

**Wycombe District
Strategic Flood Risk Assessment (SFRA)
Level 2**

Draft Update

DRAFT

June 2010

1 Introduction

- 1.1 This draft document is an update to the level 2 Strategic Flood Risk Assessment which was produced in 2008 and has been produced as a result of the identification of additional sites that fall within flood risk zone 3 as identified by the level 1 SFRA. The Level 1 SFRA will be used as background evidence to inform the application of the Sequential Test by the Council as part of the production of the Local Development Framework
- 1.2 A Level 2 SFRA reviews the hazard posed to property and life a site to ensure that the risk of flooding can be realistically mitigated through the design process. In doing so, the Level 2 SFRA provides a tool that will inform the application of the technical aspects of the Exception Test. A critical element of the Exception Test is the ability to demonstrate that the site can be developed safely and in a sustainable manner.
- 1.3 The sites assessed in this update are:
 - Land off Poppy Road, Princes Risborough
 - Kingsmead Recreation Ground, High Wycombe
- 1.4 These sites were identified as options in the 2009 update consultation. The report is currently in draft and awaiting sign off by the Environment Agency.

2 Flood Risk and PPS25 at Site ONP41 (Poppy Road, Princes Risborough)

ID: ONP41

Name: Land off Poppy Road,

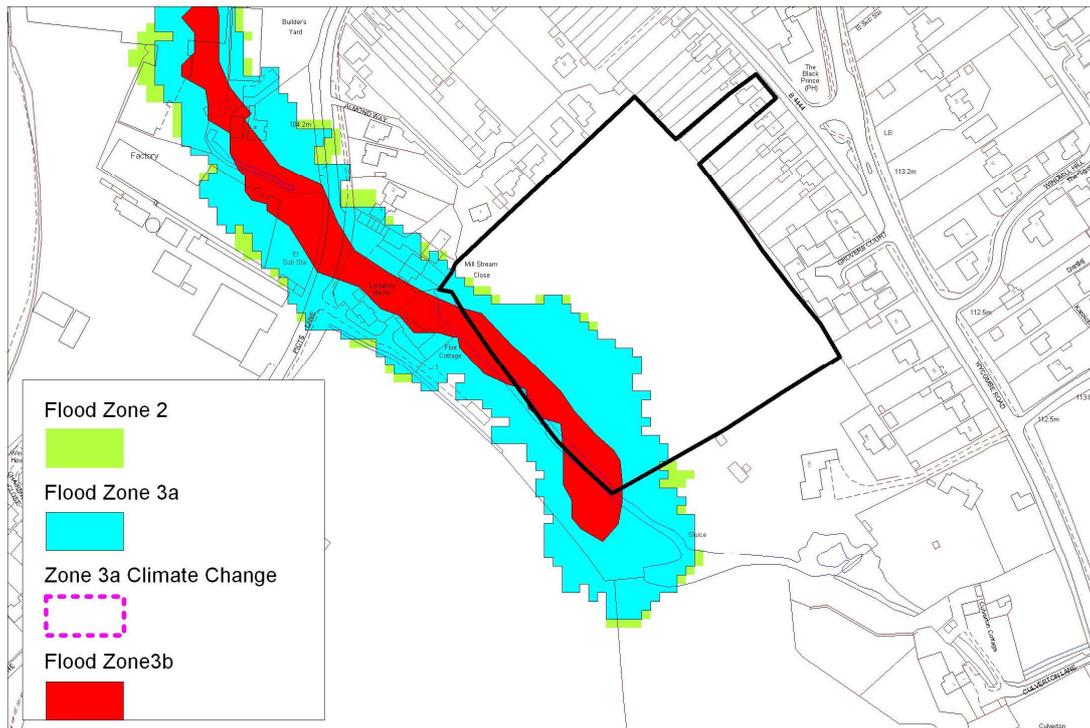
Location: Princes Risborough

Proposed Development: Residential

River Catchment: Uplands

PPS25 Flood Zone (majority of site): Flood Zone 1

PPS25 Flood Zone (worst case): Flood Zone 3b



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2.1 Description of Flood Risk

2.2 Flood Zones

2.3 The site is located on the South side of the built up area of Princes Risborough and the south east side is bounded by the Pyrtle Spring. The site is predominantly Flood Zone 1 (80%), 15% is in Flood Zone 3a and 5% in Flood Zone 3b.

2.4 Flood Depth

2.5 The Pyrtle Spring runs along the boundary of the site. Flood Zones 3a and 3b are shown adjacent to the right bank of the watercourse. The remainder of the site rises away from the watercourse and therefore the depth of water on the stream boundary is estimated to be less than 300mm.

