



## **SIGNIFICANT FLOOD RISK MANAGEMENT ASSET FRAMEWORK**

**FOR**

**LONDON DRAINAGE ENGINEERS GROUP (LODEG)**



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## Revision History

Date	Version No.	Summary of Changes
04/03/2016	1.0	Original document
31/03/2016	1.1	Updated following discussion and review with LoDEG Chairman
29/04/2016	1.2	Updated following review by focus group of six London Boroughs

## 1. Purpose

The purpose of this document is to provide a consistent methodology for defining the ‘significance’ of a flood risk management asset. The need for this definition is associated with the duty of all Lead Local Flood Authorities (LLFAs) to maintain “a register of structures or features which, in the opinion of the authority, are likely to have a significant effect on a flood risk in its area” ([Flood and Water Management Act 2010 – Part 1 – Section 21 – Clause 1\(a\)](#)).

A LoDEG membership survey in April / May 2015 highlighted that more than 80% of respondents thought that a ‘London wide’ approach to the definition of asset significance would be beneficial. Those not in favour of a London wide approach generally highlighted the need for individual Boroughs to decide on their own definition of significance based on local priorities. This document aims to address both aspects of this by providing a common method for Boroughs across London to define asset significance at a local level based on a similar set of considerations or parameters.

## 2. Background

### 2.1. Legislation and Guidance

There is limited central government (Environment Agency or Defra) guidance on asset significance. [Available guidance](#) simply states that it is a local decision for the LLFA based on what information they have available to them. The Flood and Water Management Act (Section 21) defines the duty to maintain a register as follows:

- *A lead local flood authority must establish and maintain:*
  - a) *a register of structures or features which, in the opinion of the authority, are likely to have a significant effect on a flood risk in its area, and*
  - b) *a record of information about each of those structures or features, including information about ownership and state of repair.*
- *The lead local flood authority must arrange for the register to be available for inspection at all reasonable times.*

### 2.2. Key Definitions

It is important to highlight that a **‘structure or feature’** could include **‘drainage’ assets**, but also assets **that were not built for the purpose of flood management, but act as flood management assets** such as landscaping embankments or roads. The register must include structures or features that ‘significantly’ effect **flood risk – not just those owned / maintained by the LLFA or those that only influence local sources of flood risk (surface water, groundwater and ordinary watercourses)**.

Since enactment of Section 21 in April 2011, LLFAs in England and Wales have interpreted asset significance in a variety of ways. LLFAs generally publish little information about how they have determined which significant assets are on their respective registers of structures (generally referred to as ‘Asset Registers’). LLFAs in London have adopted a similar, varied, approach to the population of their Asset Registers.

### 2.3. Questionnaire

A questionnaire was sent to all London Boroughs as part of development of this framework. The purpose of the questionnaire was to collect information on what assets London Boroughs have included (or plan to include) on their individual asset registers and what factors they consider to be important when deciding what is significant. The questionnaire was open from 2 to 24 February 2016 and received 26 responses from 25 London Boroughs. The responses received represent the views of more than 75% of the London Boroughs / LLFAs. The outcomes from the questionnaire are referred to throughout this document.

## 3. What is a Flood Risk Management Asset?

There are a range of definitions for a 'Flood Risk Management Asset' used by LLFAs in England and Wales. For the purposes of this framework document, a **Flood Risk Management Asset** is defined as:

**A structure or feature that would cause an increased flood risk if it were absent,  
modified or not appropriately maintained**

As discussed in Section 2, a structure or feature is not simply restricted to drainage assets. *The definition above is purposefully generic to include all assets that could influence flood risk – it must be noted that assets defined as significant should only be a small sub-set of assets within this wider definition.* Table 1 shows a summary of the features / structures that could be considered. This list is not exhaustive and other structures / features could influence flood risk within the particular LLFA area depending on local circumstances.

It should be noted that while the requirements of an Asset Register include recording the state of repair of an asset, there is **no obligation** on the LLFA to undertake maintenance work unless it is also the asset owner. Even if the LLFA is the asset owner, it is noted that the level of maintenance undertaken would be subject to available funding. The asset owner and maintainer may also be different parties.

