LOCAL FLOOD RISK MANAGEMENT STRATEGY

Project no. 4021383

Prepared for:

London Borough of Havering

Date: April 2025

Havering
LONDON BOROUGH

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Details of document preparation and issue:

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1. Non-technical Summary

A Local Flood Risk Management Strategy sets out the risk of flooding in the Borough and the actions that the Council and other partner organisations such as the Environment Agency, Water Companies and Highways Authorities plan to take to manage the risk. It sets out:

- The roles and responsibilities different organisations have for managing the risk of flooding.
- Links to other relevant regional and national flood management documents.
- An overview of the sources and level of flood risk in the Borough.
- Objectives to manage the risk of flooding.
- An Action Plan that will be monitored and reported against.

The Local Strategy focuses on the risk of flooding from smaller (known as ordinary) watercourses, surface water (the overland runoff after heavy rainfall) and groundwater. The Council have also produced a supporting Surface Water Management Plan that covers the risk of flooding from these sources in more detail that has informed this Local Strategy.

The objectives for the Strategy reflect the Council's priorities. They are:

- To increase awareness of flood risk in the Borough with internal and external stakeholders and members of the public.
- To work with Local Resilience Forum partners, businesses and residents to improve our preparedness, resilience, and response to flood events.
- To take a risk-based and affordable approach to managing flood risk across the Borough.
- To work together with internal and external stakeholders to manage flooding from all sources in the Borough.
- To increase understanding internally and externally of the Lead Local Flood Authority role.
- To work with internal and external stakeholders to take a consistent and prioritised approach to managing drainage and flood risk assets in the Borough, with an emphasis to maintenance of existing drainage infrastructure, including watercourses.
- To deliver a prioritised programme of works to alleviate flooding, including natural flood management measures.
- To embed actions to reduce flood risk into our approach to manage the highways network.
- To integrate policies and guidance to reduce flood risk through new development into our approach as a Local Planning Authority.

Havering has experienced flooding from watercourse, tidal, surface water, sewer, and groundwater sources. These sources interact in certain scenarios causing complex flooding. Surface water flooding is the most observed source of flooding in Havering, followed by sewer and fluvial sources. The least common source is groundwater flooding and there are no records of tidal flooding since 2007. An analysis of the flood risk in the borough was undertaken as part of the Surface Water Management Plan and it showed that, in the worst-case scenario, surface water flooding could affect over 24,000 properties in the Borough.

The Borough has 15 Critical Drainage Areas or areas where drainage issues could make them more vulnerable to flooding. These are in high to low priority order:

- 014 – River Rom and Beam River
- 036 – Ingrebourne
- 025 – Gallows Corner
- 023 – Elm Park
- 018 – Cranham
- 026 – Harold Hill North
- 005 – Ardleigh Green East
- 038 – Heath Park North
- 034 – Thames
- 040 – Harold Hill South
- 037 – River Ravensbourne
- 016 – Rise Park West
- 017 – Rise Park
- 039 – Heath Park South
- 015 – Havering Park

Workshops were held with other organisations during the development of the strategy. Informed by the analysis of flood risk, an Action Plan was developed with others which covers:

- Actions for the Critical Drainage Areas to target action where it can have the highest benefit.
- Boroughwide actions to reduce flooding in the Borough.

The accompanying Action Plan (see Appendix A) includes information about the activity, location, priority, cost, funding, estimated benefit and implementation (timing, responsibilities and key stakeholders). Review and monitoring information is also included.

Partnership working is key to deliver the measures in the Action Plan. The Council's Flood Management team will work with partners to monitor the plan and maximise the funding available and to bid for further funding as new projects and funding opportunities emerge.

The draft Local Flood Risk Management Strategy underwent public consultation in the autumn of 2024. An electronic consultation response form was available on the consultation webpage to allow consultees to provide their comments. The consultation form included questions on flood risk priorities and measures. It also provided an opportunity for the Council to engage with residents and businesses and to raise awareness for flood risk, responsibilities, funding, and competing priorities. The consultation responses were reviewed, and the Local Flood Risk Management Strategy and Action Plan updated accordingly. A Consultation Report which includes a summary of feedback received is published alongside the final document.

2. Introduction

2.1 What is a Local Flood Risk Management Strategy?

The London Borough of Havering (LBH) is a Lead Local Flood Authority (LLFA), as defined in the Flood and Water Management Act 2010 (FWMA 2010 2010). The LLFA manages local flood risk from surface water, groundwater, ordinary watercourses, and interactions with other local flood risk. The Local Flood Risk Management Strategy (LFRMS) is a statutory plan to manage flood risk that must be consistent with national strategy for flood and coastal erosion risk management.

Section 9 of the FWMA 2010[1] requires LLFAs to develop, maintain, apply, and monitor a strategy for local flood risk management (in LBH's case, for the borough[2]). The Strategy must be consistent with the national flood and coastal erosion management strategy and align with the Flood Risk Management Plan[3] (FRMP) prepared by the Environment Agency in accordance with the Flood Risk Regulations 2009[4]. The latest Flood Risk Management Plan (FRMP) was published in December 2022. The previous LFRMS for the Borough of Havering was published in 2015.

LFRMS should include information on the local flood risk, the risk management authorities in the area, and their functions. It should also explain the objectives for managing risk, the measures to meet the objectives and how they will be implemented, including funding. Finally, the strategy should include information on when it will be reviewed and how it will contribute to the achievement of wider environmental objectives.

2.2 Structure of the Strategy

The strategy provides an understanding of flood risk in LBH. It includes references to current legislation and the powers and responsibilities of stakeholders. The aims and objectives in the previous strategy have been reviewed alongside the measures broken down by categories. An Action Plan with the Surface Water Management Plan (SWMP) was developed to ensure integrated management of local flood risk. The strategy also includes information regarding implementation, monitoring and review of the Action Plan and strategy.

The LFRMS is structured as follows:

- Introduction: explains what the LFRMS is, its structure, and the review of the strategy.
- Methodology: explains the LFRMS requirements, the outputs from the gap analysis undertaken and how these outputs were addressed to fulfil the requirements. It also includes details about the Strategic Environmental Assessment (SEA) process that supported the LFRMS review.
- Understanding Flood Risk: explains the nature of flood risk in Havering, legislation and the powers and responsibilities of stakeholders.

[1] *Flood and Water Management Act 2010*, https://www.legislation.gov.uk/ukpga/2010/29/section/9

[2] Local Government Association, *Managing Flood Risk: Roles and Responsibilities*, https://www.local.gov.uk/topics/severe-weather/flooding/local-flood-risk-management/managing-flood-risk-roles-and

[3] *Flood Risk Management Plans 2021 to 2027* https://www.gov.uk/government/collections/flood-risk-management-plans-2021-to-2027

[4] *Flood Risk Regulations 2009* https://www.legislation.gov.uk/uksi/2009/3042/part/4/made

- Objectives and Measures: explains the aims, objectives and measures, and how they were developed.
- Action Plan: includes the information contained in the plan.
- Implementation, Monitoring and Review: covers the funding available to implement the Action Plan, how it will be monitored and the requirements for the review of the LFRMS.

2.3 Review of the Strategy

In 2023, Binnies were commissioned to assist LBH officers in their review of the LFRMS and SWMP and the implementation of the LLFA duties. The review followed methodology published by the London Government Association (LGA). The SWMP was reviewed at the same time to understand how flood risk knowledge had evolved since it was last published in 2013. It also defined the areas of the Borough more vulnerable to flooding and helped to develop boroughwide and area-specific measures to address flood risk. The SWMP findings were used as evidence base to support the review of the strategy.

3. Methodology

3.1 Local Flood Risk Management Strategies requirements

The requirements for the LFRMS are set out in section 9 of the FWMA 2010
"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."

3.2 Review methodology

The following steps were undertaken to review the previous 2015 strategy:

- **Working with other RMAs:** the Council and their consultants engaged with internal and external stakeholders to gather data, local knowledge and to discuss and agree priorities and objectives. Close partnership working will continue during the implementation and monitoring of the Action Plan.

- **Objectives:** the objectives of the previous LFRMS were reviewed and updated in agreement by with the Council and relevant stakeholders. They consider how flood risk knowledge evolved since the LFRMS was produced and how the LLFA duties have been implemented.

- **Wider issues and plans:** a thorough review of the changes in legislation, guidance and information was undertaken and linkages with relevant plans and strategies found. A Strategic Environmental Assessment screening report was produced to understand if an Environmental Assessment report was needed to support the review of the strategy.

- **Mapping and modelling updates:** the Surface Water Management Plan for Havering has been updated, using the latest flood map data, to identify communities within Havering that are most vulnerable to flood risk, called 'Communities at Risk'. This forms the evidence base for the LFRMS Risk Assessment and informs the Action Plan.

- **Measures, cost and benefits and prioritisation:** the measures included in the original SWMP and other flood risk plans were reviewed to understand their implementation status. New measures were developed through stakeholder engagement. As part of the detailed technical assessment carried out for the SWMP, these measures were prioritised, and their cost benefit analysed.

- **Progress review and monitoring:** the stakeholders reviewed the existing measures and their implementation. The LLFA agreed the process for progress review and monitoring of the Action Plan.

The diagram below sets out how these activities were interlinked throughout the review.

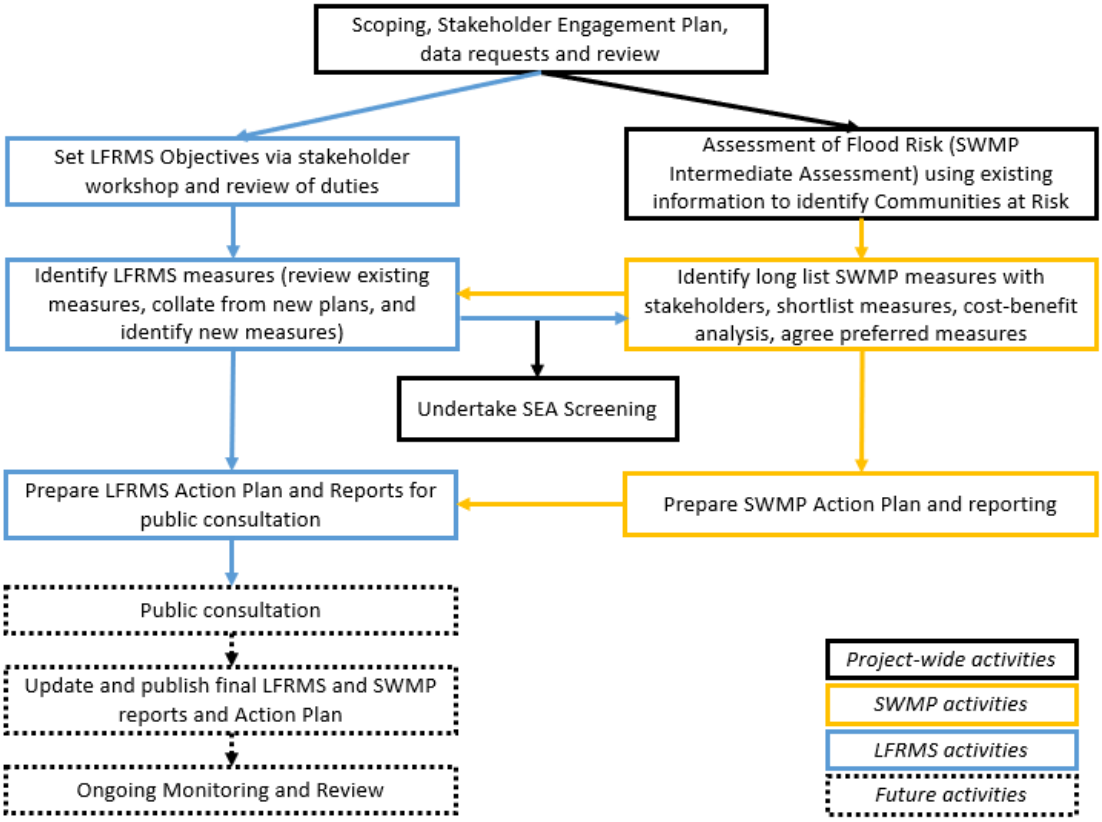

Figure 3.2-1: Steps for the LFRMS review

3.3 Strategic Environmental Assessment

Strategic Environmental Assessment (SEA) is a systematic process for identifying, reporting, proposing mitigation measures and monitoring environmental effects of plans, programmes and strategies. It aims to ensure that environmental issues are taken into account at every stage in the preparation, implementation, monitoring and review of plans, programmes and strategies of a public nature.

An SEA screening report was produced to identify whether the updates made to the LBH LFRMS will require a Strategic Environmental Assessment. The original 2015 LFRMS did not undergo SEA. The proposed Objectives and Measures for the updated LFRMS, the Action Plan, and the draft long list of actions considered for the review of the SWMP were reviewed for completeness. To aid integration, the Action Plan also refers to measures in the Flood risk Management Plans for England 2021 – 2027 second cycle (FRMP2) that are relevant to Havering. The Thames River basin district flood risk management plan 2021-2027 was adopted in

December 2022 after undergoing an SEA process[5] so the measures included from this plan were not considered further for the SEA. The outcome of the screening is that the proposed updated LFRMS does not need SEA on the basis that the strategy will not require an assessment under Article 6 or 7 of the Habitats Directive and will not set the framework for future development consents of projects.

