



Luton Borough Council Local Flood Risk Management Strategy

Interactive PDF
Luton Borough Council
July 2015



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Document Status

All Lead Local Flood Authorities in England are required to develop, maintain, apply and monitor the application of a strategy for local flood risk in their area, which is consistent with the Environment Agency's National Strategy. This is therefore a statutory document.

The Local Flood Risk Management Strategy is an important document that sets out the management of flood risk in Luton for the coming years.

Accompanying Documents

The Local Flood Risk Management Strategy is accompanied by a number of separate documents, as follows:

- A non-technical Public Summary produced as an easy reference guide;
- A Strategic Environmental Assessment; and
- A Frequently Asked Questions document.

Version History

Rev	Date	Details	Author	Checked and Approved By
01	November 2014	Draft for Partner Consultation	J Bateman, Northamptonshire County Council	K Wysocka, Luton Borough Council, 20 th November 2014
02	January 2015	Draft for Public Consultation	J Bateman, Northamptonshire County Council	K Wysocka, Luton Borough Council, 14 th January 2015
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1. INTRODUCTION

- 1.1. The Flood and Water Management Act 2010 (the Act) implemented recommendations from Sir Michael Pitt's Review of the 2007 floods in the UK. Under the Act, Luton Borough Council (the Council) became a Lead Local Flood Authority (LLFA) and was given a series of new responsibilities to coordinate the management of local flood risk from surface water, ground water and ordinary watercourses.
- 1.2. As LLFA for Luton, the Council needs to 'develop, maintain, apply and monitor' a Local Flood Risk Management Strategy. The strategy will focus on local flood risk resulting from surface water, groundwater and ordinary watercourses. The interaction with main river flooding has also been assessed.
- 1.3. The Act states that the Local Flood Risk Management Strategy must cover:
 - The risk management authorities in the area;
 - The flood risk management functions that may be exercised by those authorities;
 - The objectives for managing local flood risk;
 - The measures proposed to achieve those objectives;
 - How and when the measures are expected to be implemented;
 - The costs and benefits of those measures, and how they may be paid for;
 - The assessment of local flood risk;
 - How and when the strategy is to be reviewed; and
 - How the strategy contributes to the achievement of wider environmental objectives.
- 1.4. The strategy must be consistent with the Environment Agency's National Flood Risk Management Strategy, which was published in May 2011 (<https://www.gov.uk/government/publications/national-flood-and-coastal-erosion-risk-management-strategy-for-england>).

Introduction to the Borough of Luton

- 1.5. Luton is a large town located 30 miles north of London, bounded by the local authority areas of Central Bedfordshire to the north and west, Dacorum and St Albans to the south and North Hertfordshire to the east. The topography of the area generally slopes towards the River Lea, which runs in a south easterly direction through the centre of Luton. The highest elevations are in the north west and the lowest in the south east.
- 1.6. The borough of Luton is predominantly residential land use interspersed with industrial and commercial estates. The Victorian expansion of Luton focused on areas close to the existing town centre and railways. In the 1920s and 1930s, growth was typically through absorbing neighbouring villages and hamlets, with infill construction in between.
- 1.7. Luton Airport, which was opened in 1938 is also a key feature of the land use in the borough and was built over a historic landfill area. The airport has grown into a major transport hub serving not only the local area, but also Greater London.
- 1.8. The natural geography of Luton and the surrounds, combined with the nature of the development and associated manmade changes in the landform and drainage network, have led to areas of Luton being placed at a risk of flooding.

Objectives of the Local Flood Risk Management Strategy

- 1.9. The overarching aim of this strategy is to enable the management and communication of the risks and consequences of flooding arising from rivers, surface water runoff and groundwater in the borough of Luton.

1.10. The objectives by which the Council will achieve this are set out below. The strategy has been developed around these key objectives, with policy and guidance supporting their delivery, as well as a detailed Action Plan as set out in Appendix 1 of this strategy.

- 1. Improve the Understanding of Flood Risk in Luton:** by developing a thorough understanding of local flood risk from all sources, taking into account the implications of climate change, population increases and demographic change. This will be achieved through:
 - The identification and prioritisation of areas at highest risk;
 - Identification of flood risk management assets;
 - Engaging with communities to raise awareness and understanding of local flood risk; and
 - Investigation of flooding incidents.
- 2. Flood Risk in Planning and Development Control:** Avoid the increase in and minimise the impacts of flooding, seek improvements in flood risk management by promoting resilient construction and agree the principles of Sustainable Urban Drainage in all future development.
- 3. Emergency Planning, Response and Resilience:** In partnership with Bedfordshire and Luton Local Resilience Forum, progress emergency planning procedures relating to flood risk and support communities to recover after flooding incidents have occurred.
- 4. Flood Risk Mitigation:** Investigate options to reduce the probability of flooding, through holistic and integrated management of local flood risk, and enable partners and stakeholders to take ownership of their flood risk and commit to delivering and maintaining the recommended measures and actions.
- 5. Partnership Working:** Progress and consolidate partnerships between key stakeholders and members of the community to facilitate a collaborative culture, promoting openness and sharing of data, skills, local knowledge, resources and learning, and encouraging improved coordination.
- 6. Wider Environmental Benefits:** Improve the status of water bodies across the catchment by protecting and where possible enhancing natural water resources.
- 7. Economics:** Explore opportunities for partnership funding, affordable insurance and alternative sources of funding. Prioritise flood risk management and highway drainage infrastructure works to enable funds to be allocated to allow programming of future improvement works.

Local Flood Risk Management Actions

1.11. The Action Plan for delivering the above objectives contains a mix of long-standing, ongoing high-level actions and short-term, time bound site specific activities that are driven by partnership working and the principle of sustainable development. The integrated approach to delivering the broad aim of this strategy means that although specific actions and measures have been proposed to promote the achievement of particular objectives, some actions will inevitably help to achieve more than one. A detailed explanation of how each of the objectives will be met is provided in each of the following sections of this strategy, with the Action Plan provided in Appendix 1.

2. OBJECTIVE 1: IMPROVE THE UNDERSTANDING OF FLOOD RISK IN LUTON

Improve the Understanding of Flood Risk in Luton: by developing a thorough understanding of local flood risk from all sources, taking into account the implications of climate change, population increases and demographic change. This will be achieved through:

- The identification and prioritisation of areas at highest risk;
- Identification of flood risk management assets;
- Engaging with communities to raise awareness and understanding of local flood risk; and
- Investigation of flooding incidents.

2.1. This section of the strategy provides an overview of the type and nature of flooding in Luton. It also highlights what technical work has already been undertaken to assess flood risk in Luton and defines the roles and responsibilities for flood risk investigation and management.

What Causes Flooding?

2.2. A flood occurs when water overflows or inundates land that is normally dry. This can happen in a multitude of ways as set out below. Flooding is determined by factors in the surrounding landscape, such as steepness of the land, the amount of vegetation and geology.

2.3. Many floods take hours or even days to develop, giving residents ample time to prepare or evacuate. Others generate quickly and with little warning. These flash floods can be extremely dangerous.

2.4. **Weather events:** Flooding is normally caused by natural weather events such as:

- Heavy rainfall and thunderstorms over a short period;
- Prolonged, extensive rainfall; or
- Snow melt.

2.5. It is predicted that the impacts of climate change on the weather will increase the risk of flooding in the UK and other parts of the world. The following factors can also cause or contribute to flooding:

2.6. **Increased pressure on the sewerage network**, caused by:

- Population growth
- Urban creep (paving over of green spaces that provide natural drainage)
- Putting unsuitable products down the toilet or sink
- Cumulative effects of foul waste mixing with rainwater in combined sewer systems especially in urban areas.

2.7. **Poor maintenance:**

- Faulty sewer networks;
- Poor or insufficient drainage networks; and
- Inadequate maintenance of watercourses.

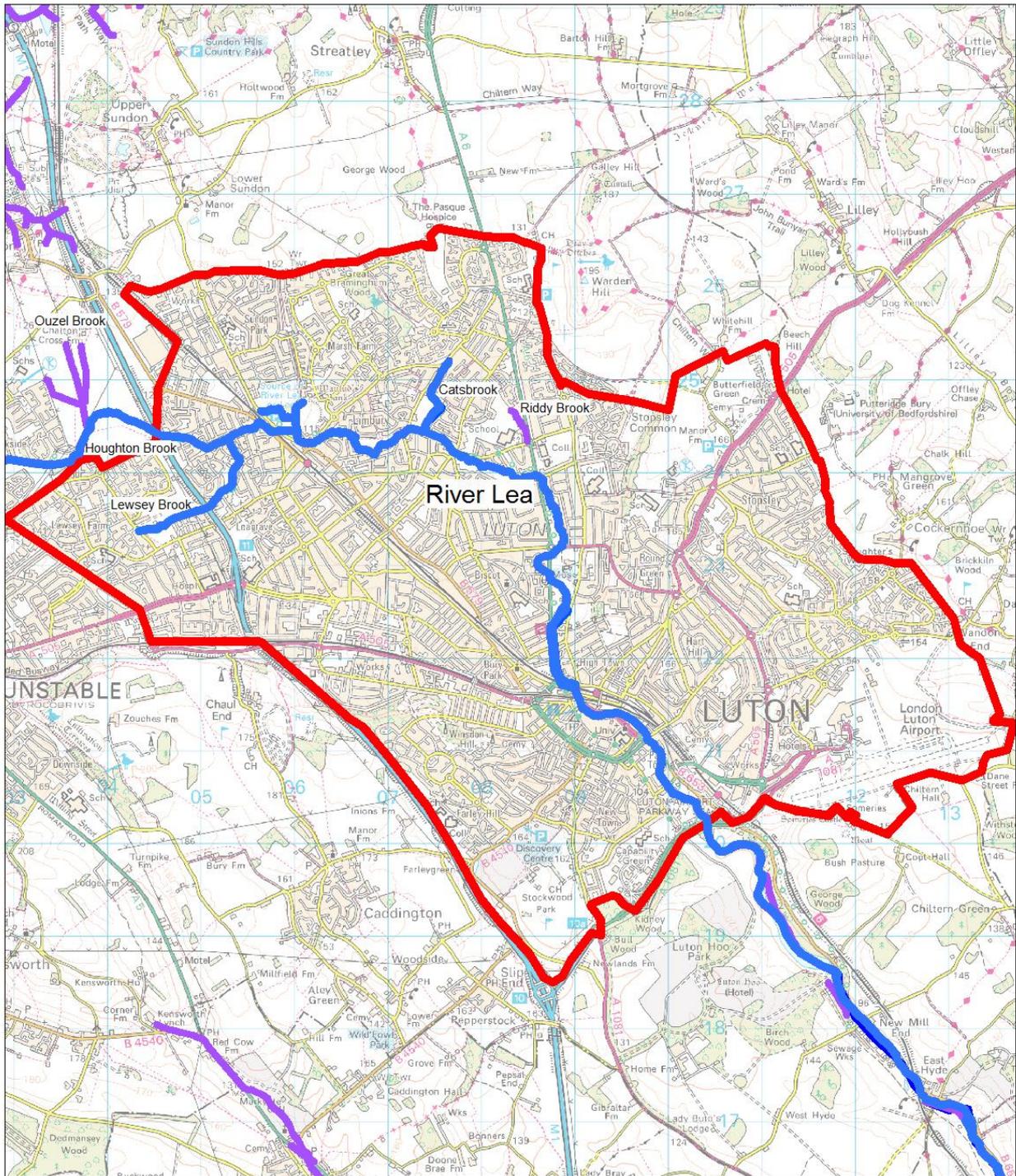
2.8. **Development and planning issues:**

- Inappropriate development in floodplains;
- Building on land in a way that prevents rainfall from draining away naturally. This includes roads and car parks that are impermeable to water. They can increase the risk of flooding from rainwater runoff;
- Flood defence schemes that are defective or badly designed.

Fluvial Flood Risk

2.9. River flooding, also known as fluvial flooding, occurs when a watercourse cannot accommodate the volume of water that is flowing into it. Rivers are categorised into main rivers and ordinary watercourses. Main rivers are usually large watercourses, such as the River Lea, but also include smaller watercourses of strategic drainage importance. All other smaller watercourses, ditches and streams are then classified as ordinary watercourses. The main rivers in Luton have been identified on Map 1 below.

Map 1: Watercourses



Legend

- Main River
- Ordinary Watercourse
- Luton Boundary



**Luton
Watercourses**

Map 1.

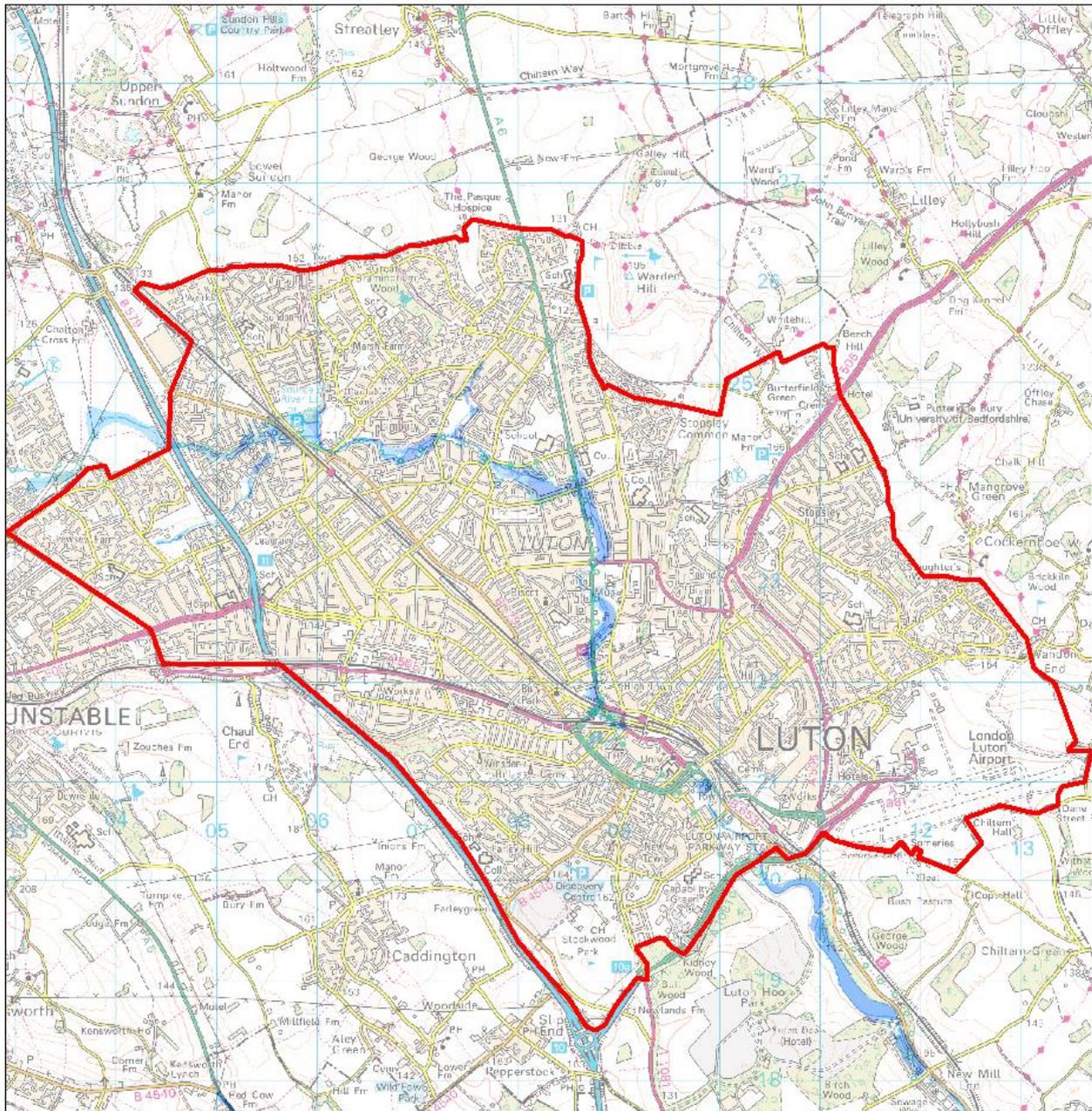
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- 2.10. The River Lea is classified as main river. The River Lea originates from a number of natural springs at Legrave Park in the north of the borough and receives flows from the Houghton Brook, Lewsey Brook and Catbrook tributaries.
- 2.11. Houghton Brook enters Luton Borough under the M1, and is classified as a main river to its confluence with the River Lea in the north-western corner of Legrave Park, and is therefore responsibility of the Environment Agency to coordinate the management of any flood risk from the watercourse.
- 2.12. Lewsey Brook is classified as main river from its source at the western end of Lewsey Park to its confluence with Houghton Brook at Acworth Crescent and is therefore responsibility of the Environment Agency to coordinate the management of any flood risk from the watercourse.
- 2.13. Catbrook is classified as main river from its source near Duxford Close to its confluence with the River Lea upstream of Runfold Avenue, and is therefore responsibility of the Environment Agency to coordinate the management of any flood risk from the watercourse.
- 2.14. Riddy Brook is the only watercourse classified as an ordinary watercourse within Luton Borough (culverted and open sections upstream of confluence with the River Lea at Austin Road) and is the responsibility of the Council to coordinate the management of any flood risk from the watercourse. The main urban areas of Houghton Regis and Dunstable are also served by small ordinary watercourses that generally originate in the surrounding farmland.
- 2.15. Map 2 shows the extent of fluvial flood risk within Luton. On this map, the dark blue area is designated as Flood Zone 3, which is the area that could be affected by flooding, if there were no flood defences, from a flood that has a 1% or greater chance of happening in any one year. The light blue area is designated as Flood Zone 2, which is the additional extent of an extreme flood with up to a 0.1% chance of happening in any one year. Where there is no blue shading, this shows the area where flooding from rivers is very unlikely (less than a 0.1% chance of flooding in any one year). Further detail can be found on the Environment Agency's "Flood Map for Planning (Rivers and the Sea)" maps online at <http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=509500.0&y=221500.0&topic=floodmap&ep=map&scale=9&location=Luton,Luton&lang=e&layerGroups=default&distance=&textonly=off>
- 2.16. The Environment Agency states that there are 286 properties in Luton within Flood Zone 3 and 1,243 within Flood Zone 2¹.

¹ Total number of properties from National Database Address Layer (Ordnance Survey, 2014) at risk of flooding by Flood Map for Planning (Rivers and Sea) (Environment Agency, 2014)

Map 2: Fluvial Flood Risk



Legend

-  Floodzone 2
-  Floodzone 3
-  Luton Boundary



**Luton Fluvial
Flood Zones**

Map 2.

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Surface Water Flood Risk

- 2.17. Surface water flooding, also known as pluvial flooding, occurs when high intensity rainfall generates runoff which flows over the surface of the ground and ponds in low lying areas. It is usually associated with high intensity rainfall events (typically greater than 30 millimetres per hour) and can be exacerbated when the ground is saturated or when the drainage network has insufficient capacity to cope with the additional flow.
- 2.18. Surface water flooding occurs as a result of the rainfall that does not soak into the land or enter a drain or river, but flows over it instead. Runoff does not necessarily cause a problem if it flows straight into drains or watercourses, or on to land where it can quickly soak away. However in some cases runoff flows onto the road (which can then freeze and create a danger to road users), or into people's homes or onto their land where it can cause damage and disruption.
- 2.19. Previous studies have indicated that surface water flood risk is a particular problem for Luton, including Lewsey and Limbury, and Parkside in Houghton Regis. This is thought to be due to the rapid expansion of Luton to the north from the 1950s to the 1980s without a related upgrade of the downstream sewer system. The problem is further compounded by the local topography, which routes surface water generally toward the centre of Luton, and by some reliance on pumped drainage which can become overwhelmed during heavy rain.
- 2.20. [Defra's National Rank Order of Settlements Susceptible to Surface Water Flooding \(Defra, 2009\)](#) indicates that the town of Luton is vulnerable to surface water flooding and is ranked 33rd out of over 4,200 settlements in England.
- 2.21. Map 3 shows the extent of surface water flood risk within Luton. On this map, the dark purple area is the high risk area that could be affected by surface water flooding from a flood that has a 3.3% (1 in 30) or greater chance of happening in any one year. The light purple area is the medium risk area that could be affected by surface water flooding from a flood that has between 1% (1 in 100) and 3.3% chance of flooding in any one year. The pink area is the low risk area that could be affected by an extreme flood that has between 0.1% (1 in 1000) and 1% chance of flooding in any one year. Where there is no shading, this shows the area where flooding from surface water is very low (less than a 0.1% chance of flooding in any one year). Further detail can be found on the Environment Agency's "Risk of Flooding from Surface Water" maps online at: <http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?lang=e&topic=ufmfsw&layer=0&x=509500&y=221500&scale=10&location=Luton%2c+Luton#x=509500&y=221500&scale=10> .
- 2.22. It is estimated that there are up to 9360² properties at risk of flooding within Luton from the 1% (1 in 100) medium risk surface water flood. Table 1 below summarises the numbers of properties that could be affected by the 1% chance of surface water flooding, depending upon the height of the property threshold³ and the proportion of the property boundary in contact with the flood:

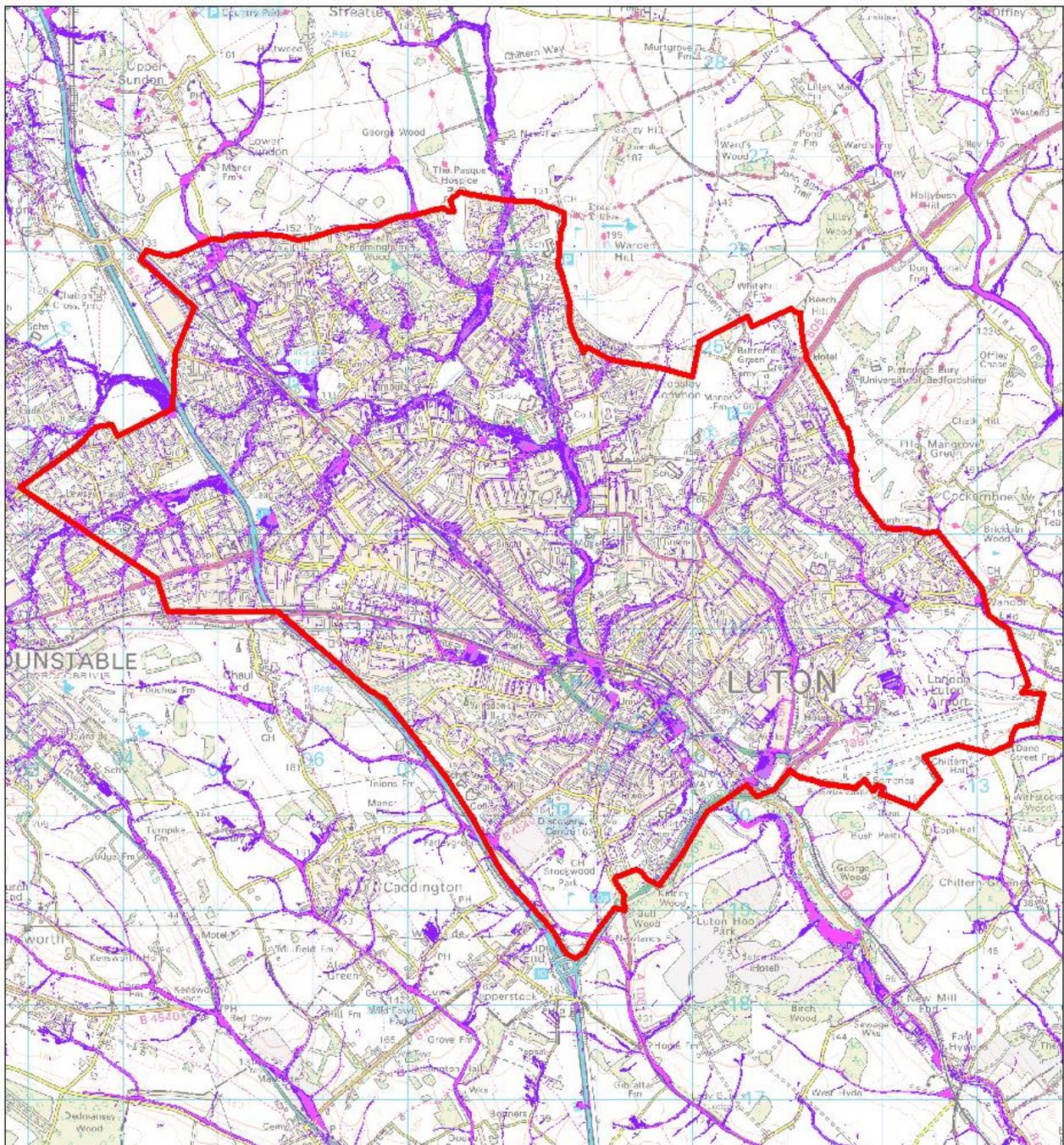
Table 1: Numbers of Properties at Risk from the 1% Chance of Surface Water Flooding

Proportion of property boundary in contact with the flood	Height of property threshold		
	0 mm	200 mm	300 mm
0% - 100%	9360	7244	4453
20% - 100%	6175	3821	1918
50% - 100%	2526	1371	720
100%	380	253	173

² Taken from the Environment Agency's uFMfSW Property Points dataset.

³ Property threshold is the relative height of the doorstep above adjacent ground level.

Map 3: Surface Water Flood Risk



Legend

-  uFMfSW 1 in 3000
-  uFMfSW 1 in 100
-  uFMfSW 1 in 30
-  Luton Boundary



**Flood Map for
Surface Water**

Map 3.

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Sewer Flood Risk

- 2.23. Sewer flooding occurs when the sewer network cannot cope with the volume of water that is entering it or when pipes within the network become blocked. This type of flooding is often experienced during times of heavy rainfall when large amounts of surface water overwhelm the sewer network causing flooding.
- 2.24. Typically sewer systems are constructed to accommodate rainstorms with a 3.3% (1 in 30) annual probability flood, depending on their age. Consequently rainstorm events greater than the 3.3% annual probability event would be expected to result in surcharging of some parts of the sewer system.
- 2.25. The highest concentrations of sewer flooding incidents are in Limbury and in Luton town centre. These two areas correlate with low lying topography adjacent to the River Lea. The gravity sewer system in Luton is generally aligned with the river as it provides a consistent downhill gradient. These two locations represent the lowest sections of the sewer network and therefore are the most likely to transmit the highest volume of water and subsequently have higher probability of flooding.

Highway Flood Risk

- 2.26. Highway flooding can be defined as flooding caused by heavy rainfall or overflowing from blocked drains and gullies causing water to pond within the highway network. The code of practice for highway maintenance states that ponding may be allowed to occur for short periods in storm conditions, however the drainage should have capacity to remove this ponding within an hour of rainfall ceasing.

Reservoir Flood Risk

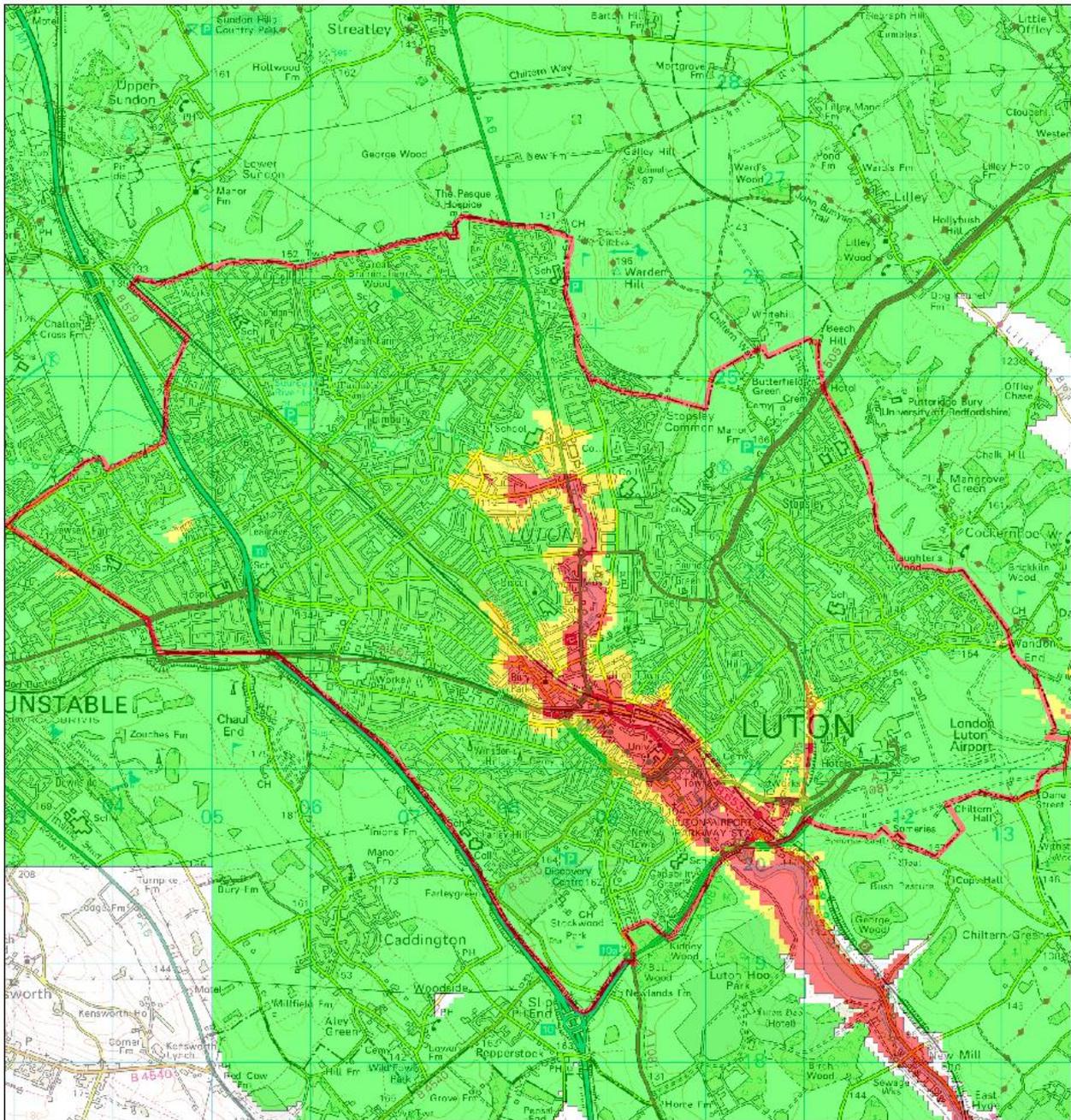
- 2.27. Reservoir flooding results from the complete or partial failure of a reservoir structure. It may be caused by erosion due to seepage, overtopping of the dam beyond its design level, or through accidental damage to the structure. It must be noted that reservoir failure is extremely rare. There are no reservoirs within the Borough of Luton; however areas in the north east of the borough are potentially at risk of flooding from reservoirs located outside of the borough.
- 2.28. The Sundon Reservoir is owned and maintained by Anglian Water and is located just outside the Luton Borough boundary at Streatley. The path for floodwater from a reservoir failure at Sundon Reservoir would head south towards Luton, where it could impact properties on Quantock Rise/Holford Way and Whitehorse Vale. Flood extents are not predicted to extend any further south than the junction of Icknield Way and Bramingham Road. Further detail can be found on the Environment Agency's "Risk of Flooding from Reservoirs" maps online at <http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?lang=en&topic=reservoir&layer=0&x=509500&y=221500&scale=10&location=Luton%2c+Luton#x=509500&y=221500&scale=10> .

