

Appendix B: Document Management Guide

73. PPS25 highlights the importance of maintaining Strategic Flood Risk Assessments as “Live Documents” and recommends regular reviews to ensure its appropriateness. To facilitate the process, a summary of the main aspects to be taken into consideration during the strategic assessment of flood risk has been prepared and is presented in the following table.

Table B.1 Summary of Main Aspects to be considered during Maintenance of SFRA

| Area Covered | Source of Information | Provider | Comments | Next Review |
|--|--|-----------------|--|---|
| Flood Zones | Hydraulic Models of main rivers in the area (fluvial) and extreme sea levels (tidal) | EA | EA outlines based on tidal risk and slightly misaligned. FM produced outlines based on river modelling | When further modelling is carried out and/or outlines reviewed by EA. Check flood map CD (EA) |
| Flood Defences and Water Management Structures | NFCDD data | EA | Only Combe Haven Catchment covered | Next issue of NFCDD CD or following completion of FAS. |
| Flooding History | Stakeholders records | HBC, EA, ES, SW | Some periods missing | Next general review of SFRA |
| Flood Warning Areas | EA Database | EA | EA outlines misaligned. Corrected by FM based on modelling | When further modelling is carried out. Check flood map CD (EA) |
| Ordnance Survey Background | Ordnance Survey | HBC | - | Next general review of SFRA |
| Local Plan Information | Local Plan | HBC | Local Plan 2004 | Next issue of Local Plan |
| Areas benefiting from Defences | EA Database | EA | EA outlines misaligned. | When further modelling is carried out following completion of FAS. |
| Groundwater | Geology and Groundwater Vulnerability | EA | - | When hydrogeology map is available |
| Artificial Sources | Stakeholders records | EA, HBC, SW | No details provided by SW and little data from EA | When full access to data is granted by SW, EA |
| Sewers | Stakeholders records | SW, HBC | No details provided by SW | When full access to data is granted by SW |
| Overland Flow | LIDAR and Contour Data | HBC | - | When LIDAR data for whole Borough is available. |

74. The following table represents our suggested schedule of maintenance.

Table B.2: Recommended Schedule of Maintenance

| Date | Activity |
|----------------|---|
| September 2007 | Issue of Draft Report |
| October 2007 | Issue of Final Report |
| (2008-2010) | Annual Interim Reviews To incorporate any major changes in terms of flood management infrastructure and any flooding incidents |
| August 2010 | General Review (every three years) To re-evaluate flood risk and planning policies according to latest legislation. |

75. It is essential that any updates of the SFRA are recorded in a structured manner. To facilitate this task, the following table has been created.

Appendix C: Planning Policy and Flood Risk

Planning Policy Statement 25 (PPS25)

76. Planning Policy Statement 25 (PPS25) defines four distinct zones of flood risk. These zones are based on the quantified degree of flood risk to which an area of land is subject at the time at which a land allocation decision is made or a planning application submitted. The PPS25 flood risk zones and their associated flood risk characterisations are summarised in the table below

Table C.1: Flood Zones – Risk and Probability

| Zone | Character of Risk | Assigned annual Flood Risk Probabilities |
|------|-----------------------|---|
| 1 | Low Probability | Less than 0.1% (above 1 in 1000 years) |
| 2 | Medium Probability | Rivers: between 1% (1 in 100 years) and 0.1% (1 in 1000 years) Sea: between 0.5% (1 in 200 years) and 0.1% (1 in 1000 years) |
| 3a | High Probability | Rivers: greater than 1% (1 in 100 years) Sea: greater than 0.5% (1 in 200 years) |
| 3b | Functional Floodplain | Greater than 5% (1 in 20 years) |

77. The PPS25 flood risk zones give a broad indication of flood risk. However, most areas which fall within the High Risk zone (zones 3a and 3b) already enjoy some degree of protection from established flood defences. The actual degree of flood risk to which these areas are subject may well be significantly less than that implied by their PPS25 classification, provided of course that those defences are adequately maintained.
78. PPS25 requires Local Planning Authorities to adopt a risk-based approach to development in areas at risk of flooding, and to apply a "Sequential Test" to such areas. This means that, other factors being equal, the planning authority should favour development in areas with the lower flood risk.
79. PPS25 sub-divides the "High Risk" Zone 3, as summarised below
- Zone 3a – High Probability
80. Areas generally not suitable for residential, commercial and industrial development unless a particular location is essential for a specific use and an alternative lower risk location is not available. Development should only be permitted in this zone if the Exception Test is passed.
- Zone 3b – The Functional Floodplain
81. Areas possibly suitable for some recreation, sport, amenity or conservation uses. Built development in these areas should be wholly exceptional and limited to essential infrastructure. Development should only be permitted in this zone if the Exception Test is passed.
82. PPS25 defines functional floodplains as "land where water has to flow or be stored in times of flood". A functional floodplain can be either an area of floodplain which is known to flood frequently and where flooding is tolerated, as it may prevent or ameliorate flooding elsewhere, or an area within a floodplain that can be deliberately inundated during a flood event to provide temporary retention storage for flood water. Functional floodplain relates only to river and coastal flooding.
83. PPS25 creates a policy framework within which all those involved in the planning process can actively contribute to a more sustainable approach to managing flood risk. This provides opportunities to:
- factor flood risk into planning decisions from the outset of the spatial planning process
 - ensure that these decisions fully consider the implications of climate change
 - provide greater clarity and certainty to developers regarding which sites are suitable for developments of different types
 - develop local authority, developer and community-led initiatives to reduce flood risk in a manner that also enhances the environment
 - ensure that both the direct and cumulative impacts of development on flood risk are acknowledged and appropriately mitigated
 - adopt a catchment-wide approach
 - develop integrated, sustainable developments which deliver multiple benefits.

Flood Risk Vulnerability

84. As part of the initiative to promote appropriate development for the different flood risk zones, PPS25 has classified infrastructure in terms of its vulnerability to flood risk as detailed below.

Essential Infrastructure: Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk, and strategic utility infrastructure, including electricity generating power stations and grid and primary substations.

Highly Vulnerable:

- Police stations, Ambulance stations and Fire stations and Command Centres and telecommunications installations required to be operational during flooding.
- Emergency dispersal points.
- Basement dwellings.
- Caravans, mobile homes and park homes intended for permanent residential use.
- Installations requiring hazardous substances consent.

More Vulnerable:

- Hospitals.
- Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.
- Buildings used for: dwelling houses; student halls of residence; drinking establishments; nightclubs; and hotels.
- Non-residential uses for health services, nurseries and educational establishments.
- Landfill and sites used for waste management facilities for hazardous waste.
- Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.

