarding the level of flood risk within Tower Hamlets taking account of emerging climate change impacts by publishing flood risk data on the Council website where appropriate	Highways Asset Management	2018	0-10k	Develop schemes resilient to climate change impacts on local flood risks	LLFA

Objective	Measures	Lead	Timeframe	Cost	Benefits	Funding
Maintain flood risk management and drainage assets	Maintain highway drainage assets, through a cyclical cleansing programme and gully repair programme.	Highways Asset Management	Ongoing	10k-100k	Reduce the amount of flooding due to blocked or broken drainage assets	LLFA & Highways Asset Management
	Carry out planned maintenance of council owned assets	Highways Asset Management	Ongoing	10k-100k	Ensure asset functionality	LLFA & Highways Asset Management
	Review and maintain the flood risk management asset register	Highways Asset Management	Ongoing	0-10k	Increase maintenance frequency of key assets	LLFA
	Install additional road gullies or reprofile the road surface where such action would serve to reduce flooding on the highway.	Highways Asset Management	Ongoing	10k-100k	Reduce flooding on highways and the occurrence of road closures	LLFA & Highways Asset Management

Objective	Measures	Lead	Timeframe	Estimated Cost (£)	Benefits	Funding
Deliver Sustainable Drainage Systems	Introduce SuDS into public highways, parks and other areas	Highways Asset Management	Ongoing	10k-100k	Potential to improve air and water quality, and provision of amenity, recreational and health benefits for the residents	LLFA
	Seek to include SuDS retrofitting policies to enhance or replace conventional drainage systems in LFRZs, or elsewhere as opportunities arise	Planning; Highways Asset Management	Ongoing	0-10k	Encourage the use of SuDS in private land	LLFA
	Review SuDS Guidance Document in light of new legislation and updates	Highways Asset Management	2018	0-10k	Developers have the most up to date guidance to aid the incorporation of SuDS in new developments	LLFA

Objective	Measures	Lead	Timeframe	Cost	Benefits	Funding
Ensure new developments reduce the risk of flooding	Apply the National Planning Policy Framework (NPPF) and technical guidance on flood risk and related policies in the Local Plan. Ensuring developments is steered towards	Planning; Highways Asset Management	Ongoing	0-10k	Protect residents and businesses from flooding through flood resilient redevelopment	Planning

Objective	Measures	Lead	Timeframe	Cost	Benefits	Funding
	low risk areas and complies with the sequential and exception test.					
	Continue to fulfil LLFA statutory consultee role on planning applications	Highways Asset Management	Ongoing	10-50k	Ensure new development reduces the risk of flooding and does not increase risk anywhere else through the promotion of SuDS	LLFA Planning
	Seek and promote opportunities in conjunction with the EA within all pre-application meetings, Masterplans and Area Action Plans to integrate fluvial and surface water flood risk reduction measures	Planning; Highways Asset Management	Ongoing	0-10k	Encouragement of flood alleviation measures from borough-wide plans to smaller planning applications	LLFA Planning
	Developments across the borough to include SUDS measures, resulting in a net improvement in water quantity and quality in accordance with local and national planning policies	Planning; Highways Asset Management	Ongoing	0-10k	Improvement in water quality with additional amenity and health benefits	LLFA

Objective	Measures	Lead	Timeframe	Cost	Benefits	Funding
	Implement the Environment Agency TE2100 Plan to improve or maintain tidal defences through the planning process.	Planning; Highways Asset Management	Ongoing	10k-100k	Protect vulnerable assets from the risk of tidal flooding	EA Land Owner

Objective	Measures	Lead	Timeframe	Cost	Benefits	Funding
Working with Risk Management Authorities and Partners to manage flood risk	Hold regular Flood Group Meetings	Highways Asset Management	Ongoing	0-10k	Opportunity to share flooding information, case studies and updated policies	LLFA
	Work in partnership with neighbouring boroughs as part of Drain London to form a coordinated London wide holistic approach to flood risk management	Highways Asset Management	Ongoing	0-10k	More opportunities for flood defence schemes in partnership with neighbouring boroughs and better coordinated flood risk management	LLFA
	Work in partnership with Environment Agency to improve knowledge and understanding of levels of flood risk and implement Local and strategic flood alleviations schemes and bid for funding opportunities	Highways Asset Management	Ongoing	0-10k	More funding opportunities for flood defence schemes	LLFA