Groundwater Flood Risk

- 2.29. Groundwater flooding occurs when water levels in the ground rise above the ground surface. Flooding of this type tends to occur after long periods of sustained heavy rainfall and can last for weeks or even months. The areas at most risk are often low-lying areas where the water table is more likely to be at a shallow depth. Flooding from groundwater is most common in areas where the underlying bed rock is chalk, but it can also happen in locations with sand and gravel in the river valleys.
- 2.30. The main causes and impacts of groundwater flooding include:
- Rise of typically high groundwater to extreme levels in response to prolonged intense rainfall;

- Rising groundwater levels in response to reduced groundwater abstraction in an urban area (termed groundwater rebound) or a mining area (termed mine water rebound);
 - Subsidence of the ground surface below the current groundwater level;
 - Rise of groundwater levels due to leaking sewers, drains and water supply mains;
 - Faulty borehole headworks or casings causing upward leakage of groundwater driven by high pressure underground; and
 - Increases in groundwater levels and changed flow paths due to artificial obstructions or pathways, and loss of natural storage and drainage paths.
- 2.31. Groundwater flooding can manifest itself as a wide area of flooding (such as across a flat area of ground) or at a point such as at a spring or within a basement of a property:
- Flooding of basements, underground car parks and other subsurface structures, which can be both a nuisance and cause structural damage;
 - Flooding of land and property, which can cause damage to possessions, crops, stock etc;
 - Flooding of sewerage systems, which can cause foul systems to open manhole covers with foul water creating a potential pollution incident; and
 - Flooding of buried services, which can result, for example, in failure of power or drinking water supply.
- 2.32. Groundwater flooding may last a long time compared to surface water flooding, from weeks to months. Hence the amount of damage that is caused to property may be substantially higher. Likewise closures of access routes, roads, railways etc may be prolonged.
- 2.33. In Luton, the north-east and south-west sides of the borough consist of a chalk geology and therefore are part of extensive aquifers, many of which are used for water supply. Many of the watercourses in Luton are spring fed, indicating ground water tables are very close to the surface in locations throughout the borough.
- 2.34. Map 4 shows the susceptibility of Luton to groundwater flooding.

Map 4: Groundwater Flood Susceptibility



Legend

- Limited potential for groundwater flooding to occur
- Potential for groundwater flooding of property situated below ground level
- Potential for groundwater flooding to occur at surface
- Luton Boundary



**Susceptibility to
Groundwater
Flooding**

Map 4.

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Snowmelt Flood Risk

2.35. Snowmelt can cause significant flooding. Unlike rainfall, which reaches the soil almost immediately, snow stores the water for some time until it melts, delaying the arrival of water at the soil for days or weeks. Long periods of snow also mean that the water is stored and accumulates, so the melt results in a significant volume of runoff in a short space of time. Snowmelt flooding can be exacerbated where the ground remains frozen during the snowmelt as this significantly reduces the permeability of the ground. The "average" snow to liquid ratio is 10:1, e.g. 10 cm of snowfall would produce an equivalent volume of runoff once melted as 1 cm of rainfall.

Historic Flooding in Luton Borough

2.36. The most significant data gap across the Council relates to records of past 'local' flooding incidents. This is a common issue across the UK as record keeping of past floods has historically focussed on flooding from rivers or the sea. Therefore, information on historic flooding within Luton is largely anecdotal, with little information available relating to the source of flooding or flood return period.

2.37. Considerable flooding has been experienced in areas of Luton, most commonly as a result of an inadequate drainage system that has not been upgraded since the town saw rapid growth in the 1950s and 1960s. The areas of Wardown Park, the Telford Way roundabout and the confluence of Houghton Brook with the Upper Lea are known to experience flooding problems. The Environment Agency have records of flooding from the Upper Lea and its tributaries through Luton for 1947, 1987, 1990, 1992, 1995, 1998, 2005, 2006 and 2007.

2.38. The Council went through the process of creating a Local Climate Impact Profile for Luton, which involved reviewing local newspapers and web sites for weather and climate related incidents and their effects from 2004 to 2008. During the five years considered by the study there were 19 instances of reported flooding (following heavy rainfall). The consequences of these incidents included interruptions and cancellations of sport events, collapse of a ceiling and subsequent closure of a junior school, evacuation of the police station, damage to cars and housing, damage to roads and buildings and delays in scheduled road repairs and construction.

Weather Event – Luton’s worst rainfall since 1891

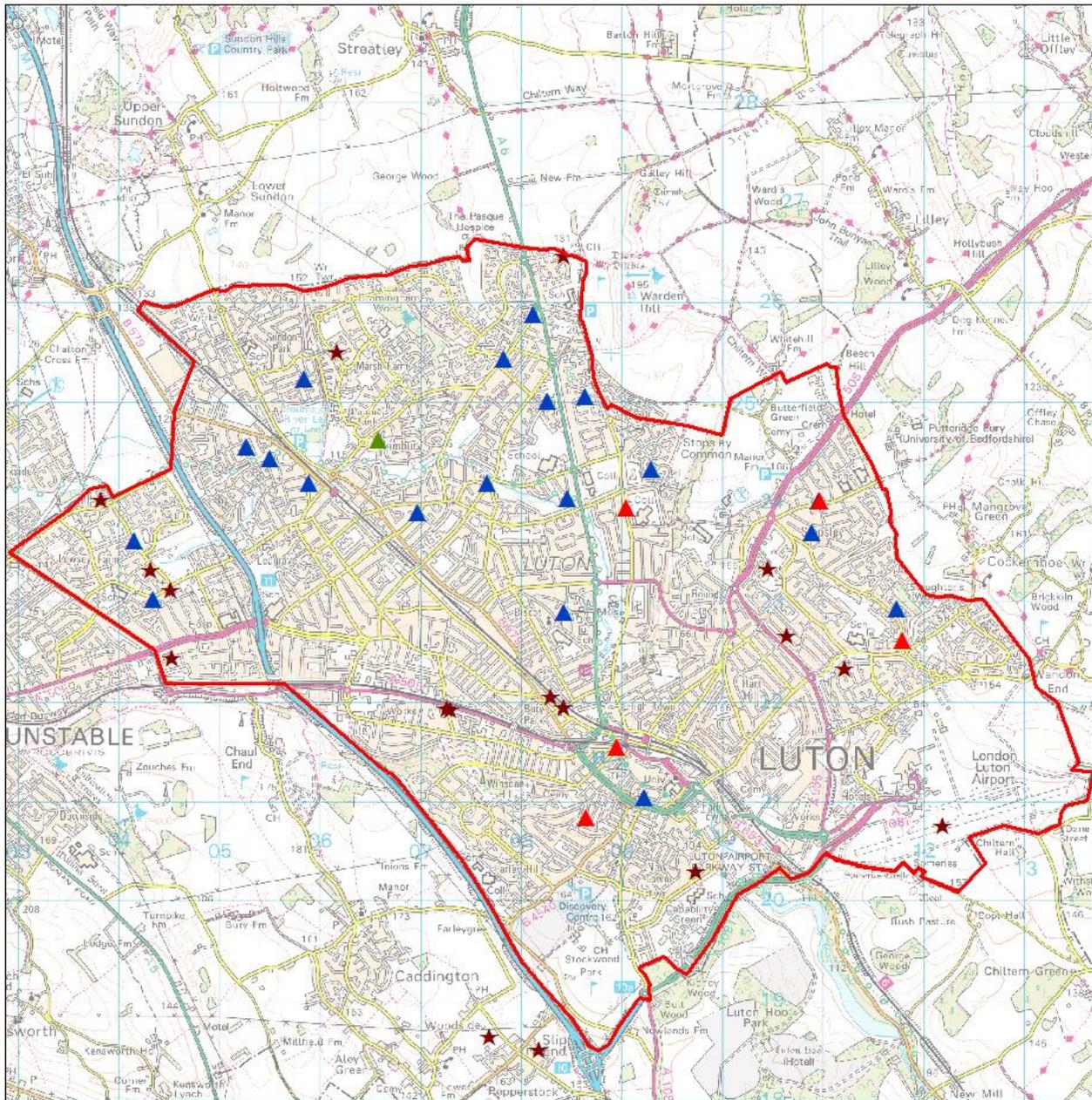
A total of 99mm of rain fell in a 48 hour period (9pm 26/05/07 to 9pm 28/05/07), which equated to two months of rain fall in just two days.

The flooding caused travel disruption due to flooding on main routes in the Luton transport network and in Wardown Park. This resulted in the flooding to Wardown Park and New Bedford Road and there was an increased number of calls to the emergency services.



- 2.39. The Limbury area of Luton has experienced flood incidents resulting in flooding to properties. Whilst the main flood source for the area is the nearby River Lea and its tributaries, much of the flooding problems for the area arise from exceedance of the surface water sewer. With much of the surface water sewer system discharging to the River Lea, when levels on the Lea are high the sewer is prevented from discharging. In such cases the system backs up and surcharges, resulting in localised flooding in isolation from the local watercourse.
- 2.40. Due to the expansion of the urban developed area in the upper reaches of the River Lea catchment, flooding from Lewsey Brook and Houghton Brook has resulted in widespread flooding of several properties in the area. This is caused in part as a result of culvert incapacity (through poor design and/or debris blockage) and rapid delivery of rainwater to the Brooks via the surface water sewer system.
- 2.41. The Strategic Flood Risk Assessment for Luton stated that, as of April 2012, Thames Water and Anglian Water had a total of 126 sewer flooding incidents (DG5) affecting properties on their register within the borough of Luton.
- 2.42. There are very few records of groundwater flooding within the borough.
- 2.43. Map 5 below indicates the locations of historic flood incidents across the borough.

Map 5: Historic Flood Incidents



Legend

- ▲ Ground Water Incidents
- ▲ Luton Borough Council Highways Maintenance July/August 1980 Flood incidents
- ▲ Luton Borough Council Highways Maintenance Known Flood Sites
- ★ Bedfordshire Fire Brigade Flooding April 09 to Oct 10
- Luton Boundary



Luton Past Flooding Incidents

Map 5.

Produced by TCM 11/11/2014

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Current and Future Flood Risk in Luton

- 2.44. Approximately 1% (0.5km²) of the borough is shown to be currently at risk of flooding from the 1% chance flooding from rivers, as shown on Map 2. The Environment Agency states that there are 286 properties at risk within Flood Zone 3 (see paragraph 2.16 above).
- 2.45. Approximately 6% (1.5 km²) of the borough is shown to be currently at risk of flooding from the 1% chance flooding from surface water, as shown on Map 3. This equates to up to 9360 properties at risk (see paragraph 2.22 above).
- 2.46. It is not possible to make a similar assessment in relation to areas currently at risk from groundwater flooding, as there is no mapping available which indicates the risk from groundwater, only the susceptibility, as shown on Map 4. The risk of flooding from sewers also has not been assessed and mapped.
- 2.47. Luton, as with all areas, is at risk from the effects of a changing climate and the effects of changes in seasonal averages such as drier, hotter summers and increased instances of extreme weather events including flash flooding and unusual amounts of snow fall. The Council is responding to the threat of and inevitable effects of climate change by working towards implementing the actions within the Climate Change Adaptation Action Plan (2010).

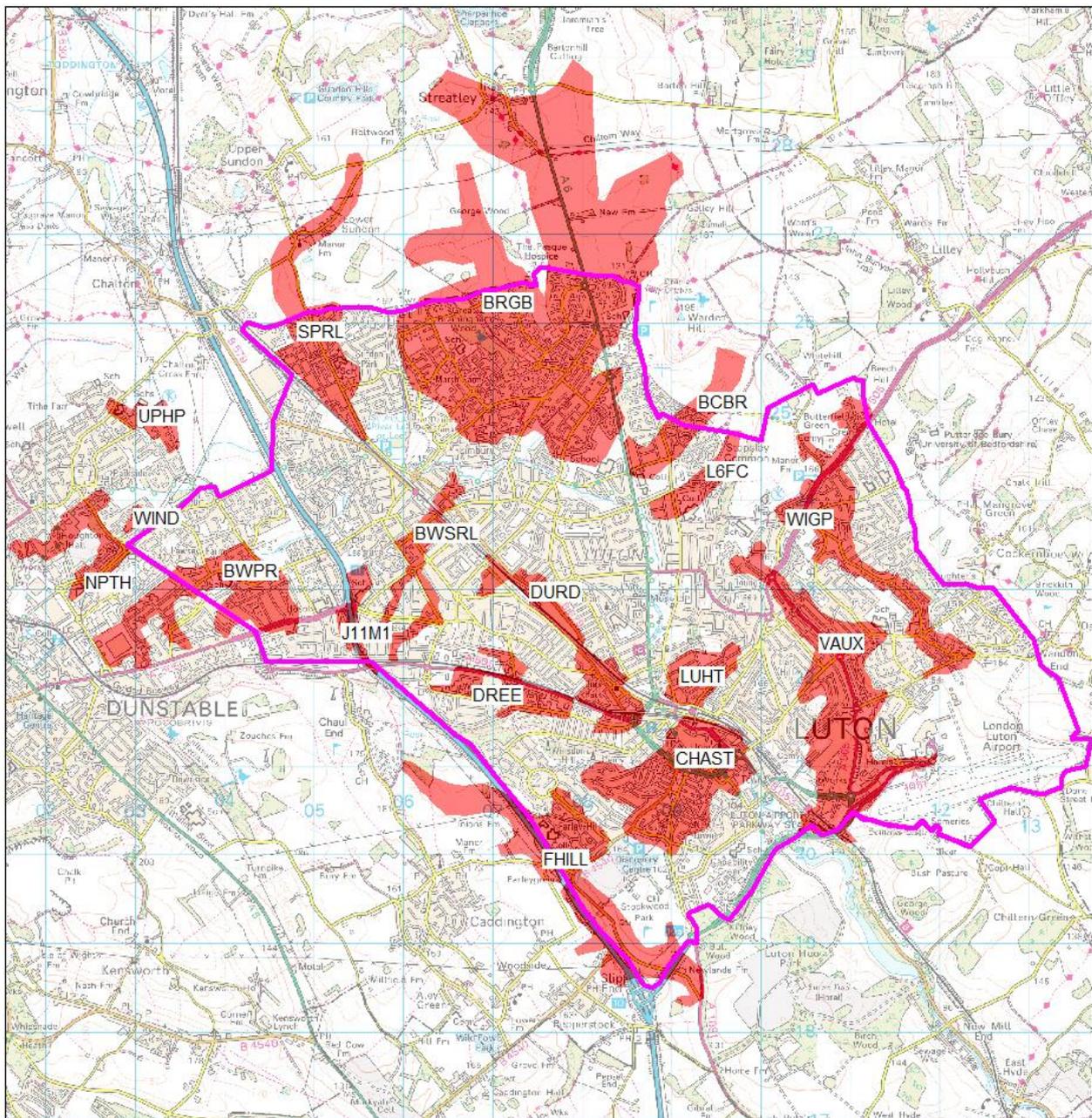
Luton Surface Water Management Plan

- 2.48. The Council has produced a Surface Water Management Plan (SWMP) for the borough of Luton which has identified areas at risk from surface water flooding. The SWMP includes information such as the potential depth and velocity of flooding and an associated action plan sets out costed solutions to flood reduction.

Prioritisation of Flood Risk Locations in Luton Borough

- 2.49. Given the extent of local flood risk in Luton and the Council's limited resources, it is not practical to attempt to address flood risk by implementing all the required works or studies across the whole borough in the short-term. It is therefore necessary to use a risk-based approach to prioritise the potential actions, in order to target resources towards the most significant risks and where interventions can offer the best value for money.
- 2.50. The SWMP for Luton undertook a detailed assessment of flood risk across the borough in order to identify discrete "Critical Drainage Areas" (CDAs). A CDA is defined within the SWMP as "a discrete geographic area (usually a hydrological catchment) where multiple and interlinked sources of flood risk (surface water, groundwater, sewer and/or river) often cause flooding during severe weather thereby affecting people, property or local infrastructure." For more details of the methodology used to define CDAs, please refer to the SWMP, which can be found on the Council's website at <https://www.luton.gov.uk/Environment/flood-risk-management/Pages/Local-flood-strategy.aspx> .
- 2.51. As part of the SWMP, a total of 17 CDAs were identified within the Luton hydrological catchment. These are the areas where flood risk works will be prioritised, but works outside of these areas will still be considered where resources allow and there is a demonstrable benefit. The 17 CDAs are shown on Map 6.

Map 6: Critical Drainage Areas



Legend

-  Critical Drainage Area
-  Luton Boundary



Luton Critical Drainage Areas

Map 6.

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2.52. Flood risk works within the CDAs need to be prioritised further and programmed, therefore a basic prioritisation methodology was developed and applied to the 17 CDAs as part of the SWMP. The prioritisation methodology was kept simple and transparent to ensure clear interpretation of the decision-making process. This aids in demonstrating that future spending on surface water management is distributed equitably to those areas within the borough most in need.

2.53. High priority CDAs were selected based upon overall verified risk and potential synergy with other projects, using good engineering judgement. Table 2 below identifies the high priority CDAs that lie within Luton, and provides a justification for this choice.

Table 2: Prioritisation Outcomes – High Priority Justification

Priority	CDA	Location	Justification
High	BRGB	Barton Road / Great Bramingham	<ul style="list-style-type: none"> • Highest number of potentially flooded properties within a CDA for the study area • Numerous records available to validate predicted flooding • Potential to work in partnership with the Environment Agency to deliver a solution • Central government funding has been agreed in principle
	BWPR	Barnfield West Academy / Poynters Road	<ul style="list-style-type: none"> • High potential for low cost solution to surface water flooding in CDA if integrated with a potential flood alleviation scheme • CDA has the fourth highest number of predicted flooded properties in the study area • Predicted flooding is supported by numerous historic flooding incidences • Central government funding has been agreed in principle
	CHAST	Chapel Street, Stuart Street	<ul style="list-style-type: none"> • Predicted flooding affects Luton Town Centre including the Arndale Centre • SWMP modelling assumptions have potentially underestimated capacity in the River Lea in this area - CDA will directly benefit from immediate further study • CDA has the second highest number of predicted flooded properties in the study area
	VAUX	Vauxhall Way	<ul style="list-style-type: none"> • Predicted flooding impacts critical infrastructure – including access to Luton Airport and Luton Airport Parkway Rail Station • Local knowledge from Council officers confirms model predictions in several locations • A Thames Water combined sewer overflow structure exists in Kimpton Road. This regularly affects water quality in the River Lea. High potential to work with Thames Water and the Environment Agency to achieve mutually beneficial solution • CDA has the fifth highest number of predicted flooded properties in the study area

2.54. Medium priority CDAs were assessed as those for which the estimated 'cost per property mitigated' was less than £25,000. The 'cost per property mitigated' is calculated as the overall cost estimate for the works divided by the number of properties benefitting from the works. The remaining CDAs were classed as low priority, on the basis that CDAs with a lower cost ratio were more likely to achieve a favourable cost / benefit ratio for future funding opportunities.

2.55. To prioritise work in each of the priority bands, each CDA was assessed to assign a 'total impacts' score, based on the impact of flooding within the area, and a 'mitigation' score based on the level to which flood risk is reduced by the proposed solution.

2.56. To determine the 'total impacts' score:

- 1) Use the risk assessment outputs from the SWMP to count the number of properties flooded within the following general categories:
 - Infrastructure
 - Essential (e.g. water treatment works, primary electricity substations and mass evacuation routes)
 - Highly Vulnerable (e.g. police stations, fire stations and ambulance stations)
 - More Vulnerable (e.g. hospitals, retirement homes and schools)
 - Households
 - Commercial / Industrial
- 2) For each category above, determine the number of each which are predicted to be flooded to a depth of:
 - 0.1m or more
 - 0.5m or more
- 3) Assign a relative importance weighting associated with each of the above parameters.
- 4) Multiply and sum the parameters above to produce a 'total impacts' score.

2.57. To determine the 'mitigation' score:

- 1) Determine the number of properties benefiting from the scheme by using the estimated level of flood mitigation achieved by the proposed solution.
- 2) Calculate a 'mitigation score' by multiplying the same weightings as above by the number of properties benefitting from the scheme.

2.58. The 'total impacts' score, 'mitigation' score and overall cost estimate of the solution were then used to produce a high level cost-benefit ranking to prioritise future work.

2.59. The above process also incorporates an 'override' parameter, which can be used to raise the priority of a specific scheme based on unquantifiable factors. For example, predicted flooding of regionally important infrastructure such as substations or railway stations.

2.60. The results of the prioritisation assessment for low and medium priority CDAs that lie within Luton are provided in Table 3 below.

Table 3: Low and Medium Prioritisation Outcomes Summary

Priority	CDA	Location	Impact Score	Estimated Cost per Property Mitigated
Medium	DURD	Dunstable Road / Luton Town Football Ground	305	£5,000
	LUHT	Luton High Town	183	£4,000
	WIGP	Wigmore Lane / Eaton Green Road	170	£18,000
	BCBR	Barnfield College, Barnfield Avenue	162	£22,000
	DREE	Dalroad Enterprise Estate	114	£7,000
	FHILL	Farley Hill	43	£24,000
Low	SPRL	Sundon Park / Railway Line	274	£27,000
	BWSRL	Beechwood Primary School / Railway Line	237	£28,000
	L6FC	Luton Sixth Form College	34	£29,000
	J11M1	Junction 11 M1	9	£401,000

2.61. The prioritisation of the CDAs, as detailed above, will be used to direct future works within Luton as and when resources allow. The Action Plan identifies schemes that are required within the CDAs, and these will be considered on a priority basis.

2.62. The Windsor Drive (WIND), Upstream of houghton Park (UPHP) and Nimbus Park/The Hurculean (NPTH) CDAs are not within Luton. Therefore, the Council will be liaising closely with Central Bedfordshire Council with regards to any actions proposed in these areas.

Flood Risk Management Roles and Responsibilities

2.63. Numerous organisations, agencies, authorities and individuals have roles and responsibilities relating to flood risk management. This section sets out what these roles and responsibilities are for each of the different organisations agencies and authorities.

2.64. Part 1, Section 6 (13) of the Act defines the following as flood risk management authorities:

- The Environment Agency;
- A Lead Local Flood Authority;
- A District Council for an area for which there is no unitary authority;
- An Internal Drainage Board (of which there are none within Luton);
- A Water and Sewerage Company; and
- A Highway Authority.

Lead Local Flood Authority

2.65. The Council is the LLFA for Luton and therefore is responsible for the management of flood risk from surface runoff, ordinary watercourses and groundwater in Luton.

2.66. Table 4 below sets out all of the functions that the Council can exercise under the Flood and Water Management Act (2010) and the Flood Risk Regulations (2009).

Table 4: Roles and Responsibilities of Flood Risk Management Authorities

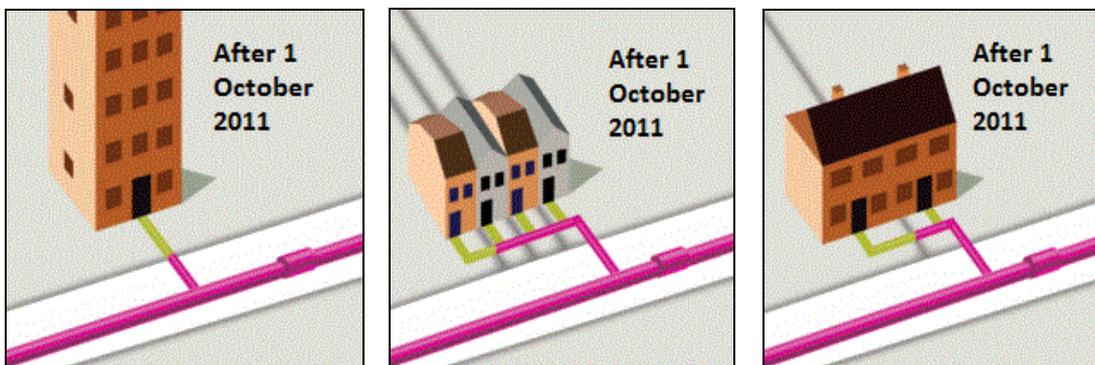
	Lead Local Flood Authority (the Council)	Highways Authority	Water and Sewerage Companies	Environment Agency
Strategic co-ordinating function in relation to flood and water management	Yes	No	No	Yes
Duty to act consistently with the National Flood and Coastal Erosion Risk Management Strategy (National FCERM Strategy)	Yes, for flood risk management functions	Yes, for flood risk management functions	Yes, for flood risk management functions	Responsible for preparing the National FCERM Strategy
Duty to act consistently with Local Flood Risk Management Strategies (LFRMS)	Yes, for flood risk management functions	Yes, for flood risk management functions	No – only to have regard to them	Support the development of LFRMS
Duty to have regard to LFRMS	Yes, for other functions that may affect flood risk	Yes, for other functions that may affect flood risk	Yes, for all relevant functions	No
Duty to investigate a flood from any source	Yes, to the extent it considers necessary	No	No	No
Duty to maintain an asset register of structures or features which affect flood risk from all sources	Yes	No, but they do keep a register of assets	No, but they do keep a register of assets	No, but they do have a register for main river assets
Power to designate 3rd Party assets which affect flood risk from all sources	Yes	Yes	No	Yes
Duty to co-operate and provide information in connection with flood risk management functions	Yes	Yes	Yes	Yes
Power to request information in connection with flood risk management functions	Yes	Yes	Yes	Yes
Power to enter into arrangements/ delegation of responsibilities under the Act	Yes	Yes	Yes	Yes
Powers to improve existing and undertake new flood risk management works	Yes for surface water, ground water and ordinary watercourses	Yes under Highways Act 1980	Yes if related to drainage	Yes for main rivers

	Lead Local Flood Authority (the Council)	Highways Authority	Water and Sewerage Companies	Environment Agency
Environmental works powers to manage flooding and water levels in the interests of nature conservation, the preservation of cultural heritage or people's enjoyment of the environment or cultural heritage	Yes	Yes	Yes	Yes
Powers to consent works on watercourses	Yes on ordinary watercourses	No	No	Yes on Main Rivers
Powers to consent works which may impede the proper flow of water in ordinary watercourses	Yes on ordinary watercourses	No	No	Yes on Main Rivers
Enforcement Powers: <ul style="list-style-type: none"> • Un-consented works - S23 of LDA, when owner does work without permission • When riparian owner fails to do work to maintain - S25 of LDA 	Yes	No	No	No, powers relate to main river only

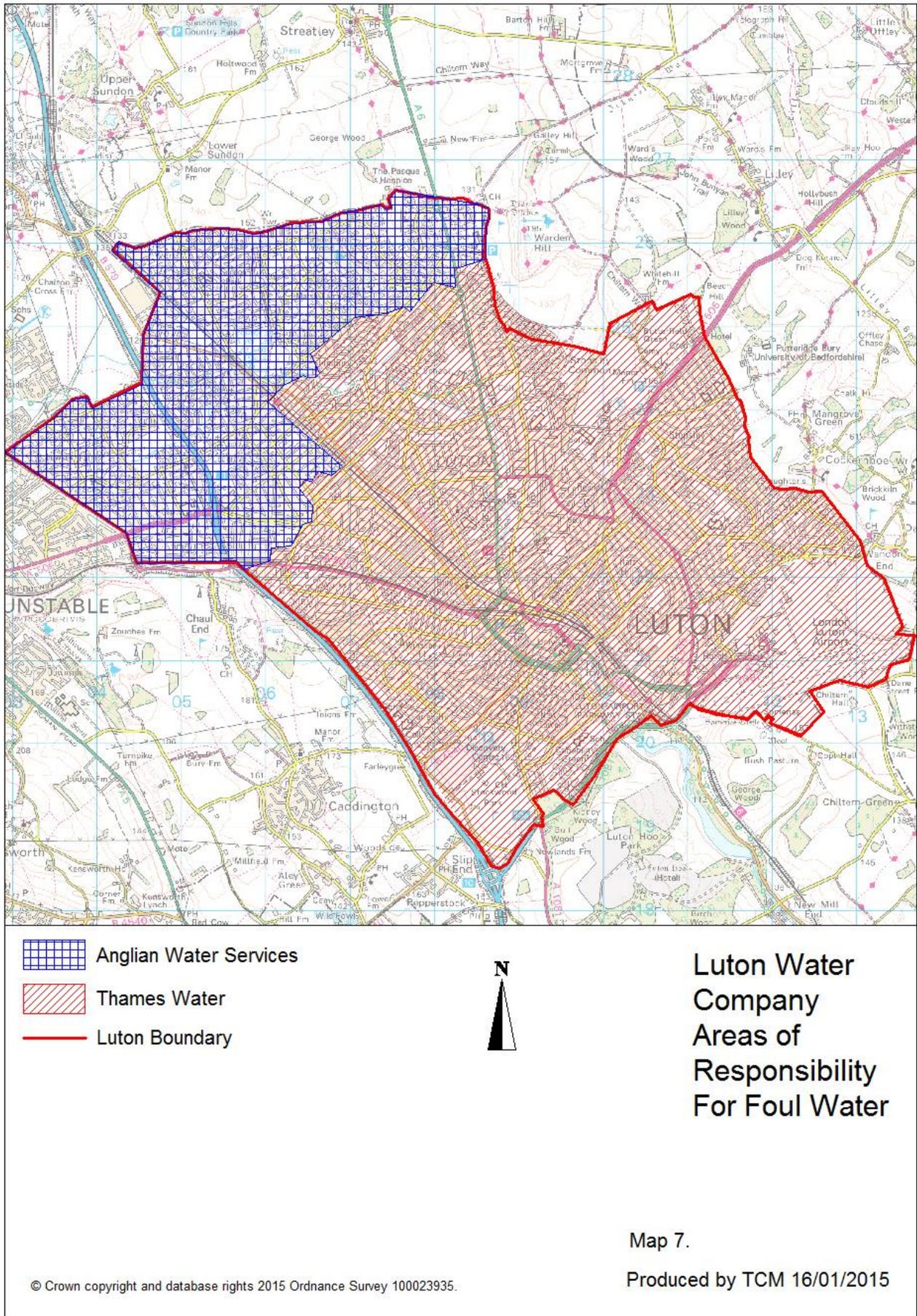
Water Companies

- 2.67. Water and sewerage companies are responsible for managing the risks of flooding from public sewer systems. A public sewer is a conduit, normally a pipe, that is vested in a water and sewerage company, or predecessor, that drains two or more properties and conveys foul, surface water or combined sewerage from one point to another point and discharges via a positive outfall. Public sewers are designed to protect properties from the risk of flooding in normal wet weather conditions. However, in extreme weather conditions there is a risk that sewer systems can become overwhelmed and result in sewer flooding.
- 2.68. Thames Water is the main sewerage undertaker within the Luton area, but Anglian Water also manages the areas of Dunstable and Houghton Regis immediately to the north and west with some interconnection with the Thames Water system in Luton. Map 7 shows the wastewater catchments for each company within Luton.
- 2.69. Public foul sewers carry waste water from toilets, bathrooms, kitchens etc. Public surface water sewers carry rainwater from roofs, driveways etc and public combined sewers carry both surface and foul water.
- 2.70. Private drainage is drainage serving a single property, when on that property's land. Private drains are the responsibility of the property owner who gains benefit from them. They can carry either surface water, foul sewage or a mixture of both, known as a combined drain.
- 2.71. Since October 2011, under the 'Private Sewer Transfer', water and sewerage companies became responsible for many more sewers and drains than before. Private drainage shared with neighbouring properties and pipes running outside of properties which connect to the Public Sewer are now the responsibility of water and sewerage companies. This is demonstrated in Figure 1 below. The green lines show pipes owned by the property owner and the pink lines show pipes owned by the water and sewerage company.