Less Vulnerable

- Buildings used for: shops; financial, professional and other services; restaurants and cafes; hot food takeaways; offices; general industry; storage and distribution; non-residential institutions not included in 'more vulnerable'; and assembly and leisure.
- Land and buildings used for agriculture and forestry.
- Waste treatment (except landfill and hazardous waste facilities).
- Minerals working and processing (except for sand and gravel working).
- Water treatment plants.
- Sewage treatment plants (if adequate pollution control measures are in place).

Water-compatible Development

- Flood control infrastructure.
- Water transmission infrastructure and pumping stations.
- Sewage transmission infrastructure and pumping stations.
- Sand and gravel workings.
- Docks, marinas and wharves.
- Navigation facilities.
- MOD defence installations.
- Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.
- Water-based recreation (excluding sleeping accommodation).
- Lifeguard and coastguard stations.
- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.
- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

85. The above classification is based partly on Defra/Environment Agency research on Flood Risks to People and also on the need of some uses to keep functioning during flooding.

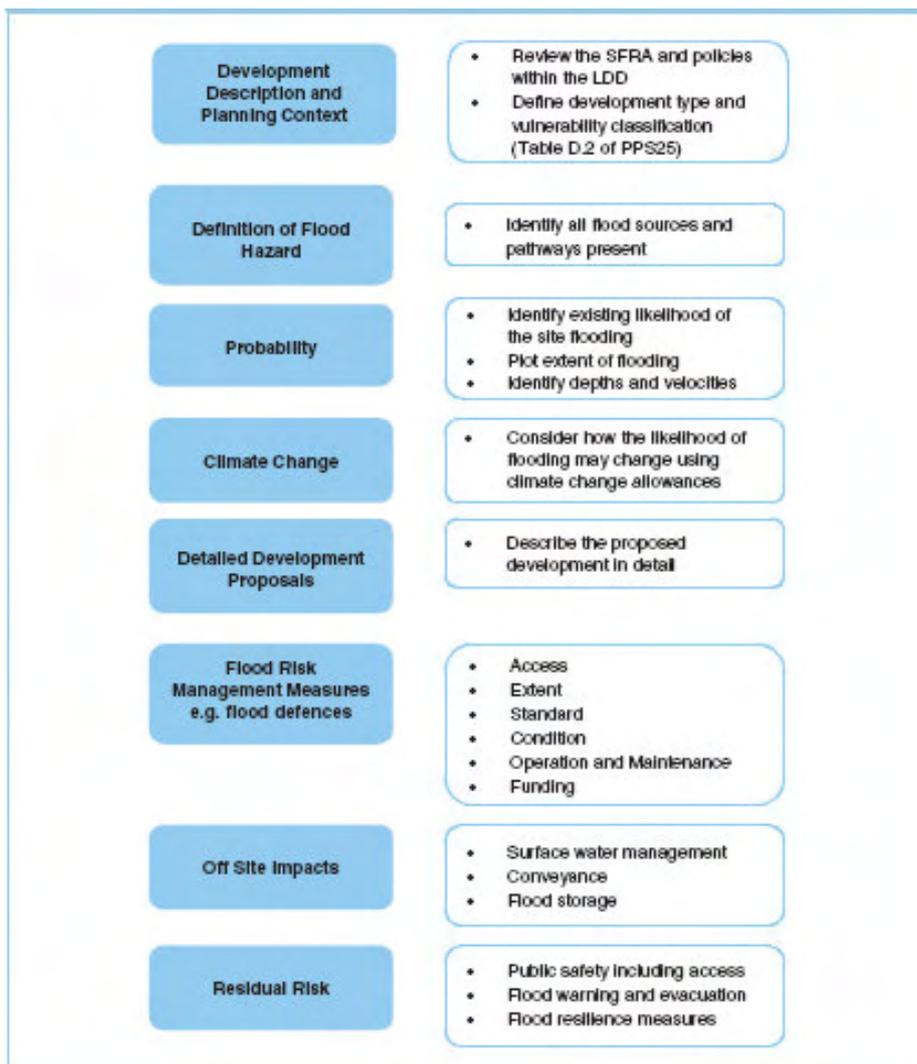
86. When buildings combine a mixture of uses, these should be placed into the higher of the relevant classes of flood risk sensitivity.

- 87. Developments that allow various uses to be spread over the site may fall within several classes of flood risk sensitivity.
- 88. The impact of a flood on the particular uses identified within this flood risk vulnerability classification will vary within each vulnerability class. Therefore, the flood risk management infrastructure and other risk mitigation measures needed to ensure the development is safe may differ between uses within a particular vulnerability classification.

Site Specific Flood Risk Assessments (FRA)

- 89. It is mandatory that an assessment of flood risk is carried out for any proposed development site within Flood Zones 2, 3a and 3b and for large developments (area >1ha) within Flood Zone 1. The FRA will inform the decision-making process at all stages of development planning.
- 90. It is the responsibility of any organisation or person proposing a development to carry out a site-specific flood risk assessment. The FRA must consider whether that development will not add to and should where possible reduce flood risk. The future users of the development must not be placed in danger from flood hazards and should remain safe throughout the lifetime of the plan or proposed development and land use.
- 91. The requirements for a site specific flood risk assessment vary depending on the location of the proposed development site in relation to the various flood zones identified in this study and the history of flooding in the area from secondary sources. The general scope of a FRA is shown in the following schematic.

Figure C.1: Scope of Site-Specific Flood Risk Assessment



(Source: Guide Companion to PPS25)

92. At all stages of the planning process, the minimum requirements for flood risk assessments are that they should:
- be proportionate to the risk and appropriate to the scale, nature and location of the development;
 - consider the risk of flooding arising from the development in addition to the risk of flooding to the development;
 - take the impacts of climate change into account (as per Annex B of PPS25 (see Appendix E));
 - be undertaken by competent people, as early as possible in the particular planning process, to avoid misplaced effort and raising landowner expectations where land is unsuitable for development;
 - consider both the potential adverse and beneficial effects of flood risk management infrastructure including raised defences, flow channels, flood storage areas and other artificial features together with the consequences of their failure;
 - consider the vulnerability of those that could occupy and use the development, taking account of the Sequential and Exception Tests and the vulnerability classification (as per Annex D of PPS25 (see Appendix E)), including arrangements for safe access;
 - consider and quantify the different types of flooding (whether from natural and human sources and including joint and cumulative effects) and identify flood risk reduction measures, so that assessments are fit for the purpose of the decisions being made;
 - consider the effects of a range of flooding events including extreme events on people, property, the natural and historic environment and river and coastal processes;
 - include the assessment of the remaining (known as 'residual') risk (as per Annex G of PPS25) after risk reduction measures have been taken into account and demonstrate that this is acceptable for the particular development or land use;
 - consider how the ability of water to soak into the ground may change with development, along with how the proposed layout of development may affect drainage systems; and
 - be supported by appropriate data and information, including historical information on previous events.

