Hertfordshire Minerals Local Plan Review

Addendum to the Level 1 Strategic Flood Risk Assessment (SFRA)

Sequential Test of Mineral Sites in the Draft Minerals Local Plan (2017)

October 2017
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1.0 Introduction

1.1 Hertfordshire County Council, as Mineral Planning Authority (MPA) for Hertfordshire, is in the process of reviewing the Hertfordshire Minerals Local Plan (MLP). The final output of the review will be a new MLP which will replace the existing Plan adopted in 2007. The emerging MLP will allocate sites and areas for sand and gravel extraction that will have been identified to provide a steady and adequate supply of aggregate during the Plan period 2016-2031.

1.2 As part of the review process, the council is publishing a Regulation 18 Draft MLP. The Draft MLP is the first publication containing the sites and/or areas that the council intends to allocate in the final MLP for future minerals development.

1.3 When allocating land for development in a Local Plan, a local authority should apply the ‘sequential test’ to demonstrate that development is allocated outside of high and medium flood risk areas. This Addendum to the SFRA contains details of the application of the sequential test in the preparation of the Draft MLP.

1.4 The sequential test is based on the information and evidence compiled in the Level 1 Strategic Flood Risk Assessment1 which was published by the council in March 2015. The SFRA (2015) was produced at the outset of the MLP review so that the council could use the compiled data within it to apply the sequential test as part of a site assessment to identify sites and/or areas for future mineral development. As such, this document should be read alongside the original Level 1 SFRA.

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2.0 **Assessment of Flood Risk**

**Strategic Flood Risk Assessment**

2.1 A SFRA is a study which assesses the risk to an area from flooding from all sources, now and in the future, and assesses the impact that land use changes and development in an area will have on flood risk.

2.2 Data related to flood risk is updated regularly and this SFRA Addendum should be considered a ‘live’ document which will be updated to contain the most up-to-date information for subsequent stages of the Plan-production process. This document has been produced specifically to support the Draft MLP and will be updated later in the Plan-production process.

**Sequential Test**

2.3 The sequential test is applied to steer development to areas with the lowest probability of flooding.

2.4 Diagram 2 in Section 6 of the Flood Risk and Coastal Change chapter in the NPPG, outlines how local planning authorities should apply the sequential test when identifying potential sites through the local plan process. This is replicated in Diagram 1.

![Diagram 1 – Application of the Sequential Test](image)

* Other sources of flooding also need to be considered.
2.5 Whilst the guidance focuses on the acceptability of allocating sites based on Flood Zones (which are a representation of risk of flooding from fluvial sources), the sequential test should take account of other sources of flooding. Potential sources of flooding and the evidence to use for assessment of the risks are identified in the Level 1 SFRA (2015).

2.6 If it is not possible for development to be located in zones with the lowest probability of flooding, a local authority must demonstrate that the development provides wider sustainability benefits that outweigh the identified flood risk. In addition, a site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime without increasing flood risk. This is called an ‘exception test’ which is only undertaken if a sequential test identifies the need to do so.

The Draft Minerals Local Plan

2.7 The Draft MLP covers a period to 2031. It contains a vision, objectives, a collection of policies, three proposed Specific Sites, and one proposed Preferred Area.

2.8 As part of the preparation of the Draft MLP, the council has published a Site Selection Report, produced by Land Use Consultants (LUC). The report details the assessment of all the sites promoted to the council during a Call for Sites exercise and of the Preferred Areas allocated within the adopted MLP.

2.9 The report concluded that seven of the 20 assessed sites have the greatest potential to mitigate the adverse impacts associated with their excavation and operation. These were considered to be the most appropriate locations for allocation in the MLP. Two of the existing Preferred Areas were also considered to be included within the list of most appropriate locations for allocation.