Figure 1: Private Sewer Transfer



Map 7: Water Company Boundaries



The Environment Agency

- 2.72. The Environment Agency is responsible for the management of flood risk from the sea, main rivers and reservoirs. It has a strategic overview role for all forms of flooding in addition to existing responsibilities for the prevention, mitigation and remedying of flood damage for main rivers and coastal areas.
- 2.73. In Luton, the Environment Agency is responsible for flood risk and water quality management of the River Lea and its associated main river tributaries. These rivers receive a large proportion of the surface water runoff in this study area, and the Environment Agency are thus an essential partner to ensure a coordinated response to flood risk management.
- 2.74. The Environment Agency is responsible for controlling works which affect main rivers and flood defences through consenting works under the Water Resources Act 1991 and their Land Drainage Byelaws.
- 2.75. The Environment Agency is a statutory consultee to the planning process for fluvial and coastal flood risk as well as being responsible for providing flood warnings, monitoring flood and coastal erosion risks and supporting emergency responders when flooding occurs.
- 2.76. In its strategic overview of all sources of flood risk role, the Environment Agency provides:
- Advice to Government on flood and coastal erosion risk, supporting future national responses, policy and strategy;
 - Supervision of flood and coastal erosion risk management;
 - Administration of allocation of flood and coastal erosion risk management capital funding, as approved by Regional Flood and Coastal Committees and Defra; and
 - Provide support to the LLFA with regards to their duties as laid out in the Flood and Water Mangement Act 2010.

Highways Authority

- 2.77. The Highways Authority in Luton is responsible for the provision and management of highway drainage under the Highways Act (1980). This excludes motorways and trunk roads that are the responsibility of the Highways Agency.
- 2.78. The Highways Authority has various duties and powers in relation to flooding and drainage on the highway. It is not responsible for flooding or drainage on private land – this is the responsibility of the owner or occupier of the land. Where flooding on a highway is caused by another person (e.g. an adjoining landowner), the Highway Authority can take action against the person responsible.
- 2.79. Highway drainage systems are for the primary purpose of accepting surface water runoff from the highway and are the responsibility of the Highway Authority unless they have been specifically adopted by the sewerage undertaker.
- 2.80. Ditches that run within the limits of the highway do not usually form part of the highway (since they do not assist the free passage of people or vehicles along the highway) and remain the responsibility of the adjacent landowner or occupier.

Highways Agency

- 2.81. The Highways Agency is responsible for the highway drainage of motorways and trunk roads (such as the M1 and the A6).
- 2.82. The Highways Agency engages with its service providers to identify the extent of existing flooding problems and the way in which they are currently being recorded.

2.83. Where motorways or trunk roads are identified as being at risk from flooding, contingency plans are prepared to warn road users and, where necessary, divert them away from the problem. Where possible, weather data from the Met Office is analysed and if intense rainfall events are forecast, suitable warnings are posted using the variable message signs.

Riparian Responsibilities

2.84. Under common law, a riparian owner is someone who has a watercourse within or adjacent to any boundary of their property. Where a watercourse is sited between two or more property boundaries each owner may be equally responsible up to the centre line of the watercourse.

2.85. Although not defined as a flood risk management authority under the Act, riparian owners retain their own duties and responsibilities for watercourses on or adjacent to their land as set out in the Land Drainage Act 1991. This includes the responsibility for the maintenance of any river, stream, ditch, drain, cut, dyke, sluice, culvert, sewer (excluding public sewers) or any other passage through which water flows.

2.86. The maintenance and clearance of watercourses and drains plays a key role in efficient drainage and flood risk management. However, the responsibility for maintenance of watercourses, particularly in relation to roadside ditches and piped systems is not generally well understood by the public.

2.87. Riparian owner's rights and responsibilities have been set out in the Environment Agency's document "Living on the Edge – a guide to the rights and responsibilities of riverside occupation", which can be found on their website at <https://www.gov.uk/government/publications/riverside-ownership-rights-and-responsibilities>

2.88. Responsibilities include the maintenance of the bank and bed of the watercourse and also the management of trees and shrubs growing on the banks in order to avoid any obstruction to the flow of water. Riparian owners must also clear any debris, even if it did not originate from their land. When a watercourse runs between the boundary of a property and a neighbour's boundary, each property owner will be responsible for maintenance up to the centre line of the watercourse.

2.89. It is essential that the Council informs all riparian owners of their legal duty to maintain watercourses in neglected areas as well as the requirement to obtain formal consent for works affecting watercourses and flood attenuation measures, which must consider all environmental implications of the proposed works.

2.90. Any works undertaken within or near watercourses should have a minimal adverse impact on the environment, for example by avoiding any disturbance to the soil of the bed and banks of the watercourse, and considering the adverse impacts of the works on any protected species. It is recommended to undertake any intrusive works between September and February, when vegetation naturally begins to die back and the wildlife should not be nesting / breeding. It is also recommended that any waste produced from the maintenance of a watercourse is left on top of the bank for a few days to allow any organisms within the waste to migrate back into the watercourse, after which the waste should be removed.

2.91. To reduce flood risk in the borough, the Council will actively encourage riparian owners to undertake flood risk management activities on their land, through a process of cooperation, advice and assistance wherever possible.

2.92. Most riparian owners are not alone – they will be living or working near neighbours who are also riparian owners to the same watercourse. It is recommended that these riparian owners work together as communities to reduce the individual burden of undertaking flood risk management activities, sharing resources, plans and skills.

2.93. Should the riparian owner fail to do the requested work, the Council or the Environment Agency (for main river) has powers to undertake the work themselves and recharge the costs to the riparian owner. The Council will always try to resolve problems through discussion and negotiation with the owners in the first instance and enforcement of legislation will only ever be used as the last resort.

Adjacent Lead Local Flood Authorities

2.94. Central Bedfordshire Council (CBC) and Hertfordshire County Council (HCC) are also LLFAs and their administrative areas border the borough of Luton. These councils therefore work together to manage and coordinate development in their adjacent areas. This is to ensure that any runoff towards Luton from neighbouring authorities and vice versa is adequately assessed and managed.

Other Bodies

2.95. There are many other bodies that can play a role in flood risk management, including:

- Natural England;
- English Heritage;
- Centre for Ecology and Hydrology;
- Institute of Civil Engineers;
- Chartered Institute of Water and Environment Management;
- British Hydrological Society;
- Met Office;
- Flood Forecasting Centre;
- Association of British Insurers;
- Royal Society for the Protection of Birds;
- Local Wildlife Trust;
- Forestry Commission;
- Woodland Trust;
- Association of Drainage Authorities;
- Engineering consultants and contractors;
- National Flood Forum;
- Red Cross;
- Salvation Army;
- Professional institutions and universities;
- Country Land and Business Association;
- National Farmers Union;
- River Restoration Centre;
- Network Rail; and
- Local environmental charities.

Asset Register

2.96. To fully understand risk, it is essential to understand what causes flooding, and whether any specific assets are fundamental to flood risk or flood protection. The Council, as LLFA, must establish maintain and publish a register of structures or features which, in the opinion of the Authority, are likely to have a significant effect on flood risk in its area.

2.97. The Council also has a duty to develop a record of information about each of these structures or features, including information about ownership and state of repair, but are not required to publish the record.

- 2.98. The Council is currently working to develop and populate the register, and records and data have now been received from:
- Environment Agency;
 - Highways Authority;
 - Anglian Water; and
 - Thames Water.
- 2.99. The asset register will be made available for inspection at all reasonable times, including inspection by the public. To book an appointment to review the asset register, please email: flooding@luton.gov.uk or call 01582 546000.
- 2.100. The information contained within the asset register will build up over time as and when new and improved data is provided. This will include when new developments are constructed which incorporate flood risk assets within their design, for example Sustainable Drainage Systems and flood storage reservoirs.

Section 19 Formal Flood Investigations

Introduction to Flood Investigations

- 2.101. A key method to fully understanding flood risk is to investigate flooding incidents as and when they occur. LLFAs have a Duty to Investigate Flooding under section 19 of the Act, which states the following:
- (1) On becoming aware of a flood in its area, a lead local flood authority must, to the extent that it considers it necessary or appropriate, investigate -
 - (a) which risk management authorities have relevant flood risk management functions, and
 - (b) whether each of those risk management authorities has exercised, or is proposing to exercise, those functions in response to the flood.
 - (2) Where an authority carries out an investigation under subsection (1) it must -
 - (a) publish the results of its investigation, and
 - (b) notify any relevant risk management authorities.
- 2.102. The term 'to the extent that it considers it necessary or appropriate' enables LLFAs to set their own thresholds that a flood needs to meet in order to be considered significant enough to warrant a full formal investigation. The thresholds are selected in order to highlight only those more significant floods, to ensure that the LLFA is not required to investigate minor incidents, and are set to reflect local priorities.

Thresholds for Formal Flood Investigations in Luton

- 2.103. The following 'characteristics' of a flood have been used to inform the Council's thresholds for whether or not it is appropriate to initiate a Formal Investigation in response to a flood. The following characteristics are also used to inform the priority of each investigation:
- The number of properties internally flooded (the more properties affected, the more significant the flood);
 - The nature or extent of critical infrastructure impacted by the flood (flooding of critical infrastructure such as hospitals can have a significant impact wider than the extent of the flooding itself);
 - The depth, area or velocity of flooding (deeper or fast-flowing water can have a more significant impact);
 - The frequency of flooding in the area (if a similar flood incident has occurred in the past this could indicate a more significant issue);

- The nature of the request to investigate (consider the reliability of any reported flooding and any political issues); and
- Whether the flood relates to a known issue (flooding which has been previously investigated may not need a repeated full investigation).

2.104. Local thresholds should be an order of magnitude below the significance criteria defined by Defra for designated Flood Risk Areas (for more information please refer to Flood Risk Regulations section in Appendix 6).

2.105. The Council's thresholds are therefore based on the characteristics above and on Defra's significance criteria (see Table 2 of "Selecting and reviewing Flood Risk Areas for local sources of flooding", Defra, 2010, <http://archive.defra.gov.uk/environment/flooding/documents/interim2/flood-risk-method.pdf>). These are the thresholds that, if reached or exceeded, would trigger a formal investigation of a flooding event being carried out by the Council. The Council retains the right to apply appropriate professional judgement when determining whether to proceed with an investigation. However any incident that does not reach that threshold can be less formally investigated and advice given to the resident or occupant of the affected premises.

2.106. The Council's Policy for thresholds for flood investigations is provided in the box below. It should be noted that application of engineering judgement should always be used in the assessment of whether or not a flood incident requires a formal investigation.

Policy 1 Thresholds for Flood Investigations

A flood would be deemed locally significant and warrant a formal investigation if:

- a) in terms of Human Health, it:
 - i) caused internal flooding of 10 or more adjacent residential properties;
 - ii) flooded 1 or more items of critical local infrastructure; or
- b) in terms of Economic Activity, it:
 - i) caused internal flooding of a row of shops or part thereof, or 2 or more adjacent business premises;
 - ii) caused a major transport link to be totally impassable or inaccessible; or
- c) in terms of Environment, it:
 - i) flooded 1 or more nationally important heritage features, Grade I listed buildings, certain Grade II listed buildings, or Wardown Park Registered park and garden;
 - ii) flooded parts of the Conservation Areas.

2.107. In this context the definition of a 'residential property' is any property whose sole or primary function is as a dwelling, including:

- a block of flats or maisonettes;
- any form of care home.

2.108. In the same context the definition of 'item of critical infrastructure' is:

- a hospital;
- an electricity sub-station;
- a fire station or an ambulance station;
- a potable water pumping station or related facility;
- a foul sewage pumping station.

2.109. In the same context the definition of a 'business premise' is:

- a large food preparation facility;

- a large manufacturing facility;
- a large office block;
- The Mall.

2.110. In the same context the definition of ‘major transport link’ is:

- all railway stations, and the railway lines to and between the stations;
- the M1 motorway and all ‘A’ roads;
- all roads with designated bus lanes;
- any other road defined in the Council’s Congestion Strategy as a priority route.

2.111. In the same context the following Grade II listed buildings qualify:

Table 5: Grade II Listed Buildings Qualifying under part c) ii) of Policy 1

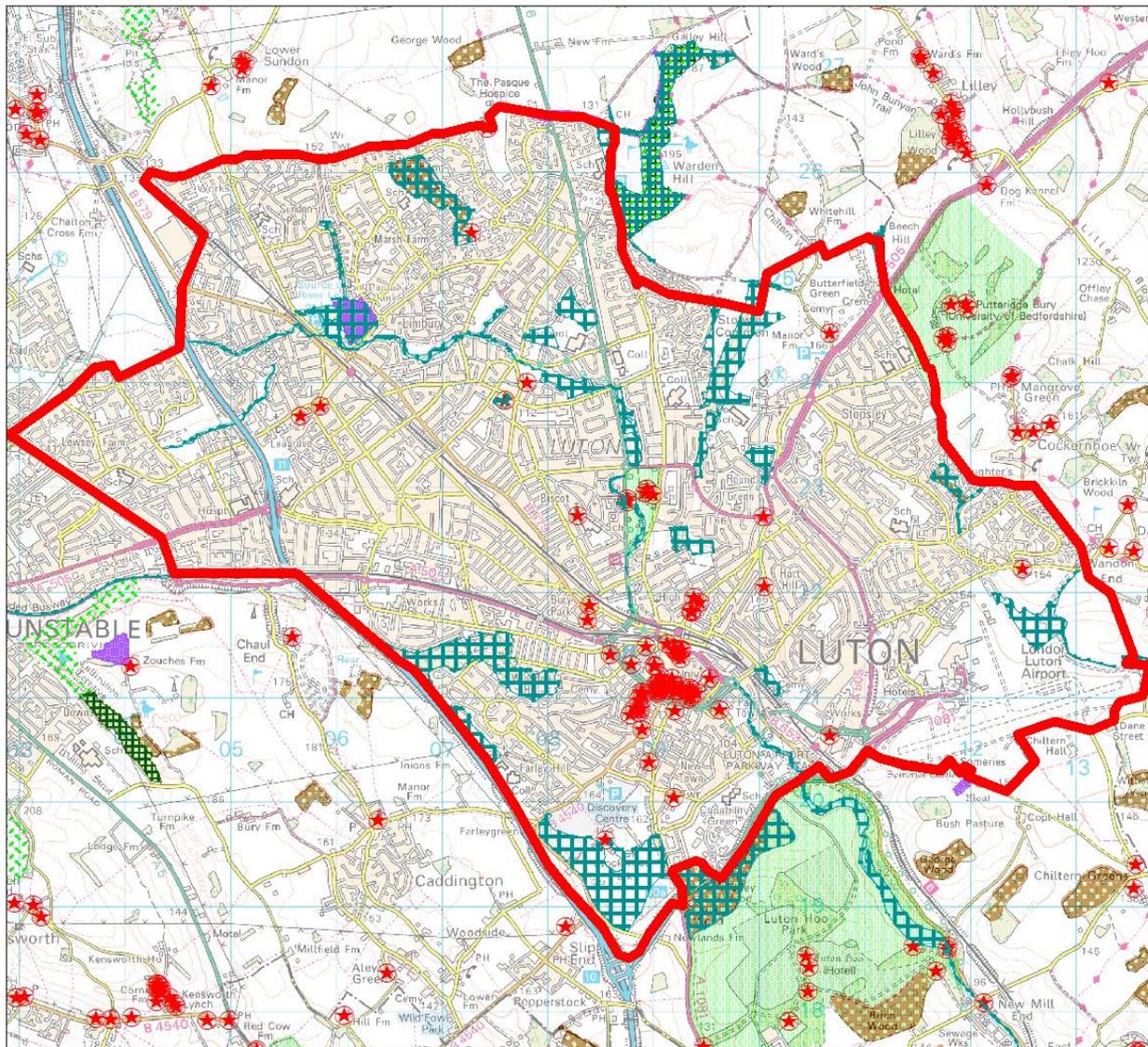
Road	Property Name/Number	Liability
Bute Street	The Shannon Hotel, 61	Owner
Bute Street	The Great Northern public house, 63	Owner
Bute Street	64	Owner
Bute Street	Kashmir restaurant & hotel, 66	Owner
Bute Street	George II public house, 68/70	Owner
Castle Street	5	Owner
Chapel Street	Bellini’s restaurant, 9	Owner
Cheapside	53	Owner
Dunstable Road	Former Odeon cinema	Owner
George Street	Town Hall	Council
George Street	21	Owner
George Street	32	Owner
George Street	63	Owner
Guildford Street	40	Owner
Guildford Street	Easy hotel, 40a	Owner
Guildford Street	47	Owner
Guildford Street	50	Owner
Moat Lane	Moat House	Owner
New Bedford Road	Wardown Park Lodge, entrance quadrant walls & gate piers	Council
New Bedford Road	Wardown Park House, summer house, entrance gate & outbuildings to Wardown Park House	Council
New Bedford Road	7	Owner

2.112. Biodiversity and historical assets within Luton are shown on Map 8.

2.113. The reasoning behind these criteria is as follows:

- Defra set a national threshold of 200 persons or 20 businesses per one km grid square flooded to a depth of 300mm during a 1% flood (0.5% rainfall event). An order of magnitude below can be considered as 20 persons, which would average 8.5 properties (based on a national occupancy rate of 2.34 persons per property), or 2 businesses. However, recognising the urban nature and generally high population density of Luton, thresholds of 10 adjacent residential properties and 2 adjacent business premises have been established to minimise the impact of small areas of localised flooding.
- The local definition of ‘major transport link’ encompasses a large range of ‘links’ because a disruption on any one link can have significant knock-on consequences for the others.

Map 8: Biodiversity and Historical Assets



Legend

-  Scheduled Monuments
-  Ancient Woodland
-  Listed Buildings
-  Site of Special Scientific Interest
-  Registered Parks & Gardens
-  National Nature Reserve
-  Local Nature Reserve
-  County Wildlife Sites
-  Luton Boundary



Bedfordshire and Luton Biodiversity Action Plan Habitats and Listed Monuments

Map 8.

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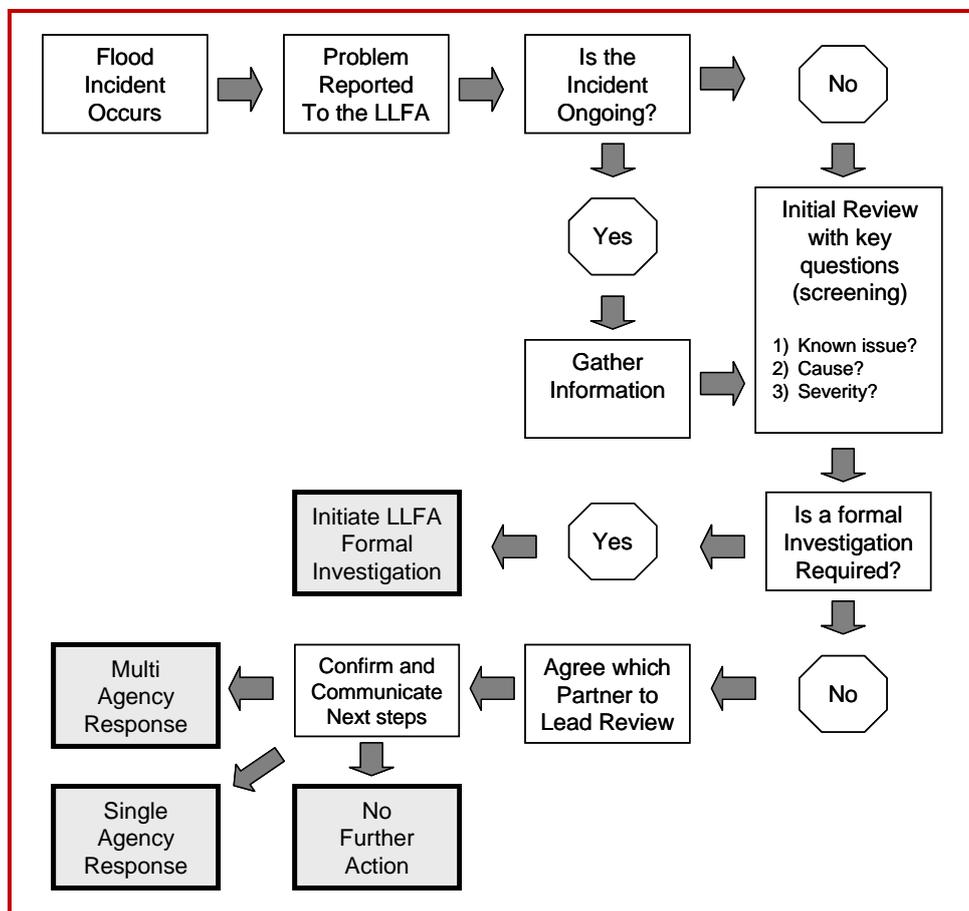
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Process for Determining Whether a Formal Investigation is Required

- 2.114. On being made aware of a flood incident, the Council will initiate a screening process to determine whether a formal investigation is required, and the next steps if no formal investigation is required.
- 2.115. The investigation of flooding often requires input from partner organisations, and it may often be more appropriate for one of these partners to lead the investigation, for example where the cause is believed to relate to their assets or areas of responsibility. The screening process should identify whether the Council is the most appropriate partner to lead the investigation.
- 2.116. It is important to stress that flooding that does not meet the thresholds for a formal investigation can, and should, still be reviewed, logged and considered in terms of any appropriate forward actions.
- 2.117. Figure 2 below summarises the Initial Screening Process for formal flood investigations.

Figure 2: Initial Screening Process for formal flood investigations

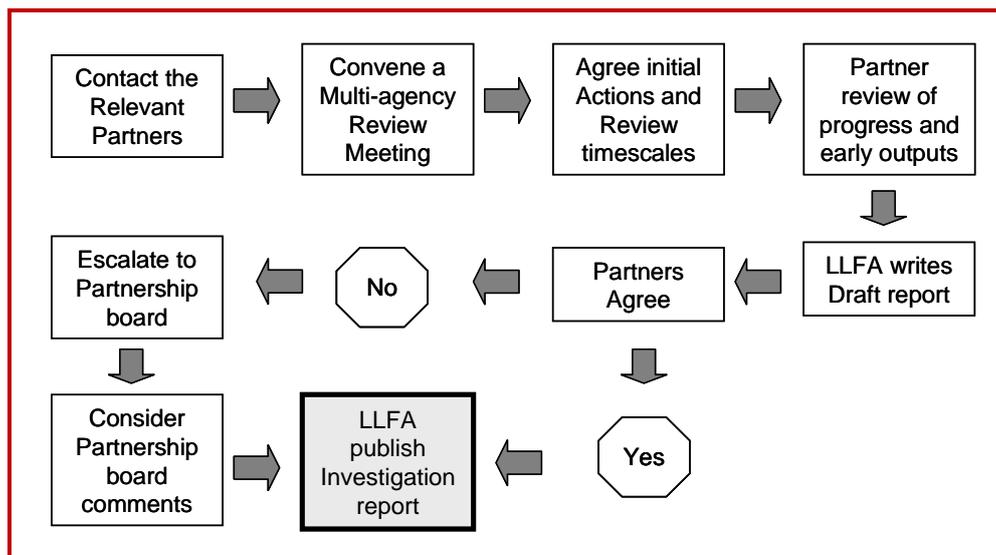


Formal Investigation Process

- 2.118. Once the screening has determined that a formal investigation is required, the LLFA will contact all relevant partners and where necessary convene a multi-agency review meeting in order to agree any initial actions. This initial stage should satisfy the legal requirements that the formal investigation must, in accordance with Section 19 of the Act, determine “(a) which risk management authorities have relevant flood risk management functions, and (b) whether each of those risk management authorities has exercised, or is proposing to exercise, those functions in response to the flood.”

- 2.119. However, in order to achieve the most from the Investigations process, the Council will undertake to make recommendations to the relevant risk management authorities for any future actions that may be required to alleviate the flood risk. Where possible the investigation will be informed by a site meeting, arranged with the affected community, to allow for adequate data collection such as photos, video footage and eyewitness statements.
- 2.120. It is important to note that this is a technical assessment and that it is for the relevant responsible body or persons to assess any recommendations in terms of their legal obligation, resource implications, priority and cost/benefit analysis of undertaking such actions.
- 2.121. The investigation report will be approved by all relevant partners before being published and all risk management authorities informed. Although the legislation places no time limits upon the formal investigation process, the Council will endeavour to publish an investigation within six months of being informed of a flood incident and determining that a formal investigation is required.
- 2.122. Following a significant rainfall event or series of events, where multiple locations are impacted by flooding, the resources may not be available to undertake all required formal investigations immediately or within this target. Therefore, investigations will need to be prioritised based on the severity of the incident, as determined by the 'characteristics' described above.
- 2.123. Figure 3 below summarises the process for undertaking a Formal Investigation.

Figure 3: Process for undertaking formal flood investigations



- 2.124. There is a statutory requirement to publish all Section 19 Formal Flood Investigation reports. The approved reports produced by the Council will therefore be available on the council web pages at <http://www.luton.gov.uk/Environment/flood-risk-management/Pages/Flood-investigations.aspx>.

3. OBJECTIVE 2: FLOOD RISK IN PLANNING AND DEVELOPMENT CONTROL

Flood Risk in Planning and Development Control: Avoid the increase in and minimise the impacts of flooding, seek improvements in flood risk management by promoting resilient construction and agree the principles of Sustainable Urban Drainage in all future development.

- 3.1. This section of the strategy sets out key principles for managing and reducing flood risk from new development and mitigating risk in existing developments.
- 3.2. To date, Strategic Flood Risk Assessments, Water Cycle Strategies, a Preliminary Flood Risk Assessment and a Surface Water Management Plan have been developed by the Council. The key policy recommendations from each of these technical studies have been collated and have been used to inform this strategy. Planners should use the advice set out in this strategy, which has been developed in accordance with the National Planning Policy Framework and associated Technical Guidance and constitutes a material planning consideration, when determining planning applications.

Flood Risk Reduction in Land-Use Planning

- 3.3. The risk of flooding is a key consideration in determining planning applications and in the selection and assessment of sites for development. The impact of flooding needs to be assessed both in respect of the risk of flooding to a particular proposed development and any increased risk of flooding to surrounding and downstream areas from a proposed development.
- 3.4. In developing land-use plans, the planning authority must take flood risk into account and ensure that the risks are managed and new properties are protected over their lifetime.
- 3.5. Effective collaborative working and cross-departmental communication must be ensured so that existing and future flood risk information is passed to the Council, and planners have suitable explanatory information and guidance notes for practical application.