Table 1: Example Flood Risk Management Assets

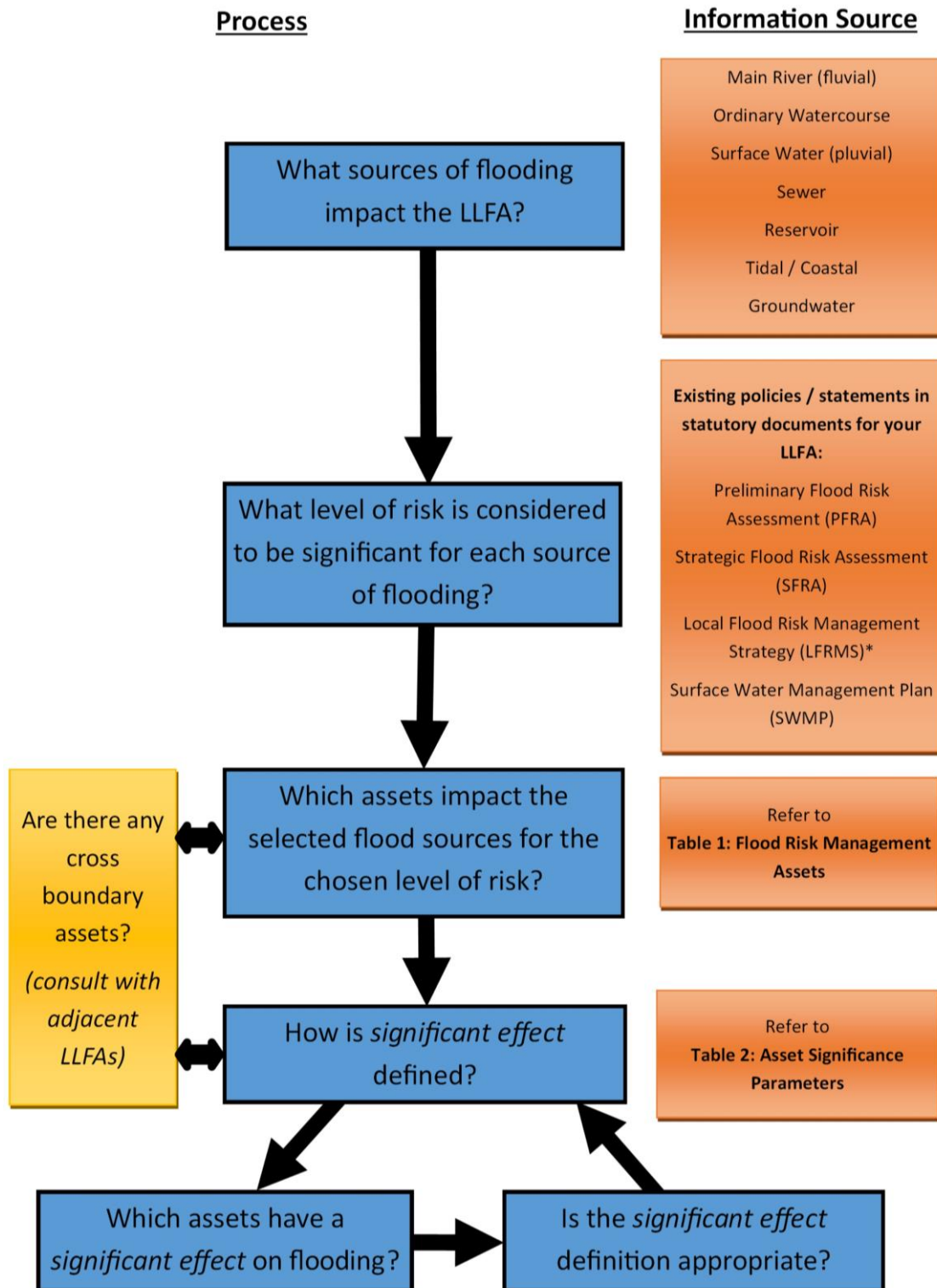
Structure / Feature	
Balancing Ponds	Ordinary watercourse
Banks	Outfalls
Bridges	Outlets
Combined sewer	Ponds
Culvert	Pumping stations
Ditch	Railway tracks
Embankment	Reservoir dam or embankment
Flood storage areas	Reservoirs
Flood walls	Retaining walls
Flow control devices	Roads (any classification)
Foul water sewer	Sluices
Garden walls	Sustainable Drainage (SuDS) features (rain gardens, swales, permeable paving etc.)
Gullies (including connecting pipes)	Storage tanks
Inlets	Structures adjacent to or within watercourses
Locks	Surface water sewer
Main River	Trash screens
Manholes	Urban features (buildings, underpasses etc.)
Mounds	Walls
Oil and petrol interceptors	Weirs

## 4. How to determine if a Flood Risk Management Asset is significant?

### 4.1. Methodology

Figure 1 describes a process for developing a register of significant Flood Risk Management Assets from a wider range of assets that influence flood risk.