Flood Risk Zones – Policies

93. PPS25 set out planning policies for the different flood risk zones identified as part of this study as described below.
- Zone 1 Low Probability*
94. This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).
95. All uses of land are appropriate in this zone.
96. In addition to the minimum requirements for FRA included in paragraph 82 of this Appendix, the following aspects should be taken into consideration as part of the flood risk assessment for proposed development sites within this area:
- **Local Considerations:** The FRA must contain an overview of the proposed development site including its location, geology, access routes and should identify potential issues in the area such as contaminated land, mines, brown fields, pits, etc.
 - **Existing Flood Risk:** The FRA must establish the site's vulnerability to flooding from all possible sources.
 - **Effects of Proposed Works:** The FRA must provide an analysis of the effect of the development on flood risk elsewhere by looking at aspects such as surface runoff increase, sewer capacity demands, flash flooding due to adjacent land, groundwater and any other local considerations.
 - **Mitigation:** The FRA must include details of any mitigation measures proposed for the development. These should where possible involve the implementation of Sustainable Drainage Systems (SUDS).
97. Planning policy indicates that developers and local authorities should aim to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the application of suitable sustainable drainage techniques.

Zone 2 Medium Probability

98. This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% – 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% – 0.1%) in any year.
99. The water-compatible, less vulnerable and more vulnerable uses of land and essential infrastructure, as described in the Flood Risk Vulnerability section, are appropriate in this zone. Subject to the Sequential Test being applied, the highly vulnerable uses are only appropriate in this zone if the Exception Test is passed.
100. In addition to the minimum requirements for FRA included in paragraph 82 of this Appendix, the following aspects should be taken into consideration as part of the flood risk assessment for proposed development sites within this area:
- Local Considerations: The FRA must contain an overview of the proposed development site including its location, geology, access routes and should identify potential issues in the area such as contaminated land, mines, brown fields, pits, etc.
 - Existing Flood Risk: The FRA must establish the site's vulnerability to flooding from all possible sources. Special attention must be placed on fluvial and coastal flooding.
 - Effects of Proposed Works: The FRA must provide an analysis of the effect of the development on flood risk elsewhere by looking at aspects such as loss of floodplain, surface runoff increase, sewer capacity demands, flash flooding due to adjacent land, groundwater and any other local considerations.
 - Mitigation: The FRA must include details of any mitigation measures proposed for the development. These should where possible involve the implementation of Sustainable Drainage Systems (SUDS).
 - Finished Floor Levels: The FRA must incorporate the recommendations from the EA and local authorities with regards to acceptable floor levels for the development.
 - Emergency Access/Egress: The FRA must provide a clear indication of a safe route to be followed by emergency services during times of flooding. This route must comply with the EA minimum requirements.
101. Planning policy indicates that developers and local authorities should seek a reduction in the overall level of flood risk in the area and beyond through the layout and form of the development, and the application of appropriate sustainable drainage methods.

Zone 3a High Probability

102. This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
103. The water-compatible and less vulnerable uses of land, as described in the Flood Risk Vulnerability section, are appropriate in this zone. The highly vulnerable uses should not be permitted in this zone. The more vulnerable and essential infrastructure uses should only be permitted in this zone if the Exception Test is passed. Essential infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in times of flood.
104. In addition to the minimum requirements for FRA included in paragraph 82 of this Appendix, the following aspects should be taken into consideration as part of the flood risk assessment for proposed development sites within this area:
- Local Considerations: The FRA must contain an overview of the proposed development site including its location, geology, access routes and should identify potential issues in the area such as contaminated land, mines, brown fields, pits, etc.
 - Existing Flood Risk: The FRA must establish the site's vulnerability to flooding from all possible sources. Special attention must be placed on fluvial and coastal flooding.
 - Effects of Proposed Works: The FRA must provide an analysis of the effect of the development on flood risk elsewhere by looking at aspects such as loss of floodplain, surface runoff increase, sewer capacity demands, flash flooding due to adjacent land, groundwater and any other local considerations.

- Mitigation: The FRA must include details of any mitigation measures proposed for the development. These should where possible involve the implementation of Sustainable Drainage Systems (SUDS). It may be necessary for the developer to carry out improvements to the existing flood management structures or, when necessary, provide new ones.
- Finished Floor Levels: The FRA must incorporate the recommendations from the EA and local authorities with regards to acceptable floor levels for the development.
- Emergency Access/Egress: The FRA must provide a clear indication of a safe route to be followed by emergency services during times of flooding. This route must comply with the EA minimum requirements.

105. Planning policy indicates that developers and local authorities should aim 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 techniques;
- relocate existing development to land in zones with a lower probability of flooding; and
- create space for flooding to occur by restoring functional floodplain and flood flow pathways and by identifying, allocating and safeguarding open space for flood storage.

Zone 3b The Functional Floodplain

106. This zone comprises land where water has to flow or be stored in times of flood. This study identifies this Flood Zone as land which would flood with an annual probability of 1 in 20 (5%) or greater in any year.

107. Only the water-compatible uses and the essential infrastructure, as described in the Flood Risk Vulnerability section, should be permitted in this zone. Essential infrastructure in this zone should pass the Exception Test. Any proposed development in this area should be designed and constructed to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- not impede water flows; and
- not increase flood risk elsewhere.

108. In addition to the minimum requirements for FRA included in paragraph 82 of this Appendix, the following aspects should be taken into consideration as part of the flood risk assessment for proposed development sites within this area:

- Local Considerations: The FRA must contain an overview of the proposed development site including its location, geology, access routes and should identify potential issues in the area such as contaminated land, mines, brown fields, pits, etc.
- Existing Flood Risk: The FRA must establish the site's vulnerability to flooding from all possible sources. Special attention must be placed on fluvial and coastal flooding.
- Effects of Proposed Works: The FRA must provide an analysis of the effect of the development on flood risk elsewhere by looking at aspects such as loss of floodplain, surface runoff increase, sewer capacity demands, flash flooding due to adjacent land, groundwater and any other local considerations.
- Mitigation: The FRA must include details of any mitigation measures proposed for the development. These should where possible involve the implementation of Sustainable Drainage Systems (SUDS). It may be necessary for the developer to carry out improvements to the existing flood management structures or, when necessary, provide new ones.
- Finished Floor Levels: The FRA must incorporate the recommendations from the EA and local authorities with regards to acceptable floor levels for the development.
- Emergency Access/Egress: The FRA must provide a clear indication of a safe route to be followed by emergency services during times of flooding. This route must comply with the EA minimum requirements.