Flood Risk and Future Development

- 3.6. The location of future development and flood defences within a catchment can heavily influence flood risk in the area and has the potential to further increase flood risk at areas downstream of such developments. Impacts include the lowering of the standard of protection offered by flood defences and the carrying capacity of culverts, drains, sewers and watercourse channels. This potentially leads to areas being at risk of flooding that were previously not at risk and highlights the increasing conflicts and pressures that are emerging between climate change scenarios and future development aspirations. All flood risk implications should therefore be considered at the earliest possible stage. Pre-application discussions between developers and the Council's Flood Risk Management team are encouraged. Regeneration proposals also offer the opportunity to integrate flood risk management into the heart of urban design.

Development in High Risk Areas

- 3.7. This measure involves the continued development and implementation of a new planning policy currently being produced, which avoids new, re-development or extensions in high flood risk areas unless the development meets the sequential approach or Exception Test, as set out in the National Planning Policy Framework and associated Technical Guidance. The Environment Agency is a Statutory Consultee to the planning process and will ensure consistency and compliance at a strategic level.

Sequential Test

- 3.8. The National Planning Policy Framework (NPPF) states that: 'Local Plans should apply sequential, risk-based approach to the location of development to avoid where possible flood risk to people and property and manage any residual risk, taking account of the impacts of climate change, by:
- Applying the Sequential Test;
 - If necessary, applying the Exception Test;
 - Safeguarding land from development that is required for current and future flood management;
 - Using opportunities offered by new development to reduce the causes and impacts of flooding; and
 - Where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to facilitate the relocation of development, including housing, to more sustainable locations.' (Paragraph 100 of the NPPF).
- 3.9. The aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower probability of flooding.
- 3.10. The Luton Strategic Flood Risk Assessment has provided the basis for applying this test and should be referred to when any future development is being considered.

Exception Test

- 3.11. A sequential approach should be used in areas known to be at risk from any form of flooding. According to the NPPF: 'If, following application of the Sequential Test, it is not possible, consistent with wider sustainability objectives, for the development to be located in zones with a lower probability of flooding, the Exception Test can be applied if appropriate'. For the Exception Test to be passed:
- It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, and
 - It must be informed by a Strategic Flood Risk Assessment where one has been prepared.
- 3.12. For any proposed development, early conversations should take place with the planning department and the Flood Risk Management team at the Council if the Exception Test is intended to be utilised.

Site-specific Flood Risk Assessments

- 3.13. All site-specific flood risk assessments submitted to the Council as part of any planning application, must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall. Both elements of this test will have to be passed for development to be allocated or permitted.' (Paragraph 103 of the NPPF).
- 3.14. Surface water and groundwater flooding should be investigated in detail as part of any site specific Flood Risk Assessment and should include comprehensive surface water runoff calculations. Development proposals should demonstrate that flooding up to the 1% (1 in 100) annual probability storm event including the effects of climate change can be controlled on site.
- 3.15. It is imperative that new development should not increase flood risk to the areas upstream or downstream of the area. Wherever possible, new development should actively reduce runoff rates and flood risk, and this betterment should be considered as part of any flood risk assessment.

Planning Applications

3.16. The Council will assess all Outline and Full Planning Applications, Discharge of Condition and Regulation 3 applications for flood risk, surface water drainage implications and sustainable urban drainage provision. If you would like to discuss any of these matters prior to submitting a formal planning application, please contact the Flood Risk Management team at flooding@luton.gov.uk.

Safeguarding Floodplains

3.17. Floodplains should be safeguarded from development, ensuring the maximum possible capacity is available to attenuate floodwater and thereby safeguarding existing property. This will include:

- An 8 metre wide undeveloped buffer strip alongside the river channel of main rivers. Any works within this distance would require consent from the Environment Agency.
- A 5 metre wide undeveloped buffer strip alongside the river channel of ordinary watercourses. Any works within this distance would require consent from the Council.
- Where development in the floodplain is unavoidable and flood plain storage is removed, the development should provide compensatory storage on a level for level basis to ensure that there is no loss in flood storage capacity.
- Further culverting of rivers should be discouraged and opportunities should be sought to de-culvert rivers, where possible, to return them to a natural system, reducing back up of flows and under capacity where this does not exacerbate the flooding elsewhere.
- Where culverting of watercourses is unavoidable, culverted main rivers will require an 8 metre wide undeveloped buffer strip alongside the culverted rivers.
- Where removal of culverts is not possible, opportunities will be sought to facilitate the investigation and where necessary and suitable the upgrade of bridges, culverts, drainage systems etc in line with current climate change considerations, through local development schemes.
- Having regard to the role development sites could have to alleviate flood risk elsewhere.
- Favouring mitigation of flood risk to and from developments through development of flood storage schemes which will also provide amenity benefit.
- Where a development identified as located within Flood Zone 3b, 3a or 2 is applying for a change of use, flood evacuation plans should be developed through liaison with the emergency services.
- Where new development is proposed that incorporates riparian areas, the developer should include where necessary plans for the improvement of river channels and flood defences within their ownership and demonstrate how the channels and/or flood defence will be maintained over the lifetime of the proposed development.
- Emergency Plans should be formulated to accompany Flood Risk Assessments for all 'more and highly vulnerable' developments as well as 'less vulnerable' developments with greater than 10 people working/living at the site.

Residual Flood Risk in New Development

3.18. Residual risk can be defined as 'the remaining risk following the implementation of all risk avoidance, reduction and mitigation measures' (Communities and Local Government, 2007). In a flood risk context, this residual risk relates to the flood risk that remains after flood avoidance and alleviation measures have been put in place. An example of residual risk could include overtopping or breaching of floodwalls/defences.

3.19. Residual risk management therefore aims to prevent or mitigate the consequences of flooding that can occur despite the presence of flood alleviation measures. Application of the Sequential

Test as defined by the National Planning Policy Framework and associated Technical Guidance aims to preferentially develop or relocate potential development sites into areas with low flood risk. Where this is not realistically possible, some development sites may be located in higher flood risk areas. As a result, such developments will require residual risk management to minimise the consequences of potential flooding. Details of potential residual risk management options are set out below and should be assessed and included in the Flood Risk Assessment:

- Assessment of breach and overtopping risk of existing defences;
- Assessment of blockage risk of existing defences;
- Assessment for remedial actions and ongoing maintenance of flood risk management infrastructure;
- Provision of overland flow paths to manage exceedance flows;
- Incorporation of flood resilience and resistance measures; and
- Flood warning and evacuation plans.

Sustainable Drainage Systems (SuDS)

3.20. Sustainable drainage systems (SuDS) provide a more sustainable approach to managing water. They aim to mimic the way water moves naturally in and around a green field site. The Council has developed a set of local standards for SuDS, which developments should comply with and these can be found in Appendix 2.

Cumulative Impact of Development on Flood Risk

3.21. Minor developments are unlikely to raise significant flood risk issues unless the cumulative impact of such developments would have a significant effect on local flood storage capacity or flood flows. The Environment Agency's Standing Advice (<https://www.gov.uk/flood-risk-standing-advice-frsa-for-local-planning-authorities>) is helpful for ensuring extensions or alterations to existing residential and non-residential development are designed and constructed to conform to any flood protection already incorporated in the property, and include flood resilience measures in the design.

3.22. Phased or other developments, where the cumulative effects of lost floodplains or increased run-off can be significant, but where it may be difficult to associate the necessary alleviation works with individual applications will be assessed in detail by the Council.

Flood Risk and Existing Development

3.23. The Council will develop a more strategic approach to surface water management, through the plan-making process, which will incorporate 'green' (non-built up vegetated areas) and 'blue' infrastructure (areas set aside for storing water or conveying storm water to drains) and which contribute to the requirements of the Water Framework Directive.

3.24. This strategic approach should comprise:

- Retro-fitting (substituting new or modernised parts for older equipment) where possible, identify and improve 'pinch points' in the drainage system, and manage the local landscape to create safe flow routes;
- Replacing impermeable surfaces (tarmac or concrete surfaces) with permeable paving;
- Incorporating rainfall harvesting to reduce demand for potable water;
- Providing adequate flood storage; and
- Maintaining existing infrastructure.

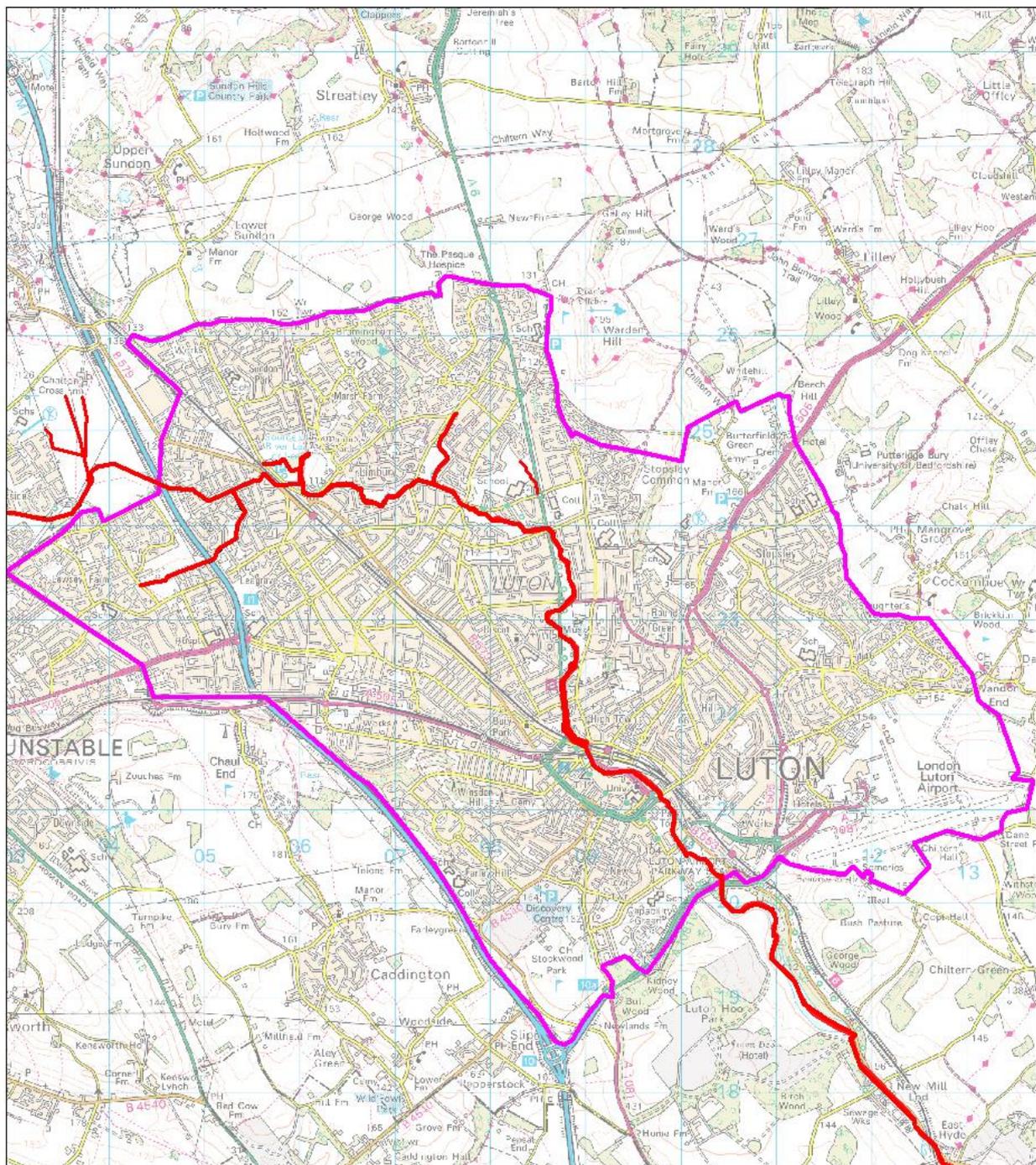
Water Framework Directive Considerations in Land-Use Planning

3.25. The Water Framework Directive (WFD) was published in December 2000 and transposed into English and Welsh law in December 2003. It introduces a new concept of "good status" that is far

more rigorous than previous water environment quality measures. It is estimated that 95% of water bodies are at risk of failing to meet “good status”.

- 3.26. The River Basin Management Plans (RBMPs) required by the Directive are important strategies that should influence development plans, and be influenced by them.
- 3.27. The Environment Agency is the competent authority relating to the Water Framework Directive. They work in partnership with spatial planners and developers to improve the water environment as well as achieving sustainable economic growth.
- 3.28. Spatial planning can help to deliver River Basin Management Plan objectives (see <https://www.gov.uk/government/publications/thames-river-basin-management-plan>) by:
 - Ensuring that the scope of Sustainability Appraisal/Strategic Environmental Assessment for spatial plans includes impacts on water bodies;
 - Respecting the limits of the water environment when generating development options; and
 - Adopting spatial plan policies that will help to achieve ‘good status’ in water bodies.
- 3.29. Best practice for plan making includes using Water Cycle Strategies to check the capacity of water bodies and infrastructure including public water supply and waste water treatment. A Phase 1 and Phase 2 Water Cycle Strategy has been undertaken for the borough of Luton.
- 3.30. Failure to comply with the requirements of the Water Framework Directive and the Habitats Directive may lead to the European Commission bringing legal proceedings against the UK which may result in European Union infraction fines for non compliance with EU law. These fines can now be recovered from local authorities in full or part, as part of the Localism Act (2011).
- 3.31. Map 9 below shows the current ecological quality of the watercourses in Luton, assessed as part of the WFD.

Map 9: Water Quality



Legend

- WFD Not Classified
- WFD Status Poor
- Luton Boundary



**Luton Water
Framework Directive
Current Ecological Quality**

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Map 9.

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Consenting Powers for Works Affecting Watercourses

- 3.32. The Environment Agency is responsible for consenting and enforcing for works within 8m of a river bank in Luton, (including where culverted), except on the Riddy Brook which would be the responsibility of the Council to consent and enforce within 5m of its banks, due to it being an ordinary watercourse.
- 3.33. Consent is required for works such as:
- The erection of any mill, dam, weir or structure that will affect the flow of a watercourse; or
 - The erection or alteration of a culvert in a watercourse.
- 3.34. Some applicants may require several different consents or perhaps even a temporary consent, and will be advised accordingly. For example, works in Luton with the potential to affect water quality may also require discharge consent (environmental permit) from the Environment Agency.
- 3.35. Prospective applicants are encouraged to review the Environment Agency's guidance on the application for flood defence consents and to undertake pre consent discussions with an officer: <https://www.gov.uk/government/publications/flood-defence-consent-england-and-wales>.
- 3.36. Applicants are then required to complete the application form and will be required to make the relevant payment as set by legislation, which is currently £50. There is a two month period (from the receipt of the application) for the Environment Agency to determine (approve or refuse) a consent application. If no conclusion is reached after this period, the consent is automatically granted (a deemed consent).

Consenting Requirements

- 3.37. The Environment Agency published the Thames Region Land Drainage Bylaws in 1991 (<https://www.gov.uk/government/publications/thames-water-authority-land-drainage-byelaws>). These bylaws are applicable to the borough of Luton, and define what works can be undertaken in or near watercourses with and without consent. The bylaws include:
1. Control of structures, pipes and cables;
 2. Control of excavations and removal of turf etc;
 3. Control of dredging and removal of shingle etc;
 4. Endangering stability of the bank;
 5. Interference with banks etc;
 6. Deposit of material on banks;
 7. Vehicles on banks;
 8. Damage by use for fishing, grazing etc;
 9. Destruction of vermin;
 10. Obstructions to flow;
 11. Planting of trees etc;
 12. Repairs to buildings;
 13. Obstruction of areas liable to flood;
 14. River control works;
 15. Discontinuance of and interference with river control works; and
 16. Alteration of level or flow.
- 3.38. The aims of these bylaws are to:
- Secure the efficient working of a drainage system in the Council's area;
 - Regulate the effects on the environment in the Council's area of a drainage system;

- Secure the effectiveness of flood risk management work; and
- Secure the effectiveness of works done in reliance on section 38 or 39 of the Flood and Water Management Act 2010 (incidental flooding or coastal erosion).

Flooding from New Development

- 3.39. Where nuisance flooding is being caused by new buildings, walls or hard surfaces (e.g. driveways, car parks, pavements) residents may wish to contact the planning department to see if there has been a breach of planning permission. Since 1st October 2008, property owners in England require planning permission if they wish to pave over their front gardens with non-permeable materials. See guidance on paving your front garden on the Planning Portal website at <http://www.planningportal.gov.uk/permission/commonprojects/pavingfrontgarden/>.
- 3.40. New walls and buildings may also require planning permission, whilst some developments may have had conditions attached to the planning permission to require that the development be constructed in a certain way (e.g. adequate drainage provision). Residents can check with the Council as to whether the proper planning permissions have been given and any conditions of that permission have been met. People wishing to query the details of planning permissions should call 01582 546317 or send an email to developmentcontrol@luton.gov.uk.

4. OBJECTIVE 3: EMERGENCY PLANNING, RESPONSE AND RESILIENCE

Emergency Planning, Response and Resilience: In partnership with Bedfordshire and Luton Local Resilience Forum, progress emergency planning procedures relating to flood risk and support communities to recover after flooding incidents have occurred.

- 4.1. This section of the strategy provides detailed information in relation to the emergency reporting mechanisms for flooding and resilience measures that can be implemented to reduce the impact of flooding.

Emergency Planning, Response and Recovery from Flooding

- 4.2. Emergency Planning and the related response to and recovery from flood events are a key element of local flood risk management. Emergency Planning is an activity intended to prevent and reduce the disruption and harm to communities from both natural and man-made hazards.
- 4.3. The Council's emergency planning team along with the police, fire and ambulance service have a very important role to play in responding to an emergency.
- 4.4. The emergency planning team leads the local authority response, using its experience and knowledge of the area and its residents to ensure key responsibilities are met, including:
- Writing and reviewing local emergency plans;
 - Providing an effective 24 hour, 365 days a year service to help in the management of a major emergency;
 - Co-operating with other responding agencies;
 - Providing emergency transport to move members of the public from the scene of an emergency to a safe location;
 - Setting up assistance centres for those evacuated from the scene of an emergency;
 - Setting up assistance centres, in the aftermath of a major emergency, to act as a focal point for information and assistance to families and friends of those missing, injured or killed;
 - Arranging emergency accommodation should members of the public be evacuated from their homes for a period of time;
 - Continuing to provide critical services to the public in the event of an emergency occurring; and
 - Providing emergency information.
- 4.5. The Council is part of the Bedfordshire and Luton Local Resilience Forum (BLLRF), in which the emergency services, local authorities, National Health Service and other agencies work together to increase resilience within the borough and ensure responses are co-ordinated across all the agencies.
- 4.6. If there is a major emergency from identified high risks such as flooding to an unexpected area, plans are in place to respond to the incident and to aid recovery. This means if emergencies do happen the impact is as minimal as possible.
- 4.7. BLLRF's activities include:
- assessing local risks in order to identify what needs to be planned for
 - preparing and testing plans and guidance for all the member organisations
 - sharing important information with local organisations to enhance emergency preparedness
 - co-ordinating countywide media response with that of other responders
 - co-ordination of support from the voluntary agencies
 - providing advice and guidance to help communities prepare for emergencies

- 4.8. More information is available on the BLLRF website (<https://www.bllrf.org.uk/home/>), including:
- emergency planning;
 - guidance on how residents or businesses can prepare for an emergency;
 - how to become a volunteer; and
 - what support to can expect from the BLLRF agencies and organisations.

Provision of sand bags to protect against flooding

- 4.9. It is the responsibility of all homeowners, residents and business-owners to protect their own property from flooding. Those who are aware that their property is at risk of flooding, for example as a result of the close proximity of a watercourse or location within a surface water flow path, should take action now to ensure that they are prepared and have protection measures in place.
- 4.10. Emergency services and local authorities no longer consider sandbags the best way to protect communities or individual homes and possessions and do not provide sandbags to residents and businesses on request to protect private properties as their focus is upon protecting communities and key utilities. Some of the many disadvantages of sandbags are outlined below:
- In an emergency sand bags may be difficult to obtain;
 - They are bulky, heavy and difficult to handle, particularly for the elderly or people with special needs;
 - If filled they are hard to store, but empty ones take time and need two people to fill;
 - Building an effective three-layer wall with sandbags can take time;
 - They do not offer complete protection as water will leak through them;
 - They absorb dirty floodwater and sewage which contaminates them with effluent and seeps into buildings;
 - Their Hessian sacking biodegrades if left for long periods of time.

Policy 2 Sand Bags

Luton Borough Council does not generally supply sandbags to the public. The Council uses its limited supplies to protect the highways and council properties within the borough. Sandbags and aqua-sacks may be deployed in partnership with the Bedfordshire Fire Services as and when they are operationally required.

- 4.11. Many alternatives to sandbags are available that are more efficient, easier to use and offer more protection from contaminated water. While the Council does not endorse any particular brand of product, the National Flood Forum have compiled an independent directory of flood protection products and services, which can be found at www.bluepages.org.uk.
- 4.12. Should you still prefer to use sandbags to protect your property, these may be purchased from local DIY stores or builders' merchants. Refer to the Environment Agency's guidance on how to use them properly for flood protection, which can be found online at <https://www.gov.uk/government/publications/sandbags-how-to-use-them-to-prepare-for-a-flood>.

Flood Warning

- 4.13. In specific flood risk areas, the Environment Agency issues flood warnings for river flood risk to those registered on the [Flood Warnings Direct system](#). The current flood warning situation can be viewed at <http://apps.environment-agency.gov.uk/flood/31618.aspx>. It is essential that those properties at risk understand this risk and are encouraged to sign up to the Environment Agency's Flood Warning Service.
- 4.14. There are a number of ways to receive warnings:

- **Direct to you** – Receive automatic warnings by phone, text or email. Sign up for the Environment Agency's free Floodline Warnings Direct service on their website or by calling Floodline on 08459 881188.
- **On the Environment Agency flood warnings website** – View up-to-date information about flood warnings in force, monitor the river levels in your area and check out the latest flood risk forecast at <http://apps.environment-agency.gov.uk/flood/31618.aspx>.
- **By calling Floodline on 08459 881188** – You can listen to recorded information on the latest warnings and predictions or speak to an operator for more general information 24 hours a day. The operators can also provide a quickdial number which gives you faster access to information for your area. You can also view the latest warnings on Digital Ceefax page 405.
- **Through the media** – You may see or hear warnings on television and in radio broadcasts.

Flood Incident Reporting

- 4.15. It is vital that members of the public who are affected by flooding are aware of the appropriate authority to contact.
- 4.16. If it is an **emergency**, contact Fire and Rescue by calling 999 or 112. This service is primarily focussed on saving life. They may also pump flood water from your property. During flooding you should focus on the safety of yourself and your dependents.
- 4.17. **Highway flooding:** To report flooding relating to a highway such as blocked gullies or flooding on a road call: 01582 510333 (Mon-Fri 8am to 6pm, Wed 10am-6pm).
- 4.18. **Flooding from public sewers:** Luton is served by two different sewerage companies, who own and manage the network of public foul and surface water sewers. To report an overflowing public sewer, you should look at your water bill to find out who your supplier is.
- If it is Anglian Water you should call 08457 145145.
 - If it is Thames Water you should call 0800 3169 800.
- 4.19. **Flooding from private sewers or drains:** If your private drains or sewers are overflowing, you will need a drainage contractor to deal with any blockage (see Buy with Confidence website at <https://www.buywithconfidence.gov.uk/> or the Yellow Pages under "Drain and Pipe Cleaning"). If you are uncertain if any blockage is in the public or private sewers, the sewerage company should be able to determine this, once on site, then recharge you the cost of any work on the private sewers.
- 4.20. **Flooding from a main river:** The Environment Agency has the operational responsibility for managing the risk of flooding from main rivers. Call 08459 333111 to report flooding from a main river or call "Floodline" on 08459 881188, which is a 24 hour advice and information service for floods and flood warning.
- 4.21. **Flooding from ordinary watercourses:** Ordinary watercourses are the responsibility of the riparian owner (see previous section on riparian owner responsibilities). They have a duty to keep the watercourse clear of any obstruction to flow and the Council can serve legal notices on them to deal with obstructions.
- 4.22. **Flooding from a burst water main:** The local water supply company is Affinity Water. The water company is responsible for their supply up to and including the water stopcock. If the water main has burst causing flooding contact Affinity Water online at <https://www.affinitywater.co.uk/report-a-leak.aspx> or by calling 0800 376 5325.
- 4.23. **Flooding from a water service pipe or internal pipe work:** This is the water system in the property up to the stopcock and is the responsibility of the homeowner or landlord. It would need

the attention of a plumber (see Buy with Confidence website at <https://www.buywithconfidence.gov.uk/> or the Yellow Pages for a local plumber).

Reporting Post-Incident

- 4.24. To report flooding in Luton after an event has occurred, please complete the Incident Report Form in Appendix 8 and send it to Flood Risk Management, Luton Borough Council, Town Hall, George Street, Luton, Bedfordshire, LU1 2BQ; call 01582 547371; or email flooding@luton.gov.uk.
- 4.25. All of the information collated is placed on the database of historic flood incidents, and will alert the Council to any recurring flooding hotspots.
- 4.26. On receipt of a report of flooding, a determination is made as to whether any incidents require formal investigation, following the Council's Flood Investigation Protocol found at paragraph 2.101.

Public Awareness and Engagement in Flood Risk Management

- 4.27. Community resilience is about communities using local resources and knowledge to help themselves during an emergency in a way that complements the local emergency services. Communities will be better prepared to cope during and after a flooding emergency if everyone works together using their local knowledge. Identifying and planning for the risks that may be encountered during a severe flood could help in reducing the potential impact on individuals and the wider community. Being prepared and able to respond to an emergency can also help communities recover more quickly.

Community Flood Plans

- 4.28. Working together as a community or group to complete a Community Flood Plan will help communities to respond quickly when flooding happens. It can help them decide what practical actions to take before, during and after a flood event, helping reduce the damage flooding can cause. The plan should also identify vulnerable people within the community that would need assistance in the event of a flood.
- 4.29. A community flood plan provides practical steps that can be taken to inspire and involve other residents within the community to work together to improve their knowledge of the risks of flooding and how to deal with flooding incidents. More information on how to complete a community flood plan can be found at <http://apps.environment-agency.gov.uk/flood/151256.aspx>.
- 4.30. The Council can provide help and support in developing these flood plans for communities located within a Critical Drainage Area (CDA), as shown on Map 6.

Community Flood Wardens

- 4.31. Community Flood Wardens are volunteers who can help to ensure flood warning messages reach residents. Wardens also act as the 'eyes and ears' of the community by updating the Council and Emergency Services about the situation on the ground. Residents that live within a defined CDA as shown on Map 6, who would like to become a Flood Warden or would like more information, should contact: flooding@luton.gov.uk.

Property Level Protection

- 4.32. Properties can be made resilient through the installation of individual property protection measures, such as the use of flood gates and air brick covers, as well as a general increase in awareness and preparedness for a flood event.
- 4.33. There are a great number of suppliers that can provide property level flood protection products and these can be found on the [National Flood Forums Blue Pages](#). This is an

independent directory of flood protection products and services, put together to advise and inform on what is available to protect homes and businesses against flooding.

Bellwin Scheme

- 4.34. The Bellwin Scheme provides emergency financial assistance to local authorities in England incurring expenditure above a qualifying threshold in response to an emergency or disaster involving destruction of, or danger to, life or property.

Flood Protection Insurance

- 4.35. Insurance plays a key role in flood risk management. Between 2000 and 2013, the Government had an agreement with the insurance industry, called the 'Statement of Principles', which committed insurers to offer insurance to existing customers where they are at significant flood risk. However, the Statement was only ever intended to be a temporary measure, and has restricted customer choice as insurers only have commitments to their existing customers, and new insurers can decide to whom they offer flood insurance. The Statement also does not guarantee affordable flood premiums or manageable excesses, and despite it an increasing number of people are beginning to struggle to afford flood insurance.
- 4.36. Flood Re will provide a fund to offer people at high flood risk who might otherwise struggle to get affordable flood insurance with cover at a set price. Insurers will put into the fund those high flood risk homes they feel unable to insure themselves, with the premium to cover the flood risk part of the household premium capped. The cap will be based on Council Tax bands, starting at no more than £210 per annum in Bands A and B, rising to £540 per annum in Band G. The capped premiums will go into the fund to help pay flood claims. So if you are at flood risk you know that the cost of your flood insurance will be limited. To help fund this, all home insurers will collectively be subject to a levy. On average this works out at £10.50 a year on all home insurance policies. Homeowners already pay this, as some cross-subsidy has always existed between lower and higher flood risks.
- 4.37. Assuming various implementation issues are resolved, the Flood Re scheme is expected to be ready for use in summer 2015. While work to develop this scheme happens, the members of the Association of British Insurers (ABI) will voluntarily continue to meet their commitments to their existing customers under the old Statement of Principles agreement. Further information on Flood Re can be found at the ABI website at <https://www.abi.org.uk/Insurance-and-savings/Topics-and-issues/Flooding/Government-and-insurance-industry-flood-agreement/Flood-Re-explained>.
- 4.38. The person taking out the insurance will not need to do anything different, they could remain insured by the same insurer, and the way claims are dealt with will be the same as any other house insurance claim.
- 4.39. In the interim, if it has not been possible to obtain affordable insurance cover through a normal insurance provider, there are specialists who may be able to help. Insurance brokers are able to negotiate with insurers to arrange insurance for challenging cases. The British Insurance Brokers' Association (BIBA) 'Find a Broker' helpline can assist you to locate a flood specialist Insurance Broker. Visit www.biba.org.uk or call 0870 950 1790.
- 4.40. The National Flood Forum provides independent advice on how to approach getting flood risk insurance. Visit www.floodforum.org.uk or call 01299 403055. More information on obtaining flood protection insurance can be found in the leaflet "Obtaining Flood Insurance in High Risk Areas", published in partnership by Defra in July 2012 (<http://www.biba.org.uk/UploadedFiles/600floodguide.pdf>).