The full screening opinion was published alongside the SWMP and LFRMS during the public consultation.

[5] Environment Agency, *Thames River Basin District Flood Risk Management Plan 2021 to 2027*, December 2022, https://www.gov.uk/government/publications/thames-river-basin-district-flood-risk-management-plan

4. Understanding Flood Risk

4.1 Flood risk management framework

Legislative, Policy and Guidance drivers

Flood risk management is regulated and implemented through a considerable series of national, regional, and local legislation, policy, guidance, strategies and plans. The aim of the regulative framework is to understand flood risk sources, flooding events and their effects to reduce their impact and/or to become more resilient and adaptive. Emergency management, land use and flood risk management are included in this framework as essential components to understand and address flood risk.

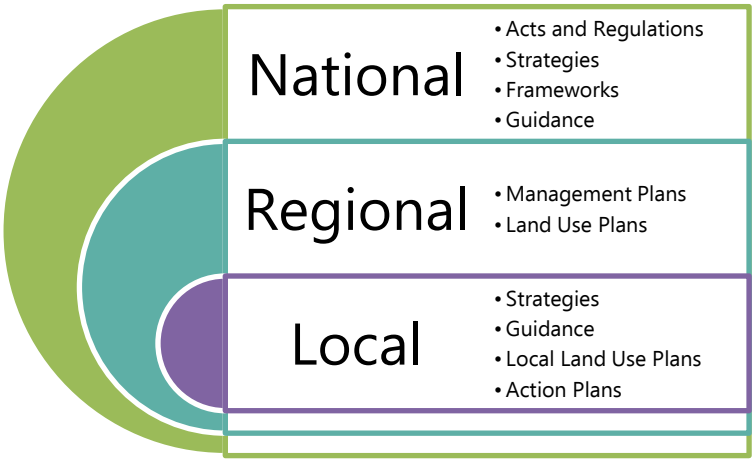

Figure 4.1-1: National, Regional and Local legislative, Policy and Guidance drivers for flood risk management

A description of the Flood risk legislation, policy, guidance, and current information, from local to national scale are described in the tables below. The rows shaded in grey in the table shows that the information has been updated since the LFRMS was first published in 2015. This new information was considered in the review of both, the strategy and the SWMP.

Figure 4.1-2: National flood risk management framework

National Legislation, Policy, Guidance & Information	Description
Flood and Water Management Act[6] 2010 (FWMA 2010)	Legislative framework to reduce flood risk from extreme weather linked to climate change. It created the role of a LLFAs. The government announced a consultation and review of the FWMA 2010 Schedule 3 with a likely implementation of 2025. The consultation and review will have implications in the LLFA statutory consultee role for surface water in the planning process

[6] *Flood and Water Management Act 2010*, https://www.legislation.gov.uk/ukpga/2010/29/section/9

National Legislation, Policy, Guidance & Information	Description
Flood Risk Regulations[7] (2009)	Implement the EU Floods Directive in England and Wales, providing a framework to assess and manage flood risk to reduce its impact.
Civil Contingencies Act[8] (2004)	It delivers a framework for civil protection in the UK allowing the UK government to make short notice changes to respond to emergencies.
National Flood and Coastal Erosion Risk Management (FCERM) Strategy[9] and Roadmap[10]	Developed by the EA to manage flood and coastal erosion risk in England. It sets out the objectives and measures to manage flood and coastal risk, how and when they should be implemented, and their costs and benefits and funding. The roadmap is a summary of the practical actions to implement the FCERM for England by 2026.
National Planning Policy Framework[11] and Planning Practice Guidance[12]	Sets out the national land use planning policies for England and how they should be applied. Government guidance which set out detailed expectations for managing flood risk through development and planning process.
Flood Risk Management Plans[13]	Statutory plan is required by the Flood Risk Regulations 2009. They are Strategic plans setting out how to work together to manage flood risk in England between 2021-2027.
Defra's Non-Statutory Technical Standards for Sustainable Drainage Systems (SuDS)[14]	Non-statutory technical standards for the design, maintenance and operation of sustainable drainage systems to drain surface water.
Climate Change Adaptation Plan[15]	Strategic approach produced by Defra to manage climate change risks through a wide range of different actions.

[7] *The Flood Risk Regulations 2009,* https://www.legislation.gov.uk/uksi/2009/3042/contents/made
[8] *Civil Contingencies Act 2004,* https://www.legislation.gov.uk/ukpga/2004/36/contents
[9] Environment Agency, *National Flood and Coastal Erosion Risk Management Strategy for England: Executive Summary*, June 2022, https://www.gov.uk/government/publications/national-flood-and-coastal-erosion-risk-management-strategy-for-england--2/national-flood-and-coastal-erosion-risk-management-strategy-for-england-executive-summary
[10] Environment Agency, *Flood and Coastal Erosion Risk Management Strategy Roadmap to 2026,* https://assets.publishing.service.gov.uk/media/629de862e90e07039c27b440/FCERM-Strategy-Roadmap-to-2026-FINAL.pdf
[11] Department for Levelling Up, Housing and Communities, National Planning Policy Framework, https://www.gov.uk/guidance/national-planning-policy-framework
[12] Department for Levelling Up, Housing and Communities, *Flood Risk and Coastal Change*, 6th March 2014, https://www.gov.uk/guidance/flood-risk-and-coastal-change
[13] Environment Agency, Flood Risk Management Plans 2021 to 2027: National Overview, 12th December 2022, https://www.gov.uk/government/publications/flood-risk-management-plans-2021-to-2027-national-overview-part-a/national-overview-part-a
[14] Department for Environment, Food and Rural Affairs, *Non-statutory technical standards for sustainable drainage systems*, March 2015, https://assets.publishing.service.gov.uk/media/5a815646ed915d74e6231b43/sustainable-drainage-technical-standards.pdf
[15] Defra, *Climate Change Adaptation: Policy Information*, 11th August 2022, https://www.gov.uk/government/publications/climate-change-adaptation-policy-information/climate-change-adaptation-policy-information

Table 4.1-1: Regional flood risk management framework

Regional Legislation, Policy, Guidance & Information	Description
Thames River Basin Flood Risk Management Plan (2022)[16] (part of the Flood Risk Management Plans included in the previous table).	Statutory strategic plan for the Thames River basin which explains how its stakeholders will work together to reduce flooding effects in their communities. The plan covers a period of 6 years.
Thames Catchment Flood Management Plan[17]	An overview of the flood risk across the river catchment and recommended ways of managing the risk now and over the next 50 to 100 years.
Thames Estuary 2100 (TE2100) Plan[18] and the 2023 update[19].	A long-term strategy developed by the EA to manage flood risk from climate change in the Thames Estuary. It focusses on addressing the challenges of climate change, aging flood defences and population growth.
London Strategic Flood Response Framework[20]	Used by the London Resilience Partnership to respond to flooding events which could cause significant and severe impacts. It is split into two parts: 1. A guide for strategic decision-makers responding to a flooding incident. 2. Provides capability guidance.
Drainage and Wastewater Management Plan[21]	A long-term strategic plan produced by Thames Water that identifies future risks to drainage and solutions to mitigate the effects of population growth, climate change and urbanisation.
London Plan[22]	Statutory spatial development strategy published by the Greater London Authority for the greater London area. It sets out London's development over the next 25 years.
London Regional Flood Risk Appraisal[23]	A comprehensive report that provides an overview of all flooding sources, likelihood, consequences and spatial implications.

[16] Environment Agency, *Thames River Basin District Flood Management Plan 2021 to 2027*, December 2022, https://assets.publishing.service.gov.uk/media/6380a45d8fa8f56ea9d462d8/Thames-FRMP-2021-2027.pdf

[17] Environment Agency, *Thames Catchment Flood Management Plan*, December 2009, https://www.gov.uk/government/publications/thames-catchment-flood-management-plan

[18] Environment Agency, Thames Estuary 2100 (TE2100), https://www.gov.uk/government/collections/thames-estuary-2100-te2100

[19] Defra, *Major updates to Thames Estuary 2100 from 2012 to 2023*, April 2023, https://www.gov.uk/guidance/major-updates-to-thames-estuary-2100-from-2012-to-2023

[20] London Resilience, London Strategic Flood Response Framework, 2020 https://www.london.gov.uk/sites/default/files/london_strategic_flood_response_framework_2020_v3.2.pdf

[21] DEFRA, Drainage and Wastewater Management Plans: Guiding Principles for the Water Industry, https://www.gov.uk/government/publications/drainage-and-wastewater-management-plans-guiding-principles-for-the-water-industry

[22] Greater London Authority, The London Plan 2021, March 2021, https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf

[23] Greater London Authority, *London Regional Flood Risk Appraisal,* August 2014, https://www.london.gov.uk/sites/default/files/gla_migrate_files_destination/Regional%20Flood%20Risk%20Assessment%20-%20First%20Review%20-%20August%202014.pdf

Regional Legislation, Policy, Guidance & Information	Description
London Surface Water Management Strategy[24]	After flooding in 2021, the London Surface Water Strategic Group was formed to address the challenges posed by surface water flooding in London. This strategy is the result of their work.
Joint Thames Strategy refresh[25]	Aims to update and enhance the strategies for managing the River Thames, to ensure a resilient and sustainable future.

Table 4.1-2: Local flood risk management framework

Local Legislation, Policy, Guidance and Information	Description
Multi-agency Flood Plan[26]	This plan provides a coordinated multi-agency response framework to mitigate the impact of a large-scale flood event.
Havering Local Plan[27]	This plan sets out the London Borough of Havering's ambitious vision and strategy for future growth and sustainable development up to 2031.
Havering Climate Emergency Action Plan 2024-2027[28]	This plan sets out the borough's actions to manage climate change impacts.
Havering Strategic Flood Risk Assessment[29]	This report assesses flood risk from all sources and the impact of climate change on a local planning authority scale to inform the Local Plan. The aim is to direct new development to areas with lower flood risk and ensure that new development helps manage flood risk.
Preliminary Flood Risk Assessment[30]	This report identifies areas at risk of flooding and which areas need further examination. Used to develop strategies to mitigate risk of flooding.
Joint Waste Development Plan[31]	This plan sets out a planning strategy for sustainable waste management which enables adequate provision of waste management facilities.

[24] London Assembly, *London's Surface Water Strategy,* https://www.london.gov.uk/programmes-strategies/environment-and-climate-change/climate-change/climate-adaptation/surface-water-flooding/londons-surface-water-strategy

[25] Thames Strategy Partnership, *Joint Thames Strategy,* https://jtsrefresh.com/

[26] London Borough of Havering, Multi-Agency Flood Plan, https://www.havering.gov.uk/downloads/file/5785/multi-agency_flood_plan_-_august_2017.pdf

[27] London Borough of Havering, Havering Local Plan, November 2021, https://www.havering.gov.uk/downloads/file/5300/havering_local_plan_2016_-_2031

[28] London Borough of Havering, Havering Climate Emergency Action Plan 2024-2027, 2024, https://www.havering.gov.uk/downloads/file/6573/climate_change_action_plan_2024_to_2027

[29] London Borough of Havering, Strategic Flood Risk Assessment, 2017 https://www.havering.gov.uk/downloads/download/153/strategic_flood_risk_assessment_2017

[30] Jacobs, *Preliminary Flood Risk Assessment*, 2011

[31] *Joint Waste Development Plan for the East London Waste Authority Boroughs*, February 2012, https://www.havering.gov.uk/downloads/file/3944/adopted-joint-waste-dpd

Local Legislation, Policy, Guidance and Information	Description
Site Specific Allocations Development Plan Document[32]	This document includes specific allocations for individual sites considered necessary to deliver the vision, objectives, and policies of the Local Plan.
Romford Area Action Plan Development Plan Document[33]	This plan provides the planning framework for the future development and regeneration of Romford town centre up to 2020.
Havering's Surface Water Management Plan	A reviewed SWMP is being prepared and will be consulted with the LFRMS.
Section 19 Flood Investigation Reports[34] [35] [36]	Reports produced by the LLFA after a flooding event to understand the causes and full effects of the flooding. They also include recommendations to address flood risk.
Emergency Planning Handbook[37]	Provides guidance for the public to be prepared for an emergency, including preparing an emergency grab bag and take simple steps to reduce the impact of an emergency.

4.2 Flood Risk Management Stakeholders

Risk Management Authorities (RMAs) have various roles and responsibilities to help coordinate flood risk management. Their aim is to collaborate and share knowledge to ensure effective drainage and flood prevention. Flood risk stakeholders and their powers and responsibilities are detailed below.

Table 4.2-1: Risk Management Authorities and Responsibilities

RMA	Powers and Responsibilities
LLFA	LLFAs are responsible for: • Preparing flood risk documents: Preliminary Flood Risk Assessments. • Publishing and updating the LFRMS. • Managing local flood risk. • Maintaining an asset register. • Investigating and publishing reports on local flood incidents. • Communicating and partnership working with other RMAs.