109. Planning policy indicates that developers and local authorities should endeavour 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 techniques; and
- relocate existing development to land with a lower probability of flooding.

Sustainable Drainage Systems (SUDS)

110. PPS25 emphasises the role of SUDS and introduces a general presumption that they will be used for all major developments.
111. Sustainable drainage is a design philosophy that uses a range of techniques to manage surface water as close to its source as possible. To produce a workable and effective scheme, SUDS must be incorporated into any proposed development at the earliest opportunity.
112. SUDS can be cost-effectively designed to form an integral part of hard and soft landscaped areas. In this way, they can contribute towards attractive schemes that enhance the nature conservation and amenity value of proposed development while also recycling the valuable water resource.
113. Consideration should be given to the arrangements for adoption and future maintenance of these systems. This is likely to influence the design just as much as technical considerations. It is recommended that maintenance of SUDS should be the responsibility of a publicly accountable body, which will often require the payment of a commuted sum or a legal agreement, possibly backed up by the deposit of a financial bond. The adopting organisation should approve any design before construction.
114. The applicability of Sustainable Drainage Systems varies depending on a series of factors such as type of soil, groundwater levels, land use, location in relation to flood zones, etc.
115. Some of the most commonly used sustainable drainage systems such as swales, trenches and permeable pavement rely on infiltration. However, there are situations where infiltration drainage is not appropriate, as indicated below:
- where poor runoff water quality may pose a pollution threat to groundwater resources
 - where the infiltration capacity of the ground is low
 - where groundwater levels are high
 - where the stability of foundations may be at risk
116. For a soil to be suitable for accepting enhanced infiltration it must be permeable, unsaturated and of sufficient thickness and extent to disperse the water effectively.
117. The performance of infiltration systems will depend on the properties of the soil in which they are constructed. The capacity of the soil to infiltrate water can be described by using an infiltration coefficient which represents the long-term infiltration rate into the soil divided by the area of infiltration. In general terms, this will be high for coarse grained soils such as sands and gravels and low for fine soils such as silts and clays. The following table provides an indication of infiltration coefficients for different soil textures.

Table C.2: Typical Infiltration Coefficients based on soil texture

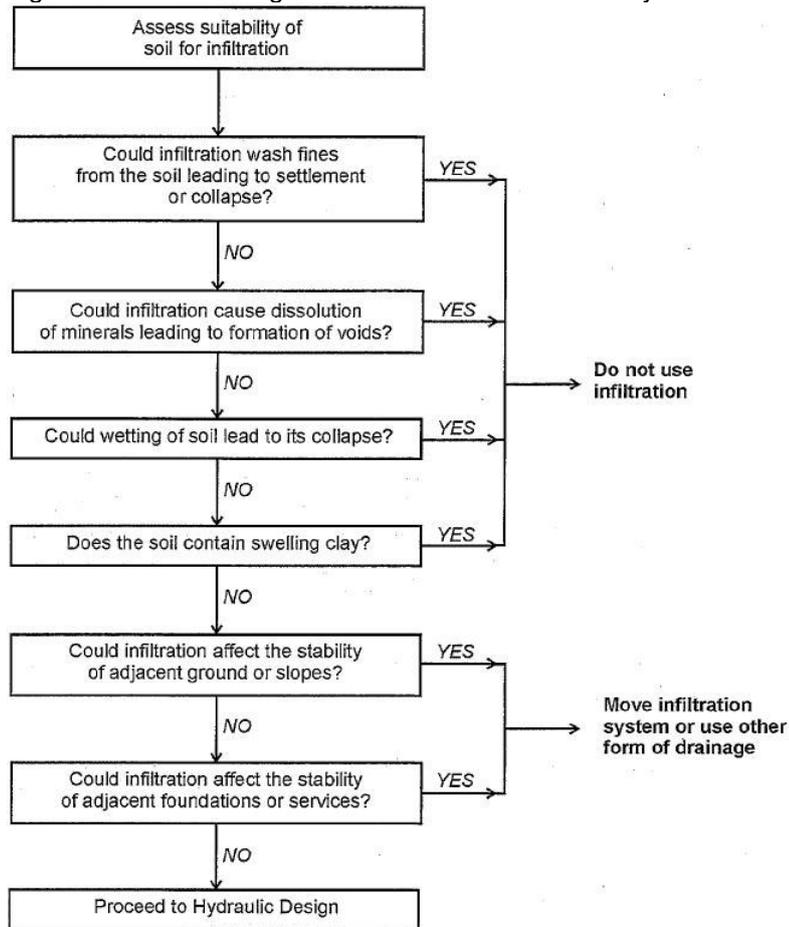
| | Soil Type | Typical Infiltration Coefficients (m/h) |
|-------------------|-----------------|---|
| Good Infiltration | Gravel | 10-1000 |
| | Sand | 0.1-100 |
| | Loamy Sand | 0.01-1 |
| | Sandy Loam | 0.05-0.5 |
| | Loam | 0.001-0.1 |
| | Silt Loam | 0.0005-0.05 |
| | Chalk | 0.0001-100 |
| | Sandy Clay Loam | 0.001-0.1 |
| Poor Infiltration | Silty Clay Loam | 0.00005-0.005 |
| | Clay | <0.0001 |
| | Till | 0.00001-0.01 |
| | Rock | 0.00001-0.1 |

(Source: SUDS Manual)

118.

For developments where infiltration techniques are proposed, a geotechnical investigation is likely to be required to ensure that the ground conditions are suitable and to check the likely performance of the infiltration method proposed. The following schematic provides a decision tree for the use of infiltration units.

Figure C.2: Decision guide for the use of infiltration systems



(Source: CIRIA C697)