Objective	Measures	Lead	Timeframe	Cost	Benefits	Funding
	Engage with partners to share information on local flood risk. Discuss opportunities to reduce the likelihood of flooding	Highways Asset Management	Ongoing	0-10k	Better access to up to date information and greater potential for new flood defence opportunities	LLFA

Objective	Measures	Lead	Timeframe	Cost	Benefits	Funding
Respond effectively to flooding emergencies	Encourage residents and business in flood risk areas to sign up to the Environment Agency Flood Warnings Direct Service	Category 1 and 2 responders	Ongoing	0-10k	The public is kept informed on flood warnings and can use property level protection more efficiently	Local Revenue
	Review the Multi–Agency Flood Plan	Category 1 and 2 responders	Ongoing	0-10k	Ensure the protection of residents, properties and the environment	Local Revenue
	Apply the emergency response measures described in the Multi-Agency Flood Plan	Category 1 and 2 responders	Ongoing	10k-100k	Ensure the protection of residents, properties and the environment	Local Revenue

5.4 Environmental Benefits

The Strategy is likely to have a positive impact on the environment in the borough. While the main purpose is to provide guidance to manage flood risk, any action derived from the Strategy will have a positive or neutral effect on the environment.

The third objective is to deliver and promote the use of SuDS features. SuDS can provide new green spaces within the borough, resulting in new local amenity spaces and health benefits for the residents as well as environmental benefits such as air quality and biodiversity improvements. SuDS can improve the water quality by filtering runoff

from impermeable areas. This will reduce the pollution load and will lower the occurrence of combined sewer overflows into the River Thames by alleviating the capacity pressures on the local sewer network.

Understanding the flood mechanisms within the borough (objective 1) and working with Risk Management Authorities and partners (objective 5) will enable the LLFA to develop efficient schemes and solutions that can protect the environment, residents and properties. Ensuring new development reduces the risk of flooding to and from a site (Objective 4) will reduce the occurrence of manhole surcharges by reducing the capacity on the sewer network.

A Strategic Environmental Assessment Scoping Report and a Habitats Regulations Screening Assessment have been produced alongside this Strategy to assess its potential impact upon the environment and protected Natura 2000 sites.

6 Funding and Resources

LBTH, as Lead Local Flood Authority, will be implementing this strategy. The Government committed funding annually to support LLFA in their new flood management roles up to 2019. In taking forward flood management activities LBTH will aim to secure new sources of funding to continue LLFA activities

Some actions will require additional funding for staff resources, expert consultancy works and project funding. External funding sources will be utilised where available:

- Funding can be obtained from Defra's Flood Defence Grant in Aid (FDGiA) and the Thames Regional Flood and Coastal Committee's local levy Thames Region Flood & Costal Committee (RFCC) funding is allocated to flood mitigation projects with local importance. The money is gained through a levy on Council Tax payers, and then administered by the RFCC, each year £10.5m is administered across the River Thames catchment. More information on this can be found at https://www.gov.uk/government/groups/thames-regional-flood-and-coastal-committee.
- Thames Water Utilities can fund flood alleviation works on the sewer network where the appropriate criteria are fulfilled.
- Utility companies and property owners are responsible for site specific flood risk alleviation, resistance and resilience of their premises.
- Developers are required to ensure that flood risks are addressed and to implement SuDS as part of new developments, contributions to flood alleviation schemes can be achieved through Community Infrastructure Levy payments or Section 106 agreements.