[32] Havering London Borough, *Sites Specific Allocations Development Plan Document*, 2008, https://www.havering.gov.uk/downloads/file/1634/site_specific_allocations_dpd.pdf
[33] Havering London Borough, *Romford Area Action Plan Development Plan Document,* 2008, https://www.havering.gov.uk/downloads/file/1633/romford-area-action-plan
[51] Jacobs U.K Limited, Havering Flooding, *June 2016 Flood Investigation Report*, 20th January 2017, www.havering.gov.uk/download/downloads/id/675/havering_2016_flood_investigation_report.pdf
[35] Jacobs U.K Limited, *Flood Investigation Section 19 Report*, 01st November 2021,www.havering.gov.uk/download/downloads/id/5246/havering_2021_flood_investigation_report.pdf
[36] Jacobs Ltd, *London Borough of Havering Section 19 Flood investigation Report*, 11th October 2023, www.havering.gov.uk/download/downloads/id/6454/havering_2022_flood_investigation_report.pdf
[37]London Borough of Havering, *Emergency Planning Handbook*, https://www.havering.gov.uk/downloads/file/5738/emergency_planning_handbook

RMA	Powers and Responsibilities
	• Acting as a statutory consultee for surface water in the planning process. This duty may change if the Government enacts Schedule 3 of the FWMA 2010 as it includes the role of the Sustainable Drainage System (SuDS) Approval Body (SAB). The SAB will then become the body to approve all major construction work which has drainage implications and ensure that any adopted SuDS schemes are properly maintained. LLFA have powers to: • Regulate ordinary watercourses to ensure the flow. • Designate flood risk management structures. • Do works to manage flood risk. • Request information from other RMAs and stakeholders. • Make byelaws. • Support emergency planning response but they are not first respondents.
Emergency Planning	'Category 1' responders to emergencies are local authorities, the Environment Agency and emergency services. They are responsible for: • Undertaking risk assessments. • Managing business continuity. • Carrying out emergency planning. • Warning and advising the public during times of emergency.
Highways Authorities	The authorities (National Highways and LBH Highways Department) provide and manage highway drainage and roadside ditches, ensuring that road projects do not increase flood risk on highways.
Thames Water (TW)	Both water companies are responsible for managing the risks of flooding from piped, foul, or combined sewer systems, as well as managing the risk of flooding to water supply and sewerage facilities.
Anglian Water	
Environment Agency (EA)	The EA is the principal flood risk management authority in England. Responsible for a strategic overview of the management of all sources of flooding and coastal erosion. Their responsibilities include: • Developing and applying the national flood and coastal erosion risk management strategy. • Supporting Regional Flood and Coastal Committees (RFCCs) in the allocation of national government funding to projects to manage flood and coastal erosion risks from all sources. • Managing flood risk from main rivers and coastal sources. • Strategic overview of surface water flooding.
Neighbouring LLFAs	They can provide information of flooding issues that could affect the LBH and collaborate in joint flood risk projects.
Transport for London (TfL)	Transport for London oversees a vast network of roads, tunnels, bridges, and public transport infrastructure across London. It collaborates with local authorities, water companies, and other stakeholders to ensure effective drainage and flood prevention. Promotes the use of drainage systems to prevent flooding on roads and other transport routes.

Table 4.2-2: Other Important Flood Risk Stakeholders' Powers and Responsibilities

Other Flood Risk Stakeholders	Powers and Responsibilities
Historic England	They provide guidance to those who manage historic buildings threatened by flooding which covers both preventative measures and post flooding actions. They are also statutory consultees for the Strategic Environmental Assessment process.
Planning Authority	Support flood risk management by: • Taking flooding into account when developing local plans. • Working with the SAB/LLFAs to ensure planning applications address surface water flooding properly and incorporate SuDS. • Consider flood risk assessments submitted in support of applications. • Develop flood risk and water evidence base and guidance such as Strategic Flood Risk Assessments, Sequential Tests, Integrated Water Management Strategies, Strategic Environmental Assessments, Supplementary Planning Documents. • Produce Waste Plans and Local Plans which contain local planning policies to address flood risk and implement SuDS.
Businesses and Households	The are responsible for understanding their risk of flooding, its consequences, to have adequate flood risk insurance and to be prepared in case of flooding.
Greater London Authority (GLA)	They do not have a duty to manage flood risk, but they can investigate London flooding (2021[38]) and support LLFAs by providing information and funding for projects and studies.
Roding, Beam & Ingrebourne (RBI) Catchment Partnership[39]	The partnership is focused on improving the health and sustainability of the river catchments by bringing together local organisations, community groups and stakeholders for achieve river improvements. Their key objectives are: • Habitat improvement by enhancing quality and connectivity by restoring natural processes. • Improving water quality by reducing pollution. • Flood risk management by implementing natural flood management techniques and sustainable drainage. • Improve community engagement in raising awareness and improving recreational opportunities. • Use citizen guidance to gather new information through activities like monitoring and surveys.

[38] Greater London Authority, *Surface Water Flooding in London: Roundtable Progress Report*, 2022, https://www.london.gov.uk/sites/default/files/flooding_progress_report_final_1.pdf

[39] Roding, Beam and Ingrebourne Catchment Partnership, Catchment Action Plan https://storymaps.arcgis.com/collections/c15bdf25036549dc936e88fbee4b92d8?item=2

4.3 Nature of Flood Risk in the London Borough of Havering

Context of the London Borough of Havering

Havering is located in Northeast London, England on the north bank of the tidal river Thames. The borough is bordered by the London Borough of Redbridge, London Borough of Barking and Dagenham and Essex County. It is the third largest borough in London covering 112.3 km^2, with a population of 262,100.

The Borough is characterised by its suburban location. Around 60% of the borough is open green space mainly located in the east. In contrast to this, the principal town of Romford, which is on the western side of the borough, is densely populated. There are strict Green Belt restrictions to prohibit the extension of developments in the east of the Borough. The southern part of borough is adjacent to the River Thames and in the London Riverside section of the Thames Gateway redevelopment areas, so will be a site of increasing development and population pressures.

The Borough of Havering is at risk of flooding from a range of sources, namely fluvial, tidal, surface water, reservoir and groundwater sources. The levels of flood risks from each source varies, and the sources will interact in certain scenarios causing complex flooding. The following sections explain the different sources of flooding, the extent to which they impact the Borough, and the number of properties at risk from each source. Further detailed analysis is available in the Surface Water Management Plan.

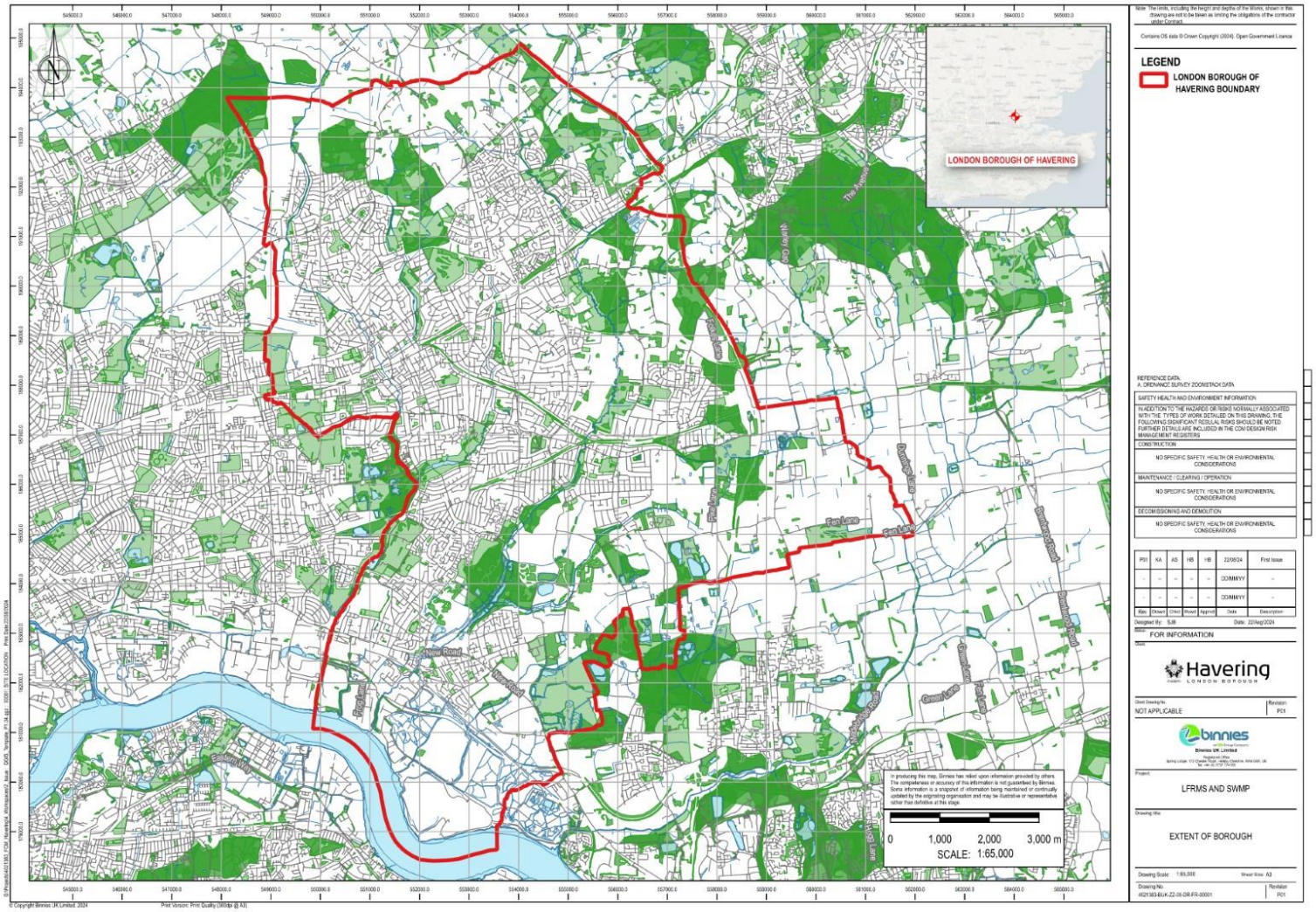

Figure 4.3-1: Extent of Borough (not to scale, see A3 scaled maps in Appendix B)

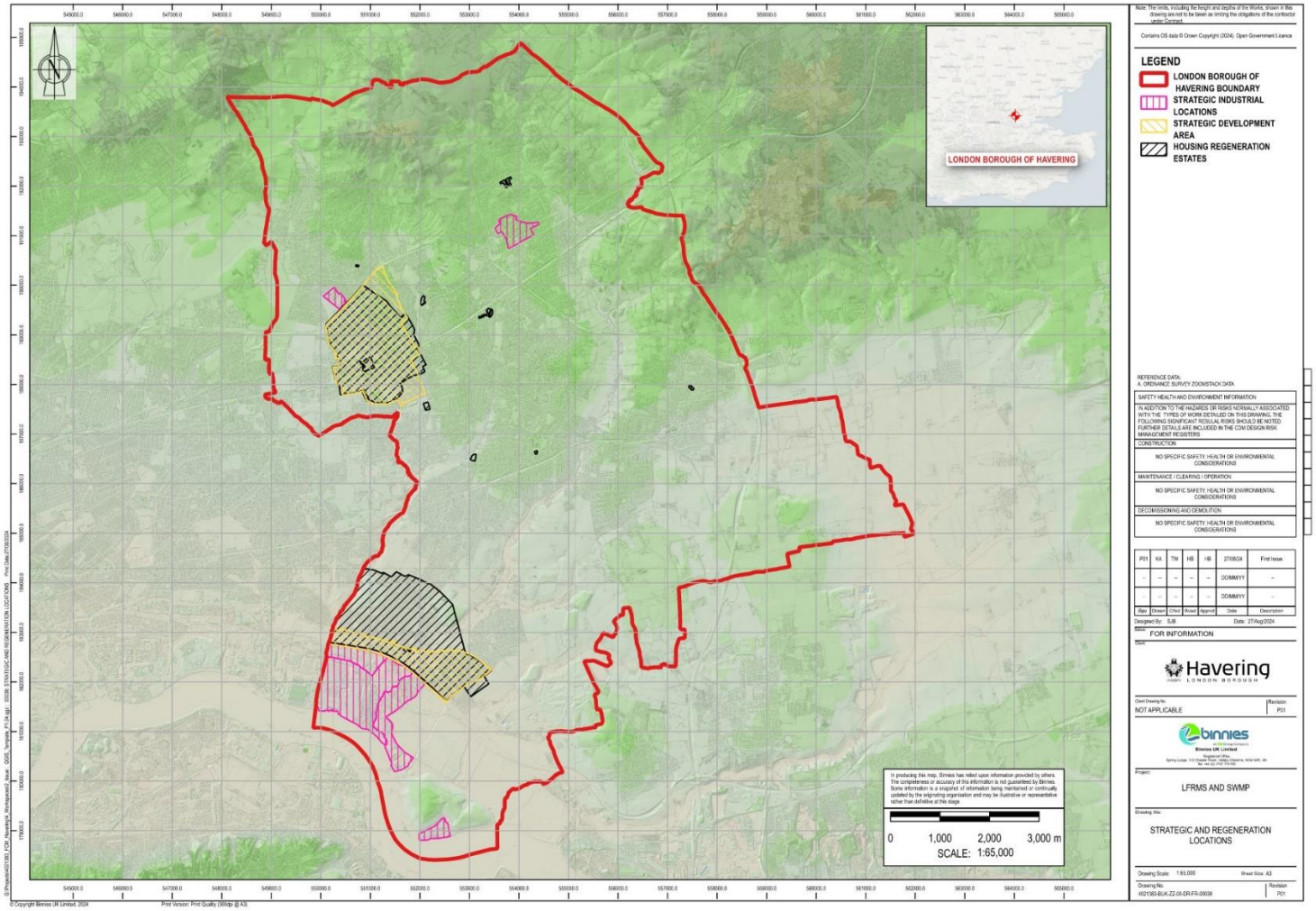

Figure 4.3-2: Strategic Development and Regeneration Areas (not to scale, see A3 scaled maps in Appendix B)

History of Flood Risk in Havering

This section presents a summary of the history of flood risk within the Borough. A detailed analysis of the history of flooding was carried out as part of the Preliminary Flood Risk Assessment in 2011. New information has also been taken from recent Flood Investigations carried out by LBH. The more-significant flood incidents are reported in the table below. The Council's 'Flood Incident Register 2007-2023' includes 299 individual records of localised flooding, including from rainfall, sewerage and/or highway drainage.