2.6 Downstream of the site there are a number of culverts which need to be assessed in any Flood Risk Assessment (FRA), the assessment should include the impact of the culverts on the probability, depth and duration of flooding at the site.

2.7 Speed of floodwaters .

2.8 The Pyrtle Spring is a watercourse that due to its ephemeral flow patterns sometimes has no flow at all, this has become more common in recent years due to the drier summers that the U.K. has experienced. Site ONP41 is near the head of the spring and this means that flood water could be relatively fast moving across the site, especially close to the water course. This is due to the steep up stream catchment and presence of a defined watercourse on the site. This would need to be fully assessed in any FRA and development suitably located to minimise flood risk.

2.9 Period of Inundation

2.10 The period of inundation associated with flooding at this site is heavily influenced by groundwater flow and the chalk aquifer of the Chiltern Hills. If groundwater levels are high and they are kept high by steady and continuing rainfall, it is possible that flooding could occur for an extensive period of time. In basin areas where flooding is caused by groundwater, flooding can last for several weeks, if not months. In the location of site ONP41, the natural drainage would not allow flooding of this longevity, but it is possible that some flooding could occur for several days.

2.11 Flood Warning/Onset of Flooding

2.12 Situated within the uppermost reaches of the catchment, the time between the rainfall event and flooding occurring on the watercourse is expected to be relatively short and flood levels will rise fairly quickly. As a result there would be a limited amount of time in which flood warnings could be issued. There is a sluice upstream of the site and any FRA of this site should include an assessment of the management of this sluice and its potential for failure.

2.13 There are currently no formal warning systems in place to raise the alarm in response to anticipated groundwater flooding incidents. The Environment Agency monitor groundwater levels in Wye, Hughenden and Marlow, and notification is provided via email (on an informal basis) to the Local Authority if raised groundwater levels are observed.

2.14 Flood Defences

2.15 No formal flood defences have been identified on the Pyrtle Spring. The nearby railway embankment may influence local flood flow routes, and this should be investigated further as part of the detailed site based Flood Risk Assessment.

2.16 Flooding from Other (Non Fluvial) Sources

2.17 The Environment Agency and the Council do not hold any records of localised flooding affecting the site.

2.18 Indicative overland flow routes are identified in Appendix L of the Level 1 SFRA, depicting areas that may be susceptible to flooding following intense rainfall that exceeds the capacity of the existing drainage system. The site does appear to be situated within an area that is susceptible to overland flow from a strategic perspective. Areas of potential groundwater emergence (and therefore a possible susceptibility to groundwater flooding) are indicated in Appendix F of the Level 1 SFRA.

2.19 Appendix A provides an indication of any known potential surface water and/or groundwater issues within the proposed development site. It is essential that the potential risks associated with groundwater and surface water flooding are carefully considered in a localised context as an integral part of the outline design process (i.e. during the detailed FRA). General information relating to observed localised flooding within the district has been provided by Bucks County Council, and is provided as Appendix M of the Level 1 SFRA, and this should be considered as part of the site based FRA.

2.20 Overview of Flood Risk (PPS 25)

2.21 The South East boundary of site ONP41 is situated within flood zone 3b, and is at risk of flooding in the 5% (1 in 20) design event. Indicative flood depths on this part for the site are expected to be no greater than 300mm. The speed and onset of flood flows across the site could be fast

and the period of inundation could be relatively long in certain circumstances. It is therefore considered that there could be some risk to life within the site.

2.22 Flood Zone 3b is shown on the boundary of the site. The Sequential Test would prohibit residential use in this part of the site. However within the site there are zones of lower flood risk that may be appropriate for this use. The layout and design of any development on the site should focus on reducing any risk to an acceptable level.

2.23 The non-main river watercourse that crosses the site should be maintained and enhanced as part of any development.

2.24 Planning Recommendations

2.25 Spatial Planning

2.26 Future development within Site ONP41 must be supported by a robust planning argument that clearly demonstrates that there are no alternative suitable sites within areas at lesser risk of flooding (i.e. application of the sequential test). **Only if this planning argument can be put into place may any further consideration be taken of Site ONP41.**

2.27 The sequential test should consider not only the planning 'need' for the future development of the site within the District, but it should also be used to steer vulnerable uses within the site to areas of lowest risk. **Development should be avoided within that proportion of the site that falls within Flood Zone 3b Functional Floodplain and Flood Zone 3a High Probability.**

2.28 Throughout the site, development must deliver a **measurable reduction in flood risk**. Risk reduction measures for consideration should include the incorporation of SUDS to seek a reduction in the rate of runoff from the site.