The long term plan for mitigating flood risk in CDAs is to seek funding from the Flood Defence Grant in Aid (FDGiA). As the integrated surface water modelling of Tower Hamlets is still ongoing, preliminary FDGiA proposals include:

- Carry out a level survey and identify which low kerbs and properties will be flooded.
- Identify where we can store dirty water in the highway through raising kerb heights
- Identify which manhole covers should be bolted down
- Identify suitable means of property level protection
- Estimate costs of the above

How will flood risk management schemes be prioritised?

The local flood risk varies across the borough. Responding to flooding incidents is given the first priority in the local flood risk management schemes followed by preventative measures. The priorities are:

1. Schemes in response to reports of flooding incidents from residents and businesses
2. Ongoing programme of drainage improvement and maintenance schemes
3. Installation of SuDS on the public Highway, parks and work with housing authorities and other bodies to have SuDS installed elsewhere in the public realm and private property.

7 Monitoring and Review

Monitoring

Implementation of the Strategy will be overseen by the LBTH Flood Group. The Flood Group includes representation from planning policy, development control, environmental health, emergency planning, and Highways teams together with an officer from the Environment Agency.

Review

The Strategy is a living document which will be updated to reflect advances in understanding and assessment of flood risk and associated policies at national, regional and local levels. Therefore, the Strategy will be reviewed and updated each year internally and every six years publicly.

Date to be reviewed	Reviewed by
December 2018	
December 2019	
December 2020	
December 2021	

8 References

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National Flood and Coastal Erosion Risk Management Strategy, Defra/Environment Agency (2011)

London Borough of Tower Hamlets (2017), Preliminary Flood Risk Assessment (PFRA)

London Borough of Tower Hamlets (2011), Surface Water Management Plan (SWMP)

London Borough of Tower Hamlets (2016), Strategic Flood Risk Assessment (SFRA)

London Borough of Tower Hamlets (2017), Local Plan (Currently under consultation)

9 Glossary

Critical Drainage Area (CDA)	A discrete geographic area (usually a hydrological catchment) where multiple and interlinked sources of flood risk (surface water, groundwater, sewer, main river and/or tidal) cause flooding in one or more Local Flood Risk Zones during severe weather thereby affecting people, property or local infrastructure.
Environment Agency (EA)	The Environment Agency is the leading public body for protecting and improving the environment in England and Wales today and for future generations. The organisation is responsible for wide-ranging matters, including the management of all forms of flood risk, water resources, water quality, waste regulation, pollution control, inland fisheries, recreation, conservation and navigation of inland waterways. It will also have a new strategic overview for all forms of inland flooding.
Flood	Land that is not normally covered by water becomes covered by water, this does not include a flood from a sewerage system unless sewerage volume increased by precipitation or a flood caused by a burst water main
Flood Risk	A risk in respect to a flood
Flood and Water Management Act (2010)	The Flood and Water Management Act implements the recommendations of the Pitt Review and places new responsibilities on upper tier and unitary authorities as a 'Lead Local Flood Authority'
Flood Defence Grant in Aid (FDGiA)	Grant in Aid funding is provided by Defra to the Environment Agency to invest in flood risk management schemes.
Fluvial flooding	Flooding from rivers.
Groundwater	Groundwater is the term used to describe the water stored underground in areas of permeable rocks, known as aquifers. Consistently high levels of groundwater can lead to groundwater flooding.
Highway Authority	As described in Section 1 of the Highways Act (1980) [2]
Lead Local Flood Authority (LLFA)	Lead Local Flood Authorities are unitary authorities or County Councils, and have been established as part of the Flood and Water Management Act. LLFAs are responsible for leading the co-ordination of flood risk management in their area, but can delegate flood or coastal erosion functions to another risk management authority by agreement.
Main River	A watercourse shown as such on the Main River Map, and for which the
Preliminary Flood Risk Assessment (PFRA)	A high-level study of the flood risk to the borough from all sources using all available information past and present.
Resilience Measures	Resilience measures are designed to reduce the impact of water that enters property and businesses, and could include measures such as raising electrical appliances.
Risk	Assessment of the probability and occurrence of an event, assessed with its potential consequence
Risk Management	Includes anything done for the purpose of analysing, assessing or reducing a risk
RoFfSW	The Environment Agency's updated Flood Map for Risk of Flooding from Surface Water.
RoFfRS	The Environment Agency's updated Flood Map for Risk of Flooding from Rivers and Sea