Figure 1: Flow Chart – Method to define Flood Risk Management Asset Significance



\* This could also include the threshold defined for undertaking a Flood Investigation under Section 19 of the Flood and Water Management Act (2010)

The process starts by defining:

- The sources of flood risk are present within the LLFA boundary
- What level of risk of flooding the LLFA defines as significant (and if the focus will be on actual or predicted risk<sup>1</sup> – or a combination of the two)

The process then identifies a ‘long list’ of assets that have an impact on the selected flood sources for the chosen risk level. It provides a list of considerations for defining ‘significance’ based on readily available information. The selected significance definition is then applied to the long list of assets to produce a (short) list of significant assets.

The process concludes with an iterative cycle to review if the selected definition of *significant effect* is appropriate and refine it as necessary. This review cycle may be triggered by:

- The initial definition of *significant effect* producing a technically unworkable process of application to assets
- Insufficient resource / capability available within the LLFA to apply the definition

It is considered good practice to review and revise the *significant effect* definition in line with a set periodic revision to other key policy or evidence documents (such as the LFRMS, PFRA or SFRA). A worked example demonstrating application of the process is provided in [Appendix A](#).

This approach ensures that the LLFA Asset Register population process:

- Considers all relevant sources of flood risk
- Selects a level of risk that is consistent with other Local Authority policies / strategies
- Obtains relevant information from within the Local Authority and other Risk Management Authorities
- Applies a consistent definition of *significant effect* on flooding to highlight those significant assets that must be on the Asset Register.

The overall definition of a *significant effect* is made by the LLFA selecting relevant parameters<sup>2</sup> and associated thresholds / measures that are appropriate for local priorities. These parameters are then applied consistently across the assets to define a short list which are classified as significant. The definition can then be refined to suit available resources / capacity within the LLFA to compile the Asset Register.

**It should also be noted that some flood risk management assets could cross over LLFA boundaries.** Adjacent LLFAs should consult with their neighbours to identify any cross boundary assets and coordinate approaches for defining asset significance where appropriate. Adjacent LLFAs do not need to apply the same significance definition, but should be aware of the potential impact of significant variations in approaches for assets that cross boundaries.

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<sup>1</sup> All LLFAs have access to the national level updated Flood Map for Surface Water (uFMfSW) to assess predicted risk. The modelling methodology for creating the uFMfSW assumes that the pipe network is represented by a constant rate across an urban area. This means that overland flow routes are shown without any specific representation of drainage assets and the uFMfSW is a good approximation of flooding that may occur during complete blockage of key drainage assets in an urban area.

<sup>2</sup> The parameters have been selected based on readily available information that can be easily obtained in a GIS data format. This would allow the process of defining significant assets to be implemented via a simple spatial analysis using any type of GIS software package.

## 4.2. Defining a 'significant effect'

Table 2 presents a list of parameters that can be used to define a *significant effect* of an asset. It is intended that LLFAs review the list, then select the parameters that are appropriate to their own local priorities and apply the relevant thresholds to define significance in a consistent manner.

***It is not mandatory to apply all parameters in the selected definition.***

A best practice approach would be to consider each parameter and record a justification for inclusion or exclusion in the definition of significance that is applied. This ensures a clear, transparent and defensible position should the selection of significant assets be challenged or queried.

The questionnaire described in Section 2.3 included a question asking Boroughs across London to rank the importance of the proposed parameters. Table 2 includes a summary of the responses where relevant and an overall ranking of importance of each of the parameters. The parameters are ranked from **1 (most important)** to **15 (least important)** based on the average importance level from the questionnaire responses. Where the questionnaire responses showed an equal importance rating for more than one parameter, then they have been given the same ranking.

The table is colour coded to show which sets of parameters were considered the most important.