2.10 Taking account of the findings of the Site Selection Report, council officers developed a series of ‘options’ using combinations of the sites/areas. One ‘option’ of site/area grouping was then selected to be included in the Draft MLP. The option included in the Draft MLP comprises:

- Proposed Specific Site 1 – Hatfield Aerodrome
- Proposed Specific Site 2 – Hatfield Furze Field
- Proposed Specific Site 3 – Hatfield Quarry - Land Adjoining Coopers Green Lane
- Proposed Preferred Area 1 – Briggens Estate

2.11 The sequential test has been applied to these four locations as well as to the other sites identified as being most appropriate for allocation in the MLP by LUC in their Site Selection Report.

2.12 All the sites assessed within the Site Selection Report are shown in Appendix 1 and are identified on the map as either being most appropriate or not being appropriate for inclusion within the MLP.
3.0 Sources of Flooding in Hertfordshire

Overview of findings from the Level 1 SFRA (2015)

3.1 A brief overview of the findings of the Level 1 SFRA (2015) is given below. Hertfordshire is affected by six sources of flooding. The SFRA compiled data for each source of flooding and this data forms the basis of the sequential test in the Chapter 5. Some updates to datasets have been released since the SFRA (2015) was published, and have been incorporated into the assessment where relevant.

Surface Water Flooding

3.2 Surface water flooding is caused by natural overland flow and the introduction of impermeable built-up areas during periods of sustained or heavy rainfall. This can cause ponding of water where it becomes obstructed or collects in low lying areas. The risk of surface water flooding will potentially increase as the extent of built-up areas and impermeable hard surfacing are added to across the county, unless there is suitable mitigation.

3.3 Map 8 of the Level 1 SFRA (2015) shows the extent of areas within the county that are at risk of surface water flooding (1 in 100 year event). Whilst areas can be likely to be affected by surface water flooding, this should not, in itself, be used to discount future development.

Groundwater Flooding

3.4 Groundwater flooding occurs when water held underground rises to a level where it breaks the surface in areas away from usual channels and drainage pathways. It occurs generally a result of exceptional extended periods of heavy rain, but can also occur as a result of reduced abstraction, underground leaks or the displacement of underground flows. Once groundwater flooding has occurred, the water can be in situ for a lengthy period of time.

3.5 The presence of the chalk aquifer in Hertfordshire and other underground water bearing areas such as the river gravel deposits mean that there is potential for groundwater flooding in Hertfordshire.

3.6 Map 6 of the Level 1 SFRA (2015) shows the areas of the county that are situated within groundwater source protection zones 2 and 3 and Map 7 shows areas susceptible to groundwater flooding. These are based on 1km squares where the percentage of the area has the potential for groundwater emergence above 25%. The majority of Hertfordshire is not shown to be at risk above this level, with very few km squares with a percentage greater than 50%.
Fluvial Flooding

3.7 Fluvial flooding occurs when the capacity of a watercourse is reached, causing water to spill out of the channel onto adjoining areas, known as the floodplain. Significant levels of fluvial flood risk are seen in the south and south eastern parts of the county in particular.

3.8 Map 2 of the Level 1 SFRA (2015) shows the extent of areas situated within flood zones 2 and 3 within the county. It should be noted that fluvial flooding is associated with all watercourses and not just from ‘main rivers’. Not all watercourses have the benefit of modelling and therefore may not have an associated flood zone.

3.9 The locations identified within the LUC Site Assessment Report are all within East Herts district, Welwyn-Hatfield borough, St Albans City and district or Three Rivers district. Of these, East Herts District Council and Welwyn-Hatfield Borough Council have both updated their own SFRA as part of the evidence base for their emerging Local Plans. As part of the updates, changes have been made to Flood Zones which are also included in the HCC SFRA (2015). However, the changes to Flood Zones have not affected any of the locations in the vicinity of sites/areas being assessed in the sequential test in this SFRA Addendum. Therefore, the Map 2 of the SFRA (2015) remains the relevant evidence to base this sequential test on.

3.10 It is likely that Map 2 will be updated for the SFRA Addendum to accompany the Regulation 19 Proposed Submission version of the MLP.