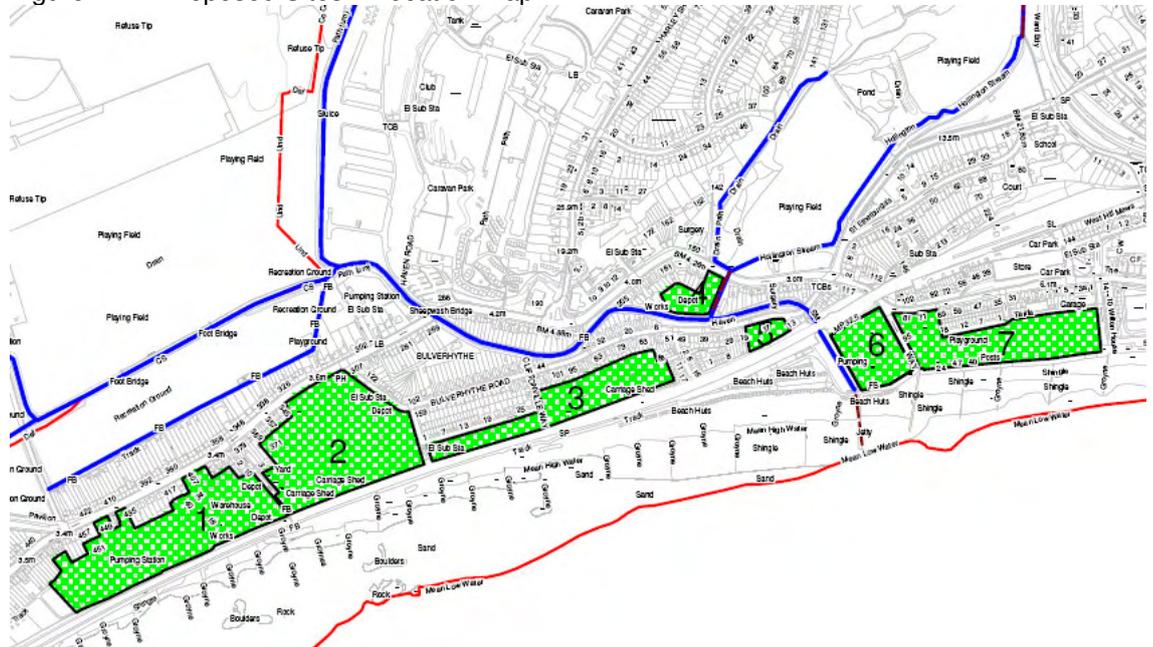
119.

The areas identified within Hastings Borough as unsuitable for the application of infiltration techniques are included in map 010. It must be noted that at this strategic level it is unrealistic to deem areas as appropriate for such techniques and it is recommended that such analysis is carried out at a site specific level.

Appendix D: Proposed Sites Assessment

- 120. There are seven areas identified by the Council for potential redevelopment. Five of them are located in Bulverhythe with the remaining two found in West Marina, as shown in the figure below.

Figure D.1 Proposed Sites – Location Map

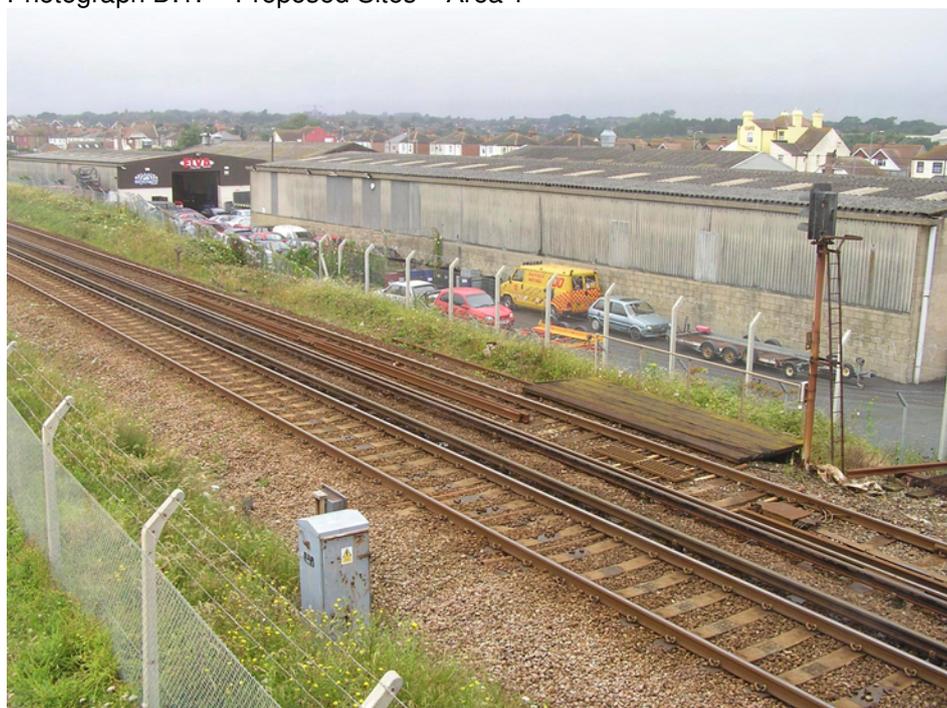


- 121. To facilitate the analysis of these areas, three maps showing fluvial risk, tidal risk and flooding history were created. These are presented in the Map section under the references Proposed Sites/FR, TR and FH respectively. The conclusions of the analysis of every site are summarised below.

Area 1

- 122. This area is located to the western end of Bulverhythe and comprises a series of warehouses, vehicle workshops and open land as shown in Figure D.1 above and Photograph D.1 below.

Photograph D.1: Proposed Sites – Area 1



123. The following conclusions can be reached from the analysis:
- **Fluvial Risk:** The north eastern part of the site (approximately 25% of the area) is currently at medium risk of flooding. Additionally, the climate change scenario suggests that approximately 70% of the site would be at risk of flooding under extreme conditions.
 - **Tidal Risk:** The EA flood map suggests that the whole site would be at high risk of flooding. However, the area benefits from the Bulverhythe Flood Defences which provide protection from this flood source.
 - **Flooding History:** No records of previous flooding within the site or its immediate vicinity were found.
124. The water-compatible, less vulnerable and more vulnerable uses of land and essential infrastructure, as described in the Flood Risk Vulnerability section (Appendix C), are appropriate in this zone. Subject to the Sequential Test being applied, the highly vulnerable uses are only appropriate in this zone if the Exception Test is passed.
125. A FRA must accompany any proposed development in the area. The amount of detail required for the FRA should be as outlined in (Appendix C – Zone 2 Medium Risk).
126. National planning policy (PPS25) for this flood zone indicates that developers and local authorities should seek a reduction in the overall level of flood risk in the area and beyond through the layout and form of the development, and the application of appropriate sustainable drainage methods.

Area 2

127. This area is located in Bulverhythe, to the east of Area 1 and comprises of railway workshops, council depot, vehicle repair workshops and residential properties as shown in Figure D.1 above and Photograph D.2 below.

Photograph D.2: Proposed Sites – Area 2



128. The following conclusions can be reached from the analysis:
- **Fluvial Risk:** The northern part of the site (approximately 50% of the area) is currently at medium risk of flooding. Additionally, the climate change scenario suggests that approximately 75% of the site would be at risk of flooding under extreme conditions.

- Tidal Risk: The EA flood map suggests that the whole site would be at high risk of flooding. However, the area benefits from the Bulverhythe Flood Defences which provide protection from this flood source.
- Flooding History: No records of previous flooding within the site or its immediate vicinity were found.