- **RED** indicates that the parameters were first or second in importance
- **ORANGE** indicates third in importance
- **GREEN** shows parameters generally ranked outside the top three

The term 'reduces the risk' should be interpreted in the context of the definition of a Flood Risk Management Asset detailed in Section 3. An asset reduces the risk to properties or infrastructure through influencing the extent or mechanism of flooding. This risk reduction may be provided intentionally by design (such as a culvert or flood wall) or unintentionally by urban features (such as a landscaped embankment).

It is noted that several of the parameters listed in the table are linked to each other and could be applied in combination. For example, a LLFA may decide on a significance definition that includes an asset that impacts actual flooding of more than five residential properties and predicted flooding for more than ten properties.



Table 2: Asset Significance Parameters

Group	Parameter Type	Parameter	Threshold or measure to consider	Questionnaire Outcomes	
				Discussion	Average Importance Ranking
Flood Extent / Mechanism	Modelled Flood Extent <sup>3</sup>	Influence of asset on predicted flood extent	Flooded / Not Flooded % Change of depth and / or extent	81% of respondents thought that the influence of an asset on actual flood extent was important. The most popular modelled flood extents considered were 1 in 30year and 1 in 100year plus climate change events for surface water and ordinary watercourses.	4
	Actual Flood Extent	Influence of asset on actual flood extent			2
	Flood Mechanism	Influence of the asset on a local flood mechanism investigated under <a href="#">Section 19</a>			11
Maintenance <sup>4</sup>	Maintenance	Level of maintenance required	Annually 6 Monthly 3 Monthly Monthly Prior to significant forecast rainfall	The frequency of maintenance required is generally proportional to the significance of consequence of failure. 79% of respondents considered maintenance and consequence of failure to be a key factor in assigning significance.	7
	Consequence of Failure	Magnitude of failure on surroundings	Degree of difference between the flood extent when asset is present / operational compared to the potential extent during failure		1
Property	Vulnerability	Vulnerability level of land use type with risk reduced by an asset (as defined by the NPPF vulnerability classification)	More Vulnerable Highly Vulnerable Essential Infrastructure	More than two thirds of respondents considered vulnerability to be a key factor in determining significance. The three highest vulnerability categories were considered most important.	4
	Residential	Number of Residential properties with reduced risk from internally flooding	Number of properties with reduced risk  Linked with thresholds set for <a href="#">Section 19 Flood Investigations</a>		4
	Commercial	Number of Commercial properties with risk reduced from internal flooding			9
	Industrial	Number of Industrial properties with reduced risk from internal flooding			10
Infrastructure <sup>5</sup>	Critical Infrastructure	Type of critical infrastructure with reduced risk	Communication <b>Emergency Services</b> <b>Energy (generation and transmission)</b> Food production / distribution <b>Health Services</b> <b>Transport Infrastructure</b> <b>Water (supply / wastewater treatment)</b> Defence / Military Chemical Storage Refuge Centres	74% of respondents thought that protection of critical infrastructure should be used in defining significance. The most important infrastructure types as indicted by respondents are highlighted in bold in the adjacent column.	2

<sup>3</sup> Note that this could include national level modelling (updated Flood Map for Surface Water) or local detailed modelling undertaken in a specific area.

<sup>4</sup> Any maintenance prioritisation decisions linked to this definition should be made in the full knowledge of potential impacts on non-significant assets and associated consequences of potential flooding.

<sup>5</sup> Decisions made around importance of infrastructure assets could also be linked to Local Authority actions associated with the Department for Transport – [Transport resilience review recommendations](#).