Sewer or Highway Flooding

3.11 Sewer or highway flooding is caused when a blockage occurs or by excess surface water entering the drainage network, exceeding available capacity. This generally occurs during periods of heavy rainfall when the drainage network becomes overwhelmed.

3.12 As records of sewer flooding are only referenced to broad areas by postcode district, it is not possible to provide a spatial representation of the associated risk.

Canal Flooding

3.13 Canal flooding is caused by overtopping or breach of the canal network. There are a number of canals within Hertfordshire including the Grand Union Canal, the Lee Navigation and the Stort Navigation.

3.14 The Canal and Rivers Trust (formerly British Waterways) is currently investigating the potential for flooding from the canal network. Current records indicate only two minor breach events on record within Hertfordshire on the Grand Union Canal and it is considered that there are
no significant flood risks associated expressly with the canals in Hertfordshire.

**Reservoir Flooding**

3.15 Reservoir flooding occurs when a reservoir structure is overtopped or fails due to damage or collapse of the reservoir structure.

3.16 Map 5 of the Level 1 SFRA (2015) shows the largest areas that might be flooded if a reservoir that holds over 10,000 cubic metres of water were to fail.

**Climate Change**

3.17 As well as looking at flood risk using past events, the future risk of flooding needs to be assessed. This is especially relevant because of the need to consider the potentially significant effects arising from climate change. Changes in climatic conditions can affect local flood risk in several ways. However, impacts will depend on local conditions and vulnerability.

3.18 The Environment Agency updated climate change allowances in February 2016. Allowances are based on projections and different scenarios of CO₂ emissions to the atmosphere and the resultant anticipated changes to:

- Peak river flow by river basin district
- Peak rainfall intensity
- Sea level rise
- Offshore wind speed and extreme wave height

3.19 Information on the latest climate change allowances has been reviewed in as part of the sequential test. For sites in Hertfordshire, only peak river flow and peak rainfall intensity are relevant due to the county being landlocked.

3.20 For the sites under consideration in this SFRA Addendum, no changes to the climate change allowances were required because all the sites are identified as being at low risk from fluvial flooding as they are 99-100% within Flood Zone 1. In addition, if the sites had contained larger sections within Flood Zone 2, mineral extraction is considered ‘water compatible’ within the Environment Agency guidance so the allowances would not be required\(^3\).

4.0 The Sequential Test

Flood Zones and the Sequential Test

4.1 Whilst all sources of flooding should be taken account of, the basis for the Sequential Test is the Environment Agency’s flood zone categorisation, resulting in all land in England being identified as falling within one of the following classifications, which are described below. Definitions have been taken from table 1 in section 4 of the Flood Risk and Coastal Change section of the NPPG.

Flood Zone 1 (Lower Probability of Flooding)

4.2 Land within this flood zone is assessed as having a less than 1 in 1,000 annual probability of river or sea flooding. The Sequential Test identifies any land use as appropriate within this location. Areas located within flood zone 1 are shown as ‘clear’ on the Environment Agency flood map and is classed as all land outside of flood zones 2 and 3.

Flood Zone 2 (Medium Probability of Flooding)

4.3 Land within this flood zone has been assessed as having a medium probability of experiencing flooding from rivers and the sea (i.e. having between a 1 in 100 and 1 in 1000 annual probability of river flooding, or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. Land within this flood zone is shown in light blue on the Environment Agency’s flood map.

Flood Zone 3a (High Probability of Flooding)

4.4 Land within this zone has been assessed as having a high probability of experiencing flooding from rivers and the sea (i.e. between 1 in 100 or greater annual probability of river flooding; or between a 1 in 200 or greater annual probability of sea flooding. Land within this flood zone is shown in dark blue on the Environment Agency’s flood map.