The timeline of flood incidents shows that, historically, tidal and fluvial sources were most common, with no records of tidal flooding since 2007. However, the most common source of flooding in recent years has been surface water flooding, followed by sewer flooding and fluvial flooding. This shift may be due to historic investment in interventions to mitigate for tidal and fluvial flooding, but also may reflect that records of localised flooding are now recognised as equally valuable. The least common source of flooding within the records is groundwater.

The following table shows the reported flood incidents within the Borough, the source of flooding and where the information is from.

Table 4.3-1: History of Flood Risk in Havering

Date	Location and Description of Flood Incident	Source of information
1448	Rainham Marshes – tidal flooding	PFRA
1707-1720s	Dagenham Breach – flooding of all the Borough south of present day A1306 and west of Ingrebourne River and north up the Bean valley. Breach of defences from failure of sluice gate.	PFRA
1888	Romford, Upminster and Hornchurch – fluvial flooding	PFRA
1914	Ingrebourne - localised flooding from the Ingrebourne	PFRA
1953	South Hornchurch, Rainham and the marshes – extensive tidal flooding of areas adjacent to the River Thames	PFRA
1968	Harold Park, Harold Wood, Upminster and Hornchurch – fluvial flooding from the Ingrebourne	PFRA
1974	Romford – fluvial flooding from the Beam, Ravensbourne and Ingrebourne watercourses	PFRA
1987	Romford – fluvial flooding from River Rom following intense rainfall	PFRA
1992	Upminster and Hornchurch – fluvial flooding from the Ingrebourne	PFRA
2000	Between Breton Hall and Beam Bridge – fluvial flooding from Lower Beam	PFRA
2003	Dover's Corner, Rainham – fluvial flooding from Ingrebourne	PFRA
22nd-23rd June 2016	The Rom, Roding and Ingrebourne catchments – fluvial and surface water flooding of 460 properties across 36 locations.	Flood Investigation Report[40]

[40] Jacobs U.K Limited, *Havering Flooding, June 2016 Flood Investigation Report*, 20th January 2017, https://www.havering.gov.uk/downloads/file/675/havering_2016_flood_investigation_report.pdf

Date	Location and Description of Flood Incident	Source of information
15th-16th August 2020	Roding, Beam and Ingrebourne catchments – flooding at 72 locations due to persistent wet weather between heatwave conditions.	Flood Investigation Report[41]
25th June 2021	Borough-wide - 49 properties were flooded due to rainfall of 150-170% above average.	Flood Investigation Report[42]
12th and 25th July 2021	Across London - on the 12th of July more than a month's rain fell in under an hour. The Met Office confirmed the return period was up to 179 years. On the 25th of July heavy rain fell across a larger area of London and Essex. This resulted in flooding of homes and significant infrastructure. Over 1,500 properties were flooded internally across London.	TW DWMP[43]

Surface Water Flooding

Surface water flooding, also known as pluvial flooding, occurs when the volume of rainfall cannot drain away through existing drainage systems or by filtering into the ground. This may be due to the ground being over saturated or when drainage systems are full. Surface water is the most frequent type of flooding within the Borough.

The best available data to show the scale of flood risk from surface water for Havering is the Environment Agency's Risk of Flooding from Surface Water map. There are four levels of flood risk mapped:

- **High** - each year, the area has a chance of flooding of greater than 1 in 30 (3.3%)
- **Medium** - each year, the area has a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%)
- **Low** - each year, the area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%)
- **Very low** - each year, the area has a chance of flooding of less than 1 in 1000 (0.1%)

Surface water flooding is predominantly influenced by topography, with areas of highest risk being either within flow paths along localised valleys or in areas where surface water ponds in low spots or behind a raised feature. Although the majority of the minor watercourses within urban areas of the Borough have been subsumed into the sewer system, these local valleys still form important surface water pathways. For lower return period events, the majority of surface water is likely to be contained within the highway, however properties are at risk of surface flooding across the Borough for the 1 in 30 scenario. The most notable areas of ponding are in a number of locations where surface water flow paths are intersected by the A12 and other key arterial routes. Surface water run-off from roads can detriment river health. The Road Pollution

[41] Jacobs U.K. Limited, *Flood Investigation Section 19 Report*, 1st November 2021, https://www.havering.gov.uk/downloads/file/5246/havering_2021_flood_investigation_report.pdf
[42] Jacobs Ltd, *London Borough of Havering Section 19 Flood Investigation Report*, 11th October 2023 https://www.havering.gov.uk/downloads/file/6454/havering_2022_flood_investigation_report.pdf
[43] Thames Water, *Our Drainage and Wastewater Management Plan 2025-2050*, May 2023, https://www.thameswater.co.uk/media-library/home/about-us/regulation/drainage-and-wastewater/appendix-p-response-to-july-2021-floods.pdf

Solutions Tool[44] shows where nature-based solutions can intercept surface water outfalls to reduce road run off pollution.

The table below shows the total number of properties at risk of surface water flooding under different scenarios within the Borough.

Table 4.3-2: Number of Properties at Risk from Surface Water Flooding

Source of Flooding	Likelihood	Number of Properties at Risk
Surface Water	High (1 in 30)	2,896
	Medium (1 in 100)	7,515
	Low (1 in 1000)	24,409

Communities at Risk analysis and Critical Drainage Areas

During the SWMP review a 'Communities at Risk' analysis was undertaken. GIS analysis was used to identify the ground level commercial and residential properties shown to be at risk of flooding in the 1 in 30-, 100-, and 1000-year surface water flood scenarios. Groups of 20 or more of these properties within close proximity were then identified as 'Communities at Risk'. The Communities at Risk have been classified into 20-50, 50-100 and over 100 properties at risk within the group, to allow identification of those at highest risk. The detailed methodology for the analysis including its assumptions and limitations can be found in Appendix B of the SWMP.

The previous SWMP identified twenty-three Critical Drainage Areas (CDA) which are areas with drainage issues and therefore more vulnerable to flooding. The 'Communities at Risk' analysis was used to understand which CDAs were more vulnerable to surface water flooding and shortlisted them to fifteen which are in the table below. The other eight were renamed as Drainage Areas. The table below shows the prioritised CDAs, which reflect the number of properties at risk.

Table 4.3-3: Prioritised Critical Drainage Areas

Priority	Critical Drainage Areas	Number of Properties at Risk
1 (Highest)	014 – River Rom and Beam River	1,964
2	036 – Ingrebourne	1,058
3	025 – Gallows Corner	748
4	023 – Elm Park	574
5	018 – Cranham	446
6	026 – Harold Hill North	400
7	005 – Ardleigh Green East	298
8	038 – Heath Park North	268
9	034 – Thames	257
10	040 – Harold Hill South	250
11	037 – River Ravensbourne	220

[44] Road Pollution Solutions Tool https://mapapps.bgs.ac.uk/road-pollution-solutions/

Priority	Critical Drainage Areas	Number of Properties at Risk
12	016 – Rise Park West	201
13	017 – Rise Park	150
14	039 – Heath Park South	122
15 (Lowest)	015 – Havering Park	113

The following map shows all CDAs and Drainage Areas in the Borough.

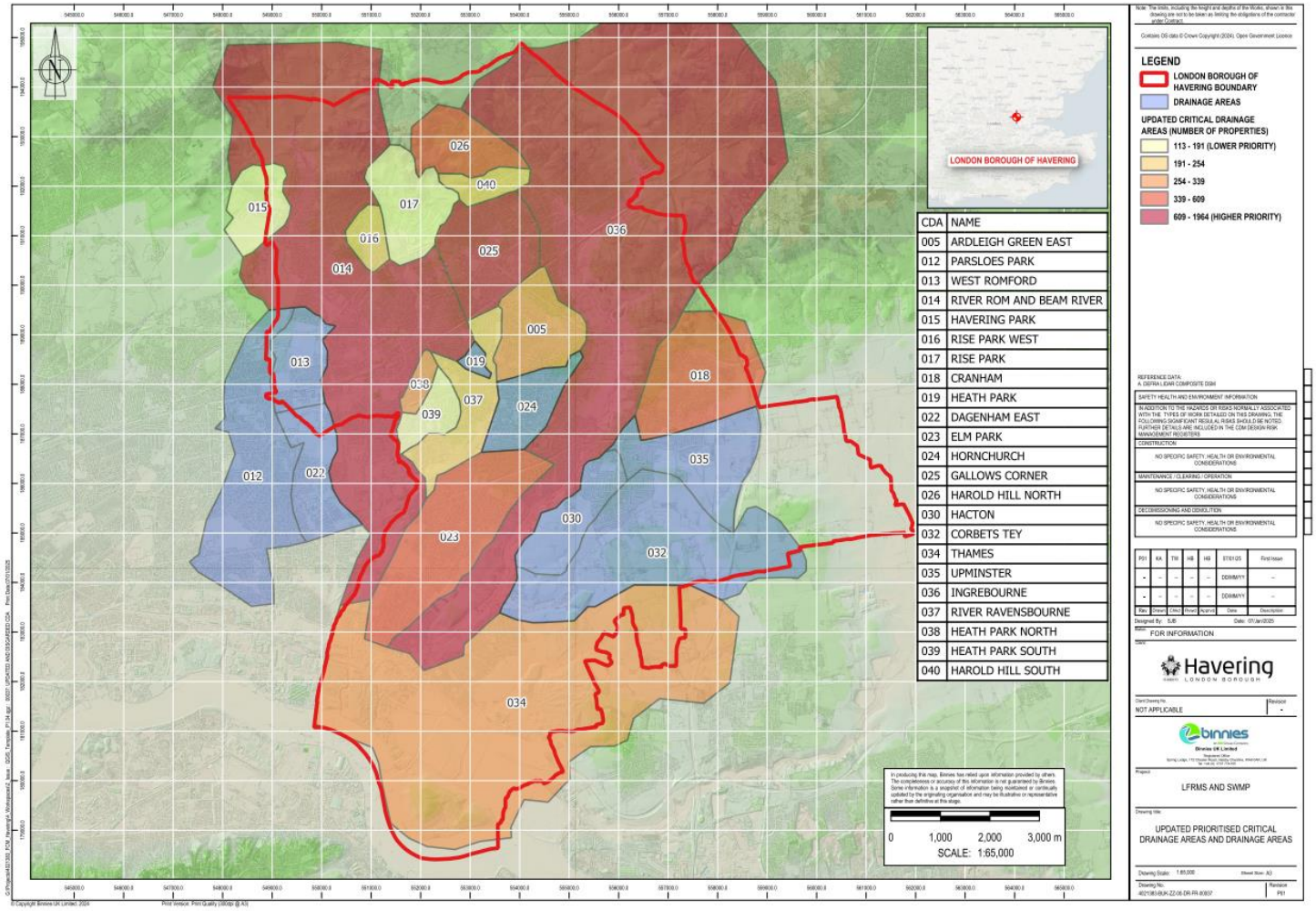

Figure 4.3-3: Updated Critical Drainage Areas and Drainage Areas (not to scale, see A3 scaled maps in Appendix B)

Appendix C of the SWMP sets out full details of the flood risk analysis for each CDA, showing the number of infrastructure and homes at risk of flooding, an explanation of flood risk in the CDA, the outputs of the Communities at Risk analysis and the supporting maps.

The table below gives an overview of the risk of surface water flooding for the CDAs. It shows the communities, properties, and critical infrastructure (including public/community facilities, education, health and care facilities, major roads, and emergency services) at risk in each CDA and the total.

Table 4.3-4: Summary of Risk per CDA (please note that the CDAs are not in priority order).