Group	Parameter Type	Parameter	Threshold or measure to consider	Questionnaire Outcomes	
				Discussion	Average Importance Ranking
	<b>Road Type</b>	Types of roads with reduced risk	Motorways A Road B Road Access road for emergency services Access road to key transport hubs (train/tube/bus/tram stations) Local Road Part of the Local Authority Resilient Network	74% of respondents thought that protection of roads should be used in defining significance <sup>6</sup> . The most important road types identified were motorways, A Roads, access to emergency services and key transport hubs.	12
	<b>Road Flooding</b>	Impact of flooding on road operation	Flood depth Impact on journey time Length of road flooded Duration of flood	Respondents indicated that the two most important impacts of flooding on roads were flood depth and duration.	
	<b>Railway Type</b>	Types of railways with reduced risk	Network Rail London Overground London Underground TfL Rail	63% of respondents thought that protection of railway should be used in defining significance. The most important railway type identified was Network Rail. Respondents also suggested that stations and service yards could also be considered.	13
	<b>Railway Flooding</b>	Impact of flooding on rail operation	Flood depth Impact on journey time Length of road flooded Duration of flood	Respondents indicated that the most important impacts of flooding on railways were impact on journey time, flood depth and duration.	
Environmental and Social	<b>Designated environmental sites</b>	Types of sites with reduced risk	Special Areas of Conservation (SAC) Special Protected Areas (SPA) Site of Special Scientific Interest (SSSI) Ramsar Local Conservation Areas and Parks	37% of respondents thought that protection of designated sites should be considered in defining significance.	14
	<b>Heritage Feature</b>	Types of heritage features with reduced risk	World Heritage Site Scheduled Monument Listed Buildings Registered Parks and Gardens	Responses were split approximately 50/50 for defining an asset as significant if it protected a heritage feature.	15
	<b>Potential to cause significant pollution</b>	Type of land use that can cause significant pollution if flooded	Integrated Pollution Prevention and Control (IPPC) Control of Major Accident Hazards (COMAH) Wastewater treatment works Petrol stations Waste transfer sites Food processing establishment	58% of respondents thought that potential for pollution should be used to define significance.	8

<sup>6</sup> The questionnaire had two questions about the importance of roads in this context. The first question was a 'yes / no' query asking if impact on roads should be used to define significance. The second was within a table which asked respondents to rank the importance of roads relative to other factors. 74% of respondents answered 'yes' to the first question, but then ranked roads as lower importance compared to other factors in the table later in the survey resulting in a low relative importance ranking.

## 5. References

*Flood and Water Management Act (2010)* - <http://www.legislation.gov.uk/ukpga/2010/29/contents>

*Flood maps for surface water: how they were produced (2013)*  
<https://www.gov.uk/government/publications/flood-maps-for-surface-water-how-they-were-produced>

*Flood risk areas: selecting and reviewing for local sources of flooding: guidance to lead local flood authorities* - <https://www.gov.uk/government/publications/flood-risk-areas-selecting-and-reviewing-for-local-sources-of-flooding-guidance-to-lead-local-flood-authorities>

*Flood risk management: information for flood risk management authorities, asset owners and local authorities* - <https://www.gov.uk/guidance/flood-risk-management-information-for-flood-risk-management-authorities-asset-owners-and-local-authorities>

*Significant Flood Risk Management Asset Framework for London – Questionnaire (2016)*.  
Commissioned by LoDEG – redacted questionnaire responses available upon request from George Warren (LoDEG Chairman – London Borough of Hammersmith and Fulham).

## Appendix A – Worked Example

To aid application of the methodology described in Section 4, a worked example is provided below for a fictional London Borough (London Borough of eXample – LBX). The example is not a recommendation of parameters / thresholds that should be adopted, but a demonstration of how the process could be applied.

### Background

The London Borough of eXample (LBX) is:

- Located on the River Thames (tidal and fluvial influenced reaches)
- A mixture of heavily urbanised and rural land uses (with several ordinary watercourses in rural areas that then run through the urban areas to the main rivers with culverted and open reaches)
- A mixture of Thames Basin geological conditions (river deposits close to the Thames and London Clay in most other areas)
- Generally flat adjacent to the River Thames, but undulating with clear historic urbanised / rural topographic valleys and associated flow paths away from the main river.
- Served by a mixture of combined and separated sewer networks

### What sources of flooding impact the LLFA?

*Table 3: What sources of flooding impact the LLFA?*

Source of Flooding	Impacts LLFA?	Comment
<b>Main River</b>	Yes – River Thames and Main River Tributaries	Part fluvial and part tidal
<b>Ordinary Watercourse</b>	Yes	Rural and urban areas
<b>Surface Water</b>	Yes	Urban areas mainly
<b>Sewer</b>	Yes	Combined sewers in older parts of Borough and separated sewers in more recently developed areas
<b>Reservoir</b>	No	None
<b>Tidal / Coastal</b>	Yes	Part fluvial and part tidal
<b>Groundwater</b>	Yes	Minimal impact – high susceptibility in river deposits adjacent to the Thames

**What level of risk do is considered significant for each source of flooding?**

*Table 4: What level of risk is considered significant for each source of flooding?*