129. The water-compatible, less vulnerable and more vulnerable uses of land and essential infrastructure, as described in the Flood Risk Vulnerability section (Appendix C), are appropriate in this zone. Subject to the Sequential Test being applied, the highly vulnerable uses are only appropriate in this zone if the Exception Test is passed.
130. A FRA must accompany any proposed development in the area. The amount of detail required for the FRA should be as outlined in (Appendix C – Zone 2 Medium Risk).
131. National planning policy (PPS25) for this flood zone indicates that developers and local authorities should seek a reduction in the overall level of flood risk in the area and beyond through the layout and form of the development, and the application of appropriate sustainable drainage methods.

Area 3

132. This area is located in Bulverhythe, to the east of Area 2 and comprises carriage sheds, railway land and undeveloped land as shown in Figure D.1 above and Photograph D.3 below.

Photograph D.3: Proposed Sites – Area 3



133. The following conclusions can be reached from the analysis:
- Fluvial Risk: A small part of the site (approximately 10% of the area) is likely to be affected during the climate change outline scenario.
 - Tidal Risk: The EA flood map suggests that the whole site would be at high risk of flooding. However, the area benefits from the Bulverhythe Flood Defences which provide protection from this flood source.
 - Flooding History: No records of previous flooding within the site or its immediate vicinity were found.
134. Based on the above, all uses of land would be appropriate in this zone. However, early liaison with the EA is recommended to ensure all parties are in agreement with regards to potential uses.

135. A FRA must accompany any proposed development in the area. The amount of detail required for the FRA should be as outlined in (Appendix C – Zone 1 Low Probability).
136. National planning policy (PPS25) indicates that developers and local authorities should aim to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the application of suitable sustainable drainage techniques

Area 4

137. This area is located in Bulverhythe, to the north of the confluence between the Combe Haven and the Hollington Stream and comprises a depot as shown in Figure D.1 above and Photograph D.4 below.

Photograph D.4: Proposed Sites – Area 4



138. The following conclusions can be reached from the analysis:
- Fluvial Risk: The southern part of the site (approximately 15% of the area) is located within the functional floodplain with a further 10% of the site within Flood Zone 3a. Overall 60% is within Flood Zone 2 and a further 15% is likely to be affected during the climate change outline scenario.
 - Tidal Risk: The EA flood map suggests that the whole site would be at high risk of flooding. However, the area benefits from the Bulverhythe Flood Defences which provide protection from this flood source.
 - Flooding History: Previous flooding is known to have occurred to the eastern and southern ends of the site.
139. Based on the above, only the water-compatible uses and the essential infrastructure, as described in the Flood Risk Vulnerability section (Appendix C), should be permitted in this zone. Essential infrastructure in this zone should pass the Exception Test. Any proposed development in this area should be designed and constructed to:
- remain operational and safe for users in times of flood;
 - result in no net loss of floodplain storage;
 - not impede water flows; and
 - not increase flood risk elsewhere.
140. A FRA must accompany any proposed development in the area. The amount of detail required for the FRA should be as outlined in (Appendix C – Zone 3b Functional Floodplain).

141. National planning policy (PPS25) indicates that developers and local authorities should endeavour 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 techniques; and
 - relocate existing development to land with a lower probability of flooding.

Area 5

142. This area is located in Bulverhythe, to the eastern end of Bulverhythe Road and comprises of a depot and a warehouse as shown in Figure D.1 above and Photograph D.5 below.
- Photograph D.5: Proposed Sites – Area 5



143. The following conclusions can be reached from the analysis:
- Fluvial Risk: A significant part of the site (approximately 50% of the area) is within Flood Zone 2 (Medium Risk). The whole site is likely to be affected during the climate change outline scenario.
 - Tidal Risk: The EA flood map suggests that the whole site would be at high risk of flooding. However, the area benefits from the Bulverhythe Flood Defences which provide protection from this flood source.
 - Flooding History: Previous flooding is known to have occurred to the northern end of the site.
144. The water-compatible and less vulnerable uses of land, as described in the Flood Risk Vulnerability section, are appropriate in this zone (Appendix C). The highly vulnerable uses should not be permitted in this zone. The more vulnerable and essential infrastructure uses should only be permitted in this zone if the Exception Test is passed. Essential infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in times of flood.
145. A FRA must accompany any proposed development in the area. The amount of detail required for the FRA should be as outlined in (Appendix C – Zone 3a High Probability).
146. National planning policy (PPS25) indicates that developers and local authorities should aim 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 techniques;
 - relocate existing development to land in zones with a lower probability of flooding; and

- create space for flooding to occur by restoring functional floodplain and flood flow pathways and by identifying, allocating and safeguarding open space for flood storage.

Area 6

147. This area is located in West Marina, to the east of the Combe Haven river mouth and comprises a pumping station and other buildings as shown in Figure D.1 above and Photograph D.6 below.

Photograph D.6: Proposed Sites – Area 6



148. The following conclusions can be reached from the analysis:
- **Fluvial Risk:** The western part of the site (approximately 15% of the area) is located within the functional floodplain with a further 10% of the site is located within Flood Zone 3a. Overall 30% is within flood zone 2 and a further 5% is likely to be affected during the climate change outline scenario.
 - **Tidal Risk:** The EA flood map suggests that the whole site would be at high risk of flooding. However, the area is deemed to benefit from Flood Defences which provide protection from this flood source.
 - **Flooding History:** Previous flooding is known to have occurred to the northern end of the site. Additionally, overtopping is known to occur in the area.
149. The above findings suggest that only the water-compatible uses and the essential infrastructure, as described in the Flood Risk Vulnerability section (Appendix C), should be permitted in this zone. This is however subject to the conclusions of a more detailed FRA which is being undertaken in respect of this site.

Area 7

150. This area is located in West Marina, to the east of Area 6 and comprises a playground, chalets and open land previously occupied by the Bathing Pool as shown in Figure D.1 above and Photograph D.7 below.

Photograph D.7: Proposed Sites – Area 7



151.

The following conclusions can be reached from the analysis:

- Fluvial Risk: The site is not deemed to be at risk of fluvial flooding.
- Tidal Risk: The EA flood map suggests that a relatively small part of the site (approximately 5%) is currently at high risk of flooding with a further 10% at medium risk. However, the area is deemed to benefit from Flood Defences which provide protection from this flood source.
- Flooding History: Previous flooding is known to have occurred to the north of the site. Additionally, overtopping is known to occur in the area. Ground levels, however, suggest that any overtopping occurring at the eastern end of the site will swiftly find its way to the road between sites 6 and 7 and then downhill towards the railway bridge.

152.

The above findings suggest that the water-compatible, less vulnerable and more vulnerable uses of land and essential infrastructure, as described in the Flood Risk Vulnerability section (Appendix C), are appropriate in this zone. Subject to the Sequential Test being applied, the highly vulnerable uses are only appropriate in this zone if the Exception Test is passed. This is however subject to the conclusions of a more detailed FRA which is being undertaken in respect of this site.