Strategic Flood Risk Assessment (SFRA)	A SFRA provides information on areas at risk from all sources of flooding. The SFRA should form the basis for flood risk management decisions, and provides the basis from which to apply the Sequential Test and Exception Test (as defined in the National Planning Policy Framework) in development allocation and development control process.
Surface Water Management Plan (SWMP)	Extends the scope of the PFRA by assessing options for reducing flood risk and sets out an Action Plan for future work.
Sustainable Urban Drainage Systems (SuDS)	Sustainable drainage systems or sustainable (urban) drainage systems: a sequence of management practices and control measures designed to mimic natural drainage processes by allowing rainfall to infiltrate and by attenuating and conveying surface water runoff slowly compared to conventional drainage. SUDS can operate at different levels; ideally in a hierarchy of source control, local control and regional control.

Appendix A: Legislative Context

Flood and Water Management Act 2010

Section 9 of the FWMA (2010), states that each Lead Local Flood Authority in England must produce a document to show how local flood risk will be managed within the area. Below is Section 9 from the FWMA (2010). Sub section 4 specifies what the strategy must cover.

9. Local flood risk management strategies: England

(1) A lead local flood authority for an area in England must develop, maintain, apply and monitor a strategy for local flood risk management in its area ("local flood risk management strategy").

(2) In subsection (1) "local flood risk" means flood risk from—

(a) surface runoff,

(b) groundwater, and

(c) ordinary watercourses.

(3) In subsection (2)(c) the reference to an ordinary watercourse includes a reference to a lake, pond or other area of water which flows into an ordinary watercourse.

(4) The strategy must specify—

(a) the risk management authorities in the authority's area,

(b) the flood and coastal erosion risk management functions that may be exercised by those authorities in relation to the area,

(c) the objectives for managing local flood risk (including any objectives included in the authority's flood risk management plan prepared in accordance with the Flood Risk Regulations 2009),

(d) the measures proposed to achieve those objectives,

(e) how and when the measures are expected to be implemented,

(f) the costs and benefits of those measures, and how they are to be paid for,

(g) the assessment of local flood risk for the purpose of the strategy,

(h) how and when the strategy is to be reviewed, and

(i) how the strategy contributes to the achievement of wider environmental objectives.

(5) The strategy must be consistent with the national flood and coastal erosion risk management strategy for England under section 7.

(6) A lead local flood authority must consult the following about its local flood risk management strategy—

(a) risk management authorities that may be affected by the strategy (including risk management authorities in Wales), and

(b) the public.

(7) A lead local flood authority must publish a summary of its local flood risk management strategy (including guidance about the availability of relevant information).

(8) A lead local flood authority may issue guidance about the application of the local flood risk management strategy

Civil Contingencies Act 2004

Local authorities have 7 duties under the Civil Contingencies Act 2004:

- Assess the risk of emergencies occurring and use this to inform contingency planning
- Put in place emergency plans
- Put in place business continuity management arrangements
- Put in place arrangements to make information available to the public about civil protection matters and maintain arrangements to warn, inform and advise the public in the event of an emergency
- Share information with other local responders to enhance co-ordination
- Co-operate with other local responders to enhance co-ordination and efficiency
- Provide advice and assistance to businesses and voluntary organisations about business continuity management.

Multi Agency Flood Plan

This document describes the roles of the different organisations involved in planning for and responding to severe flood incidents.

National Planning Policy Framework

The National Planning Policy Framework (NPPF) was introduced in 2012 and provides Government guidance on planning. It includes national flood risk policies that describe how flood risk is managed in relation to new development.

Appendix B: Maps

Map 1: Detailed River Network
Map 2: Flood Map for Planning
Map 3: Risk of Flooding from Rivers and Sea
Map 4: Risk of Flooding from Surface Water
Map 5: Surface Water Study Model Results