2.29 It should be recognised that property situated within Flood Zone 3b functional floodplain will be subject to frequent flooding, on average, no less than once in every 20 years. There are clear sustainability implications to be considered in this regard, and it is highly questionable whether insurance against flooding related damages will be available in the longer term.

2.30 Development Control

2.31 All proposed development within Site ONP41 will require a detailed Flood Risk Assessment (FRA), in accordance with Section 7.6.1 of the Level 1 SFRA. It is essential that the adopted design follows the 'sequential approach', steering development towards areas of lowest risk within the site.

2.32 The configuration and design of development within the site must follow the guiding principles set out in Section 7.4 of the Level 1 SFRA. In summary however, the following development control recommendations must be incorporated into all development within Site ONP41 as a minimum:

- A positive reduction in the risk of flooding within the District must be demonstrated as an outcome of the proposed development;
- Floor levels must be situated a minimum of 300mm above the 1% (1 in 100) fluvial predicted maximum flood level plus climate change;
- Basements are not permitted within Flood Zone 3b Functional Floodplain. Sleeping accommodation must not be provided at basement level within Flood Zone 3a, and an access point for escape must be provided that is situated above the 1% (1 in 100) peak design flood level, including climate change;
- Implementation of SUDS to ensure that the volume and rate of runoff from the site (post development) does not exceed the equivalent greenfield runoff rates. Any SUDS design must take due account of groundwater and geological conditions (refer Section 7.6.3 of the SFRA);
- To ensure the safety of residents and employees during a flood, access and egress routes must be designed to meet Environment Agency defined criteria, as set out in Appendix I of the SFRA;
- Ensure that there is no net loss in floodplain storage as a result of the proposed development. This may be achieved by ensuring (for example) that the existing building footprint is not increased, that overland flow routes are not truncated by buildings and/or infrastructure, or hydraulically linked compensatory flood storage is provided within the site (or upstream). It must be demonstrated that the proposed development does not result in an increase in maximum flood levels within adjoining properties;
- A minimum 8m buffer zone must be provided to 'top of bank' within sites immediately adjoining a river corridor. This relates to both open waterways and culverted waterway corridors;
- As an integral part of the government's "Making Space for Water" agenda, the Environment Agency is actively seeking the re-naturalisation of culverted watercourses as part of any future development. Realistic opportunities to reinstate the natural open waterway within existing culverted reaches of the river(s) should be promoted.