Flood Zone 3b (The Functional Floodplain)

4.5 Land within this zone is normally classed as having an annual probability of 1 in 20 (5%) or greater in any year of flooding or land that is designed to flood in an extreme flood (0.1%). The primary purpose of the functional flood plain is where water has to flow or be stored in times of flood. The NPPG requires local planning authorities to identify within their SFRAs areas of the functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. Land within this zone is not separately distinguished from flood zone 3 on the Environment Agency’s flood map.

4.6 Development within flood zones 2, 3a and 3b should seek opportunities to reduce the overall level of flood risk in the area through the layout and
form of the development and the appropriate application of sustainable drainage systems.

**Sequential Test Vulnerability Classes**

4.7 In order to apply the sequential test, local planning authorities are required to take into account the flood risk vulnerability of land uses. Table 2 in section 4 of the Flood Risk and Coastal Change section of the NPPG categorises different types of uses and development according to their vulnerability to flood risk.

4.8 There are a total of five vulnerability classes which are listed below:

- Essential Infrastructure;
- Highly Vulnerable;
- More Vulnerable;
- Less Vulnerable;
- Water Compatible-Development.

4.9 Of relevance to the review of the Hertfordshire Minerals Local Plan, all types of mineral workings (except for sand and gravel) have been classified as ‘less vulnerable’. Sand and gravel workings are however classified as ‘water-compatible development.’ This is summarised in Table 1.

| Flood Risk Vulnerability classification | Less Vulnerable | Water-Compatible | Appropriate for Minerals Development?
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Flood Zone 1</td>
<td>✓</td>
<td>✓</td>
<td>All minerals workings and processing facilities are acceptable in flood zone 1.</td>
</tr>
<tr>
<td>Flood Zone 2</td>
<td>✓</td>
<td>✓</td>
<td>All minerals workings and processing facilities are acceptable in flood zone 2.</td>
</tr>
<tr>
<td>Flood Zone 3a</td>
<td>✓</td>
<td>✓</td>
<td>All minerals workings and processing facilities are acceptable in flood zone 3a.</td>
</tr>
<tr>
<td>Flood Zone 3b</td>
<td>X</td>
<td>✓</td>
<td>Only sand and gravel workings are acceptable. Other minerals workings and processing facilities are not acceptable in flood zone 3b.</td>
</tr>
</tbody>
</table>

Key:

✓ Development is appropriate
X Development should not be permitted

4.10 There may be occasions during the site selection process that following the application of the Sequential Test, only limited areas within a potential
sand and gravel site are located within flood zones 2, 3 and 3b. This may not potentially affect the actual extraction of sand and gravel, but care should be taken to ensure that the plant site and associated processing facilities are located within the areas of the site that are covered by flood zone 1.

4.11 If a mineral extraction site were to be located within flood zones 2 and 3, or partly outside of flood zone 1, the NPPG\(^4\) encourages minerals planning authorities to take into account at the restoration stage the potential to, amongst other things, increase flood water storage, which can also enhance the natural environment.

\(^4\) NPPG Paragraph: 008 Reference ID: 7-008-20140306.
5.0 Findings of the MLP Sequential Test

Table 2 – Summary of Sequential Test of Most Appropriate Sites/Areas for allocation within the Minerals Local Plan