CDA	1 in X-year Scenario Event	Communities at Risk	Properties at Risk	Critical Infrastructure at Risk
005 - Ardleigh Green East	**30**	0	98	1
	100	2	298	6
	1000	9	980	11
014 – River Rom and Beam River	**30**	2	756	28
	100	14	1,964	43
	1000	63	5,919	75
015 – Havering Park	**30**	1	72	1
	100	1	113	1
	1000	1	198	2
016 – Rise Park West	**30**	0	76	1
	100	2	201	1
	1000	3	592	2
017 – Rise Park	**30**	1	98	2
	100	1	150	2
	1000	3	292	3
018 – Cranham	**30**	0	136	3
	100	2	446	6
	1000	17	1,357	9
023 – Elm Park	**30**	0	119	10
	100	2	574	20
	1000	26	3,035	33
025 – Gallows Corner	**30**	1	287	5
	100	6	748	8
	1000	18	2,213	16
026 – Harold Hill North	**30**	4	271	3
	100	3	400	3
	1000	4	682	4
034 – Thames	**30**	0	55	11

CDA	1 in X-year Scenario Event	Communities at Risk	Properties at Risk	Critical Infrastructure at Risk
	100	2	257	21
	1000	9	983	30
036 – Ingrebourne	**30**	1	387	18
	100	6	1,058	32
	1000	37	3,659	48
037 – River Ravensbourne	**30**	0	79	2
	100	3	220	2
	1000	10	919	7
038 – Heath Park North	**30**	1	129	2
	100	2	268	2
	1000	2	621	3
039 – Heath Park South	**30**	0	53	2
	100	1	122	4
	1000	5	470	5
040 – Harold Hill South	**30**	0	110	1
	100	4	250	5
	1000	6	573	7
Total	**30**	13	2,726	90
	100	51	7,069	156
	1000	213	22,493	255

Table 4.3.5 below sets out the results of the Communities at Risk analysis for surface water flood risk for the whole Borough. 2% of all properties within the Borough are at risk during a 1 in 30-year surface water flooding scenario. The risk increases to 8% in a 100-year surface water flooding scenario and 25% in a 1 in 1000-year surface water scenario.

Table 4.3-5: Summary of Communities at Risk and number of properties at risk

	1 in 30-year event	1 in 100-year event	1 in 1000-year event
Communities at Risk within the Borough	7	52	231
Total properties at risk within the Communities at Risk	643	3056	16278
Total properties at risk across the Borough	2,896	7,515	24,409

Rivers and Sea Flooding

River flooding, also known as fluvial flooding, occurs when a river overflows it banks and spreads to the surrounding land. This can be caused by a variety of factors or a combination of them.

Sea or tidal flooding is when seawater submerges low lying land along the coast which is caused by higher-than-average high tide, heavy rainfall, or onshore winds. These factors can be negatively influenced by topography and coastal processes.

The best available data to show the scale of flood risk from rivers and sea for Havering is the Environment Agency's Risk of Flooding from Rivers and Seas map. There are four levels of flood risk mapped:

- **High** - each year, the area has a chance of flooding of greater than 1 in 30 (3.3%)
- **Medium** - each year, the area has a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%)
- **Low** - each year, the area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%)
- **Very low** - each year, the area has a chance of flooding of less than 1 in 1000 (0.1%)

The Borough can be divided into four main watercourse catchments, all flowing north to south to the tidal **River Thames** which forms the southwestern boundary of the Borough.

- **The River Beam and its tributaries** (River Rom, Emerson Park Stream, Blacks Brook and Ravensbourne), drain the western part of the Borough, with the Beam forming the western boundary of the Borough with the London Borough of Barking and Dagenham.
- **The Ingrebourne and its tributaries** (Weald Brook, Carters Brook, and Paines Brook), drain the centre, east and north of the Borough;
- **The River Mardyke** drains the eastern area of the Borough into Thurrock;
- **The Rainham Main Sewer** drains the southeastern part of the Borough.
- Within the urban areas of the Borough, the majority of the minor watercourses have been subsumed into the urban drainage system.

The EA Risk of Flooding from Surface Water map also indicates where there is risk from minor watercourses, and indeed are typically used to represent flood risk for watercourses not included in the EA's risk of flooding from Rivers and Seas.

The Borough benefits from the Thames Tidal defences as well as a number of structures including flood storage areas on the main rivers. Further details of the flood storage areas and defences within the Borough can be found within the Strategic Flood Risk Assessment.

Table 4.3-6: Number of Properties at Risk from River and Sea Flooding

Source of Flooding	Likelihood	Probability	Number of Properties at Risk
Rivers and Sea	High	Greater than 1 in 30 (3.3%)	333
	Medium	1 in 30 (3.3%) to 1 in 100 (1%)	651
	Low	1 in 100 (1%) to 1 in 1000 (0.1%)	565
	Very low	Less than 1 in 1000 (0.1%)	3,009

Groundwater Flooding

Groundwater flooding is the emergence of groundwater at the ground surface. It occurs when the water table in permeable rock raises to enter basements and lower ground floors or rises to above the ground surface. This is not always linked to a rainfall event, but it is generally linked to longer durations of rainfall.

The best available data to show the scale of flood risk from groundwater for Havering is the Environment Agency's Areas Susceptible to Groundwater Flooding map. The data is a 1km square grid that identifies, at a broad scale, areas susceptible to flooding from groundwater on the basis of geological and hydrogeological condition, using British Geological Survey data. It does not show the likelihood of groundwater flooding and therefore is a hazard not risk-based dataset. There are four categories showing the proportion of the 1km grid square that is susceptible to ground water flood emergence:

- **Very High** - >75%
- **High** - 50-75%
- **Medium** – 25%-50%
- **Low** - <25%

Groundwater flooding is most likely to occur in areas underlain by permeable rocks, called aquifers, particularly in areas underlain by chalk. The risk within Havering is relatively limited as the geology is predominantly clayey, although the EA data indicates highest susceptibility mostly in the far eastern and western regions of the Borough, with the northern third of the Borough being at lowest susceptibility.

Table 4.3-7: Number of Properties at in Areas Susceptible to Groundwater Flooding

Source of Flooding	Susceptibility	Number of Properties at Risk
Groundwater	>75%	23,157
	50-75%	19,827
	25-50%	23,134
	<25%	23,361

Reservoir Flooding

Reservoir flooding occurs when a dam breaches, caused by extreme rainfall or structural failure, resulting in large volumes and rapid flow of water from a reservoir.

The best available data to show the scale of flood risk from reservoir failure for Havering is the Environment Agency's Reservoir Flood Map, for those maps that the EA regulates under the Reservoirs Act 1975. There are 2 flooding scenarios shown on the reservoir flood maps.

- The **'dry-day'** scenario predicts the flooding that would occur if the dam or reservoir failed when rivers are at normal levels.
- The **'wet day'** scenario predicts how much worse the flooding might be if a river is already experiencing an extreme natural flood.

The rigorous requirements for inspection and maintenance of these reservoirs means that the likelihood of structural failure is minimal. In Havering, the extent of flood risk from reservoirs is less than the extent of fluvial flooding so there are no additional properties at risk of flooding.

Table 4.3-8: Number of Properties at Risk from Reservoir Flooding

Source of Flooding	Scenario	Number of Properties at Risk
Reservoir	Dry-day	784
	Wet-day	764

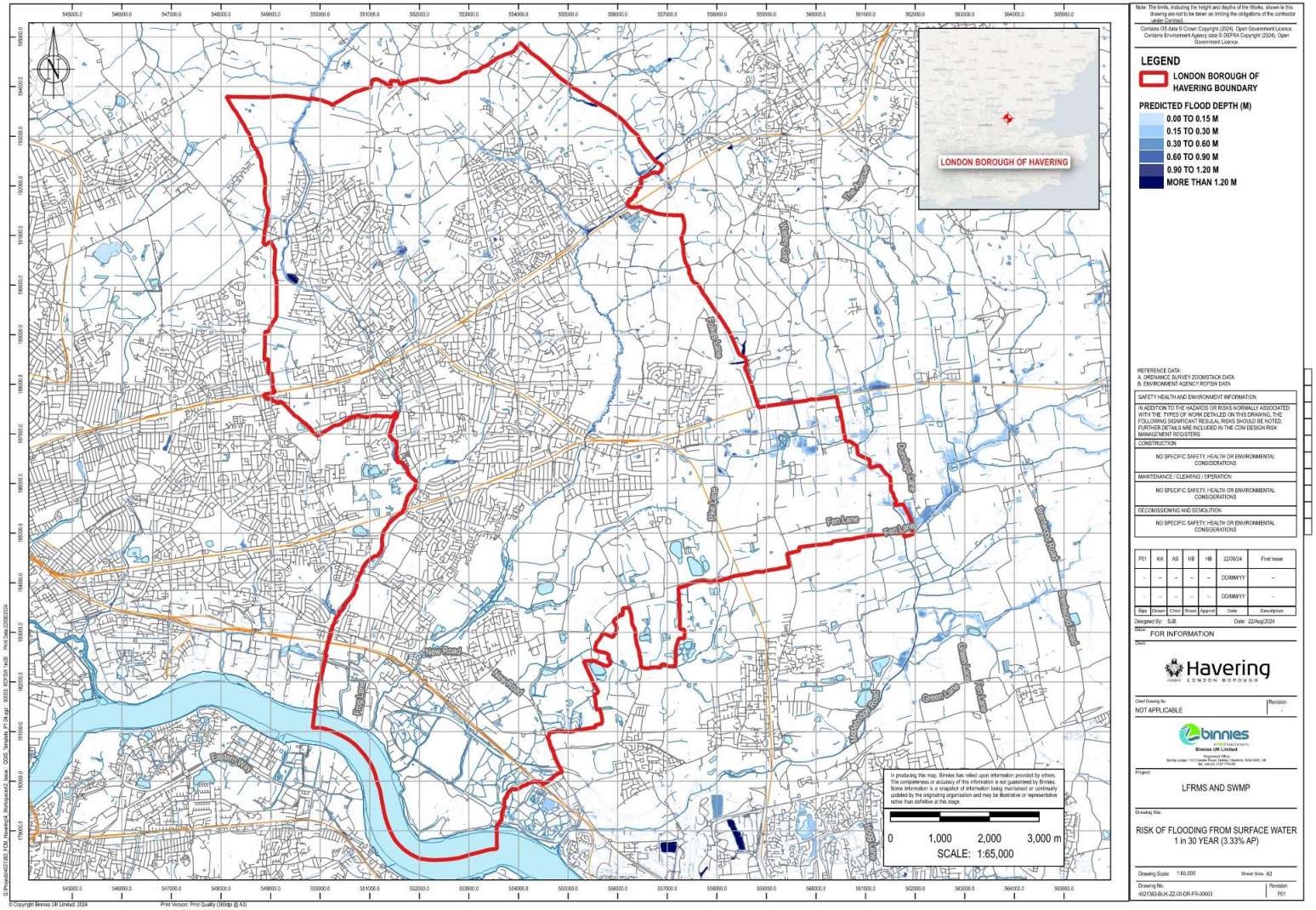

Figure 4.3-4: Risk of Flooding from Surface Water 1 in 30 YEAR (3.33% AP) (not to scale, see A3 scaled maps in Appendix B)