Source of Flooding	Reference Document(s)	Selected Risk Level
<b>Main River</b>	SFRA & LFRMS (Flood Map for Planning)	Flood Zone 3 (1 in 100 chance of occurring in any given year)
<b>Ordinary Watercourse</b>	LFRMS (Environment Agency - Updated Flood Map for Surface Water)	High Risk (1 in 30 chance of occurring in any given year) and within Critical Drainage Area
<b>Surface Water</b>	LFRMS (Environment Agency - Updated Flood Map for Surface Water)	High Risk (1 in 30 chance of occurring in any given year) and within Critical Drainage Area
<b>Sewer</b>	SWMP (Thames Water – Sewer flooding incidents by four-digit postcode)	Shown on Thames Water Flood Incident (DG5) Register (sewer flooding due to hydraulic overload occurring more frequently than once in 20 years)
<b>Reservoir</b>	N/A	N/A – No reservoirs
<b>Tidal / Coastal</b>	SFRA & LFRMS (Flood Map for Planning)	Flood Zone 3 (1 in 200 chance of occurring in any given year)
<b>Groundwater</b>	SWMP & LFRMS (Drain London – Increased Potential for Elevated Groundwater Map)	Areas at increased potential for elevated groundwater

**Which assets impact the selected flood sources for the chosen level of risk?**

Table 5: Which assets impact the selected flood sources for the chosen level of risk?

Source of Flooding	Flood Extent Definition	Flood Extent Data Source	Potential Flood Risk Management Assets (FRMA)	FRMA Data Source
<b>Main River</b>	Flood Zone 3	Flood Map (EA Geostore) Historic Flood Map (EA Geostore)	Fluvial Flood Defences Flood Storage Areas Statutory Sealed Main Rivers	Flood Map – Defences (EA Geostore) Flood Storage Areas (EA Geostore) National Flood Defence Dataset (NFCDD – EA Special Data Request)
<b>Ordinary Watercourse</b>	Updated Flood Map for Surface Water (uFMfSW)– 1 in 30 chance of flooding in any year	Updated Flood Map for Surface Water – Basic – 30yr Extent (EA Geostore)	<i>As for sewers (refer below)</i> Ordinary Watercourses - open reaches Ordinary Watercourses – flood walls Ordinary Watercourse – inlet / outlet structures and culverts Ordinary Watercourse – bridges	Ordnance Survey – Master Map (inland water / road or track) Detailed River Network (EA Geostore) Site walkovers / inspections (completed by LBX LLFA Officer) Local knowledge (LBX Highways, Drainage and Parks teams)
<b>Surface Water</b>	Known flood extent from historic events that occur more than once every two years.	Recorded by LBX (call centre records, anecdotal evidence, highways maintenance records, officer knowledge etc.)	Underpasses (road and pedestrian) Mounds / Embankments Road gullies Roads SuDS Features (major only – ponds & wetlands)	Review of uFMfSW predicted flow paths and ponding areas (completed by LBX LLFA Officer) Review of LiDAR Data (EA Geostore) LLFA Statutory Consultee records (held by LBX LLFA Officer)

Source of Flooding	Flood Extent Definition	Flood Extent Data Source	Potential Flood Risk Management Assets (FRMA)	FRMA Data Source
<b>Sewer</b>	Four-digit postcode with one or more sewer flood incident recorded	Thames Water – Flood Incident Data	Surface Water Sewers + Manholes Combined Sewers + Manholes Pumping Stations Combined Sewer Overflows	Thames Water – Technical Information Thames Water – Data Requests
<b>Reservoir</b>	N/A	N/A	N/A	N/A
<b>Tidal / Coastal</b>	Flood Zone 3	Flood Map (EA Geostore) Historic Flood Map (EA Geostore)	Tidal Flood Defences	Flood Map – Defences (EA Geostore) National Flood Defence Dataset (NFCDD – EA Special Data Request)
<b>Groundwater</b>	Drain London – Increased Potential for Elevated Groundwater (iPEG) Map	Greater London Authority – Drain London Data	Water extraction points / pumping stations Artificial groundwater management (pumping to avoid London Underground station flooding)	Source Protection Zones - EA Geostore Groundwater extraction points - EA Special Data Request Transport for London – Drainage Information

Data Source References:

EA Geostore: <https://data.gov.uk/publisher/environment-agency?page=1>

EA Special Data Request: [enquiries@environment-agency.gov.uk](mailto:enquiries@environment-agency.gov.uk)

Thames Water – Technical Information: [technical.information@thameswater.co.uk](mailto:technical.information@thameswater.co.uk)