<table>
<thead>
<tr>
<th>Site</th>
<th>Surface Water</th>
<th>Ground Water</th>
<th>Fluvial Flood Zone</th>
<th>Climate Change Allowance</th>
<th>Sewer or Highway</th>
<th>Canal</th>
<th>Reservoir</th>
<th>Flood History</th>
<th>Existing Flood Defences</th>
<th>Outcome of Sequential Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposed Specific Site 1: Hatfield Aerodrome</td>
<td>Low Risk (&lt;5% at High Risk)</td>
<td>Low Risk (0% at Risk)</td>
<td>Low risk (&gt;99% FZ1)</td>
<td>No Change (mineral extraction)</td>
<td>Low Risk</td>
<td>Low Risk</td>
<td>Low Risk</td>
<td>None known</td>
<td>None known</td>
<td>Development is <strong>appropriate</strong></td>
</tr>
<tr>
<td>Proposed Specific Site 2: Hatfield – Furze Field</td>
<td>Low Risk (&lt;10% at High Risk)</td>
<td>Low Risk (0% at Risk)</td>
<td>Low Risk (100% FZ1)</td>
<td>No Change (FZ1)</td>
<td>Low Risk</td>
<td>Low Risk</td>
<td>Low Risk</td>
<td>None known</td>
<td>None known</td>
<td>Development is <strong>appropriate</strong></td>
</tr>
<tr>
<td>Proposed Specific Site 3: Hatfield – Land adjoining Coopers Green Lane</td>
<td>Low Risk (10% at High Risk)</td>
<td>Low Risk (0-25% at Risk)</td>
<td>Low Risk (100% FZ1)</td>
<td>No Change (FZ1)</td>
<td>Low Risk</td>
<td>Low Risk</td>
<td>Low Risk</td>
<td>None known</td>
<td>None known</td>
<td>Development is <strong>appropriate</strong></td>
</tr>
<tr>
<td>Proposed Preferred Area 1: The Briggens Estate</td>
<td>Low Risk (&lt;10% at High Risk)</td>
<td>Low Risk (25-50% at Risk)</td>
<td>Low Risk (100% FZ1)</td>
<td>No Change (FZ1)</td>
<td>Low Risk</td>
<td>Low Risk</td>
<td>Low Risk</td>
<td>None known</td>
<td>None known</td>
<td>Development is <strong>appropriate</strong></td>
</tr>
<tr>
<td>Location 1</td>
<td>Low Risk (&lt;5% at High Risk)</td>
<td>High Risk (&gt;75% at Risk)</td>
<td>Low Risk (100% FZ1)</td>
<td>No Change (FZ1)</td>
<td>Low Risk</td>
<td>Low Risk</td>
<td>None known</td>
<td>None known</td>
<td>Development is <strong>appropriate</strong></td>
<td></td>
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<tr>
<td>Location 2</td>
<td>Low Risk (&lt;10% at High Risk)</td>
<td>Low Risk (0-25% at Risk)</td>
<td>Low Risk (100% FZ1)</td>
<td>No Change (FZ1)</td>
<td>Low Risk</td>
<td>Low Risk</td>
<td>None known</td>
<td>None known</td>
<td>Development is <strong>appropriate</strong></td>
<td></td>
</tr>
<tr>
<td>Location 3</td>
<td>Low Risk (&lt;10% at High Risk)</td>
<td>Medium Risk (50-75% at Risk)</td>
<td>Low Risk (100% FZ1)</td>
<td>No Change (FZ1)</td>
<td>Low Risk</td>
<td>Low Risk</td>
<td>None known</td>
<td>None known</td>
<td>Development is <strong>appropriate</strong></td>
<td></td>
</tr>
<tr>
<td>Location 4</td>
<td>Low Risk (&lt;10% at High Risk)</td>
<td>Medium Risk (50-75% at Risk)</td>
<td>Low risk (&gt;99% FZ1)</td>
<td>No Change (mineral extraction)</td>
<td>Low Risk</td>
<td>Low Risk</td>
<td>None known</td>
<td>None known</td>
<td>Development is <strong>appropriate</strong></td>
<td></td>
</tr>
<tr>
<td>Location 5</td>
<td>Low Risk (&lt;10% at High Risk)</td>
<td>Low Risk (0% at Risk)</td>
<td>Low risk (&gt;99% FZ1)</td>
<td>No Change (mineral extraction)</td>
<td>Low Risk</td>
<td>Low Risk</td>
<td>None known</td>
<td>None known</td>
<td>Development is <strong>appropriate</strong></td>
<td></td>
</tr>
</tbody>
</table>

Development is **appropriate**
Summary of Sequential Test

5.1 Table 2 summarises the flood risk information for each site and the conclusion from the sequential test process. Sand and gravel extraction sites are classed as 'water compatible' but the allocation of sites should follow the sequential approach and consider the impact of flooding from sources other than fluvial flooding.