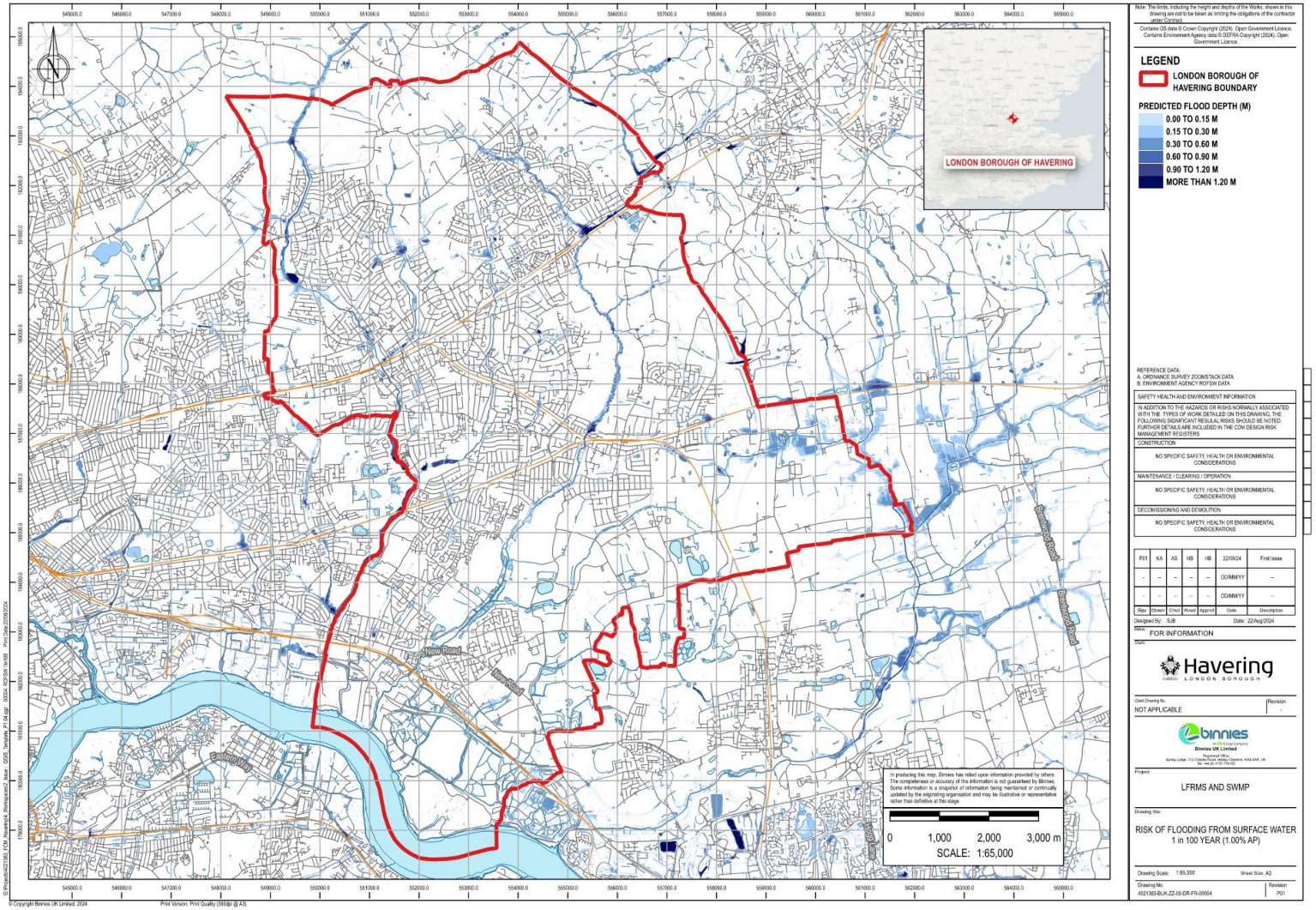

Figure 4.3-5: Risk of Flooding from Surface Water 1 in 100 YEAR (1.00% AP) (not to scale, see A3 scaled maps in Appendix B)

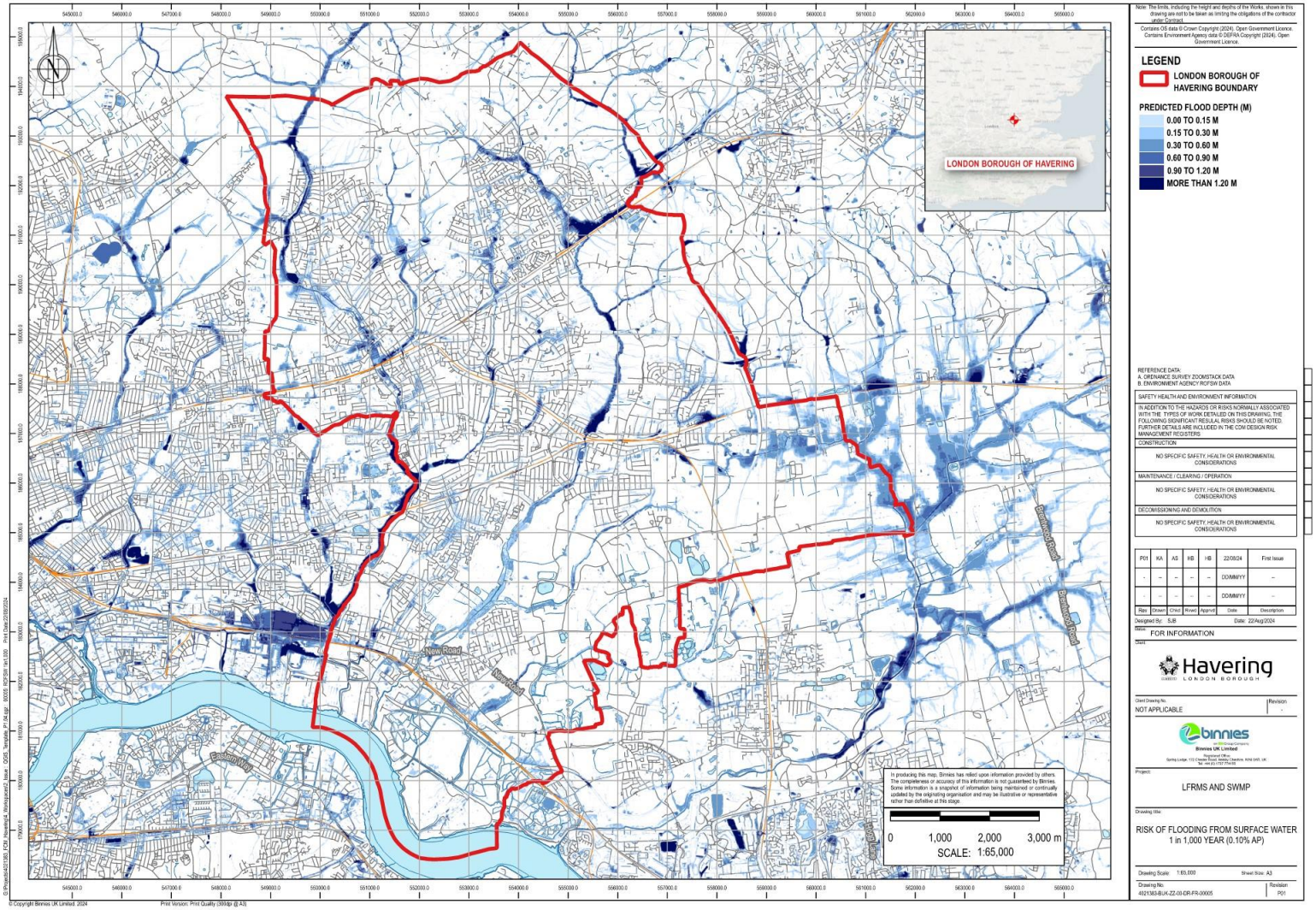

Figure 4.3-6: Risk of Flooding from Surface Water 1 in 1,000 YEAR (0.10%AP) (not to scale, see A3 scaled maps in Appendix B)

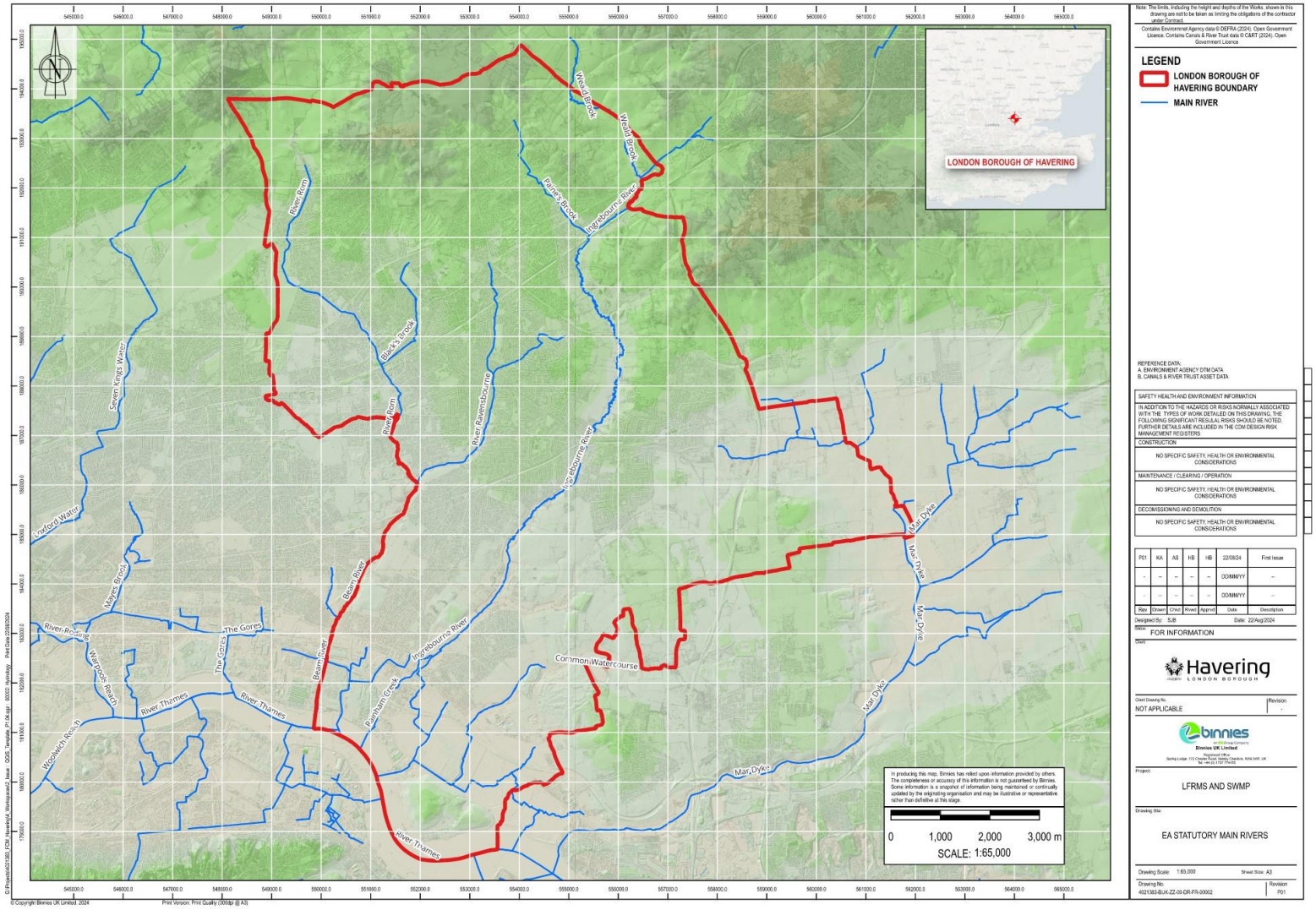

Figure 4.3-7: EA Statutory main river (not to scale, see A3 scaled maps in Appendix B)

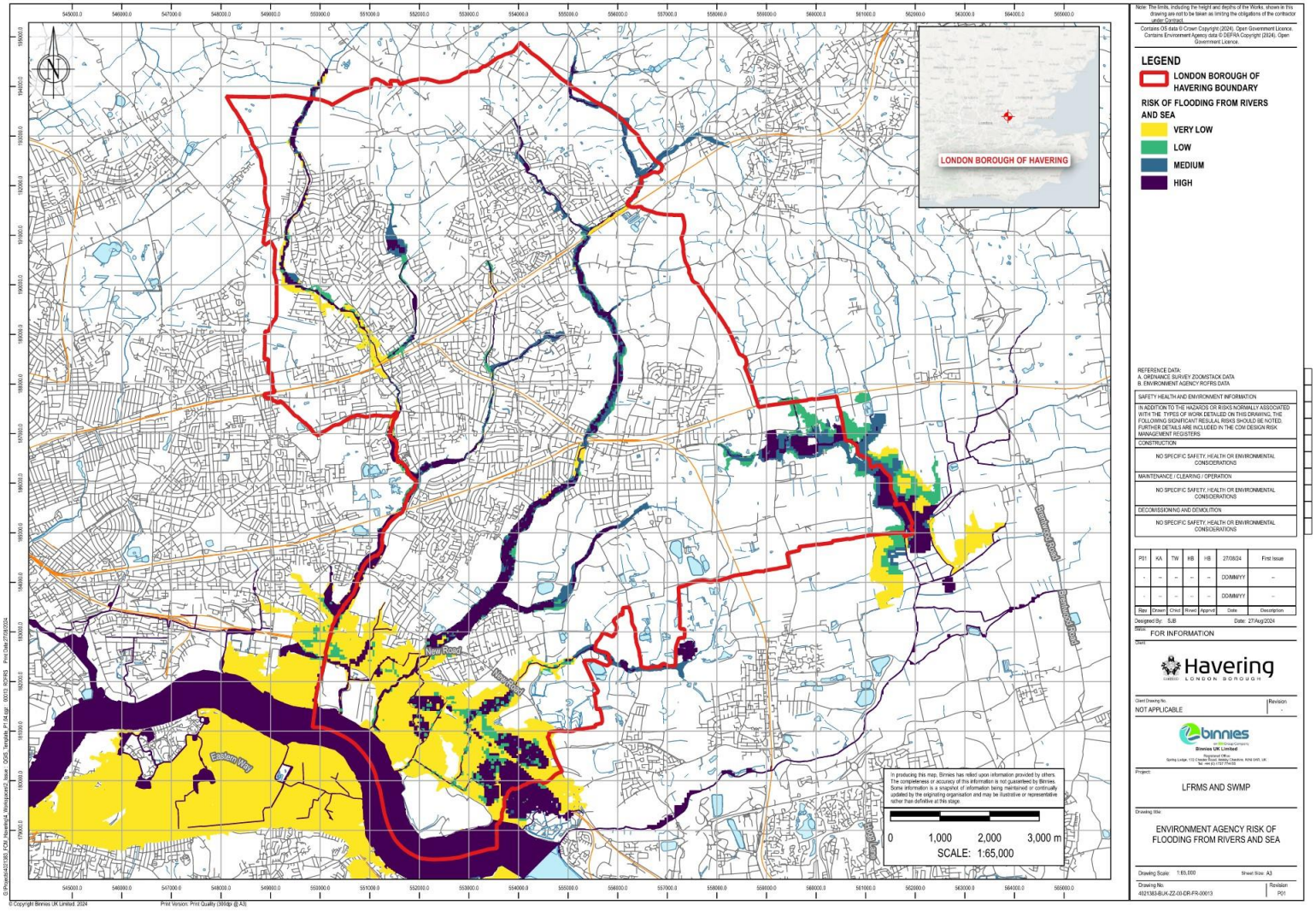

Figure 4.3-8: Environment Agency Risk of Flooding from Rivers and Sea (not to scale, see A3 scaled maps in Appendix B)