Thames Water – Data Requests: [datarequests@thameswater.co.uk](mailto:datarequests@thameswater.co.uk)

Thames Water – Flood Incident Data: [Mark.Dickinson@thameswater.co.uk](mailto:Mark.Dickinson@thameswater.co.uk)

Greater London Authority – Drain London Data: [kevin.reid@london.gov.uk](mailto:kevin.reid@london.gov.uk)

Transport for London – Drainage Information: [rajan.sharma@tfl.gov.uk](mailto:rajan.sharma@tfl.gov.uk)

**How is significant effect defined?**

Review and select parameters with associated measures / thresholds

*Table 6: Selection and justification of definition*

Parameter Type	Parameter	Selected for Definition?	Measure / Threshold Applied	Justification
<b>Modelled Flood Extent</b>	Influence of asset on predicted flood extent	Yes	Flooded / Not Flooded	Represents the best available information on flood risk within LBX
<b>Actual Flood Extent</b>	Influence of asset on actual flood extent	Yes	Flooded / Not Flooded	Represents the best available information on flood risk within LBX
<b>Flood Mechanism</b>	Influence of the asset on a local flood mechanism investigated under Section 19	No	N/A	Section 19 investigation threshold is generally defined as 'case-by-case' basis in LFRMS. No clear definition to apply in this context.
<b>Maintenance</b>	Level of maintenance required	Yes	Prior to significant forecast rainfall	Proactively managed assets are considered to be important to LBX
<b>Consequence of Failure</b>	Magnitude of failure on surroundings	Yes	Flooded / Not Flooded	Linked to level of maintenance – proactively managed assets generally have significant consequence of failure.
<b>Vulnerability</b>	Vulnerability level of land use type with risk reduced by an asset (as defined by the NPPF vulnerability classification)	Yes	More Vulnerable Highly Vulnerable Essential Infrastructure	Linked to other property flooding parameters – vulnerability criteria to be applied to each land use type.
<b>Residential</b>	Number of Residential properties with reduced risk from internally flooding	Yes	Two or more (all are More Vulnerable)	An asset that only protects one property is considered the responsibility of the property owner.



Parameter Type	Parameter	Selected for Definition?	Measure / Threshold Applied	Justification
<b>Commercial</b>	Number of Commercial properties with reduced risk from internal flooding	Yes	Two or more – More and Highly Vulnerable land uses only	Maintain consistency with other property thresholds selected.
<b>Industrial</b>	Number of Industrial properties with reduced risk from internal flooding	Yes	Two or more – More and Highly Vulnerable land uses only	Maintain consistency with other property thresholds selected
<b>Critical Infrastructure</b>	Type of critical infrastructure protected	Yes	One or more - Essential Infrastructure only	Considered to be important for effective functioning of LBX during flooding from selected events
<b>Road Type</b>	Types of roads with reduced risk	No	N/A	Critical routes (mass evacuation routes) are included as Critical Infrastructure.
<b>Road Flooding</b>	Impact of flooding on road operation	No	N/A	
<b>Railway Type</b>	Types of railways with reduced risk	No	N/A	No key rail routes within identified within flood extents for selected level of risk.
<b>Railway Flooding</b>	Impact of flooding on rail operation	No	N/A	No key rail routes within identified within flood extents for selected level of risk.
<b>Designated environmental sites</b>	Types of sites with reduced risk	N/A	N/A	No designated sites within LBX.
<b>Heritage Feature</b>	Types of heritage features with reduced risks	No	N/A	Heritage features are generally only listed buildings and are covered under property flooding parameter above.
<b>Potential to cause significant pollution</b>	Type of land use that can cause significant pollution if flooded	Yes	Petrol stations	No other high pollution risk sites located within LBX. Other relevant site types are included as More Vulnerable commercial / industrial sites (e.g. waste transfer)

LBX definition of significant effect

A Flood Risk Management Asset (FRMA) has a significant effect in LBX if it influences a predicted or known flooding extent (as defined in the previous section for all sources of flooding) such that it alters the potential risk to:

- Two or more residential properties
- Two or more commercial or industrial properties that have land use classifications of More or Highly Vulnerability (as defined by the NPPF)
- One or more item of Essential Infrastructure
- One or more petrol stations

In addition to the above, any FRMA that is proactively maintained by the LBX in advance of significant forecast rainfall is also defined as having a significant effect.