5. OBJECTIVE 4: FLOOD RISK MITIGATION

Flood Risk Mitigation: Investigate options to reduce the probability of flooding, through holistic and integrated management of local flood risk, and enable partners and stakeholders to take ownership of their flood risk and commit to delivering and maintaining the recommended measures and actions.

- 5.1. This section of the strategy sets out how flood risk mitigation can be achieved. The objective will be met through the delivery of the Action Plan.

Flood Alleviation Schemes

- 5.2. The Action Plan in Appendix 1 contains a list of potential capital improvement schemes over the short, medium and long term. The implementation of these schemes will result in effective flood risk mitigation across Luton.

Flood Risk Management Works and Enforcement

- 5.3. The purpose of enforcement action is to ensure that the proper flow of water in watercourses is maintained and to ensure that flood risk is not increased. The Environment Agency has the powers to undertake enforcement on main rivers under the Land Drainage Act 1991, and the Council has the powers to undertake enforcement on ordinary watercourses. Enforcement could be undertaken for any works within the bylaw margin of a watercourse, that have not been appropriately consented (see paragraph 3.32 on consenting). Any enforcement action would be undertaken using a risk based and proportionate approach.
- 5.4. The Environment Agency also has the power to undertake works on main rivers under the Water Resources Act 1991 in order to manage flood risk, such as maintenance, where the riparian owner has failed or refuses to do so, and to charge the costs of undertaking these works back to the riparian owner.
- 5.5. The Council also has similar powers relating to works on ordinary watercourses, as well as works to manage flood risks from other local sources such as surface water and groundwater.
- 5.6. The use of these powers will be supported by the investigation of significant flooding incidents to identify causal factors and where appropriate undertake the necessary enforcement or corrective action.

Utilisation of Designation Powers

- 5.7. Designation is a form of legal protection reserved for certain key structures or features that are privately owned and maintained, but which make a contribution to the flood risk management at a particular location. This is to ensure that the risk of a person altering or removing a structure or feature, which is relied on for flood risk management, without consent is prevented.
- 5.8. A designation is a legally binding notice served by the designating authority to the owner of the feature and the notice is also a local land charge. This means that the notice will also automatically apply to any successive owners or occupiers of land or property where a designation exists.
- 5.9. In Luton the Environment Agency and the Lead Local Flood Authority have the powers to designate. The Council will therefore work with the Environment Agency to put together an agreed borough-wide register of features, which have a critical role to play in terms of flood risk protection and will work to formally designate such features, if considered necessary and appropriate.

Mitigating Groundwater Flood Risk

- 5.10. There are no publicly available flood risk maps for groundwater. If you want to find out if your property could be at risk of flooding from groundwater or may have flooded in the past you can contact: flooding@luton.gov.uk. If you are still unsure whether your home is at risk you may wish to carry out a flood risk assessment. To do this, you will need to contact a professional such as a consulting engineer or chartered surveyor.
- 5.11. Solutions to groundwater flooding are limited simply because of the volumes of water involved and because the water is difficult to contain or channel.
- 5.12. Property owners who are at risk of groundwater flooding are able to take some measures to limit the impact of this type of flooding such as:
- Moving services (electrics, boilers, service-meters) well above the likely flood level;
 - Using water resistant materials such as lime plaster or cement render rather than gypsum plaster on walls;
 - Filling the property with plastic or steel units (such as in the kitchen or bathroom) rather than traditional chipboard;
 - Using waterproof flooring such as tiles rather than carpets;
 - Tanking (waterproofing) of basements;
 - Using sump-pumps;
 - Installing non-return valves on main drainage systems;
 - Sealing cess pits (tanks to store waste).
- 5.13. Further information can be found within the Environment Agency guidance document “Flooding from Groundwater: Practical advice to help you reduce the impact of flooding from groundwater” at <http://www.groundwateruk.org/downloads/EAGWFlooding.pdf>
- 5.14. The Council will work with partners to coordinate assembling of new guidance in relation to groundwater flooding in Luton for developers, planners and homeowners in the borough, which will inform future iterations of the strategy. The guidance will aim to:
- Explain what groundwater flooding is and its various causes;
 - Identify areas within Luton that are potentially susceptible to groundwater flooding;
 - Use existing groundwater susceptibility mapping combined with geological, hydrogeological and historical flooding records to refine the areas of susceptibility to risk locally;
 - Provide a methodology to assist planning officers and flood risk engineers to establish the risk of groundwater flooding at individual sites; and
 - Set out a procedure for undertaking the assessment of groundwater risk for developers based on known susceptibility, development proposals and local ground conditions.

Nuisance Flooding

Advice on Legal Proceedings

- 5.15. Land Tribunals have an important role in settling disputes referred to them under the Land Drainage Act 1991, such as flooding caused by blocked drains or inadequately drained land. This tribunal can deal with drainage on all types of land and has the powers to order a landowner to carry out work to maintain or reinstate drainage.
- 5.16. Enforcement of Land Tribunal Orders is undertaken by the Environment Agency, however few reach the point of requiring enforcement action. It is currently free to make an application to the Land Tribunal, however you will need to cover the costs of providing maps and other information, and may also wish to hire legal representation. For more information see the Defra website at <https://www.gov.uk/apply-land-registration-tribunal>.

- 5.17. You can take civil law proceedings (an action for private nuisance) in the Luton County Court or the High Court (which one will depend upon the value of financial claims and complexity of the issues involved) if it appears that the facts amount to nuisance under the common law. Nuisance is an unreasonable interference with a person's use or enjoyment of their property/land or of some right connected with that land.
- 5.18. Flooding, in certain circumstances, could be found to be a "nuisance" under common law. Relevant factors include the extent of damage suffered, duration and frequency of the problem, sensitivity of the complainant, nature of the locality, and any malice involved, and the practicality and cost of rectifying the nuisance. They are relevant to determining whether a common law nuisance exists and what remedies might be awarded.
- 5.19. If you can satisfy the Court that your neighbour is causing a "nuisance", the Court can issue an injunction to order the person to take steps to prevent the nuisance recurring and can also award damages.
- 5.20. You should seek your own legal advice if you are considering taking legal action and bear in mind that you may be responsible for not only your legal costs but those of the other party if unsuccessful, and you may have to bear some of their costs even if you are successful.

Mediation

- 5.21. Whatever the cause of the nuisance flooding, mediation can be a means of resolving a dispute with your neighbour without going to court. It is also a cheaper option than court. If you are on a low income it may be possible to get help with the costs of mediation. The National Mediation Helpline (phone 0845 603 0809) can provide more information and put you in touch with a mediator.
- 5.22. Someone in your local community, for example a local Councillor, may also be willing to act as an informal mediator to try to resolve the problem.

Asset Maintenance

- 5.23. A great number of flooding incidents can be attributed to poor maintenance of assets. As assets age, they are likely to deteriorate and may become less able to perform their original flood risk management function. The impact on flood risk will vary depending on the type of asset. For example road drainage gullies may silt up reducing their capacity to carry water and therefore increasing the risk of surface water flooding. Other assets, such as flood defence walls can weaken over time, so that they can no longer hold back flood water.
- 5.24. Routine inspection and maintenance can mitigate this risk and extend the lifetime of assets. However without this regular maintenance and a programme of replacement and remediation, the potential failure of assets could increase flood risk. The increase in risk would depend on the significance of the asset and what is protected by the asset.
- 5.25. The Council is responsible for managing all of its own assets such as highways drainage assets. In addition, the Council has powers to undertake works to maintain privately owned flood risk assets, and charge the costs of this work to the riparian owner of the asset.
- 5.26. All risk management authorities within Luton have a responsibility to maintain their own assets to ensure that flood risk within the borough is not increased. The Environment Agency has an [Asset Management Plan](#) which explains their approach to the management of assets that reduce the risk of flooding from main rivers.

6. OBJECTIVE 5: PARTNERSHIP WORKING

Partnership Working: Progress and consolidate partnerships between key stakeholders and members of the community to facilitate a collaborative culture, promoting openness and sharing of data, skills, local knowledge, resources and learning, and encouraging improved coordination.

6.1. This section of the strategy outlines the partnership approach in Luton to flood risk management.

Local Partnership and Governance Arrangements

- 6.2. The requirement for LLFAs to work with all interested parties was initially highlighted in the Pitt Review as Recommendation 15: “Local authorities should positively tackle local problems of flooding by working with all relevant parties, establishing ownership and legal responsibility.” This recommendation was then transposed into the Act.
- 6.3. As well as engaging with local communities and members of the public, it is also important to engage effectively with other risk management authorities.
- 6.4. It is essential that the Council, as well as the partners and other risk management authorities, increase flood risk management capacity and skills in order to deliver the responsibilities under the Act.
- 6.5. It is recognised that the understanding of flood risk across the borough and identifying existing skill sets can be enhanced through partnership working. Over time the Council will develop a greater understanding of local flood risk and the strategy implementation will be adjusted accordingly.
- 6.6. The Act requires the LLFA to establish arrangements to bring together all relevant bodies to work as partners in the management of local flood risk. Through the close working partnerships already established within the borough, the Council will ensure:
- Good engagement amongst key decision makers, partners, communities and other stakeholders;
 - More effective and transparent prioritisation between competing projects throughout the borough and also between projects tackling different sources of risk; and
 - A compelling business case for external contributions and other local investment.

Luton Flood Management Group

6.7. At a borough level, the Council have set up the Luton Flood Management Group to ensure that effective flood risk management and resilience is built into service delivery to deliver better protection from flooding for communities and key infrastructure. Membership currently includes departmental representatives from Highways Development, Highways Maintenance, Sustainability and Strategic Planning, Emergency Planning and Parks, in recognition of the of the cross-department input required on managing local flood risk. Colleagues from Development Control, Building Control and Fixed Assets are also invited when relevant. The Environment Agency and Thames Water are also represented on this group.

The Local Resilience Forum

- 6.8. The Bedfordshire and Luton Local Resilience Forum (BLLRF) was formed in 2004. It brings together the emergency services, local authorities, National Health Service and other agencies which are all required to respond to any major emergency in Bedfordshire and Luton.
- 6.9. As well as dealing with the aftermath of an emergency, all services and organisations work together to ensure that the best possible plans are in place. These are regularly tested and

updated so that agencies can respond immediately and effectively to any threat. All responders work to a set of common objectives, which will help to:

- Prevent the disaster getting worse;
- Save life;
- Relieve suffering;
- Restore normality as soon as possible;
- Protect property; and
- Facilitate a criminal investigation and judicial process if necessary.

Regional Flood and Coastal Committees

6.10. The borough of Luton falls within the area of responsibility of the Thames Regional Flood and Coastal Committee (RFCC). RFCCs play an important local role in guiding flood and coastal management activities within catchments, advising on and approving programmes of work for their areas. They also raise local levies under existing arrangements to fund local priority projects and works. The Council is part of a constituent authority group along with Buckinghamshire County Council, Slough Borough Council and Central Bedfordshire Council. This group is represented on the RFCC by a single elected member from the authorities listed above, currently Councillor Lesley Clarke from Buckinghamshire County Council.

Ward Forums and Area Boards

6.11. Ward forums give local people the opportunity to meet together and discuss issues relevant to their own wards. Residents will then be able to feed back their concerns and issues to the main area committee which draws up action plans to address matters raised. These plans then help shape agendas of future meetings. Ward forums are open to everyone living and working in Luton.

6.12. Area Boards consists of ward members of the area covered by the committee. The role of the area board is to consider matters relating to their areas, particularly in such fields as service development, service improvement, neighbourhood renewal, regeneration and community planning. The area board also advises the executive in relation to executive functions, which affect their areas. They consider matters that have been raised through the ward meetings, address issues raised by the individual ward members, by local interest groups or matters which have been referred to them for consideration by the executive or by the Council.

6.13. The forums and boards are an ideal medium for residents to raise issues relating to flood risk, in particular for highlighting areas where maintenance is required by riparian owners and for suggesting options for future flood risk works.

Public Engagement

6.14. There is a formal requirement for stakeholder engagement for much of the work undertaken under the Flood and Water Management Act. The Council will choose methods and processes of engagement to make them as relevant and effective as possible. There is no single 'right' way to engage, many techniques are appropriate, however the way the Council will do this will depend on the targeted stakeholder and the particular objectives of any specific consultation. The Council will seek to structure engagement in a way that will genuinely gauge the views of stakeholders.

6.15. The Council has prepared a Communication, Engagement and Consultation Strategy, which sets out how the Council will undertake consultations and communications with the public in relation to flood risk management. This can be found on the Council web page at <https://www.luton.gov.uk/Environment/flood-risk-management/Pages/Local-flood-strategy.aspx>.

7. OBJECTIVE 6: WIDER ENVIRONMENTAL BENEFITS

Wider Environmental Benefits: Improve the status of water bodies across the catchment by protecting and where possible enhancing natural water resources.

- 7.1. This section of the strategy outlines how legislative requirements will be met, how the strategy contributes to wider environmental objectives, and measures that can be undertaken to improve water quality.
- 7.2. It is important that actions taken forward from this strategy focus on achieving wider environmental benefits. The implementation of flood risk management offers a significant opportunity to improve the natural and built environment across the borough. The Act states that the strategy must specify how it will contribute to the achievement of wider environmental objectives and sustainable development.
- 7.3. It should also be noted that Luton Borough council embraces Environmental Stewardship as a strategic approach to habitat management. A number of key features of the river corridor are subject to High Level Stewardship agreements making Natural England a stakeholder in development of flood risk management schemes. At the same time, the status of protected species, particularly water voles and great crested newts, must be fully recognised and accommodated during flood mitigation works.
- 7.4. This strategy will contribute to the achievement of wider environmental objectives in the following ways:
 - Encouragement of source control measures (such as Sustainable Drainage Systems, see Appendix 2), which can help improve water quality through reducing runoff and therefore reducing diffuse pollution entering watercourses and drainage systems. This could also potentially help to meet Water Framework Directive targets for water quality within Luton, providing there are no associated flood risk implications;
 - Promotion of Water Framework Directive targets and River Basin Management Plan actions, to ensure no deterioration of surface water and groundwater and the protection of all water bodies and protected areas with the implementation of any new flood risk management schemes; and
 - Enhancement of biodiversity and habitat creation within any future capital schemes.
- 7.5. Given the scope and content of this strategy, Defra has determined that a statutory Strategic Environmental Assessment (SEA) is required to be prepared to support this strategy. A SEA is undertaken to ensure that any environmental consequences are considered during the preparation of the strategy.
- 7.6. The SEA has been developed alongside this strategy and has been used to inform sustainable decision making throughout. In assessing this strategy for Water Framework Directive (WFD) compliance, the measures proposed are unlikely to have environmental effects and will not cause deterioration to water bodies. However, actions identified may require site specific environmental assessment to identify any potential environmental effects. The full WFD Compliance Assessment can be found in Appendix 7.

Flood Attenuation

- 7.7. Additional flood storage and attenuation have been identified as specific actions within this strategy. Flood attenuation areas are designed to reduce flooding, by storing runoff during the peak flow and releasing it at a controlled rate, during and after the peak flow has passed.

7.8. At a local level, flood storage areas can benefit the environment through biodiversity enhancement and habitat creation, thereby contributing to the requirements of the Water Framework Directive. Flood storage often provides amenity improvement and can be linked into the green infrastructure network.

Provide Blue and Green infrastructure

7.9. Blue corridors are a component of green infrastructure, adjacent to watercourses or along key overland flow paths, which are designated for the primary purpose of conveying water, particularly in times of flood. They also provide a wide range of additional functions such as amenity and biodiversity conservation.

7.10. The Council is working closely with key partners to ensure careful land-use planning aids the enhancement of existing recreation grounds by providing multi-functional green spaces. Also the development of district parks, providing new, local multi-functional green spaces in areas of open space deficiency, and connecting key river corridors such as the River Lea corridor with wider network of green spaces in residential areas, are concepts that are all being supported as part of the Local Plan making process.

7.11. It is important that opportunities are sought when new development and redevelopment arise, and that areas of floodplain reinstatement in conjunction with green and blue infrastructure are identified and realised. This will not only have flood risk benefits, but also ecological, environmental and recreational improvements. There is a significant opportunity to use existing and proposed green and blue infrastructure corridors as integrated sustainable drainage systems.

De-Culverting

7.12. Where practical and specifically linked to new and re-developed areas, the Council when working with its flood risk management partners will endeavour to promote the de-culverting of watercourses and restore them to open channels. This will not only increase conveyance, reduce risk of blockages and minimise the need for trash screens, but in most cases, will also lead to the environmental enhancement of the area.

7.13. In cases where culverting is unavoidable, it is necessary to seek consent from the Environment Agency for main rivers and from the Council for the small stretch of ordinary watercourse in Luton.

Luton Lea Catchment Partnership

7.14. The Council will continue working with the Luton Lea Catchment Partnership to promote improvements to the Lea and enabling communities to be involved in decisions that affect them.

7.15. Luton Lea Catchment Partnership is a group of local individuals and organisations working locally to improve the Lea from its source and through Luton, enabling communities to be involved in decisions that affect them.

7.16. The partnership brings together local businesses, organisations and communities to work collaboratively and highlight the issues affecting the river.

7.17. The partnership has developed community based projects and has outlined potential improvements that will benefit the river and its biodiversity thus contributing towards the requirements of the Water Framework Directive. These improvements such as litter picking and rubbish clearance, raising awareness of the river's course through the town, and addressing various access issues will also benefit the wider environment and communities throughout the Lea catchment.

7.18. Larger scale projects have already been identified by the partnership, including sustainable drainage systems in green spaces, improvements to the Lea Linear Park and a research project at Luton Hoo Lakes. These will be developed into a catchment plan for the River Lea in Luton.

8. OBJECTIVE 7: ECONOMICS

Economics: Explore opportunities for partnership funding, affordable insurance and alternative sources of funding. Prioritise flood risk management and highway drainage infrastructure works to enable funds to be allocated to allow programming of future improvement works.

- 8.1. A key objective of this strategy is to align stakeholders, particularly those with available funding, with those who would benefit from further investment in flood risk management.
- 8.2. Specific aims have been outlined in the Action Plan to ensure this objective is met, including:
 - Continue to bid for relevant funding as and when the opportunity arises, to support future projects and flood alleviation schemes i.e. Flood Defence Grant in Aid (FDGiA) funding; and
 - Ensure Infrastructure Development Plans, Community Infrastructure Strategies and Transport Infrastructure Plans are influenced by this strategy and that developer funding is sought where considered appropriate and necessary.
- 8.3. A coordinated approach led by the Council as the LLFA is therefore considered essential and this will include a partnership approach to bidding for funding such as FDGiA.
- 8.4. The Council will be considering all forms of funding set out below and will ensure that when opportunities arise, detailed and robust bids are submitted.

Flood Risk Management Funding Mechanisms

- 8.5. It is important to identify what funding mechanisms are available to the Council to fund the flood risk management measures that have been set out in this strategy. A summary of different forms and sources of funding is provided below.

European Funding

- 8.6. **LIFE+ initiative** is a limited but focused funding programme providing specific support for the implementation of European environmental policy and legislation. The budget for the 2014-2017 period totals €1.46 billion and the programme comprises three strands:
 - **LIFE+ Nature and Biodiversity:** supports environmental and nature conservation projects which aim to protect birds and habitats and prevent the loss of biodiversity.
 - **LIFE+ Environmental Policy and Governance:** aims to contribute to the implementation, updating and development of European Union environmental policy and legislation, including the integration of the environment into other policies, thereby contributing to sustainable development.
 - **LIFE+ Information and Communication:** supports projects which raise awareness of environmental, protection or biodiversity conservation issues. Projects include communication and awareness raising campaigns on environmental issues, which should be linked to the implementation, updating and development of EU environmental policy and legislation.

National Funding

- 8.7. The amount of Government funding put towards flood and coastal erosion risk management projects is limited each year. Under Defra's partnership funding approach, relatively small amounts of local funding could make the difference between locally-important projects going ahead or not.

Defra Grants

- 8.8. Defra is committed to funding LLFAs to carry out their responsibilities under the Flood and Water Management Act. Defra grants are either allocated directly to authorities to support the

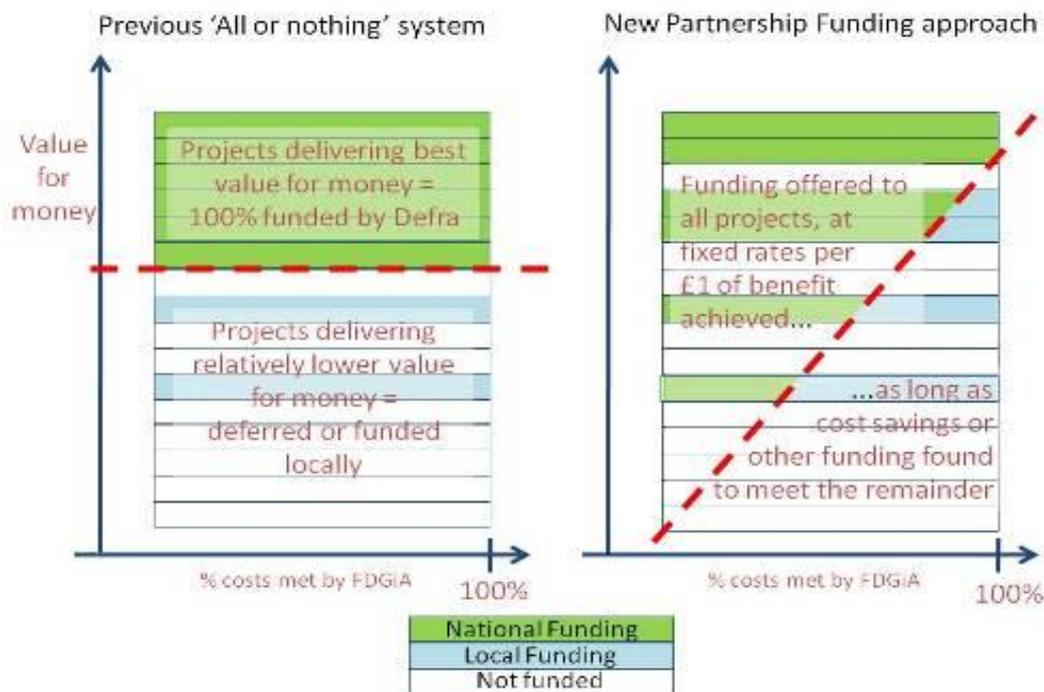
introduction of new legislation and practices, or made available for Local Authorities to submit grant applications for funding.

- 8.9. Since 2013, in addition to the funding provided to LLFAs through their settlement funding assessment (SFA) – which includes Business Rates Retention and Revenue Support Grant, there was funding from Local Services Support Grant (LSSG). The LSSG component for the Council in 2014/15 was £51,000. The LSSG component of the funding for 2015/16 will be £34,000, therefore representing a reduction of £17,000. The SFA funding for the Council for 2014-15 was £123,000 and will remain at this amount for 2015-16. The total reduction in funding of £17,000 will have an impact on the delivery of flood and water management functions.
- 8.10. Defra is evaluating the arrangements for managing flood risk in England. The aim of this review is to evaluate the operation of the arrangements for managing local flood risk put in place by the Flood and Water Management Act. The roles and responsibilities of the LLFAs are a particular focus. The evaluation will look at the effectiveness and efficiency of LLFAs as a whole, will identify good practice and will identify the scope for simplification or efficiencies in the delivery of the relevant statutory responsibilities. The levels of funding post-2016 have therefore yet to be announced.

Flood Defence Grant in Aid (FDGiA)

- 8.11. Defra has the national policy responsibility for flood and coastal erosion risk management and provides funding through grant in aid to the Environment Agency, who then administer grant for capital projects to Local Authorities.
- 8.12. The new approach to funding capital maintenance and defence projects commenced in April 2012. It aims to encourage communities to take more responsibility for the flood risk that they face and aims to deliver more benefit by encouraging total investment to increase beyond the levels that Defra alone can afford. The new approach will see levels of Flood Defence Grant in Aid (FDGiA) for each scheme relating directly to benefits, in terms of the number of households protected, the damages being prevented plus other scheme benefits such as environmental benefits, amenity improvement, agricultural productivity and benefits to business. Local contributions raised towards a project will help release the FDGiA. In addition to these elements, payment rates for protecting households in deprived areas will be higher so that schemes in these areas are more likely to be fully funded by the Government.
- 8.13. Under this system some schemes will receive complete funding, if the benefits significantly outweigh the costs, and for others partial funding would be available. It is hoped that this approach would encourage people to find cheaper ways to achieve positive outcomes and/or find other funding mechanisms to pay the remaining cost of the scheme. This is demonstrated by Figure 4 below.

Figure 4: Changes to the Flood Defence Grant in Aid System



A Six Year Programme of Works

- 8.14. At the end of June 2013 Defra secured agreement on capital funding for flood defences covering the period 2015-16 to 2020-21. This will see central government capital funding increase from £344 million in 2014-15 to £370 million in 2015-16 and remain at this level in real terms until 2020/21.
- 8.15. The Six Year Programme of Works currently includes three schemes benefitting Luton. Houghton Regis Flood Storage Area (to be delivered by the Environment Agency); Barnfield West Academy, Poynters Road Flood Alleviation Scheme (to be delivered by the Council); and Barton Road, Great Bramingham Flood Alleviation Scheme (to be delivered by the Council). The allocation of funding is provisional and subject to meeting funding criteria during the business case development process. Further details are included in the Action Plan in Appendix 1.
- 8.16. The council will continue bidding for further funding as well as influencing communities and beneficiaries of potential schemes as and when they are developed. Where it is not possible to fill funding gaps, it will be necessary to explore alternative solutions to reduce the costs of the schemes.
- 8.17. The first process to develop any scheme is to consult with the key partners, in order to discuss and agree funding options and to assess any environmental implications. All partners and potential sources of funding have been set out in the Action Plan. For the majority of the schemes, further investigations will be required to reduce the uncertainties and to get a clearer understanding of the requirements of the scheme and to allow for FDGiA bids to be submitted.
- 8.18. There are a number of triggers which may alter the way in which projects are funded and these could include: changes to funding regimes, availability of funding, changes in political priorities, community pressures, a major flooding incident, new development, regeneration, revised assessments of flood risk.

Regional Funding

Regional Flood and Coastal Committee Local Levy

- 8.19. This is an additional locally raised source of income raised by way of levy on Local Authorities. The levy is used to support (with the approval of the RFCC) flood risk management projects that are not considered to be national priorities and hence do not attract full (or 100%) national funding through FDGiA.
- 8.20. Both of the schemes within the Six Year Programme that are being led by the Council (see paragraph 8.15 above) are being supported by funding from the Local Levy.

Luton-Specific Local Sources of Funding

Infrastructure Delivery Plan

- 8.21. The Infrastructure Delivery Plan (Infrastructure Delivery Schedule 2014-2031 Draft Report, Luton Borough Council, August 2014) provides evidence of the impact that the proposed growth for Luton will have on its infrastructure up to 2031. Its purpose is to identify the infrastructure needed to deliver development, to provide the phasing, costs and timing for each item of infrastructure identified, and to assess the extent to which this infrastructure may impact on the delivery of development. In addition, it identifies responsibility for delivery, potential funding sources and, importantly, highlights any funding gaps, as well as suggesting ways in which any impacts may be overcome. The Infrastructure Delivery Schedule considers Flood Risk as a category of infrastructure which is required to support the ongoing development of Luton.

Local Enterprise Partnership (LEP)

- 8.22. South East Midlands Local Enterprise Partnership (SEMLEP) consists of eleven local authority areas. There are four unitary authorities: Bedford Borough Council, Central Bedfordshire Council, Luton Borough Council and Milton Keynes Council; and seven district councils in Buckinghamshire, Oxfordshire and Northamptonshire.
- 8.23. SEMLEP is a functional economic area with a population of 1.7m and gross value added of £38.6bn. It has grown significantly in the last 20 years (population growth of 18.6% between 1991 and 2011). It has the potential to continue to grow above existing trends in terms of new homes and jobs during the SEMLEP Strategic Economic Plan period (2015 to 2020).
- 8.24. The Council will continue to work with SEMLEP to secure long-term, Government-supported investment in flood infrastructure and defences within Luton.

Other sources of potential funding

- 8.25. **Private funding:** an important funding mechanism will come from fundraising from the local communities and businesses that would benefit from flood defence schemes.
- 8.26. **Water Company investment:** funds can be raised through the price review process to support investment in water and wastewater infrastructure. This will include action taken to reduce sewer flooding and increase asset resilience. Water companies are able to invest in some types of surface water management and may be increasingly willing to invest in order to protect their assets and customers.
- 8.27. **Section 106 (Town and Country Planning Act 1990):** this is a contribution from developers, linked to specific developments and the infrastructure required to make them acceptable in planning terms. It can be very specific to the issue being addressed and is negotiated separately for each development. It can be used to pay for defences and flood alleviation measures that specific developments need in order to be safe.

- 8.28. **Business Rate Retention:** this looks at the option to enable councils to retain their locally raised business rates. Such an approach could help local councils reduce their dependency on central government funding and could provide incentives, through the business rates system, for them to promote economic growth.
- 8.29. **New Homes Bonus:** this is a financial incentive to build new housing. It may help fund any additional local infrastructure needed. It should not lead to inappropriate development in areas at flood risk but should be used in cases where a particular development is dependent on flood risk management.
- 8.30. **Big Lottery Fund – Reaching Communities:** the Reaching Communities funding is for projects that help people and communities most in need. Grants are available from £10,000, upwards and funding can last for up to 5 years. There is no upper limit for total project costs. The fund can cover salaries, running costs, a contribution towards core costs and equipment. Funds of up to £100,000 are also available for land, buildings or refurbishment capital costs.