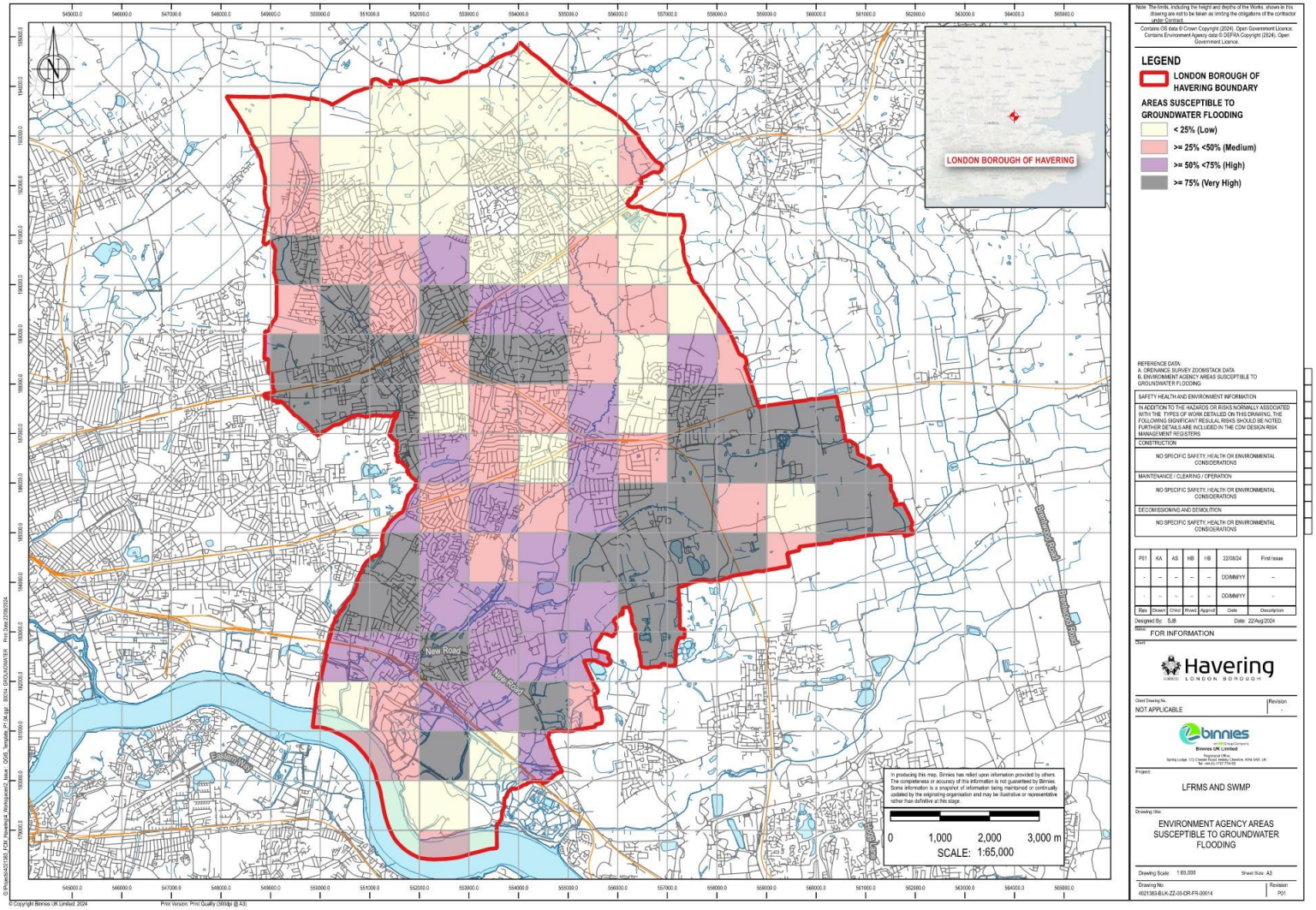

Figure 4.3-9: Environment Agency Areas Susceptible to Groundwater Flooding (not to scale, see A3 scaled maps in Appendix B)

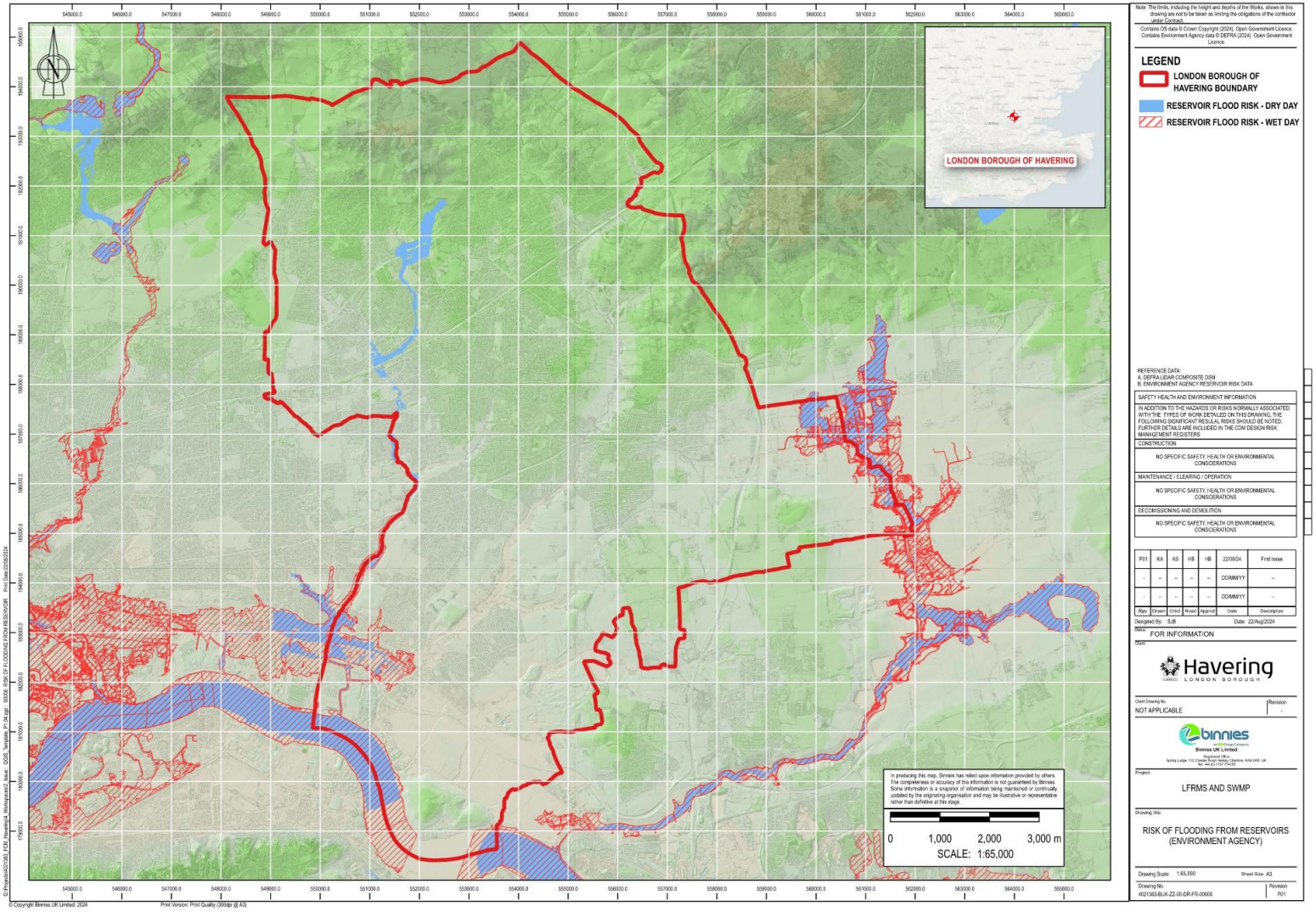

Figure 4.3-10: Risk of Flooding from Reservoirs (Environment Agency) (not to scale, see A3 scaled maps in Appendix B)

Factors Increasing Flood Risk

There are several factors which contribute to an increased risk of flooding including:

- The **condition of infrastructure** needs to be maintained as it will deteriorate overtime. Failed infrastructure will put other infrastructure that should be protected at higher risk.
- **New developments/changes in land use** could increase the cover of impermeable surfaces and reduce permeable plants and vegetation. Figure 4.3.2 shows the Strategic Development and Regeneration Areas or the 'planned development.' However, further, smaller scale development will also take place.
- **Climate change** (see next section).

Climate Change

The Intergovernmental Panel on Climate Change (United Nations body for assessing the science related to climate change) explains in its latest report[45] that continued greenhouse gas emissions will lead to average increases in global temperatures reaching 1.5°C soon. This will increase moisture in the atmosphere leading to heavier and more frequent storms. Heavier storms will overwhelm existing drainage systems and lead to surface water flooding more often. This was clearly seen in the London 2021 flooding.

In 2022, the National Infrastructure Commission reported[46] that about 325,000 properties are in areas at the highest risk of surface water flooding in England. Without action, up to 295,000 more properties could be put at risk. They also acknowledged that surface water flood risk is the risk we know the least about, being highly localised and hard to predict.

Climate change will also have a significant impact on tidal flood risk as rising sea levels will reduce the level of protection that existing tidal defences offer. The Thames Estuary 2100 plan 10 year review[47] reports how sea level rise has been accelerating over the last few decades. This will translate into more frequent Thames Barrier closures.

The TE2100 Plan[48] acknowledges that flood risk from the River Ingrebourne is relatively low. However, the marshland drainage system will need enhancing as sea levels rise and storm rainfall increases. The tidal sluices will also need upgrading on the River Beam, Havering New Sewer, River Ingrebourne and Rainham Main Sewer as the sea level rises and fluvial flows increase.

The GLA Regional Flood Risk Appraisal (2018)[49] highlights the importance of analysing future impacts of climate change for local rivers such as the River Rom and Black Brook.

[45] Intergovernmental Panel on Climate Change, *AR6 Synthesis Report Climate Change 2023* https://www.ipcc.ch/report/ar6/syr/
[46] National Infrastructure Commission, *Reducing the risk of surface water flooding*, 2022 https://nic.org.uk/app/uploads/NIC-Reducing-the-Risk-of-Surface-Water-Flooding-Final-28-Nov-2022.pdf
[47] DeFRA, *Thames Estuary 2100: 10-year monitoring review (2021)* https://www.gov.uk/government/publications/thames-estuary-2100-te2100-monitoring-reviews/thames-estuary-2100-10-year-monitoring-review-2021#executive-summary
[48] DEFRA, *Thames Estuary 2100: Rainham Marshes Policy Unit*, 2023 https://www.gov.uk/guidance/rainham-marshes-policy-unit-thames-estuary-2100#managing-flood-risk-in-this-area
[49] Greater London Authority, *Regional Flood Risk Appraisal*, 2018 https://www.london.gov.uk/sites/default/files/regional_flood_risk_appraisal_sept_2018.pdf

The Havering Climate Change Action plan 2024-2027[50] includes adaptation to flooding as a key element for future service planning.

There is a lack of existing model data to accurately assess the impact of climate change on surface water flood risk within the Borough. The analysis carried out for the SWMP used the relative difference between the EA Risk of Flooding from Surface Water extent maps for the 1 in 100-year and in in 1000-year storm events. This can be used to demonstrate which parts of the Borough may be most sensitive to changes in surface water flood risk, which could be driven by climate change. Increased urban development, deteriorating assets and wider land use change may also serve to increase flood risk.

Using the 1 in 1000-year as a proxy for climate change on the 1 in 100-year storm event shows that boroughwide, over 24,000 properties could be at risk of surface water flooding due to climate change compared with 7,500 in the present-day scenario, over a three-fold increase. The five CDAs most vulnerable to increases in flood risk, which may be driven in part or full by climate change, are:

- 014 – River Rom and Beam River
- 036 – Ingrebourne
- 023 – Elm Park
- 025 – Gallows Corner
- 018 – Cranham

[50] London Borough of Havering, *Havering Climate Change Action Plan 2024-2027* https://democracy.havering.gov.uk/documents/s73391/7.1%20Revised%20HCCAP%202024-27%20to%20be%20published%20DRAFT.pdf

5. Objectives and Measures

5.1 Stakeholder Engagement

As the review of the LFRMS and the SWMP was undertaken at the same time, a Stakeholder Engagement Plan was carried out to identify who would be affected by the outcomes of the plan and strategy. This enabled all stakeholders to be engaged throughout the review of both documents. The Stakeholder Engagement Plan covers the individual stakeholder details, what their interest is in the project, what they would want from the project, what is expected from them and methods of communication for each internal and external stakeholder.