Proposed Sites - SUDS Recommendations

| Site | General Geology | General Drainage Assessment | Aquifer Type | Groundwater / Vulnerability | SUDS Recommendations |
|--------|--|-----------------------------|--------------|-----------------------------|---|
| Area 1 | Siltstone, Sandstone, Mudstone and Clay. Potentially Contaminated Soil | Poorly Drained Soils | MINOR | MINOR High Soil Class | Attenuation Systems, not suitable for Infiltration Techniques |
| Area 2 | Siltstone, Sandstone, Mudstone and Clay. Potentially Contaminated Soil | Poorly Drained Soils | MINOR | MINOR High Soil Class | Attenuation Systems, not suitable for Infiltration Techniques |
| Area 3 | Siltstone, Sandstone, Mudstone and Clay | Poorly Drained Soils | MINOR | MINOR High Soil Class | Attenuation Systems |
| Area 4 | Siltstone, Sandstone, Mudstone and Clay | Poorly Drained Soils | MINOR | MINOR High Soil Class | Attenuation Systems |
| Area 5 | Siltstone, Sandstone, Mudstone and Clay | Poorly Drained Soils | MINOR | MINOR High Soil Class | Attenuation Systems |
| Area 6 | Siltstone, Sandstone, Mudstone and Clay | Poorly Drained Soils | MINOR | MINOR High Soil Class | Attenuation Systems |
| Area 7 | Siltstone, Sandstone and Mudstone | Moderately Drained Soils | MINOR | MINOR High Soil Class | Infiltration and Combined Infiltration/Attenuation Systems |

Disclaimer: These recommendations are based on the general information available for the preparation of the SFRA and included in Maps 006 and 010 as well as the geology map of the area. Site specific investigations may confirm or modify the above assessments.

Appendix E: Broad Development Options - Assessment

153. There are eight areas identified by the Council as broad development options. They are distributed throughout the Borough, as shown in the Map section of the SFRA and described below:
- Area A – Upper Wilting Farm (Refer to maps for Section 5)
 - Area B – Queensway South (Refer to maps for Sections 1 and 5)
 - Area C – Queensway North (Refer to maps for Section 1)
 - Area D – Central St Leonards (Refer to maps for Section 9)
 - Area E – Hastings Town Centre (Refer to maps for Section 9)
 - Area F – Broomgrove – Ore Valley Millennium Communities (Refer to maps for Sections 3, 6 and 7)
 - Area G – Farley Bank – Ore Valley Millennium Communities (Refer to maps for Sections 3 and 7)
 - Area H – Former Mount Pleasant Hospital (Refer to maps for Section 3)
154. To facilitate the analysis of these areas, three series of maps showing fluvial risk, tidal risk and flooding history were created. These are presented in the Map section under the references Broad Development Options/FR, TR and FH respectively. Maps for the analysis of tidal risk were produced only for sections where tidal flooding was likely to occur (Sections 5, 7 and 9). The conclusions of the analysis of every site are summarised below.
- Area A – Upper Wilting Farm*
155. This site is mostly in Rother District Council Land. The area is proposed as a focus for residential development (at least 500 dwellings) and high tech industry. A new railway station is likely to be required for the area as part of the essential infrastructure for development.
156. The following conclusions can be reached from the analysis:
- Fluvial Risk: The site is not deemed to be at risk of fluvial flooding.
 - Tidal Risk: The EA flood map suggests that a very small part of the south-western edge of the site (less than 5% of the area) is currently at high risk of flooding. However, the area benefits from the Bulverhythe Flood Defences which provide protection from this flood source.
 - Flooding History: No records of previous flooding within the site or its immediate vicinity were found.
157. Based on the above, the site is located within Flood Zone 1 – Low Probability of Flooding. All uses of land would be appropriate in this zone. However, early liaison with the EA is recommended to ensure all parties are in agreement with regards to the best distribution for the potential land uses.
158. A FRA must accompany any proposed development extending over an area of 1 ha in the area. The amount of detail required for the FRA should be as outlined in (Appendix C – Zone 1 Low Probability).
159. Planning policy indicates that developers and local authorities should aim to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, improvements to the local defences, local land raising and the application of suitable sustainable drainage techniques.
- Area B – Queensway South*
160. The proposal for this area comprises nine business units together with conference facilities and an education and visitor centre.
161. The following conclusions can be reached from the analysis:
- Fluvial Risk: The site is not deemed to be at risk of fluvial flooding.
 - Tidal Risk: The EA flood map suggests that the site is not at risk of tidal flooding
 - Flooding History: No records of previous flooding within the site or its immediate vicinity were found.

162. Based on the above, the site is located within Flood Zone 1 – Low Probability of Flooding. All uses of land would be appropriate in this zone.
163. A FRA must accompany any proposed development extending over an area of 1 ha in the area. The amount of detail required for the FRA should be as outlined in (Appendix C – Zone 1 Low Probability).
164. Planning policy indicates that developers and local authorities should aim to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, improvements to the local defences, local land rising and the application of suitable sustainable drainage techniques.
- Area C – Queensway North*
165. The area is being proposed for business development and in conjunction with Queensway South will provide approximately 45,000 m² of gross floor space.
166. The following conclusions can be reached from the analysis:
- Fluvial Risk: The site is not deemed to be at risk of fluvial flooding.
 - Tidal Risk: The EA flood map suggests that the site is not at risk of tidal flooding
 - Flooding History: No records of previous flooding within the site or its immediate vicinity were found.
167. Based on the above, the site is located within Flood Zone 1 – Low Probability of Flooding. All uses of land would be appropriate in this zone.
168. A FRA must accompany any proposed development extending over an area of 1 ha in the area. The amount of detail required for the FRA should be as outlined in (Appendix C – Zone 1 Low Probability).
169. Planning policy indicates that developers and local authorities should aim to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, improvements to the local defences, local land rising and the application of suitable sustainable drainage techniques.
- Area D – Central St Leonards*
170. The area forms part of the Central St Leonards Masterplan and includes a proposal for 157 houses at Crystal Square Car Park and approximately 2,600m² of commercial/retail floorspace.
171. The following conclusions can be reached from the analysis:
- Fluvial Risk: The site is not deemed to be at risk of fluvial flooding.
 - Tidal Risk: The EA flood map suggests that the site is not at risk of tidal flooding
 - Flooding History: No records of previous flooding within the site or its immediate vicinity were found.
172. Based on the above, the site is located within Flood Zone 1 – Low Probability of Flooding. All uses of land would be appropriate in this zone.
173. Under PPS25 there is no statutory requirement to provide a FRA for this site as it is located in an area at low risk of flooding and it extends over less than 1ha. (approximate area = 0.70ha)
174. Planning policy indicates that developers and local authorities should aim to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, improvements to the local defences, local land rising and the application of suitable sustainable drainage techniques.
- Area E – Hastings Town Centre*
175. The area is a focus for growth in mostly retail, employment and education floorspace. A broad indication is:
- Station Plaza: 5,900m² of education floorspace and 103 residential units
 - Lacuna Place: 8,100m² of retail and office space (phase 1 is already under construction)

- Priory Quarter: 23,000m² of mixed use development comprising offices, education, retail and leisure.