Prioritised Approach

- 8.31. Although the benefits of individual flood risk management measures are often many times greater than their cost, it is not technically, economically or environmentally possible to prevent all flooding. For each potential project or scheme outlined in the Action Plan, the following will be assessed:
- The potential for these projects to receive national FDGiA funding;
 - How any identified funding gaps might be filled, either by drawing upon partners' resources or pursuing wider sources of funding.

9. STRATEGY MONITORING AND REVIEW

Monitoring

9.1. It is intended that the partnership arrangements established as part of the Luton Flood Management Group will continue in order to:

- discuss, guide and monitor implementation of the proposed actions;
- review opportunities for operational efficiency; and
- review and implement any legislative changes.

9.2. It is in the interest of the Council and the residents of the catchment that the Action Plan remains current and up-to-date. To help facilitate this, the Council will liaise with other flood risk management authorities and monitor progress.

Review

9.3. In order to capture the works undertaken by the Council, its partners and other stakeholders, and to reflect any other necessary amendments, the Action Plan will be reviewed on an annual basis and the strategy on a three yearly basis. Examples of things which might trigger an Action Plan review include:

- Occurrence of a flood incident;
- Additional data or modelling becoming available, which may alter the understanding of risk within the study area; and
- Additional (major) development or other changes in the catchment which may affect the surface water flood risk.

APPENDIX 1: ACTION PLAN

This Action Plan highlights the key objectives of this strategy and the associated actions that have been identified as being required or advantageous to achieve these objectives.

The Action Plan draws out previously identified actions within other flood and water technical documents related to Luton, which have not yet been implemented. Whilst there is a focus on the works required by the Council in order to meet its responsibilities under the Flood and Water Management Act, the Action Plan also identifies actions which are led by other partners within the borough, to provide an overview of proposed flood risk management activities within the borough. There are a number of potential flood alleviation schemes identified which will require further investigation to assess their viability before any works on the ground can be undertaken. These potential schemes have been compiled from information drawn from a number of different sources including: those submitted for government funding in the past but have been unsuccessful; schemes recommended within technical documents; and potential improvement works identified by Luton Highways Authority for flood hotspots.

For the majority of actions, little information is currently available on potential costs and timeframes. This information will be included as further investigatory work is undertaken and during future updates of the Action Plan.

Timeframes for undertaking the actions have been summarised into Short (1-3 years), Medium (3-5 years), Long (5+ years), and Ongoing.

The Action Plan will be updated annually to allow progress to be monitored. Any new actions will be identified and included within the plan on a year on year basis. Existing actions will be updated when new information becomes available or progress has been made. Completed actions will remain within the plan to ensure that a record is kept of all completed works.

A map showing the general locations of areas that would benefit from the schemes in the Action Plan is provided as Map A1.

Table A1: Action Plan

Subject Area	Action Description	Approx cost	Lead	Timeframe	Source of information
Objective 1	Improve Understanding of Flood Risk in Luton				
Riparian ownership	Produce advice for riparian owners and future property developers on their obligations for the maintenance of riparian areas.	Unknown	LBC (Luton Borough Council)	High priority Short	SFRA 2013
	Consider developing a strategy for maintaining and where necessary improving, the standard of defence offered by flood defence structures in private ownership along the Upper River Lea through Luton.	Unknown	LBC	Medium	SFRA 2013
	Investigate watercourses within the borough, which have no known riparian ownership. For these reaches, consider whether it would be feasible for LBC to take on ownership, or investigate other options to ensure future maintenance.	Unknown	LBC	Medium	Stakeholder workshop
Community awareness and engagement	Prepare and implement a communication strategy to communicate with different audiences to raise awareness of flood risk using a clearly defined process for internal and external communication with stakeholders and the public.	Unknown	LBC	High priority Short	SWMP 2012
	Engage with residents regarding the flood risk in their areas, to make them aware of their responsibilities for property drainage (especially in the CDAs) and steps that they can take to improve flood resilience.	Unknown	LBC	High priority Short	SWMP 2012
	Promote a greater awareness of flood risk amongst local businesses. This will focus on actions to reduce the impact of flooding.	Unknown	LBC	Short	CFMP 2009
	Consider developing themed guidance for communities	Unknown	LBC	Short	LBC
	Inform residents of measures that they can take to mitigate surface water flooding to/around their property.	Unknown	LBC	Short	SWMP 2012

Subject Area	Action Description	Approx cost	Lead	Timeframe	Source of information
Asset register	Maintain, update and expand as appropriate, a register of structures or features, which are considered to have an effect on flood risk. Integrate the register with existing LBC Highways Asset Management System (AMS).	Unknown	LBC	High priority Short	SWMP 2012
	Consider integrating with or incorporating data from other registers, for example existing LBC Highways Asset Management System (AMS).	Unknown	LBC	High priority Short	Workshop
	Explore viability of using Planning Service's hand-held devices for pro-active asset collection and storage.	Unknown	LBC	Short	LBC
	Liase with Thames Water on transfer of assets if they only drain the highway.	Unknown	LBC	Medium	LBC
Investigations and reporting	Encourage recording flooding incidents in a consistent manner across Council departments, emergency services and Risk Management Authorities.	Unknown	LBC	High priority Short	SWMP 2012
	Develop and adopt a standardised data capture form.	Unknown	LBC	High priority Short	SWMP 2012
	Investigate flood incidents as they are reported, to identify which authorities have relevant functions to deal with the flood and whether each of them intends to respond.	Circa £500-£1,000 per investigation	LBC	Ongoing	SWMP 2012
	Investigate historical flooding incidents in CDAs. Review flooding reports, then conduct survey of local residents (e.g. mail drop, door knocking) to update datasets.	Unknown	LBC	Ongoing	SWMP 2012
Studies and reviews	Review PFRA in line with Flood Risk Regulations requirements. Undertake review in line with guidance issued by the Environment Agency/Defra.	Unknown	LBC	Short	SWMP 2012
	Review SFRA and reflect any updates in planning policies.	Unknown	LBC	Short	LBC

Subject Area	Action Description	Approx cost	Lead	Timeframe	Source of information
Studies and reviews	Consider detailed assessment of the overall level of groundwater flood risk. Determine extent of i) residential use of at-risk basements, ii) groundwater boreholes and iii) geological condition. Assess the overall level of groundwater flood risk. Produce guidance for the public explaining groundwater risk, the extent of risk in the borough and potential mitigation measures.	Unknown	LBC	Long	SWMP 2012
	Consider developing a geo-hazards study to inform future sustainable drainage guidance.	Unknown	LBC	Short	LBC
	Consider undertaking more detailed hydraulic modelling of the impact of reservoir flooding on Luton.	Unknown	LBC	Medium	LBC
	Continue to develop mapping tools to make flood information more accessible to the Council.	Unknown	LBC	Ongoing	LBC
Objective 2	Flood Risk in Planning and Development Control				
Safeguarding areas from future development	The Upper Lea catchment (near Lewsey Farm, on Houghton Brook and near Limbury) should be safeguarded against future development, ensuring these areas are available for flood defence works as necessary and when funds become available. It should be noted that these sites are also Public Open Space.	Unknown	LBC	Ongoing	SFRA 2013
Floodplain protection	Protect floodplains from inappropriate development and, where opportunities arise, seek to increase the area of floodplain within urban areas, to restore natural river forms and floodplains and in so doing restore river corridors and floodplains as areas of biodiversity and improved amenity value.	Unknown	LBC	Ongoing	SFRA 2013

Subject Area	Action Description	Approx cost	Lead	Timeframe	Source of information
Runoff from future development	Ensure new developments in the area do not increase the burden on the existing drainage system, through ensuring applications are restricting site discharge rates to greenfield rates or less, and/or through capital contributions to improvement-works on the existing drainage infrastructure.	Unknown	LBC	Ongoing	SFRA 2013
Strategic development	Opportunities will be sought through development or strategic planning to deliver schemes to alleviate flooding to existing properties.	Unknown	LBC	Ongoing	SFRA 2013
SuDS Retrofitting for reducing runoff	Seek to include SuDS retrofitting policies in the Local Plan update, to enhance or replace conventional drainage systems in Critical Drainage Areas (CDAs), or elsewhere as opportunities arise.	Unknown	LBC	Medium	SWMP 2012
Sustainable development	Contribute towards achievement of corporate sustainable development goals related to flood risk and water management. Look for opportunities to integrate fluvial and surface water flood risk reduction measures through liaison with planning and development control.	Unknown	LBC	Ongoing	SWMP 2012
Water efficiency	When considering planning applications for new development, ensure all new development is providing water efficiency measures.	Unknown	LBC	Ongoing	Water Cycle Strategy Phase 1 and 2 update v9
Future development near flood defences	Existing defence structures and banks on the Upper Lea through Luton are, in places, in poor condition with some sections having already collapsed or at risk of collapse. LBC should require new developments on the margins and/or within 8m of the River Lea to upgrade/replace and maintain the banks of the River Lea and thereby the standard of defence currently offered to the rest of Luton by their presence.	Unknown	LBC	Ongoing	SFRA 2013
Objective 3	Emergency Planning, Response and Resilience				

Subject Area	Action Description	Approx cost	Lead	Timeframe	Source of information
Emergency response procedures	Ensure current emergency response to catchment wide surface water flooding is appropriate, through liaison with Emergency Planning forum.	N/A	LBC	Short	SWMP 2012
	Review the emergency response procedures to ensure adequate provisions and advice for localised and catchment wide surface water flooding.	N/A	LBC	Short	SWMP 2012
Establish resilience plans for infrastructure services	Determine whether services (e.g. power, telecommunications) are resilient to surface water flooding. Discuss the overall resilience of services with relevant companies.	N/A	LBC	Medium	SWMP 2012
Warning opportunities	Explore the potential to implement robust warning systems and real-time data collection across the borough.	Unknown	LBC	Medium	LBC
Objective 4	Flood Risk Mitigation				
Capital Improvement Project – Houghton Regis Flood Alleviation Scheme	Environment Agency Flood alleviation scheme to alleviate flood risk in the headwaters of the Upper Lea, namely flooding from the Houghton Brook, Lewsey Brook and on the River Lea affecting the Limbury area of Luton. The project includes the construction of a flood storage area on the Houghton Brook between the M1 and Houghton Regis. (See Map A1 ref 01)	Total indicative cost £2.59M. LBC have contributed £230k, and indicative FDGiA allocation £2.1M	EA (the Environment Agency)	Medium	Luton Flood Risk Management Study (Environment Agency) SFRA 2013
Capital Improvement Project – Icknield Way Flood Alleviation Scheme	Investigate solutions flooding which flows over the footway into properties. The surface water system surcharges at Icknield Way, and outfalls in to Catsbrook. Preferred solution to include sustainable drainage features. (See Map A1 ref 02)	Unknown	LBC and TW (Thames Water)	Ongoing	SFRA 2013

Subject Area	Action Description	Approx cost	Lead	Timeframe	Source of information
Capital Improvement Project – Barton Road / Great Bramingham CDA Flood Alleviation Scheme (BRGB)	<p>Investigate solutions to the flooding in the Barton Road/Great Bramingham Road CDA. Potential capital solutions could include:</p> <ul style="list-style-type: none"> • Flood storage areas to the north; • Property level protection for buildings remaining within the floodplain (approx. 200 houses – including flood warning system); • SuDS installed throughout the CDA. <p>(See Map A1 ref BRGB)</p>	<p>FDGiA Indicative allocation £2.351M, Local Levy indicative contributions £170k. Estimate costs: Dry storage areas: £1,540,000. Demountable individual property defences and warning system: £5,000,000. SuDS throughout CDA: £88,000.</p>	LBC	Medium	SWMP 2012
Capital Improvement Project – Chapel Street / Arndale Centre CDA (CHAST) Flood Alleviation Scheme	<p>Investigate solutions to the flooding in the Chapel Street / Arndale Centre CDA. Potential capital solutions could include:</p> <ul style="list-style-type: none"> • Installation of a new culvert from the corner of Chapel Street and George Street to Manor Road Park; • Highway improvements along Chapel Street, Castle Street and London Road; • Property level protection and flood warning system for buildings remaining within the floodplain (including properties around Manor Road Park); • LBC to work with the EA to proactively manage the risk of the River Lea culvert collapse. <p>(See Map A1 ref CHAST)</p>	<p>Total estimate £4.95M</p>	LBC	Medium	SWMP 2012

Subject Area	Action Description	Approx cost	Lead	Timeframe	Source of information
Capital Improvement Project – Barnfield West Academy / Poynters Road CDA (BWPR) Flood Alleviation Scheme	<p>Investigate solutions to the flooding in the Barnfield West Academy / Poynters Road CDA. Potential solutions could include:</p> <ul style="list-style-type: none"> • Removal of silt from the watercourse to restore flow capacity and provide flood storage capacity in-bank; • Replacement of the sewer outfall grilles with a low maintenance design; • Increasing pipe sizes along Ridgeway Avenue, Goldstone Crescent & Jillifer Road towards Pastures Way; • Creation of below ground storage to attenuate runoff into Lewsey Park; • Property level protection for buildings remaining within the floodplain (including a flood warning system). <p>(See Map A1 ref BWPR)</p>	FDGiA indicative allocation £637k. Local Levy indicative contributions £50k. Total scheme estimate £3.68M.	LBC	Medium	SWMP 2012

Subject Area	Action Description	Approx cost	Lead	Timeframe	Source of information
Capital Improvement Project – Vauxhall Way CDA (VAUX) Flood Alleviation Scheme	<p>Investigate solutions to the flooding in the Vauxhall Way CDA. Potential solutions could include:</p> <ul style="list-style-type: none"> • Flood storage areas along Vauxhall Way adjacent to Eaton Valley Road; • Implement flood gates for the industrial yard near Vauxhall Way (including a flood warning system); • Increased conveyance from Airport Way underpass; • Creation of a storage area or wetland in the vacant lot adjacent to Parkway Road and associated pipe work to route excess flow under Parkway Road and the A505 into the River Lea. <p>LBC to maintain regular contact with General Motors/IBC and Luton Airport to ensure any future flooding is recorded appropriately and fully assessed. Create a detailed integrated model of the CDA to confirm flood predictions. (See Map A1 ref VAUX)</p>	Total scheme estimate £2.49M	LBC	Medium	SWMP 2012
Capital Improvement Project – Barnfield College, Barnfield Avenue CDA (BCBR) Flood Alleviation Scheme	<p>Investigate solutions to the flooding in the Barnfield College, Barnfield Avenue area. Initiate public consultation to confirm scope of problem and probable level of acceptance of proposed solution. Potential solutions could include constructing new surface water sewers around Cromer Way, The Magpies and Rookery Drive; creating a dry storage area by bunding along Cromer Way; installing below ground storage at the upstream end of Old Bedford Road; and/or installing property level flood protection. (See Map A1 ref BCBR)</p>	Total scheme estimate £1.5M	LBC	Medium	SWMP 2012

Subject Area	Action Description	Approx cost	Lead	Timeframe	Source of information
Capital Improvement Project – Beechwood Primary School/ Railway Line CDA (BWSRL) Flood Alleviation Scheme	Investigate solutions to the flooding in the Beechwood Primary School/ Railway Line area. Initiate public consultation to confirm scope of problem and probable level of acceptance of proposed solution. Potential solutions could include: increasing pipe capacity around Linden Road & Mostyn Road; Below ground storage near Beechwood Primary School; introducing individual property protection; highway improvements along Linden Road and Mostyn Road. (See Map A1 ref BWSRL)	Total scheme estimate £3.8M	LBC	Long	SWMP 2012
Capital Improvement Project – Dalroad Enterprise Estate CDA (DREE) Flood Alleviation Scheme	Investigate solutions to the flooding in the Dalroad Enterprise Estate area. Initiate public consultation to confirm scope of problem and probable level of acceptance of proposed solution. Potential solutions could include: installing below ground storage near Connaught Road and Dunraven Avenue; introducing property level protection; and highway improvements along Kingsway. (See Map A1 ref DREE)	Total scheme estimate £500k	LBC	Medium	SWMP 2012
Capital Improvement Project – Dunstable Road/Luton Town Football Ground CDA (DURD) Flood Alleviation Scheme	Investigate solutions to the flooding in the Dunstable Road/Luton Town Football Ground area. Initiate public consultation to confirm scope of problem and probable level of acceptance of proposed solution. Review connectivity of area with CHAST CDA after further investigation completed. Potential solutions could include: below ground storage around Selbourne Road; implementing flood gates; and highway improvements on Dunstable Road. (See Map A1 ref DURD)	Total scheme estimate £1.1M	LBC	Medium	SWMP 2012

Subject Area	Action Description	Approx cost	Lead	Timeframe	Source of information
Capital Improvement Project – Farley Hill CDA (FHILL) Flood Alleviation Scheme	Investigate solutions to the flooding in the Farley Hill area. Monitor CDA for future development and ensure appropriate mitigation measures are implemented. Potential solutions could include: increasing pipe diameter; implementing individual property protection; improving existing flood storage near B4540/Newlands Road and creating new flood storage north west of Lawn Cottage. (See Map A1 ref FHILL)	Total scheme estimate £900k	LBC	Medium	SWMP 2012
Capital Improvement Project – Junction 11 M1 CDA (J11M1) Flood Alleviation Scheme	Investigate solutions to the flooding in the Junction 11 M1 area. Initiate public consultation to confirm scope of problem and probable level of acceptance of proposed solution. Potential solutions could include: constructing flood storage; implementing individual protection for the properties near Derby Road; installing a green roof for the Challney School; including SuDS and related education material for Challney School; and highway improvements for the M1 within the CDA. (See Map A1 ref J11M1)	Total scheme estimate £2.8M	LBC	Long	SWMP 2012
Capital Improvement Project – Luton Sixth Form College CDA (L6FC) Flood Alleviation Scheme	Investigate solutions to the flooding in the Luton Sixth Form College area. Initiate public consultation to confirm scope of problem and probable level of acceptance of proposed solution. Potential solutions could include: introducing pipes around Foxhill Road & increase pipe size around Avebury Avenue and Stratton Gardens; installing above ground storage along flow route; and introducing flood gates and SuDS for remaining flooded properties. (See Map A1 ref L6FC)	Total scheme estimate £900k	LBC	Long	SWMP 2012
Capital Improvement Project – Luton High Town CDA (LUHT) Flood Alleviation Scheme	Investigate solutions to the flooding in the Luton High Town area. Potential solutions could include: introducing individual property protection; and localised improvement to inlet capacity. (See Map A1 ref LUHT)	Total scheme estimate £400k	LBC	Long	SWMP 2012

Subject Area	Action Description	Approx cost	Lead	Timeframe	Source of information
Capital Improvement Project – Nimbus Park/ The Herculean CDA (NPTH) Flood Alleviation Scheme ⁴	Investigate solutions to the flooding in the Nimbus Park/ The Herculean area. Potential solutions could include: installing a flood attenuation pond and preferential overland flows near the Houghton Brook; introducing permeable paving around the Herculean Buildings; installing temporary/ demountable defences; and introducing green roof areas in business parks. (See Map A1 ref NPTH)	Total scheme estimate £1.7M	Central Beds Council	Long	SWMP 2012
Capital Improvement Project – Sundon Park/ Railway Line CDA (SPRL) Flood Alleviation Scheme	Investigate solutions to the flooding in the Sundon Park/ Railway Line area. Initiate public consultation to confirm scope of problem and probable level of acceptance of proposed solution. Potential solutions could include: above ground storage at the upstream end of Camford Way and creating a bund along this road; implementing individual property protection; and introducing green roofs for the industrial estate buildings. (See Map A1 ref SPRL)	Total scheme estimate £4.6M	LBC	Long	SWMP 2012
Capital Improvement Project – Upstream of Houghton Park CDA (UPHP) Flood Alleviation Scheme ⁵	Investigate solutions to the flooding in the area upstream of Houghton Park. Potential solutions could include: introducing new pipes near Kent Road/Sundon Road; improving the overland drainage channel between the College and Houghton Park Road; and introducing individual property protection. (See Map A1 ref UPHP)	Total scheme estimate £600k	Central Bedfordshire Council	Long	SWMP 2012
Capital Improvement Project – Wigmore Lane/ Eaton Green Road CDA (WIGP) Flood Alleviation Scheme	Investigate solutions to the flooding in the Wigmore Lane/ Eaton Green Road area, to reduce the risk to properties from surface water runoff on the highway. Initiate public consultation to confirm scope of problem and probable level of acceptance of proposed solutions. (See Map A1 ref WIGP)	Total scheme estimate £2.3M	LBC	Medium	SWMP 2012

⁴ Whilst NPTH CDA is not within Luton boundary, it does have an impact on properties within Luton

⁵ Whilst UPHP CDA is not within Luton boundary, it does have an impact on properties within Luton

Subject Area	Action Description	Approx cost	Lead	Timeframe	Source of information
Capital Improvement Project – Windsor Drive CDA (WIND) Flood Alleviation Scheme ⁶	Investigate solutions to the flooding in the Windsor Drive area. Initiate public consultation to confirm scope of problem and probable level of acceptance of proposed solutions. Potential solutions could include: introducing new surface water sewers around Tudor Drive; and installing individual property protection. (See Map A1 ref WIND)	Total scheme estimate £600k	Central Bedfordshire Council	Long	SWMP 2012
Investigation/study for Acworth Crescent/ Pirton Road/ Montague Avenue	Investigate solutions to the flooding of the highway at Acworth Crescent/ Pirton Road/ Montague Avenue, which is thought to be caused by Houghton Brook backing up through the surface water system. (See Map A1 ref 03)	Unknown	LBC	Medium	SFRA 2013
Investigation/study for Pastures Way	Investigate solutions to the flooding affecting the highway, park and properties adjacent to Lewsey Park, which is thought to be a combination of sewer capacity and the capacity of the brook. (See Map A1 ref 04)	Unknown	LBC	Medium	SFRA 2013
Investigation/study for Icknield Road	Investigate solutions to the carriageway flooding at the rear of properties on Limbury Road, which is likely to be as a result of the sewer surcharging. (See Map A1 ref 05)	Unknown	LBC	Medium	SFRA 2013
Investigation/study for Midhurst Gardens	Investigate solutions to the flooding from the River Lea at Midhurst Gardens, where it overflows and on occasion floods a number of properties. (See Map A1 ref 06)	Unknown	LBC	Medium	SFRA 2013
Inspection/maintenance for Eighth Avenue	Investigate solutions to the flooding, including foul flooding, which occurs in the highway and within one property on Eighth Avenue. Initial investigations found a substantially blocked surface water system that had an overflow into foul sewer system. Ensure regular inspection and maintenance. (See Map A1 ref 07)	Unknown	LBC	Medium	SFRA 2013

⁶ Whilst WIND CDA is not within Luton boundary, it does have an impact on properties within Luton

Subject Area	Action Description	Approx cost	Lead	Timeframe	Source of information
Investigation/study for Blenheim Crescent	Investigate solutions to the flooding at Blenheim Crescent, which occurs in heavy rain threatening property. (See Map A1 ref 08)	Unknown	LBC	Medium	SFRA 2013
Investigation/study for Enderby Road and source of Riddy Brook	Investigate solutions to the flooding at Enderby Road, where the sewers surcharge in storm conditions (from gullies and manholes) and water flows off highway, flooding garages and threatening to flood properties. Investigation should include assessment of water quality issues impacting on Riddy Brook. (See Map A1 ref 09)	Unknown	LBC	Medium	SFRA 2013
Investigation/study for Old Bedford Road	Investigate solutions to the flooding on Old Bedford Road, which affects garages and frontages in storm conditions. (See Map A1 ref 10)	Unknown	LBC	Medium	SFRA 2013
Investigation/study for Chapter House Road	Investigate solutions to the carriageway flooding at Chapter House Road, which occurs under storm conditions. Water can also enter front and rear gardens of two properties flooding them and a garage on one occasion. (See Map A1 ref 11)	Unknown	LBC	Medium	SFRA 2013
Investigation/study for flood alleviation in CDAs	In relevant CDAs across catchment, investigate options to reduce the depth and duration of standing water on the highway. Partnership working will be required between LBC Highways and Thames Water as necessary.	Unknown	LBC/TW	Short	SWMP 2012
Investigation of condition of Mill Stream banks	Mill Stream banks are in danger of collapse due to lack of maintenance. However riparian ownership in this area is unclear. Further investigation is required to determine whether a scheme can be put in place to improve the condition of the watercourse at this location, through partnership working with the community.	Subject to funding/FDGiA	LBC	Medium	Stakeholder workshop
Investigation/study of impacts of Airport Extension	Further investigation required into the drainage proposals for the Airport extension site. (See Map A1 ref 12)	Unknown	LBC	Ongoing	Stakeholder workshop

Subject Area	Action Description	Approx cost	Lead	Timeframe	Source of information
Investigation/study of impacts of Marsh Farm Project	Redevelopment of Purley Centre flats into shops and housing. Investigation required into the potential impacts of the development in relation to SuDS and surface runoff. Ensure LBC has opportunity to input into procurement and design. (See Map A1 ref 13)	Unknown	LBC	Medium	Stakeholder workshop
Inspection/maintenance of watercourses and defences	Establish and regularly update a risk-based maintenance plan of all watercourses and defences ensuring they are clear of debris that could affect flood flow conveyance and water quality.	Unknown	EA & LBC	Short	SFRA 2013
Inspection/maintenance of highways drainage	Improve maintenance regimes of highways drainage, and target those areas identified to regularly flood or known to have blocked gullies.	Unknown	LBC	Medium	SWMP 2012
Inspection and maintenance of surface water sewers	Maintenance of surface water sewers to ensure all drainage systems are operating at capacity. May require mapping of existing drainage infrastructure. Review existing maintenance schedules and if necessary revise/prioritise CDAs.	Unknown	LBC & TW	Short	SWMP 2012
Inspection of River Lea culvert through town centre	EA and LBC to work proactively together to monitor the condition of the River Lea culvert through the town centre. Share condition assessment information and jointly review other information as it becomes available. (See Map A1 ref 14)	Unknown	EA & LBC	Short	SWMP 2012
Designation	Establish internal procedure for implementing 'designation powers' as provided by the FWMA. Review designation powers and implement procedures in relevant council services.	N/A	LBC	Short	SWMP 2012
Powers to undertake works	Establish internal procedure for implementing 'works powers' as provided by the FWMA. Review works powers and implement procedures in relevant council services.	N/A	LBC	Medium	SWMP 2012
Property level protection	Consider retrofitting flood resilience and resistance measures to properties where there is a history of flooding.	Average £5k per property	LBC	Medium	SWMP 2012

Subject Area	Action Description	Approx cost	Lead	Timeframe	Source of information
Buildings Information Modelling (BIM)	Review all LBC projects for potential BIM requirements.	N/A	LBC	Ongoing	Stakeholder workshop
Objective 5	Partnership Working				
Stakeholder engagement	Engage with developers and local regulators such as the Environment Agency, Thames Water Anglian Water and the highways authority, throughout the development/ planning process to develop and instigate initiatives for the reduction of flood risk.	N/A	LBC	Ongoing	SFRA 2013
Co-operation and data sharing	Co-operate with other local Risk Management Authorities in exercising functions under both the Act and the Regulations. Regular sharing of data and expertise in addressing local flooding issue.	N/A	LBC	Ongoing	SWMP 2012
Catchment Partnership	Continue working with the Luton Lea Catchment Partnership to promote improvements to the Lea and enabling communities to be involved in decisions that affect them.	N/A	LBC	Ongoing	Stakeholder workshop
Objective 6	Wider Environmental Benefits				
Water efficiency	Carry out a programme of retrofitting and water audits of existing dwellings and non-domestic buildings. Aim to move towards delivery of 20% of the existing housing stock with easy fit water saving devices.	Unknown	Affinity Water	Long	Water Cycle Strategy Phase 1 and 2 update v9
Water efficiency	Establish a programme of water efficiency promotion and consumer education, with the aim of behavioural change with regards to water use.	Unknown	Affinity Water	Long	Water Cycle Strategy Phase 1 and 2 update v9
Water Framework Directive	Pursue opportunities for wetland habitat creation and enhancement of existing wetland features, and linking habitats through extensive Green Infrastructure to surrounding countryside.	N/A	LBC	Ongoing	Water Cycle Strategy Phase 1 and 2 update v9
SuDS retrofitting for water quality	Determine areas within the catchment, which are appropriate for retrofitting bio-retention basins and car parking pods. Desktop study to determine feasibility of incorporating these SuDS.	Unknown	LBC	Medium	SWMP 2012

Subject Area	Action Description	Approx cost	Lead	Timeframe	Source of information
Managing siltation	Continue investigating the causes and solutions for sustainable management of silt in the watercourses and lakes in the River Lea catchment in Luton	Unknown	LBC	Ongoing	LBC
Combine sewer overflows	Liaise with Thames Water on the issues of combine sewer overflows in order to reduce hydraulic surcharging or premature operation of overflows.	Unknown	LBC	Ongoing	LBC
Objective 7	Economics				
Funding opportunities	Continue to bid for relevant funding as and when the opportunity arises, to support future projects and flood alleviation schemes i.e. FDGiA funding.	N/A	LBC	Ongoing	LLFA
	Work with SEMLEP to secure long-term, Government-supported investment in flood infrastructure and defences within Luton.	N/A	LBC	Ongoing	Stakeholder workshop
Developer contributions	Seek opportunities from developers to contribute to the flood defence of existing developments through commuted sums.	N/A	LBC	Ongoing	SFRA 2013
Explore partnership schemes	Seek opportunities to integrate fluvial and surface water flood risk reduction measures. Review and monitoring of policy implementation and in partnership with EA.	N/A	LBC	Short	SWMP 2012
Infrastructure funding	Ensure Infrastructure Development Plans, Community Infrastructure Strategies and Transport Infrastructure Plans are influenced by this strategy.	N/A	LBC	Ongoing	LLFA
Insurance	Investigate the flood risk to LBCs existing corporate property portfolio to inform potential impacts on insurance premiums. Also ensure flood risk to property is investigated prior to new acquisitions.	N/A	LBC	Ongoing	Stakeholder workshop

APPENDIX 2: SUSTAINABLE DRAINAGE ADVICE

This section is intended to supplement the [Non-statutory Technical Standards for Sustainable Drainage Systems](#). This guidance is aimed at developers and development control officers, and includes:

- Technical requirements;
- Links to the landscape;
- Sustainable use of water;
- Water quality treatment processes;
- SuDS features in private ownership;
- Designation;
- Waste management;
- Other environmental issues.