The stakeholders with interest in the LFRMS and SWMP are:

- Thames Water,
- Anglian Water,
- Environment Agency,
- LBH Lead Local Flood Authority,
- LBH Planning,
- LBH Emergency Planning,
- LBH Highways,
- LBH Parks and Environment,
- LBH Lead Members.

5.2 Setting Aims and Objectives

Two workshops were held with the key stakeholders to discuss how the council's priorities for managing flood risk aligned with those of the stakeholders. These discussions informed the development of the LFRMS Aims and Objectives. The information was used to set seven categories under which each of the aims, objectives and measures would sit (see table 5.3-1).

5.3 LFRMS Measure development

As part of the stakeholder workshops, new measures, which are in effect actions, were developed to identify how the council would meet the new LFRMS aims and objectives. These measures are boroughwide which means that they would have an impact across the whole Borough. The table below shows the LFRMS aims and objectives within each of the seven categories and the measures needed to realise these objectives.

The LFRMS measures are included in the Action Plan, alongside measures developed as part of the SWMP update, as explained in Section 6 below.

Table 5.3-1: LFRMS Aims, Objectives and Measures

Aims	Objectives	LFRMS Measures
Supporting communities to be more flood resilient *A1	• To increase awareness of flood risk in the Borough with internal and external stakeholders and members of the public. • To work with Local Resilience Forum partners, businesses and residents to improve our preparedness, resilience, and response to flood events. • To take a risk-based and affordable approach to managing flood risk across the Borough.	• Maintain a register of critical flood risk sites across the borough, plus make it available to internal and external stakeholders. • Improve preparedness by arranging for term service contractor to maintain a stock of plant and materials for emergency flooding responses. • Identify a list of priorities that can be managed with the budget available for flood risk.
Working with others to reduce risk *A2	• To work together with internal and external stakeholders to manage flooding from all sources in the Borough. • To increase understanding internally and externally of the Lead Local Flood Authority role. • To work with internal and external stakeholders to take a consistent and prioritised approach to managing drainage and flood risk assets in the Borough, with an emphasis to maintenance of existing drainage infrastructure, including watercourses.	• Have quarterly flood risk meetings to encourage collaboration with internal and external parties. • Produce a concise table documenting LLFA duties and their implementation, plus make it available to internal and external stakeholders. • Manage and reduce flood risk by having a risk-based maintenance regime that prioritises critical flooding locations. • Address flood risk to reduce flooding on highways by adding drainage considerations to a checklist for scheme designs. • Have a register of assets owned, maintained, and managed by the LLFA. • Agree with stakeholders the precise maintenance responsibility for every drainage asset within the borough
Making places flood resilient *A3	• To deliver a prioritised programme of works to alleviate flooding, including natural flood management measures. • To embed actions to reduce flood risk into our approach to manage the highways network. • To integrate policies and guidance to reduce flood risk through new development into our approach as a Local Planning Authority.	• Develop a prioritised 5-year programme of natural flood management projects across the Borough. • Ensure more sustainable planning decisions by providing developers with copies/links of the Local Flood Risk Management Strategy and Action Plan. • Devise a professional development plan to upskill council officers involved with flood risk management.

6. Action Plan

In addition to the borough-wide LFRMS measures, area-specific measures have been developed as part of the SWMP update. These identify the localised action that would best manage flood risk within each Critical Drainage Areas.

A long list of measures was collated and agreed with stakeholders. The measures were shortlisted and prioritised using a multicriteria analysis, followed by a cost benefit analysis to show which are most viable within each Critical Drainage Area (CDA). Full details of the analysis undertaken can be found in the SWMP report.

The measures from the LFRMS and from the SWMP have been combined into a detailed Action Plan for the SWMP and the LFRMS. This Action Plan is included as Appendix A of the LFRMS.

The Action Plan is split into two sections showing boroughwide and CDA specific measures. The information included in the plan covers the following categories:

- **Measures and description:** shows the name of the measure and provides details of what the measure is**.**
- **General location:** states what CDA it is in or if it is boroughwide.
- **Priority ranking:** shows the ranking of CDA specific measures which ranges from very low to very high.
- **Cost/funding:** details what funding could be available to implement the measure and the average cost of the measures.
- **Estimated benefit:** provides the 'per property' and 'total' benefit of implementing the measure, taken from the cost benefit analysis.
- **Duration:** explains the time needed to implement the measure (short, medium or long-term and an idea of the implementation time). The implementation time will vary depending on resources, internal and external funding and priorities. Ongoing measures are those that are already being implemented.
- **Responsibility:** states the lead LBH team and primary support for implementing the measure.
- **Stakeholders:** shows who will/could be involved and support the measure implementation.
- **LFRMS:** states which LFRMS aims/objectives the measures apply to. Applies to boroughwide measures only.
- **Review/monitoring:** shows the Key Performance Indicators (KPIs) against which the measure should be monitored.
- **Origin:** sets out whether the measure is new or has been identified from a previous study, strategy or plan.

7. Implementation, Monitoring and Review

7.1 Funding

There are several potential funding sources for delivery of the Action Plan, which are explained below. Partnership working is key to maximise the funding available.

Internal Funding

LLFA Grant from Local Government Financial Settlement provides most of the LLFAs funding to carry out their duties under the Flooding and Management Act 2010.

Estates Improvement Budgets which could support projects to reduce flood risk in the estates.

Council budget which could support enhance partnership working, upskilling and implementation of other flood risk related projects. This includes Service Area Revenue Budgets which are the financial plans and estimates made by local authorities for their revenue expenditure.

External Funding - RMAs

The Thames Regional Flood and Coastal Committee (TFRCC), Flood Defence Grant in Aid (FDGiA) and Local Levy Funding is funding from central government for managing flood risk in England for the development of feasibility studies and implementation of capital flood risk projects.

Thames Water has previously made funding available for projects which manage flood water and prevent it entering the sewer network.

The **Greater London Authority (GLA)** has previously provided funding for projects which provide green infrastructure and climate change adaptations across London.

Other Sources of Funding

The Department for Education (DfE) has previously provided for projects which will reduce the impacts of flooding for schools.

Local Wildlife and River Trusts occasionally have funds which can be used to support delivery of SuDS in communities.

Central Government occasionally make funding available to improve quality of housing, commercial and local areas.

Business Improvement Districts (BIDs) have programmes focuses on improving the local environment in their area, may have implemented SuDS and are open to exploring opportunities to improve the areas they operate in.

Funds from developer contributions and the planning system.

The table below shows more details of the potential funding streams.

Table 7.1-1: Funding Streams Summary

Source	Funding stream	Project develop-ment	Capital delivery	Maintenance	Funding criteria
London Borough of Havering	Internal funding	Yes	Yes	Yes	Local government service budgets are set annually. Projects will need to deliver multiple benefits to bring in funding from other departments. This includes LLFA Grant from Local Government Financial Settlement which provides most of the LLFAs funding, Estates Improvement Budgets and Council Budgets.
Defra (administered by the Environment Agency - EA)	External Funding, Flood Defence Grant in Aid (FDGiA)	Yes	Yes	No	The amount of funding available depends on the 'Outcome Measures' a capital scheme will deliver, such as residential properties protected, reduction of other damages from flooding and environmental enhancements. 'Partnership Funding' from other sources is needed to fill any gaps needed in the funding required to deliver a scheme. Occasionally other funding becomes available, targeted towards reducing flooding to Frequently Flooded Communities or Schools.
Thames Regional Flood and Coastal Committee (administered by the EA)	External Funding, Local Levy	Yes	Yes	No	This funding is administered by the RFCC to meet local priorities, which may change from time to time. The TRFCC follows local levy principles relating to climate change, net zero carbon impact, multiple-benefits, biodiversity net gain, partnership working, communicating and building capability standards, catchment-based approaches, cost-effectiveness, efficiency, learning lessons and sharing information from similar schemes. Funding for Sustainable Drainage Systems and Natural Based Solutions projects is high up on the TRFCC's agenda.
Thames Water	Partnership funding, SuDS specific funding	Yes	Yes	Only for maintaining sewerage elements	Thames Water provide Partnership Funding towards schemes where there are also elements that reduce the risk from sewer flooding. Their priorities for allocating funding are set out in their Drainage and Wastewater Management Plan[51]. Appendices on SuDS and London Flooding 2021 contain information on projects funded by Thames Water.
Greater London	Partnership funding,	Yes	Yes	In some cases	The GLA has previously provided funding for projects which provide green infrastructure and climate change adaptation across London. previously provided

[51] Thames Water, Drainage and Wastewater Management Plan, https://www.thameswater.co.uk/about-us/regulation/drainage-and-wastewater-management/our-dwmp

Source	Funding stream	Project develop-ment	Capital delivery	Maintenance	Funding criteria
Authority (GLA)	specific local schemes without FDGiA				funding for projects which provide green infrastructure and climate change adaptations across London. Some examples include: • Greener City Fund: Community Green Space Grants[52] • Green and Resilient Spaces Fund[53]
Developers via the Planning System	Partnership funding	Yes	Yes	No	Section 106 monies collected from larger developments may be able to be used. Larger flood alleviation projects may be eligible for Community Infrastructure Levy. Local authorities must spend the levy on infrastructure needed to support the development of their area.
Other funding streams	Partnership funding, specific local schemes without FDGiA	Yes	Yes	Maybe	The list of potential funding streams is extensive and will depend on the direct benefits a scheme provides to reducing flood risk to certain infrastructure/ businesses/ utilities and/ or the delivery of multiple benefits. For example, this might include: - Developers - Businesses - Utility companies - Organisations such as Business Improvement Districts, Wildlife and Rivers Trusts - Charities - Natural England - Historic England - National Lottery Community Fund - Department for Education - Levelling Up Fund - Ofwat Innovation Fund

[52] London Assembly, Grow Back Greener Fund 2021, https://www.london.gov.uk/programmes-strategies/environment-and-climate-change/parks-green-spaces-and-biodiversity/green-space-funding/grow-back-greener-fund-2021

[53] London Assembly, Green and Resilient Spaces Fund, https://www.london.gov.uk/programmes-strategies/environment-and-climate-change/parks-green-spaces-and-biodiversity/green-space-funding/green-and-resilient-spaces-fund-round-one

The process of bidding for external funding may require specific expertise in obtaining grant funding. The value of the funding available can vary significantly and the outcome(s) of any funding bid(s) may remain uncertain for some time after a bid is made. This can make pooling together funding from different stakeholders and sources complex and resource intensive.

The LBH will work together with other organisations to bid for available funding on a prioritised basis to deliver the measures in the Action Plan. The Council's LLFA team will work with partners to maximise the funding available and to bid for further funding as new projects and funding opportunities emerge. The information in the Action Plan will support future bids for funding, particularly for Flood Defence Grant in Aid and Local Levy.

Measures have been ranked in order of priority to give an idea of which measures are likely to be implemented first. However, it is important to note that measure implementation is subject to the borough's resources and funding, and these could change at a short notice due to different factors such as national government funding changes, internal changes, responses to emergencies, etc. The implementation of the measures will be monitored regularly.

7.2 Ongoing Monitoring

Monitoring the Action Plan is key as part of the overall implementation of the LFRMS. The LLFA will carry out regular monitoring of the LFRMS.

7.3 Review Timeframe

There are no set timeframes within which LFRMS are required to be reviewed. However, it has been decided that this LFRMS will be reviewed within 6-years. A review may be triggered earlier if a significant flooding event changes the understanding of local flood risk or changes local priorities, or if there is a major change in local or national policy.

As with the implementation of the Action Plan, the review of the LFRMS will be subject to the Borough's funding and resources.

8. Glossary

BID - Business Improvement District

CDA – Critical Drainage Area

CE – Community and Engagement

Defra – Department for Environment, Food and Rural Affairs

DfE – Department for Education

DWMP – Drainage and Wastewater Management Plan

EA – Environment Agency

FCERM – Flood and Coastal Erosion Risk Management

FDGiA – Flood Defence Grant in Aid

FRMP – Flood Risk Management Plan

FRMP2 - Flood risk Management Plans for England 2021 – 2027

FWMA 2010 – Flood and Water Management Act 2010

GIS – Geographic Information System

GLA – The Greater London Authority

IDB – Internal Drainage Body

KPI – Key Performance Indicators.

LBH – London Borough of Havering

LFRMS – Local Flood Risk Management Strategy

LGA – London Government Association

LLFA – Lead Local Flood Authority

RFCC – Regional Flood and Coastal Committee

RMA - Risk Management Authority

SAB - SuDS Approval Body

SEA – Strategic Environmental Assessment

SuDS – Sustainable Drainage Systems

SWMP – Surface Water Management Plan

TE2100 – Thames Estuary 2100 Plan

TfL – Transport for London

TRFCC – The Thames Regional Flood and Coastal Committee

TW – Thames Water

Appendix A: Action Plan (see separate document)

Appendix B: A3 Scaled Maps (see separate document)