176. The following conclusions can be reached from the analysis:

- Fluvial Risk: The site is not deemed to be at risk of fluvial flooding.
- Tidal Risk: The EA flood map suggests that the site is not at risk of tidal flooding
- Flooding History: Previous flooding is known to have occurred within the site. Three different flooding incidents have been reported. These relate to records from Hastings Borough Council, Southern Water and Emergency Services and are mainly concentrated in the south-eastern edge of the site.

177. Based on the above, the site is located within Flood Zone 1 – Low Probability of Flooding. All uses of land would be appropriate in this zone. However, it is essential that the site specific Flood Risk Assessment identifies the reasons behind previous flooding incidents and, if necessary, recommends systems to avoid reoccurrence of these events.

178. A FRA must accompany any proposed development in the area. The amount of detail required for the FRA should be as outlined in (Appendix C – Zone 1 Low Probability). and make emphasis on the flooding history of the area including, if necessary, recommendations to avoid reoccurrence of past flooding incidents.

179. Planning policy indicates that developers and local authorities should aim to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, improvements to the local defences, local land rising and the application of suitable sustainable drainage techniques.

Area F - Broomgrove – Ore Valley Millennium Communities

180. The area is being proposed for mixed use development including housing, retail, community facilities, open space and generation of employment opportunities.

181. The following conclusions can be reached from the analysis:

- Fluvial Risk: The site is not deemed to be at risk of fluvial flooding.
- Tidal Risk: The EA flood map suggests that the site is not at risk of tidal flooding
- Flooding History: No records of previous flooding within the site or its immediate vicinity were found.

182. Based on the above, all uses of land would be appropriate in this zone. However, due to the proximity of the Ore Valley Stream and the fact that this watercourse has not been mathematically modelled, it is essential that the FRA for the site includes a detailed analysis of the risk posed by this source.

183. A FRA must accompany any proposed development extending over an area of 1 ha in the area. The amount of detail required for the FRA should be as outlined in (Appendix C – Zone 1 Low Probability). and, in liaison with the EA must take into consideration the likely effect of Ore Valley Stream on the development and vice versa.

184. Planning policy indicates that developers and local authorities should aim to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, improvements to the local defences, local land rising and the application of suitable sustainable drainage techniques.

Area G – Farley Bank – Ore Valley Millennium Communities

185. The area is being proposed for mixed use development including housing, retail, community facilities, open space and generation of employment opportunities.

186. The following conclusions can be reached from the analysis:

- Fluvial Risk: The site is not deemed to be at risk of fluvial flooding.
- Tidal Risk: The EA flood map suggests that the site is not at risk of tidal flooding
- Flooding History: No records of previous flooding within the site or its immediate vicinity were found.

187. Based on the above, the site is located within Flood Zone 1 – Low Probability of Flooding. All uses of land would be appropriate in this zone.
188. Under PPS25 there is no statutory requirement to provide a FRA for this site as it is located in an area at low risk of flooding and it extends over less than 1ha. (approximate area= 0.75ha)
189. Planning policy indicates that developers and local authorities should aim to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, improvements to the local defences, local land rising and the application of suitable sustainable drainage techniques.
- Area H – Former Mount Pleasant Hospital*
190. The area is being proposed for social housing (approximately 45 dwellings) and non-retail uses.
191. The following conclusions can be reached from the analysis:
- Fluvial Risk: The site is not deemed to be at risk of fluvial flooding.
 - Tidal Risk: The EA flood map suggests that the site is not at risk of tidal flooding
 - Flooding History: No records of previous flooding within the site or its immediate vicinity were found.
192. Based on the above, the site is located within Flood Zone 1 – Low Probability of Flooding. All uses of land would be appropriate in this zone.
193. A FRA must accompany any proposed development extending over an area of 1 ha in the area. The amount of detail required for the FRA should be as outlined in (Appendix C – Zone 1 Low Probability).
194. Planning policy indicates that developers and local authorities should aim to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, improvements to the local defences, local land rising and the application of suitable sustainable drainage techniques.

Broad Development Options - SUDS Recommendations

| Site | General Geology | General Drainage Assessment | Aquifer Type | Groundwater / Vulnerability | SUDS Recommendations |
|--|--|-----------------------------|--------------|-------------------------------|---|
| Area A – Upper Wilting Farm | Sandstone and Mudstone - Wadhurst Clay | Poorly Drained Soils | N/A | N/A | Attenuation Systems |
| Area B – Queensway South | Sandstone and Mudstone - Wadhurst Clay | Poorly Drained Soils | MINOR | MINOR Low Soil Class | Attenuation Systems |
| Area C – Queensway North | Sandstone and Mudstone - Wadhurst Clay | Poorly Drained Soils | MINOR | MINOR Intermediate Soil Class | Attenuation Systems |
| Area D – Central St Leonards | Siltstone, Sandstone and Mudstone | Moderately Drained Soils | MINOR | MINOR High Soil Class | Infiltration and Combined Infiltration/Attenuation Systems |
| Area E – Hastings Town Centre | Mudstone - Wadhurst Clay and Potentially Contaminated Soil | Poorly Drained Soil | MINOR | MINOR High Soil Class | Attenuation Systems, not suitable for Infiltration Techniques |
| Area F - Broomgrove – Ore Valley Millennium Communities | Siltstone, Sandstone and Mudstone. Potentially Contaminated Soil | Moderately Drained Soils | N/A | N/A | Attenuation Systems, not suitable for Infiltration Techniques |
| Area G - Farley Bank – Ore Valley Millennium Communities | Siltstone, Sandstone and Mudstone. | Moderately Drained Soils | N/A | N/A | Infiltration and Combined Infiltration/Attenuation Systems |
| Area H – Former Mount Pleasant Hospital | Siltstone, Sandstone and Mudstone. | Moderately Drained Soils | N/A | N/A | Infiltration and Combined Infiltration/Attenuation Systems |

Disclaimer: These recommendations are based on the general information available for the preparation of the SFRA and included in Maps 006 and 010 as well as the geology map of the area. Site specific investigations may confirm or modify the above assessments.