Sustainable Drainage Systems (SuDS) differ from conventional drainage systems where rainwater runs quickly off hard surfaces, straight into drains and then into rivers, often carrying pollution with it. SuDS involve a range of techniques such as green roofs, rainwater harvesting, permeable paving and landscape features such as ponds and wetlands, to ensure that the post-development runoff patterns closely match the undeveloped situation.

Benefits of SuDS

SuDS provide a range of benefits over conventional drainage systems:

- **Reduced flood risk** – SuDS slow down the flow of rainwater from a site by filtering and storing it. This reduces pressure on our overstretched drainage system and therefore reduces the risk of flooding, especially after heavy rainfall. This is particularly important as our drainage system is under increasing pressure due to development and the increased risk of heavy rainfall due to climate change.
- **Improved water quality** – SuDS features such as green roofs and permeable paving filter and clean rainwater on site. This ensures water entering drains and then rivers is free of oil and pollutants which can harm wildlife.
- **Benefits for people and wildlife** – SuDS create opportunities for rainwater recycling and for creating attractive water features which support wildlife. SuDS also reduce the need for expensive conventional drainage systems, and thus can provide cost savings.

SuDS techniques

SuDS techniques most likely to be used in Luton include:

- **Permeable paving** – rainwater filters through permeable paving where it is stored before soaking into the ground or entering drains.
- **Living roofs** – planted 'green' roofs store and clean water as well as providing habitats for wildlife.
- **Rainwater harvesting** – rainwater can be collected from roofs for re-use in for example flushing toilets or, most simply, can be collected in water butts for use in watering plants and landscaped areas.
- **Soft landscaping** – landscape features, such as rain gardens, swales, basins, ponds and wetlands, can be designed to collect and store runoff.

Inclusion of SuDS in development

The Council supports SuDS techniques being used on all new developments. It is also possible to incorporate SuDS into existing buildings, known as 'retro-fitting'.

From the 6th April 2015, all major planning applications must ensure that sustainable drainage systems for the management of run-off are put in place, unless demonstrated to be inappropriate. Under these arrangements and in considering planning applications, local planning authorities should consult the relevant lead local flood authority on the management of surface water. The local planning authorities should satisfy themselves that the proposed minimum standards of operation are appropriate and ensure, through the use of planning conditions or planning obligations, that there are clear arrangements in place for ongoing maintenance over the lifetime of the development. All sustainable drainage systems should be designed to ensure that the maintenance and operation requirements are economically proportionate.

Local Principles for Implementation of Sustainable Drainage

The following principles for the design and implementation of SuDS in Luton should be considered in addition to the guidance within the [Non-statutory Technical Standards for Sustainable Drainage Systems](#).

Runoff Destinations

SuDS are able to most effectively mimic the natural surface water runoff processes at the site prior to development when a series of SuDS techniques are applied progressively as part of an interconnected system, referred to as a 'management train'. The management train comprises several techniques: prevention; source control; site control; and regional control. The application of these techniques allows for several stages at which the water can be treated, evapo-transpirate and infiltrate.

The management train promotes SuDS options which mitigate the potential increase in the rate of runoff, such as layout and makeup of the development scheme, and use good housekeeping measures to reduce pollution to runoff. This is followed by techniques which control runoff at the source, such as infiltration to ground through permeable paving and green roofs. The next stages of the management train control runoff sequentially by site-wide and regional techniques.

The management train for the site should be described as part of the evidence supporting a planning application.

Where possible, sites should be divided into sub-catchments to reflect the different drainage characteristics and land uses. Each sub-catchment must have its own drainage strategy. Dealing with the water locally in sub-catchments not only reduces the quantity that has to be managed at any one point, but also reduces the need for conveying the water off the site. When dividing catchments into small sections it is important to retain a perspective on how this affects the management of the whole catchment and the hydrological cycle.

Off-site flood risk

The application must include details of catchments and flow discharging into the site, routes through the site and discharging out of the site.

All development within Luton must cater for the 1% design storm event (or 1 in 100 years) including an allowance for climate change with any flooding of the site restricted to designated areas and flow routes.

If the SuDS system discharges to a water body, it should be demonstrated that high water levels within the water body for the design storm event would not affect the performance of the system.

When discharging to an existing sewer, it will need to be demonstrated that the sewer can accommodate the proposed discharge rates. Improvements to the sewer may need to be included in the design, or discharge rates reduced below the greenfield rate. These should be agreed with the appropriate sewerage company.

Peak flow control

The greenfield runoff rate will need to be agreed with the relevant authority (the Council or the Environment Agency for sites within Flood Zone 2 or 3), and should take into account the 100%, 3% and 1% rainfall events, including climate change projections. Evidence would need to be provided to support a higher rate of discharge and would have to be agreed by the Council and the Environment Agency.

New developments should restrict discharge rates to greenfield runoff rates up to and including the 1% rainfall event accounting for climate change, through the use of SuDS. Proposed 'brownfield' redevelopments should also reduce post-development runoff rates for events up to and including the 1% return period event with an allowance for climate change to greenfield runoff rates and in any case must not be higher than the existing site conditions. The storage volumes for the site should allow for interception storage to remove (by infiltration or evaporation) runoff from the first 5mm of rainfall. Green roofs are assumed to retain first 5mm fully on that surface. Where unlined permeable paving is used it is presumed that the 5mm interception criteria is achieved.

Attenuation storage must be provided to limit the rates of runoff to the agreed greenfield rates; and, where possible, long-term storage using landscaping to store runoff from the 1% event.

For small catchments where the control diameters are liable to blockage, the discharge can be increased to between 2-5ltr/sec. A discharge flow proposed below a minimum of 2l/sec from a single structure should be reviewed in terms of maintenance and blockage potential. All flow control devices restricting the rate of flow must have a bypass feature to manage flows when a blockage occurs. The bypass can be an internal weir overflow within the chamber discharging to the outfall pipe or channel. The overflow weir shall be 200mm above the maximum water level.

The design should take into account the landscaping of the site to maximise the potential for storage at low points.

All surface storage features must provide a 300mm freeboard above the design maximum water level.

The outflow hydrograph should be as close as reasonably possible to the greenfield hydrograph for all rainfall events.

Volume control

All developments (excluding minor house extensions less than 250m²) which relate to a net increase in impermeable area are recommended to include at least one 'at source' SuDS measure (e.g. water butt, rainwater harvesting tank, bio-retention planter box etc).

Where possible the additional volume of runoff should be stored and used for recycling. If the additional volume is not recycled or infiltrated it may be stored as a lower level within the storage facility-controlled with appropriate discharge control.

Evidence would need to be provided to support a higher volume of discharge and would have to be agreed by the Council in consultation with the Environment Agency or water company as appropriate.

Flood risk within the development

As the drainage system requires appropriate space and the overland flow routes during exceedance events must be considered, planning applications should explain how development has been designed with these matters in mind.

It should be demonstrated that any blockage within the system and extreme rainfall volumes can be accommodated through safe overflow routes. Flow across the site must be diverted away from

buildings and main access-egress routes across the site. The route and depth of overground flows must be demonstrated by 3D digital terrain modelling or other appropriate drawings. Green areas, roads and off-highway footpaths or cycleways often provide suitable conveyance corridors. The crossfalls and kerb heights may need to be adjusted above normal standards to ensure the water is effectively managed – such departures must be agreed with the Highway Authority.

Small controls (orifice plates, slots etc) should be visible from the surface without the need for removal or covers or use of special access facilities (e.g. visible through gratings). Thus any blockage can be readily identified by walk-by inspection.

The minimum acceptable pipe diameter is 50mm where the flow has already been treated through infiltration so risk of blockage is low, or 150mm before such treatment. The design of orifice controls with smaller diameter may be agreed at the discretion of the Council.

All sources of water entering the site predevelopment should be identified, and an assessment made of how flows will be routed through the site, where flows left the site pre-development and where they leave post development.

High groundwater levels will need to be accounted for in the design of any infiltration drainage.

Water quality

At least one surface feature should be deployed within the management train to improve the quality of runoff. Only if surface features are demonstrated as not viable, an approved proprietary engineered pollution control feature, such as vortex separator, serviceable/replaceable filter screens, and pollution interceptors may be used as a last resort.

Soakaways should be chamber or geocellular type with access for removing silt and a robust inspection and a satisfactory de-silting maintenance system. Prior to discharge into any inaccessible infiltration system, measures must be provided to remove silt, suspended or floating matter. Rubble filled soakaways are not acceptable unless adequate easily inspected and maintained silt removal devices precede discharge to the soakaway.

Controls and de-silting features should be visible from the surface without the need to remove covers. Gully gratings or chequer grids may be suitable.

Silt traps should be readily accessible for manual clearance or suction vehicles. Vortex separators should not require man-entry for inspection or emptying.

Structural integrity

All details of structures or chambers in excess of 1m deep or 600mm diameter, or 600mm high should be submitted with structural calculations relating to the ground conditions proven by site investigations.

Where proprietary systems are installed, designers, suppliers and installers should provide a full replacement warranty for the life span of the SuDS (e.g. 'Geocellular' system, vortex separators etc).

Designing for economic sustainability

SuDS should be designed to provide an effective 'whole life' sustainable solution, by ensuring that:

- Systems operate efficiently for long periods (20 to 50 years) before replacement or rehabilitation is needed;
- Systems operate efficiently for medium periods (2 to 5 years) before significant maintenance activities are required;
- Regular operation and maintenance needs are easily understood and implemented by relatively unskilled labour; and

- Where possible, natural resources are reused and energy efficient products, processes, operation and maintenance are possible.

Maintenance proposals shall be proactive not reactive – blockages should not be allowed to occur with resultant surface flooding or to the detriment to the performance of the SuDS. The SuDS feature shall be designed and located to facilitate the approved maintenance regime.

Multi-functionality

Where site use allows, SuDS should be designed as part of multifunctional spaces such as sports and recreational areas, with opportunities for education. The expected design frequency of inundation areas and attenuation function should be determined in order to facilitate and manage multi-function use.

Frequently wetted areas should be minimised to ensure maximum availability for leisure purposes elsewhere within the feature.

Where dry detention basins or infiltration basins are proposed, a lower area should be provided to restrict the wet areas during frequent events and thus maximise the duration and extent of areas used for recreation.

Landscape and visual impact

Water should be kept above the ground surface wherever possible and SuDS should be considered as an integral part of the landscape or urban design.

SuDS features should be visually attractive, such as ponds and wetlands, with details such as channels, canals and cascades to provide visual interest. Where possible, all hard structures such as inlets, outlets and headwalls should be designed to be unobtrusive. Appropriate cladding such as local stone should be considered.

The shape and depth of swales or basins below surrounding ground should be integrated into the landscape but not be excessive in land take

Ecology

The primary function of SuDS is flood prevention, consequently the maintenance regime must not be restricted by ecological requirements to be detriment of flood prevention. The design of the shape or depth of water bodies or type of vegetation should not be deliberately selected to create habitats for protected species. The SuDS should have a maintenance regime which discourages the development of protected habitats. Grass strimming, grass cutting and silt removal, dredging etc shall be carried out on a frequent basis to maintain the designed flow regime. To discourage excessive vegetation within the main body of water feature the bed should be at least 1m below normal water level and thus limit light levels on the bed.

A robust vegetation cover must be established as soon as possible to prevent silt migration and assist the drainage function. This will then develop into a biodiversity asset.

Tree and shrub selection and care must take into account the need for permanent ground cover and must not compromise access.

Local plant material should be used where possible to allow natural colonisation of SuDS features. Do not plant any invasive or vigorously colonising species. All planting in open SuDS should be native to the UK, ideally of local provenance, and from an accredited source to avoid the introduction of alien species.

Natural drainage features around the site should be retained and enhanced.

The vertical and horizontal diversity in open SuDS features should be maximised. A shallow aquatic edge to ponds and wetlands should be included, with a maximum depth of 450mm and minimum width of 1m.

Exceedance and extreme event management

The SuDS shall be designed such that below ground features prevent any surface flooding for the 3% event. The SuDS shall be designed such that surface features contain the entire volume within the SuDS feature for the requisite design event (normally 1% unless agreed otherwise).

Exceedance flow shall be routed so that they do not flood into buildings or basements or utility complexes. Consequently, planning applications should explain how the development scheme has been designed with consideration to such routes (blue/green corridors or roads, cycleways etc).

Health and Safety

All open water features must be assessed regarding the risk of drowning, particularly to small children, and must demonstrate that all reasonable measures have been taken to minimise the risk of drowning or harm. Risk to the public, maintenance staff and wildlife must also be minimised.

Safety features to consider include:

- Where children under the age of 5 years are likely to have unsupervised access to SuDS features, consider the use of a fence. However, fences themselves can represent hazards as they can hinder rescue and can be visually unacceptable.
- Slopes of the SuDS features should be a maximum of 1 in 3, with 1 in 6 or less desirable for ease of maintenance access and egress.
- Safe access margins surrounding SuDS feature should be provided for maintenance, preferably 3.5m in width with a cross-fall of 1 in 20 (or as determined by maintenance machinery requirements).
- If it is acceptable at pre-application stage when landuse is being planned, that a 3.5m wide maintenance strip around the wet area of a pond is not required then a 1m wide bench should be provided above normal water level at the edge of ponds, allowing for a stationary rest.
- Consideration should be given to providing 1m wide ledges with 300mm steps in place of a slope – this provides vegetation platforms and is generally accepted as a means of dissuading small children from walking into deeper water.
- Dense marginal planting can be used to limit accidental access but should not restrict visibility to any areas of open SuDS.

Danger signs and lifesaving equipment should not be necessary where the above points have been taken into consideration in the design of the SuDS.

More information can be found in the CIRIA Report RP992-5 WP1 Safety Framework and Checklist (http://www.susdrain.org/files/resources/SuDS_manual_output/paper_rp992_17_health_and_safety_principles.pdf).

A communications plan should be prepared and information boards provided to inform residents and the public of the SuDS design and features on the site.

Although malaria is not currently a risk in the UK, this must be considered in the design of wetlands by reducing preferential breeding areas for mosquitoes such as small temporary pools unconnected to open water. In well-designed SuDS the water must be moving with a residence time of only a few days. In addition, emergent vegetation must have minimal submerged growth to reduce the available locations for larvae to develop.

The proposals for management of open water features should include measures for reducing the potential risk of/transmission of Weils disease.

Where open water habitat, including SuDS features, is located within 8 miles of an airport, guidance provided by the Civil Aviation Authority (“CAP 772 Wildlife Hazard Management at Aerodromes” www.caa.co.uk/cap772) must be followed to minimise the risk of aircraft bird strike.

Importance of Considering SuDS in Pre-Application

Although not mandatory, pre-application consultation is strongly recommended as it produces significant benefits later in the process. Prior to making an application for development within Luton, developers are advised to familiarise themselves with the relevant local and national water management policies and guidance. It is important at this early stage to identify:

- Whether the hierarchy of SuDS techniques can be delivered. If the full hierarchy cannot be delivered, the reasons for using a lower priority system.
- The existing topography and overland runoff routes during periods of exceedence.
- Soil conditions and the acceptable runoff rate and volume, which should be agreed through discussions with the Council.
- The location of the SuDS features within the development.
- How SuDS features are to be integrated into Urban Design and the landscape. Adequate space must be identified to accommodate side slopes for basins and ponds and to ensure the relationship between bed levels and surrounding ground is satisfactory.
- Environmental and ecological consequences and benefits to the SuDS.
- The multiple land-uses provided.
- The relationship between the highways and the drainage system.
- Whether temporary drainage will be required during the construction phase, and if so, what this will consist of.

Useful Additional Guidance

The following sites provide useful additional information about design and policy:

- Susdrain - the online community for sustainable drainage: www.susdrain.org/
- Thames Water SuDS information: [http://www.thameswater.co.uk/cr/Sustainable drainage/Sustainableurbandrainsystems/index.html](http://www.thameswater.co.uk/cr/Sustainable%20drainage/Sustainableurbandrainsystems/index.html)
- Interim Code of Practice for Sustainable Drainage Systems: http://www.susdrain.org/files/resources/other-guidance/nswg_icop_for_suds_0704.pdf
- National Planning Policy Framework – Planning Practice Guidance <http://planningguidance.planningportal.gov.uk/>

APPENDIX 3: GLOSSARY

Term	Definition
Aquifer	A source of groundwater comprising water bearing rock, sand or gravel capable of yielding significant quantities of water.
Asset Management Plan (AMP)	A plan for managing water and sewerage company infrastructure and other assets in order to deliver an agreed standard of service.
Breach	A constructional failure of a flood defence or other structure that is acting as a flood defence.
Catchment	An area of land where surface water from rain, melting snow or ice, converges to a single point at a lower elevation - usually a watercourse.
Catchment Flood Management Plan (CFMP)	A high-level planning strategy through which the Environment Agency works with their key decision makers within a river catchment to identify and agree policies to secure the long-term sustainable management of flood risk.
Civil Contingencies Act (2004)	A UK Parliamentary Act delivering a single framework for civil protection in the UK. As part of the Act, Local Resilience Forums have a duty to put into place emergency plans for a range of circumstances including flooding.
Climate Change	Long-term variations in global temperature and weather patterns caused by natural and human actions.
Climate Change Act (2008)	An Act that requires a UK wide climate change risk assessment every five years, accompanied by a national adaptation programme that is also reviewed every five years. It also requires public bodies and statutory organisations such as water companies to report on how they are adapting to climate change.
Commencement Order	An instruction that brings a defined aspect of legislation into force.
Critical Drainage Area (CDA)	A discrete geographic area (usually a hydrological catchment) where multiple and interlinked sources of flood risk (surface water, groundwater, sewer and/or main river) cause flooding in one or more Local Flood Risk Zones during severe weather thereby affecting people, property and/or local infrastructure.
Critical Infrastructure	Assets that are essential for the functioning of a society and economy. Most commonly associated with the term are facilities for: electricity generation, transmission and distribution; and gas production, transport and distribution.
Culvert	A channel or pipe that carries water below ground level.
DG5 Register	A water company held register of properties which have experienced sewer flooding due to hydraulic overload, or properties which are 'at risk' of sewer flooding more frequently than once in 20 years.
EU Floods Directive (2007)	A European Directive that has been transposed to UK law through the Flood Risk Regulations (2009).
Environment Agency	Government agency reporting to Defra charged with protecting the environment and managing flood risk in England.
Exception Test	The two parts to the Exception Test require proposed development to show that it will provide wider sustainability benefits to the community that outweigh flood risk, and that it will be safe for its lifetime, without increasing flood risk elsewhere and where possible reduce flood risk overall.
Flood defence	Infrastructure used to protect an area against floods such as floodwalls and embankments; they are designed to a specific standard of protection (design standard).

Term	Definition
Flood Hazard Map	A map that defines flood risk areas and shows: the likely extent (including water level or depth) of possible floods; the likely direction and speed of flow of possible floods; and whether the probability of each possible flood occurring is low, medium or high (in the opinion of the person preparing the map).
Flood Map	A multi-layered map, which provides information on flooding from rivers and the sea for England and Wales. The flood map can also show flood defences and the areas benefiting from those flood defences.
Flood Map for Surface Water	A national data set held by the Environment Agency showing areas where surface water would be expected to flow or pond, as a result of different chances of rainfall event.
Flood Resilience	Actions taken which allow the ingress of flood water through a property but enable swift recovery after the flood event. Flood resilience measures may include (among others) flood-resistant construction materials, raised electricity sockets and water-resistant flooring.
Flood Resistance	Actions taken to prevent to ingress of flood water to a property. Flood resistance measures may include flood barriers placed over doorways.
Flood Risk	A combination of two components: the chance (or probability) of a particular flood event occurring and the impact (or consequence) that the event would cause if it took place.
Flood Risk Area	See entry under Indicative Flood Risk Areas.
Flood Risk Management (FRM)	A process to reduce the probability of occurrence through the management of land, river systems and flood defences and reduce the impact through influencing development on flood risk areas, flood warning and emergency response.
Flood Risk Management Authority	Includes: (a) the Environment Agency, (b) a lead local flood authority, (c) a district council for an area for which there is no unitary authority, (d) an internal drainage board, (e) a water company, and (f) a highway authority.
Flood Risk Management Plan	A plan for the management of a significant flood risk. The plan must include details of: objectives set by the person preparing the plan for the purpose of managing the flood risk; and the proposed measures for achieving those objectives (including measures required by any provision of an Act or subordinate legislation).
Flood Risk Regulations (2009 FRR)	Transposition of the EU Floods Directive into UK law. The EU Floods Directive is a piece of European Community (EC) legislation to specifically address flood risk by prescribing a common framework for its measurement and management.
Floods & Water Management Act (FWMA 2010)	An Act of Parliament which forms part of the UK Government's response to Sir Michael Pitt's Report on the Summer 2007 floods, the aim of which is to clarify the legislative framework for managing surface water flood risk in England. The Act was passed in 2010 and is currently being enacted.
Fluvial Flooding	Flooding resulting from water levels exceeding the bank level of a watercourse (river or stream). In this report the term Fluvial Flooding generally refers to flooding from Main Rivers (see later definition).
Flood Zones	Nationally consistent delineation of 'high' and 'medium' flood risk, published on a quarterly basis by the Environment Agency

Term	Definition
Flood Zone 1 Low Probability	Defined as an area only at risk of flooding from flood events with an Annual Exceedance Probability (AEP) of less than 0.1% (1 in 1000). The probability of flooding occurring in this area in any one year is less than 0.1%.
Flood Zone 2 Medium Probability	Defined as an area at risk of flooding from flood events with an Annual Exceedance Probability (AEP) of between 1% (1 in 100) and 0.1% (1 in 1000). The probability of flooding occurring in this area in any one year is between 1% and 0.1%.
Flood Zone 3a High probability	Defined as an area at risk of flooding from flood events with an Annual Exceedance Probability (AEP) of greater than 1% (1 in 100). The probability of flooding occurring in this area in any one year is greater than 1%.
Flood Zone 3b Functional Floodplain	Defined as land where water has to flow or be stored in times of flood. Usually defined as areas at risk of flooding from flood events with an Annual Exceedance Probability (AEP) of greater than 5% (1 in 20) design event. The probability of flooding occurring in this area in any one year is greater than 5%.
Fluvial	The processes associated with rivers and streams and the deposits and landforms created by them.
Geographic Information System (GIS)	Any system, which stores geographical data, such as elevations, location of buildings and extent of flood, outlines.
Groundwater	Water located beneath the ground surface, either in soil pore spaces or fractures in rock.
Gully	An artificial channel serving as a gutter or drain.
Indicative Flood Risk Areas	Areas determined by the Environment Agency as potentially having a significant flood risk, based on guidance published by Defra and WAG and the use of certain national datasets. These indicative areas are intended to provide a starting point for the determination of Flood Risk Areas by LLFAs. Luton does not have an Indicative flood risk area.
Integrated Urban Drainage	A concept, which aims to integrate different methods and techniques, including sustainable drainage, to effectively manage surface water within the urban environment.
Internal Drainage Board	An Internal Drainage Board is a local public authority established in areas of special drainage need in England and Wales. They have permissive powers to manage water levels within their respective drainage districts. IDBs undertake works to reduce flood risk to people and property and manage water levels to meet local needs. There is no IDB district covering Luton.
Land Drainage Act	The Land Drainage Act, enacted in December 1991, aimed to consolidate existing water legislation and outlined the duties and powers to manage land drainage for a number of bodies including internal drainage boards and local authorities.
Lead Local Flood Authority (LLFA)	Local Authority responsible for taking the lead on local flood risk management (Luton Borough Council is the LLFA for Luton). The duties of LLFAs are set out in the FWMA 2010.
LiDAR	Light Detection and Ranging, a technique to measure ground and building levels remotely from the air.
Local Flood Risk Zone (LFRZ)	Local Flood Risk Zones are defined as discrete areas of flooding that do not exceed the national criteria for a 'Flood Risk Area' but still affect houses, businesses or infrastructure. A LFRZ is defined as the actual spatial extent of predicted flooding in a single location (and see Critical Drainage Area above).

Term	Definition
Local FCERM Strategy	A local strategy required by the FWMA 2010 that 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.
Local Planning Authority (LPA)	The local authority or Council that is empowered by law to exercise planning functions for a particular area (Luton Borough Council is the LPA for Luton).
Local Resilience Forum (LRF) (BLLRF)	A multi-agency forum, bringing together all the organisations that have a duty to cooperate under the Civil Contingencies Act, and those involved in responding to emergencies. They prepare emergency plans in a co-ordinated manner and respond in an emergency. Roles and Responsibilities are defined under the Civil Contingencies Act. Luton Resilience Forum have also joined with Bedfordshire Resilience Forum to form Bedfordshire and Luton Local Resilience Forum (BLLRF). BLLRF is a statutory body covering a police force area, designed to bring together multi-agency co-operation and information sharing.
Main River	Main Rivers are a statutory type of watercourse in England and Wales and are usually larger streams and rivers. A Main River is defined as such on the Environment Agency's Main River map, and can include any structure or appliance for controlling or regulating the flow of water in, into or out of a Main River. The Environment Agency's powers to carry out flood defence works apply to Main Rivers only.
National FCERM Strategy	National Flood and Coastal Erosion Risk Management Strategy. Prepared by the Environment Agency in partnership with Defra. The strategy is required under the Flood and Water Management Act 2010 and will describe what needs to be done by all involved in flood and coastal risk management to reduce the risk of flooding and coastal erosion, and to manage its consequences.
National Receptor Dataset (NRD)	A collection of risk receptors produced by the Environment Agency. A receptor could include essential infrastructure such as power infrastructure and vulnerable properties such as schools and health clinics.
Ordinary Watercourse	All watercourses that are not designated main river are ordinary watercourses, and are the responsibility of riparian owner.
Pitt Review	Comprehensive independent review of the 2007 summer floods by Sir Michael Pitt, which provided recommendations to improve flood risk management in England.
Pluvial Flooding	Flooding from water flowing over the surface of the ground or hard surfaces; often occurs when the soil is saturated or the covering is impenetrable and natural drainage channels or artificial drainage systems have insufficient capacity to cope with the additional flow.

Term	Definition
Policy Area (PA)	One or more Critical Drainage Areas linked together to provide a planning policy tool. Primarily defined on a hydrological basis, but can also accommodate geological concerns where these significantly influence the implementation of SuDS.
Preliminary Flood Risk Assessment (PFRA)	Assessment required by the EU Floods Directive which summarises flood risk in a geographical area. Led by Lead Local Flood Authorities.
Priority 1 and Priority 2 Roads	The roads within Luton have been prioritised for the purposes of gritting. Trunk/major roads (including the M1 and A6) are gritted by the Highways Agency. Other A roads together with certain B roads and other roads are called the Precautionary Network (P1). The Adverse Network (P2) covers certain links to villages not on the precautionary network as well as certain bus routes and industrial estates.
Regional Flood and Coastal Committee (RFCC)	RFCCs were set up under the Floods and Water Management Act 2010. The committees have a chair appointed by the Minister, members from Lead Local Flood Authorities (allowing for local democratic input) and independent members recruited by the Environment Agency. RFCCs play an important local role in guiding flood and coastal risk management activities within catchments and along the coast, advising on and approving programmes of work for their areas as well as raising local levies to fund local priority projects and works in partnership with others. Luton is covered by the Thames RFCC
Reservoir	Artificial lake used to store water. Reservoirs may be created in river valleys by the construction of a dam or may be built by excavation in the ground or by conventional construction techniques such as brickwork or cast concrete. Reservoirs greater than 10,000m ³ are governed by the Reservoirs Act.
Reservoir Act (1975)	The 1975 Act seeks to ensure public safety through imposing statutory obligations on reservoir undertakers to have their reservoirs supervised and periodically inspected by qualified civil engineers, with a requirement to carry out any works recommended in the interests of safety in the report of an inspection. Schedule 4 of the Flood and Water Management Act 2010 (the 2010 Act), which mainly amends the 1975 Act to introduce a more risk-based regulatory regime linked to the danger to human, contains a number of provisions allowing England and Wales to make a number of pieces of secondary legislation.
Residual Risk	The risk which remains after all risk avoidance, reduction and mitigation measures have been implemented.
Resilience and Resistance Measures	Measures designed to keep flood water out or reduce the impact of water that enters property and businesses; could include measures such as raising electrical sockets and appliances and flood guards for example. Risk In flood risk management is defined as a product of the probability or likelihood of a flood occurring, combined with the consequence of or the hazard posed by the flood.
Return Period	The probability of a flood of a given magnitude occurring within any one year e.g. a 1% (1 in 100) Annual Exceedance Probability (AEP) flood event has a 1% probability of occurring once in any one year.
Riparian Owner	All landowners and tenants whose property is adjoining a body of water have the right to make reasonable use of it and the responsibility to suitably maintain it.