5.2 It can be seen that the site selection process taken during the preparation of the Draft MLP has identified sites which are all appropriate for sand and gravel extraction and processing with the majority of alternative sites not included in the Draft MLP also showing few signs of potentially inappropriate flood risk.

Site Specific Flood Risk Assessment Guidance

5.3 Due to the size and scale of the proposed mineral workings, any new planning application for sand & gravel within the county will likely need to be accompanied by an individual Flood Risk Assessment (FRA), regardless of their location within flood zones 1, 2 and 3 and the outcome of the sequential test. FRAs should assess whether the development will be acceptable in flood risk terms both within the site and on the surrounding area.
6.0 Conclusion

Findings of the Sequential Test

6.1 This SFRA Addendum has assessed the 10 sites/areas either included in the Draft MLP or not included but considered appropriate for inclusion by the LUC Site Assessment Report.

6.2 All sites were subjected to the sequential test which shows there to be a sufficient selection of sites/areas that are suitable for mineral working to provide a steady and adequate supply of minerals throughout the Plan-period of the emerging MLP.

6.3 Using the findings of the sequential test, it can be seen that no sites that are to be included in the Draft MLP require the implementation of an 'exception test' to justify their inclusion in the Plan.

Future Updates

6.4 It is envisaged that this SFRA Addendum will be reviewed and updated by the MPA (if considered necessary) in time for the publication of the Regulation 19 Proposed Submission version of the Minerals Local Plan. Updates may be required if:

- The county’s district/borough local planning authorities update their individual SFRAs
- The River Basin Management Plans are updated by the Environment Agency
- Any other documents referred to within this SFRA are updated
- The Lead Local Flood Authority revises The Local Flood Risk Management Strategy 2013-2016 (post 2016)
- Updates occur to the data used within the maps that are contained in Appendix 1 of the Level 1 SFRA (2015)
Appendix 1: Map of Sites/Areas
HERTFORDSHIRE COUNTY COUNCIL
Minerals Local Plan Review - Location of Sites and Areas Assessed
Level 1 Strategic Flood Risk Assessment Addendum, October 2017
Appendix 2: Glossary of Terms

Catchment Flood Management Plans (CFMPs): Are documents produced by the Environment Agency that cover each river catchment area in England and Wales and are designed to provide a strategic approach to flood risk management for the next 50-100 years.

Catchment Flood Management Plan Policy Units: Catchment areas that have been divided into individual policy units that relate to specific sections of a river. These identify the nature of flood risk and measures that need to be undertaken to reduce flood risk.

Flood Risk Management Strategies: Are documents produced by the Environment Agency that provide a strategic approach to flood risk management that recommend short, medium and long-term actions over the next 100 years.

Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. The Environment Agency has divided England into three zones; flood zones 1, 2 and 3. Definitions of these zones are contained in Section 5.

Groundwater Source Protection Zones show the risk of contamination from any activities that might cause pollution in the area. The Environment Agency has divided groundwater source catchments into three zones (inner, outer and total catchment). The inner zone (zone 1) is defined as the 50 day travel time from any point below the water table to the source. This zone has a minimum radius of 50m. The outer zone (zone 2) is defined by a 400 day travel time from a point below the water table. This zone has a minimum radius of 250 or 500m around the source, depending on the size of the abstraction. Total catchment (Zone 3) is defined as the area around a source within which all groundwater recharge is presumed to be discharges at the source.

Main River is defined as a watercourse marked as such on a 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.

Ordinary Watercourse includes every river, stream, ditch, drain, cut, dyke, sluice, sewer (other than a public sewer) and passage through which water flows and which does not form part of a main river.