**Which assets have a significant effect on flooding?**

The process applied to identify significant FRMAs within LBX is defined in the table below for the asset types previously identified in the potential FRMAs list. Recommended actions for each are also included where relevant.

*Table 7: Which FRMAs are significant?*

Source of Flooding	Potential Flood Risk Management Assets (FRMA)	Significant FRMAs	Justification	Recommended Actions
<b>Main River</b>	Fluvial Flood Defences Flood Storage Areas Statutory Sealed Main Rivers	All FRMAs that provide a minimum standard of protection of 1 in 100 chance of flooding in any given year from fluvial flooding to areas of LBX that exceed the definition of 'significant effect'	Assets that provide a 'Benefit from Defence' as defined by the EA	Maintain regular contact with EA to ensure appropriate maintenance is undertaken and influence asset management decision making where relevant.
<b>Tidal / Coastal</b>	Tidal Flood Defences	All FRMAs that provide a minimum standard of protection of 1 in 200 chance of flooding in any given year from tidal flooding to areas of LBX that exceed the definition of 'significant effect'	Assets that provide a 'Benefit from Defence' as defined by the EA	Maintain regular contact with EA to ensure appropriate maintenance is undertaken and influence asset management decision making where relevant.

Source of Flooding	Potential Flood Risk Management Assets (FRMA)	Significant FRMAs	Justification	Recommended Actions
<p><b>Ordinary Watercourses / Surface Water</b></p>	<p>As listed in Table 5</p>	<p>All FRMAs that are within the predicted surface water 1 in 30yr flood extent or a known flood extent that also contains land uses / infrastructure that exceed the definition of 'significant effect'</p>	<p>Assets that influence the selected level of flood risk from the stated sources.</p>	<p>Complete site visits to confirm condition of above ground assets.</p> <p>Review asset ownership and maintenance responsibilities.</p> <p>Contact third party asset owners / maintainers to determine if appropriate maintenance is being undertaken.</p> <p>Consider designation of significant FRMAs under Schedule 1 of the Flood and Water Management Act (2010)</p> <p>Consider prioritisation and optimisation of (or justification to gain) maintenance budgets of LBX owned / maintained significant FRMAs</p>
<p><b>Sewer</b></p>	<p>Surface Water Sewers + Manholes</p> <p>Combined Sewers + Manholes</p> <p>Pumping Stations</p> <p>Combined Sewer Overflows (CSOs)</p>	<p>All <u>major</u> sewer assets that are within or connected to the predicted surface water 1 in 30yr flood extent, the four-digit postcode area with recorded sewer flood incidents or a known flood extent that also contains land uses / infrastructure that exceed the definition of 'significant effect'.</p> <p>A 'major' sewer asset is defined any pipe of 300mm diameter (or non-circular equivalent) or greater and connected manholes, pump stations or CSOs.</p>	<p>Major sewer assets have the most significant effect on the selected level of flood risk. Thames Water are responsible for operation and maintenance of the network and the LLFA only need maintain an overview of the network to understand key interactions with other sources of flood risk.</p>	<p>Actively engage with Thames Water to understand maintenance proprieties / planned works and where joint working would be beneficial for both parties to manage multiple sources of flood risk.</p>

Source of Flooding	Potential Flood Risk Management Assets (FRMA)	Significant FRMAs	Justification	Recommended Actions
Groundwater	Water extraction points / pumping stations Artificial groundwater level management (e.g. pumping to prevent London Underground station / line flooding)	Any groundwater pumping operations located within iPEG extents that also contains land uses / infrastructure that exceed the definition of 'significant effect'	Groundwater flooding is most likely in these areas if levels are already proactively managed.	Identify / consult with asset owners to understand operational regime and associated risks.

**Is the 'significant effect' definition appropriate?**

Check that the selected definition is workable and refine if needed:

- Does it classify too many FRMAs as significant? i.e. More than the LLFA has resource / capability to identify and analyse?
- Do they cover more than 20% of the 'long list' of assets? (as a general rule of thumb)
- Can we easily access the data needed? How often is the data updated?
- Does the definition identify all (or very few) FRMAs as significant? Is this appropriate / realistic?
- Are there any cross boundary significant FRMAs? Does our definition conflict with any adjacent LLFAs significant FRMA definitions?
- What budget is available to manage the significant FRMAs owned / maintained by LBX? Can we justify more funding based on the risks identified?