Term	Definition
Risk Management Authority (RMA)	Defined by the Floods and Water Management Act as “the Environment Agency, a lead local flood authority, a district council for an area for which there is no unitary authority, an internal drainage board, a water company, and a highway authority”.
River Basin Management Plans (RBMP)	Produced by the Environment Agency for the eleven river basin districts in England and Wales and are the central tool setting out the objectives and actions required to achieve the objectives of the Water Framework Directive. RBMPs describe the main issues for each river basin district and state the environmental objectives for the basin, explain the objectives selected to achieve good ecological status and summarise the actions needed to deliver those objectives. A River Basin District is: a river basin, or several river basins, and the river basin’s adjacent coastal waters.
Sequential Test	Informed by a SFRA, a planning authority applies the Sequential Test to demonstrate that there are no reasonably available sites in areas with less risk of flooding that would be appropriate to the type of development or land use proposed
Sewer	<p>A sewer is a pipe which carries and removes either rainwater (surface) or foul water (or a combination of both) from more than one property. A sewer can also be categorised as being a private or public sewer and can carry surface or foul water.</p> <ul style="list-style-type: none"> • A Private Sewer is solely the responsibility of the occupiers/owners of the properties that it serves. • A Public Sewer is a sewer that has been adopted and maintained by a Sewerage Undertaker.
Sewer flooding	Flooding caused by a blockage in or overflowing from a sewer or urban drainage system.
Stakeholder	A person or organisation affected by a problem or its solution, or interested in the problem or solution. They can be individuals or organisations, and includes the public and communities.
Strategic Flood Risk Assessment (SFRA)	A strategic framework for the consideration of flood risk when making planning decisions at local level.
Surface water	Rainwater (including snow and other precipitation) which is on the surface of the ground (whether or not it is moving), and has not entered a watercourse, drainage system or public sewer.
Surface Water Management Plan (SWMP)	Are produced by local authorities and are described as a framework through which key local partners with a responsibility for surface water and drainage in their area work together to understand the causes of surface water flooding and agree the most cost effective way of managing that risk. The purpose is to make sustainable surface water management decisions that are evidence based, risk based, future proofed and inclusive of stakeholder views. A SWMP should establish a long-term action plan to manage surface water in an area and should influence future capital investment, drainage maintenance, public engagement and understanding, land-use planning, emergency planning and future developments.

Term	Definition
Sustainable Drainage Systems (SuDS)	Methods of management practices and control structures that are designed to drain surface water in a more sustainable manner than conventional techniques and include: permeable surfaces, swales, wetlands and ponds.
The Water Framework Directive (WFD)	The Water Framework Directive was introduced in December 2000 and became UK law in December 2003. The directive focuses on improving the ecology of our water ecosystems and aims to protect and enhance the quality of surface water, groundwater, estuaries and coastal waters. The Environment Agency are the lead authority responsible for the delivery of these targets, but must work closely with lead local flood authorities, such as the Council, to ensure that targets are achieved.

APPENDIX 4: ABBREVIATIONS

Abbreviation	Meaning / Definition
ABI	Association of British Insurers
AEP	Annual Exceedance Probability
AWS	Anglian Water Services
BGS	British Geological Society
CBC	Central Bedfordshire Council
CDA	Critical Drainage Area
CFMP	Catchment Flood Management Plan
CIRIA	Construction Industry Research and Information Association
DCLG	(The Department for) Communities and Local Government
Defra	The Department for Food and Rural Affairs
DG5	Water companies record of Sewer Flooding
EA	Environment Agency
F&WMA	Flood and Water Management Act 2010
FCERM	Flood and Coastal Erosion Risk Management
FDGiA	Flood Defence Grant in Aid
FEP	Flood Evacuation Plan
FMfSW	Flood Map for Surface Water
FRA	Flood Risk Assessment
FRM	Flood Risk Management
FRR	Flood Risk Regulations
FSR	Flood Storage Reservoir
FWD	Flood Warnings Direct
GIS	Geographical Information System
LBC	Luton Borough Council
LDDs	Local Development Documents
LDF	Local Development Framework
LFRMS	Local Flood Risk Management Strategy
LFRZ	Local Flood Risk Zone
LGA	Local Government Association
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
LRF	Local Resilience Forum
LTN	Luton
MAFP	Multi Agency Flood Plan
NFCDD	National Flood and Coastal Defence Database
NPPF	National Planning Policy Framework
NRD	National Receptor Dataset
PA	Policy Area
PFRA	Preliminary Flood Risk Assessment
PPG	Planning Policy Guidance Note
PPS 1	Planning Policy Statement 1: Delivering Sustainable Development
PPS 3	Planning Policy Statement 3: Housing
PPS12	Local Development Frameworks
RBD	River Basin District
RBMP	River Basin Management Plan
RFCC	Regional Flood and Coastal Committee

RFRA	Regional Flood Risk Assessment
RMA	Risk Management Authority
RSS	Regional Spatial Strategy
SAB	SuDS Approval Body
SEA	Strategic Environmental Assessment
SFRA	Strategic Flood Risk Assessment
SSSI	Site of special scientific interest
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan
TW	Thames Water
UKCIP	The UK Climate Impacts Programme
WaSC	Water and Sewerage Company
WCS	Water Cycle Study or Strategy
WFD	Water Framework Directive

APPENDIX 5: FLOOD AND WATER RELATED STUDIES AND STRATEGIES

- Luton & South Beds Level 1 Strategic Flood Risk Assessment, September 2008, Scott Wilson http://www.centralbedfordshire.gov.uk/Images/SouthBeds_SFRAStage1_Report2008v3.3_tcm6-46418.pdf
- Luton Level 1 Strategic Flood Risk Assessment Update, February 2013, Capita Symonds <http://www.luton.gov.uk/Environment/Lists/LutonDocuments/PDF/Luton%20Level%201%20Strategic%20Flood%20Risk%20Assessment%20Update.pdf>
- Luton Preliminary Flood Risk Assessment, June 2011, Capita Symonds http://www.luton.gov.uk/Transport_and_streets/Lists/LutonDocuments/PDF/Engineering%20and%20Transportation/Climate%20change/Luton-PFRA-20110608-V1pt0.pdf
- Luton Surface Water Management Plan, DRAFT 2012, Capita Symonds <http://www.luton.gov.uk/Environment/Lists/LutonDocuments/PDF/Luton%20SWMP%20-%20Final%20Draft%20-%20V1%207.pdf>
- Luton & South Beds Water Cycle Strategy Phase 1 - Outline Strategy Technical report, December 2008, Halcrow http://www.centralbedfordshire.gov.uk/Images/Water%20Cycle%20Strategy%20Phase%201Technical%20Report%20Vers%202.2_tcm6-55558.pdf
- Luton Borough Council Water Cycle Strategy Phase 1 & 2 Detailed Report, October 2013 Capita URS (not currently available online)
- Luton Strategy Appraisal Report, July 2012, Environment Agency (not available online)
- Luton Climate Change Adaptation Action Plan, March 2010, LBC <http://www.luton.gov.uk/Environment/Climate/Pages/Climate%20change%20adaptation.aspx>
- Thames River Basin District Consultation on the draft Flood Risk Management Plan October 2014, EA <https://consult.environment-agency.gov.uk/file/3092398>
- Thames Catchment Flood Management Plan Summary report, December 2009, EA https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/293903/Thames_Catchment_Flood_Management_Plan.pdf
- Thames River Basin District Consultation on the draft update to the river basin management plan, 2014, EA <https://consult.environment-agency.gov.uk/file/3078877>
- Thames River Basin Management Plan, December 2009, EA https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/289937/qeth0910bswa-e-e.pdf
- National Flood and Coastal Erosion Management Strategy for England, September 2011, EA <http://www.environment-agency.gov.uk/research/policy/130073.aspx>
- Luton Local Plan 2011-2031, 2014 draft, LBC <http://www.luton.gov.uk/Environment/Planning/Regional%20and%20local%20planning/Pages/Local%20Plan%202011%20-%202031.aspx>
- Luton Local Plan 2001-2011, 2006, LBC <http://www.luton.gov.uk/Environment/Planning/Regional%20and%20local%20planning/Pages/Luton%20Local%20Plan%202001%20-%202011.aspx>
- Bedfordshire and Luton Flood Response Plan, 1st Edition, Bedfordshire and Luton Local Resilience Forum <http://www.bedfordshire.gov.uk/Resources/PDF/F/FloodPlanReport.pdf>
- Luton Infrastructure Delivery Schedule 2014 – 2031, Draft report, August 2014 (not currently available online)

APPENDIX 6: LEGISLATIVE CONTEXT

Flood and Water Management Act 2010

The Flood and Water Management Act received Royal Assent in April 2010. It revises, modernises and consolidates significant elements of existing legislation covering flooding, land drainage, coastal erosion and reservoir safety. It also strengthens and extends existing flood and water legislation including implementing appropriate recommendations from the Pitt Review into the floods of 2007.

The key provisions of the Flood and Water Management Act 2010 include:

- **Statutory responsibilities for managing flood risk** – There are national strategies and guidance on managing flood risk in England and Wales. Unitary and county councils bring together the relevant bodies to develop local strategies for managing local flood risk;
- **Protection of assets which help manage flood risk** – The Environment Agency, local authorities and internal drainage boards are able to ensure that private assets which help manage the risks of floods cannot be altered without consent;
- **Sustainable drainage** – drainage systems for all new developments will need to be in line with the National Standards to help manage and reduce the flow of surface water;
- **Powers to carry out environmental works** – the Environment Agency, local authorities and internal drainage boards are able to manage water levels to deliver leisure, habitat and other environmental benefits;
- **Reservoir safety** – the public will be protected by a new risk-based regime for reservoir safety. It will reduce the burden on regulated reservoirs where people are not at risk, but introduce regulation for some potentially higher-risk reservoirs currently outside of the system;
- **Transfer of private sewers** – on 1st October 2011, water and sewerage companies in England and Wales became responsible for private sewers, which were previously the responsibility of property owners. Not all private sewers and lateral drains were included, for example property owners remain responsible for the sections of pipe between their property and the transferred private sewer or lateral drain. No new private sewers will be created after the completion of the private sewer transfer.
- **New sewer standards** – all sewers will be built to agreed standards in future so that they are adopted and maintained by the relevant sewerage company;
- **Water company charges** – protection can be offered against unaffordable charges for surface water drainage for community groups such as churches. Social tariffs can be provided for those who would otherwise face difficulty meeting their bills;
- **Protection of water supplies** – wider powers have been provided for water companies to control non-essential domestic uses of water in times of drought;
- **Other protection for water company customers** – new powers have been provided to reduce the level of debt, new arrangements are in place for managing very risky infrastructure projects which could be a threat to the ability of the water company to provide its services, and updated arrangements have been provided for administration of water companies should they get into difficulties.

The Flood and Water Management Act 2010 (the Act) creates clearer roles and responsibilities, which include the role of 'Lead Local Flood Authority' (LLFA) for county councils and unitary authorities in managing local flood risk (from surface water, ground water and ordinary watercourses) and a strategic overview role for all flood risk for the Environment Agency, which retains responsibility for main river (fluvial) flooding.

The Act requires the Environment Agency to 'develop, maintain, apply and monitor a strategy for flood and coastal erosion risk management in England'. The Environment Agency's National Flood and Coastal Erosion Risk Management Strategy was published in September 2011. The strategy describes at a high level what needs to be done by all organisations involved in flood and coastal erosion risk management. These include local authorities, internal drainage boards, water and sewerage companies, highways authorities, and the Environment Agency.

The National strategy sets out a statutory framework to help communities, the public sector and other organisations to work together to manage flood and coastal erosion risk. It supports local decision-making and engagement in flood risk management, making sure that risks are managed in a co-ordinated way across catchments. This includes the development of local flood risk management strategies by LLFAs, as well as the Environment Agency's strategic overview of all sources of flooding and coastal erosion.

In carrying out its role as the LLFA, the Council's key duties and responsibilities, once all elements of the Flood and Water Management Act (2010) have been enacted will include:

- To develop, maintain and apply in consultation with key stakeholders a Local Flood Risk Management Strategy for Luton (this document), which should include risks from surface water run-off, groundwater and ordinary watercourses i.e. those watercourses which do not fall under the of the Environment Agency;
- To establish local management and governance arrangements with other key stakeholders to ensure delivery of effective joined up management of flood risk;
- To fulfil the requirements of the EU Floods Directive in relation to sources of flood risk by completing preliminary flood risk assessments, the identification of Flood Risk Areas and preparing Surface Water Management Plans for areas of greatest risk;
- To approve, adopt and maintain Sustainable Drainage Systems (SuDS) that meet national standards for development (unlikely to be commenced);
- To establish and maintain a register of flood risk management assets with a record of each structure, together with details of ownership and state of repair, where known, and where appropriate designate such structures/ features which may affect flood risk so they cannot be altered without consent. Assets can be designated by the LLFA and the Environment Agency;
- To investigate flooding incidents to understand their cause and ensure that appropriate agencies play their role in the effective management of flooding incidents and recovery;
- A power to undertake works to manage flood risk from surface water run-off, groundwater and ordinary water courses; and
- To plan for the emergency management of flooding as a key partner of the Local Resilience Forum (LRF).

Flood Risk Regulations 2009

The Flood Risk Regulations (2009) incorporate the requirements of the European Floods Directive into national law in England and Wales. As with most European Union law, the Directive was written for the benefit of many different countries. The Flood Risk Regulations are concerned with identifying and taking action in relation to areas with the most significant flood risks across the country. The first stage of implementing the Flood Risk Regulations, the Preliminary Flood Risk Assessment, was undertaken by the Council in June 2011 and has supported the preparation of this strategy.

The Regulations:

- Give responsibility to the Environment Agency to prepare Preliminary Flood Risk Assessments, flood risk maps, hazard maps and flood risk management plans for flood risk from the sea, main rivers and reservoirs;
- Give responsibility to LLFAs to do the same for all other forms of flooding (excluding sewer flooding), including surface runoff, groundwater and ordinary watercourses; and
- Require areas of nationally significant risk to be identified, and flood risk maps, hazard maps and management plans to be produced for those areas.

The Environment Agency supplied the core national datasets to undertake this work and guidance was provided on how to identify areas of nationally significant flood risk affecting more than 30,000 people in a 5km² area.

All of the documents under the Regulations are to be reviewed and if necessary updated every 6 years. Therefore the second set of preliminary assessment reports will be published in 2017.

The Preliminary Flood Risk Assessment has shown that no areas in Luton met the significant flood risk criteria as set out by the Flood Risk Regulations 2009. The National review confirmed that the assessment was compliant with the requirements of the Flood Risk Regulations and comprehensively covered the additional more discretionary aspects of the Environment Agency's guidance.

Under the Regulations, some LLFAs need to produce flood hazard and risk maps and Flood Risk Management Plans (FRMPs) for the 10 Flood Risk Areas in England and 8 in Wales, by December 2015. As Luton is not within one of these Flood Risk Areas, there is no requirement to produce a FRMP or hazard and risk maps. The Environment Agency and Natural Resources Wales need to prepare flood hazard and risk maps and FRMPs for main rivers, the sea and reservoirs covering the whole of England and Wales.

FRMPs set out how risk management authorities and communities will work together to reduce the potential adverse consequences of flooding. The Environment Agency is working in partnership with LLFAs and other risk management authorities to develop these plans at a catchment scale by pooling information from various existing plans such as Catchment Flood Management Plans and Reservoir Plans. The Environment Agency is working with LLFAs to pool information from LFRM Strategies and this information on local flood risk management will be set within the context of the broader catchment plan.

As part of the Environment Agency's strategic overview of all sources of flood risk, they have created a single surface water flood map for all of England and Wales. This will benefit all LLFAs by allowing them to focus on managing surface water flood risk, and will enable the public to better understand how the risk of surface water flooding may affect them.

The Pitt Review 2007

Following the 2007 severe flood events an independent review of the flood-related emergencies that occurred was undertaken by Sir Michael Pitt on behalf of the Government. The final published report entitled "Learning Lessons from the 2007 Floods" called for urgent and fundamental changes in the way the country was adapting to the likelihood of more frequent and intense periods of heavy rainfall.

The report included 92 recommendations, of which 21 specifically referred to local authorities. Of particular importance was the recommendation that local authorities should play a major role in the management of local flood risk, taking the lead in tackling local problems of flooding and co-ordinating all relevant agencies. The Act puts in place the recommendations by Sir Michael Pitt.

Other Key Pieces of Legislation and Guidance

The **National Planning Policy Framework (March 2012)** outlines the core planning principles taking flood risk management into consideration and highlights the need for the effective planning for flood risk infrastructure. The framework emphasises that flood risk should be included in the environmental assessment of development and that pre-application engagement and front-loading is essential for developers to understand what is required of them in relation to flood risk assessment, mitigation and water management. The framework also includes objectives to minimise the vulnerability to climate change and to manage the risk of flooding. The Technical Guidance to the Framework provides additional advice to local planning authorities to ensure the effective implementation of planning policy on development in areas at risk of flooding.

The **Localism Act (2011)** requires LLFAs to make arrangements for overview and scrutiny committees to review and scrutinise risk management authorities. Risk management authorities are now under a duty to comply with a request made by an overview and scrutiny committee for information or a response to a report in relation to its flood or coastal erosion risk management functions.

Local authorities, the Environment Agency and other prescribed bodies are obliged to work together on certain strategic matters under the 'duty to cooperate' in the Localism Act in England. In particular, these organisations should cooperate across boundaries because flood risk often requires wider than local consideration.

The Government published the **Water White Paper in 2011** to highlight that water is essential for economic growth and that the environment should be protected for future generations. It also:

- Outlines plans to modernise the rules which govern how we take water from our rivers;
- Explains how we will improve the condition of our rivers by encouraging local organisations to improve water quality and make sure we are extracting water from our environment in the least harmful way;
- Announces plans to reform the water industry and deregulate water markets to drive economic growth; and
- Enables business and public sector customers to negotiate better services from suppliers and cut their costs.

The **Climate Change Act (2008)** requires a UK-wide climate change risk assessment every five years, accompanied by a national adaptation programme that is also reviewed every five years. The Act has given the Government powers to require public bodies and statutory organisations such as water companies to report on how they are adapting to climate change.

Making Space for Water (July 2004) states that the Government will, over the 20-year lifetime of the strategy, implement a more holistic approach to managing flood and coastal erosion risks in England. The approach involves taking account of all sources of flooding, embedding flood and coastal risk management across a range of Government policies. The aim is to manage risks by employing integrated approaches which reflect both national and local priorities, so as to reduce the threat to people and their property and deliver the greatest environmental, social and economic benefit, consistent with the Government's sustainable development principles.

The **Civil Contingencies Act (2004)** aims to deliver a single framework for civil protection in the UK and sets out the actions that need to be taken in the event of a flood. The Act is separated into two substantive parts: local arrangements for civil protection (Part 1) and emergency powers (Part 2).

Responsibilities under part 1 of the Civil Contingencies Act include:

- Undertake risk assessments;
- Develop Emergency Plans;
- Develop Business Continuity Plans;
- Arrange to make information available to the public about civil protection matters and maintain arrangements to warn, inform and advise the public in the event of an emergency;
- Share information with other local responders to enable greater co-ordination;
- Co-operate with other local responders to enhance co-ordination and efficiency; and
- Provide advice and assistance to businesses and voluntary organisations about business continuity management.

The **Strategic Environmental Assessment (SEA) Directive (2001)** (EC Directive 2001/42/EC) is legislation which aims to increase the consideration of environmental issues during decision making related to strategic documents. The SEA identifies any significant environmental effects that are likely to result due to the implementation of a plan, programme or strategy.

The **Water Framework Directive (2000)** (WFD) is the most substantial piece of EC water legislation to date and is designed to improve and integrate the way water bodies are managed throughout Europe. It came into force on 22 December 2000 and was transposed into UK law in 2003. Member States must aim to reach “good” chemical and ecological status in inland and coastal waters by 2015. It is designed to:

- Prevent deterioration of aquatic ecosystems, protect them and improve the ecological condition of waters;
- Aim to achieve at least good status for all waters. Where this is not possible, good status should be achieved by 2021 or 2027;
- Promote sustainable use of water as a natural resource;
- Conserve habitats and species that depend directly on water;
- Progressively reduce or phase out the release of individual pollutants or groups of pollutants that present a significant threat to the aquatic environment;
- Progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants, and;
- Contribute to mitigating the effects of floods and droughts.

To address this, the Environment Agency is the coordinating authority and has produced river basin management plans to develop new and better ways of protecting and improving the water environment.

The **Land Drainage Act (1991)** outlines the duties and powers to manage land drainage for a number of bodies including the Environment Agency, Internal Drainage Boards, local authorities, navigation authorities and riparian owners. The Act has updated many parts of this legislation.

The powers and duties under this act can be summarised as:

- Duty on drainage board to exercise a general supervision over all matters relating to drainage of land;
- A general duty to the environment when exercising powers;
- Powers to maintain, improve and build new works required for drainage;
- Consenting and enforcement powers for ordinary watercourses and main rivers;
- Powers to make byelaws; and
- General powers of entry onto land for water level management so that statutory authorities can exercise flood risk management for the common good.

The **Natural Environment and Rural Communities Act (2006)** makes local authorities and other public bodies statutorily obliged to take biodiversity into account when undertaking their functions.

APPENDIX 7: WATER FRAMEWORK DIRECTIVE ASSESSMENT

Flood Risk Management activities are, like any other activities, subject to European Directives. The Water Framework Directive (WFD) requires local flood risk management strategies to take account of River Basin Management Plans (RBMPs). RBMPs are plans for protecting and improving the water environment and have been developed in consultation with organisations and individuals. They contain the main issues for the water environment and the actions we all need to take to address them. Luton is covered by the Thames River Basin district. The RBMP reports can be found on the Environment Agency's website at <https://www.gov.uk/government/collections/river-basin-management-plans>.

'Flood protection' is recognised in the WFD as one of the activities that may mean that the default target of 'Good Ecological Status' (GES) may not be achieved. The legacy of human intervention can often be great so that the necessary actions to achieve GES would be technically unfeasible or disproportionately costly to deliver.

An initial assessment has been undertaken at a strategic level to test the compliance of the Luton Local Flood Risk Management Strategy with the requirements of the directive to ensure that the measure proposed do not cause deterioration to water bodies or prevent future improvements. The contents of this Strategy relates primarily to Article 4 of the directive, which outlines the environmental objectives:

- All surface water bodies to achieve good ecological and chemical status by 2015. This covers inland waters, transitional waters (estuaries) and coastal waters.
- All groundwater bodies to achieve good groundwater quantitative and chemical status by 2015.
- Heavily-modified water bodies and artificial water bodies to achieve good ecological potential and good surface water chemical status by 2015.
- No water bodies to experience deterioration in status from one class to another.
- Protected Areas to achieve the requirements made under their designation in relation to the water environment.

New schemes that affect the water environment may impact the biological, hydro-morphological, physio-chemical and/or chemical quality elements of a watercourse. Any of these impacts could lead to deterioration and/or improvements to water bodies; therefore a preliminary assessment is required which should have regard to all of these matters. The Local Planning Authority as decision maker on these planning applications will likely secure via a condition(s) any measures identified that are required to achieve WFD requirements.

When the Project Appraisal for flood risk management projects, schemes and initiatives are undertaken, they will be expected to take account of the WFD, as all schemes, projects and measures will be subject to tests for WFD compliance at design stage and will need to demonstrate that proposals meet with the requirements of the Directive.

The strategy will be regularly reviewed and updated every three years. Further plans and individual schemes will be developed using latest available guidance, so ensuring flexibility is maintained in implementing compliance options in future.

Water Framework Directive and the Local Flood Risk Management Strategy

The fundamental objective of the strategy which relates to WFD is Objective 6 to: 'Improve the status of water bodies across the catchment by protecting and where possible enhancing natural water resources'.

The strategy sets out long-term policy aims for sustainable flood risk management and considers the need to work with nature, as far as possible, and contribute to environmental improvement.

Moreover, as the Council progresses with the implementation of the action plan, the delivery of measures, which actively contribute to achieving the overall aims of the WFD, can be ensured.

Table A2: Water Framework Directive Compliance check

Article	Explanation	Evidence
4.1.a(i)	This article requires implementation of necessary measures to prevent deterioration of status of all surface water bodies.	The strategy presents policies for the long-term management of flood risk and operates at a strategic level. Prior to physical flood alleviation works being undertaken to implement the LFRMS objectives, further assessment and appraisal will consider the implication of achieving GES and on preventing deterioration. The objectives within the strategy need to be considered against the National Strategy objectives. Presence of flood defences, or other flood risk management activities, may result in continued or increased deterioration in ecological status, or the modification of water bodies. Conversely, flood risk management activities may result in the protection, enhancement and restoration of the ecological status of water bodies through, for example, enabling greater floodplain connectivity, reducing detrimental erosion and sedimentation, and reducing polluted run-off from land. These considerations will need to be reviewed and evaluated at design stage of specific schemes as actions are progressed or implemented.
4.1.a(ii)	This article requires protection, enhancement and restoration of all surface water bodies, other artificial and heavily modified water bodies with the aim of achieving good ecological status.	
4.1.a(iii)	This article requires protection and enhancement of artificial and heavily modified water bodies with aim of achieving good ecological potential (GEP) and good surface water status.	
4.1a(iv)	This article requires the implementation of measures to reduce pollution from priority substances and ceasing or phasing out emissions, discharges and losses of priority hazardous substances. FRM works should not compromise delivery of these.	Presence of flood defences may exacerbate erosion resulting from increases in flow and if eroded sediments contain any priority or hazardous substances, this could affect the ability to meet the requirements of the WFD. This will need to be reviewed as and when the strategy actions are progressed. The impact of potential individual schemes on erosion, and the possible consequences, will need to be reviewed on a case-by-case basis. Specific measures to reduce the risk of pollution, such as reducing misconnections of foul to surface water sewers and working with businesses to limit accidental spillages of pollutants, are being undertaken by partners including the Environment Agency and water companies, and are beyond the remit of the strategy.
4.1.b(i)	This article requires the implementation of measures to prevent or limit inputs of pollutants to groundwater, and to prevent the deterioration of status of groundwater bodies. FRM works should not compromise delivery of these.	The strategy will outline groundwater flooding risk for Luton, which is limited. These impacts will routinely be assessed on a case-by-case basis. Specific measures to reduce the risk of pollution to groundwater are beyond the remit of the strategy.

Article	Explanation	Evidence
4.1(c) and 4.2	Protected areas shall achieve compliance with the WFD objectives by 2015, unless otherwise specified in other legislation such as the Strategic Environmental Assessment Directive.	The production of the LFRMS has been supported by the production of a Strategic Environmental Assessment. All future works will be site-specific detailed assessment.
4.4	This article allows for an extension of deadlines to achieve objectives, subject to conditions (relating to technical feasibility, cost and natural conditions).	<p>The strategy could help deliver WFD requirements through ongoing implementation of good practice in construction and maintenance activities.</p> <p>Any future works will be subject to more detailed assessment and appraisal. The implementation of the strategy is sufficiently flexible to adapt to different scenarios.</p>
4.5	This article allows for water bodies to be set less stringent environmental objectives where human activity requires it for reasons relating to technical feasibility and cost. There are conditions and a requirement to ensure that the benefits brought by the human activity can not be achieved by any other means that are not disproportionately costly.	The LFRMS itself will not increase the risk as it is not leading to major increases in morphological pressure and neither is it compromising delivery of expected mitigation measures, which may be used to define GES. Any further works emanating from the strategy will be subject to more detailed assessment and appraisal, at which time the technical feasibility and cost of those proposals will be considered, alongside the need to achieve the environmental objectives set in the River Basin Management Plans (RBMPs).
4.6	Temporary deterioration in the status of water bodies shall not be a breach of requirements of the WFD. If this is the result of natural causes, which are exceptional and could not reasonably have been foreseen, such as extreme floods and prolonged droughts, are permitted. Conditions include the need to take practical steps to prevent further damage.	The effects of flooding on the environment (water contamination) will be minimised where possible by the provision of warnings, and actions of emergency planning teams. The strategy establishes the policy intent for long term management of flood risk, which will see decreased risk in some areas. As the Council prioritises resources and the need for and impact of its activities, it will actively plan to assess the environmental impact of future works.

Article	Explanation	Evidence
4.7	<p>Failure to achieve GES is not a breach of the WFD if it is the result of new modifications to physical characteristics of the water body and the following conditions are met:</p> <p>All practical mitigation is undertaken.</p> <p>There is overriding public interest and/or the benefits for human health or safety or for sustainable human development outweigh the benefits to the environment and society of achieving WFD objectives.</p> <p>The beneficial objectives served by the modifications – in this case flood risk management – can not for reasons of technical feasibility or disproportionate cost be achieved in a more environmentally sensitive way.</p>	<p>The strategy sets out the long-term management of flood risk and operates at strategic level. Prior to physical works being undertaken to implement the strategy objectives, further assessment and appraisal will consider the implication on achieving GES.</p> <p>Individual schemes could affect the physicochemical and hydromorphological status of a water body. This will need to be assessed on a case-by-case basis as and when further details of schemes are developed and appraised.</p> <p>The appraisal techniques used will be sufficiently robust to ensure the human health and societal benefits in providing flood risk management are balanced with the impacts on the environment, and that alternative approaches are also considered.</p> <p>The strategy is sufficiently flexible to adapt to future requirements.</p>

The examination of the current state of understanding of the WFD and the nature of the strategy suggests that the plan is compliant with the requirements of the Directive and actively highlights opportunities for improvements to meet WFD objectives and improve ecological status. It highlights the need for further examination at future stages of site-specific scheme/project development and appraisal, which should be addressed by good practice in detailed appraisal. The strategy provides a sufficiently flexible approach to ensure that this is achieved.

APPENDIX 8: LUTON FLOOD INCIDENT REPORT FORM

Please send completed forms to:

Flood Risk Management, Highway Development, Department of Environment & Regeneration, Luton Borough Council, Town Hall, Luton. LU1 2BQ

If you have any photos or other evidence of flooding then please include these or email them to flooding@luton.gov.uk

Contact Details

Name:
Address:
Telephone Number:
Email Address:
Today's Date:

Flooding Information

Where was the flooding?
When did the flooding happen?
How long did it last?
What was the cause of the flooding? (for example: blocked drain/ditch, runoff from development, failure of a flood defence, overflow from river)

How deep was the flooding?

What was the impact of the flooding? (please indicate whether any residential or commercial properties were internally flooded and how many, whether any roads were blocked or closed, any loss of power/water/gas supply etc)

Has this flooding happened before? (please add dates of any previous events of flooding and any further details)

Any other comments?