River Basin Management Plans (RBMPs): Are documents produced by the Environment Agency that are drawn up for the 10 river basin districts in England and Wales, as a requirement of the EU Water Framework Directive. RBMPs are designed to protect and enhance the quality of fresh water, groundwater, estuaries and coastal water.

Surface Water Management Plans (SWMPs): Are plans which promote a coordinated strategic approach to managing surface water drainage and reducing flood risk. They should reflect the future proposals of all key stakeholders and provide a clear delivery plan. They may also provide a way to integrate the
requirements of forthcoming River Basin Management Plans into development planning. SWMPs should focus on managing flood risk and optimising the provision of SuDS.
Appendix 3: Sources of Information Used in the Hertfordshire SFRA (2015)

This level 1 SFRA for the review of the Hertfordshire Minerals Local Plan has drawn on a number of sources of information, all of which are listed below:

1. Level 1 Strategic Flood Risk Assessment prepared for Broxbourne Borough Council by Halcrow Group Ltd and published in December 2007. The SFRA covers the entire area that lies within the administrative boundary of Broxbourne.

2. Level 1 Strategic Flood Risk Assessment prepared by East Herts Council and published in November 2008. The SFRA covers the entire area that lies within the administrative boundary of East Herts.

3. Level 1 Strategic Flood Risk Assessment prepared for Hertsmere Borough Council by Halcrow Group Ltd and published in May 2008. The SFRA covers the entire area that lies within the administrative boundary of Hertsmere.

4. Level 1 Strategic Flood Risk Assessment prepared for North Herts District Council by WSP and published in July 2008. The SFRA covers the entire area that lies within the administrative boundary of North Herts.

5. Level 1 Strategic Flood Risk Assessment prepared for Stevenage Borough Council by Faber Maunsell Ltd and published in February 2009. The SFRA covers the entire area that lies within the administrative boundary of Stevenage.

6. Level 1 Strategic Flood Risk Assessment prepared for Three Rivers District Council by Halcrow Group Ltd and published in January 2012. The SFRA covers the entire area that lies within the administrative boundary of Three Rivers.

7. Strategic Flood Risk Assessment, Assessment for Flood Risk Sites prepared for Three Rivers District Council by Halcrow Group Ltd and published in November 2012. The SFRA covers the entire area that lies within the administrative boundary of Three Rivers.

8. Level 1 Strategic Flood Risk Assessment prepared for Watford Borough Council by Halcrow Group Ltd and published in May 2012. The SFRA covers the entire area that lies within the administrative boundary of Watford.

9. Level 1 Strategic Flood Risk Assessment prepared for Welwyn Hatfield Borough Council by Scott Wilson Ltd and published in May 2009. The SFRA covers the entire area that lies within the administrative boundary of Welwyn Hatfield.
10. Level 1 Strategic Flood Risk Assessment prepared for Dacorum Borough Council, St Albans City and District Council, Three Rivers District Council and Watford Borough Council by Halcrow Group Ltd and published in August 2007. The SFRA covers the entire area that lies within the administrative boundaries of Dacorum, St Albans, Three Rivers and Watford.


19. The Great Ouse Catchment Flood Management Plan, published by the Environment Agency in December 2009. The CFMP covers the remaining parts of Hertfordshire that are not covered by The Thames CFMP.


21. The Influence of Aggregate Quarrying in River Floodplains on Biodiversity, published by Symonds Group Ltd.


23. Flood Zone 2 GIS shape file, published by the Environment Agency. This is the area of land that lies within the extent of the 0.1% chance flood but outside Flood Zone 3.
24. Flood Zone 3 GIS shape file, published by the Environment Agency). This is the area of land that lies within the extent of the 0.1% chance flood but outside Flood Zone 2.

25. Historic Flood Map GIS shape file, published by the Environment Agency. This shows the combined extents of known flooding from rivers, the sea and groundwater.


30. Areas at Risk from Surface Water Flooding GIS shape file (1 in 100 year), published by the Environment Agency.