3 Flood Risk and PPS25 at Site KR1 (Kingsmead Recreation Ground)

ID: KR1

Name: Kingsmead Recreation Ground,

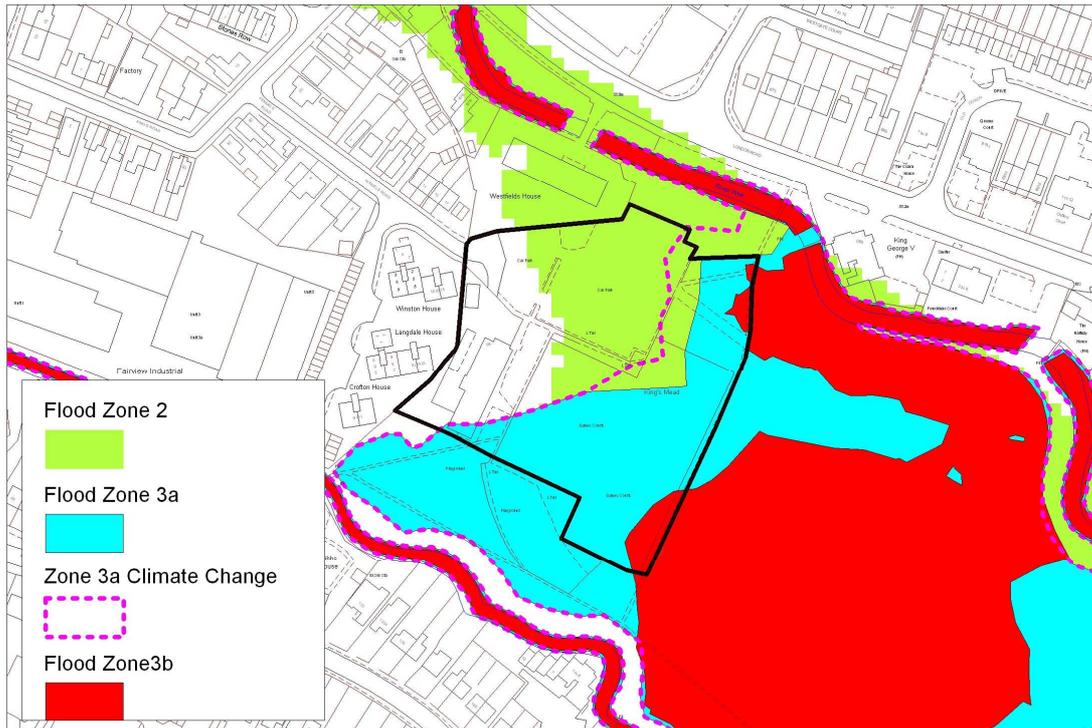
Location: High Wycombe

Proposed Development: Mixed use - residential and recreational uses

River Catchment: Wye

PPS25 Flood Zone (majority of site): Flood Zone 3a

PPS25 Flood Zone (worst case): Flood Zone 3b



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4 Description of Flood Risk

4.2 Flood Zones

4.3 Site KR1 is situated at the north west end of the Kingsmead Recreational Area and lies in the valley between the River Wye and the Backstream. Flood Zone 3b encroaches onto the site in two small areas on the South east boundary of the site. The remainder of the site is fairly evenly split between Flood Zone 3a (41%), Flood zone 2 (32%) and Flood Zone 1 (24%). The siting of the zones reflects the topography of the site with the land rising from South East to North West.

4.4 Flood Depth

4.5 From analysis of the flood zones and site inspections, it is estimated that the depth of river flooding on the site in the 1% (100 year) event will be approximately 500 mm at the deepest point. However this depth of flooding is only in the southern corner of the site.

4.6 Speed of floodwaters

4.7 The site is at risk of overtopping of the right bank of the River Wye during periods of high flow. The modelled peak flow in this area is approximately 4 cumecs which is a modest rate of flow. The flow is also affected by a number of constrictions upstream, particularly road crossings, and also the site is downstream of the Rye which acts as a flood storage area.

4.8 The mechanism for flooding would indicate that floodwaters would pond within the site. It can therefore be assumed that the speed of floodwaters will be relatively slow. However, during higher order flood events, such as the 0.1% AEP (1 in 1000) the flood zone maps indicate a different flood mechanism, with the capacity of the River Wye exceeded upstream of the site. During such an event it is likely that there would be significant flood flows across the site. This will need to be allowed for in any design for of this site development.

4.9 Period of Inundation

4.10 The period of inundation will depend on the flooding mechanism causing the flood. There are two main sources of inundation from the River Wye on this site, intense rainfall and groundwater flooding.

4.11 Flooding from intense rainfall will be a short duration event. The general ground level slopes downstream taking water away from the site and back to the river. These types of storm normally occur when there is a positive soil moisture deficit allowing flood water to percolate into the ground aiding recovery. It is likely flood water will not last more than 24 hours in this type of event.

4.12 Flooding from groundwater will occur after a prolonged period of rainfall that have raised groundwater levels in the whole catchment. If there is sufficient flow to cause flooding at this site then it is likely that flooding will occur for an extensive period of time. In basin areas groundwater flooding can last for several weeks. The topography of the site would allow water to drain naturally downstream but it is possible to have surface water lying for a number of days due to the saturated ground.

4.13 Flood Warning/Onset of Flooding

4.14 Situated at the bottom of a steep sided valley the time between the rainfall event and flooding occurring is likely to be relatively short. Improved forecasting of intense rainfall events using rainfall radar may give up to two hours warning of a severe event but this level of notice is unlikely to help those on the site react to an event. This area is covered by the Environment Agency's Flood Warning Service, and as such proposed development of this site should include use of this flood warning service.

4.15 There are no formal warning systems in place for groundwater flooding. However levels are monitored at key indicator boreholes, with Piddington being the most appropriate for this site. Trigger levels have been agreed for this borehole which would allow advanced warning to occupiers of the site that flooding was more likely. These warnings would be issued up to a week in advance by the Local Authority.

4.16 The onset of flooding could be affected by the many structures (bridges, culverts etc.) on the River Wye and Back Stream. Blockage of one of these structures could lead to the rapid onset of flooding at the site. Any FRA in relation to this site needs to include an assessment of the impact of potential blockages of these structures would have on flooding of this site.

4.17 Flood Defences

4.18 The principle flood defence upstream of this site on the River Wye is the Rye flood storage pond. This is designed to allow excess flood water to overflow the right bank of the river into the Rye where it is contained by a bund adjacent to Bassetsbury Manor. A high level overflow prevents water overtopping the bund, the overflow is taken by culvert to the Backstream where it is discharged after the main peak of the hydrograph has passed. The amount of water overflowing from the river is controlled by a notch weir which is designed to allow a maximum of 2 cumecs (50 cusecs) to pass.

4.19 Flooding from Other (Non Fluvial) Sources

4.20 The Environment Agency and the Council do not hold any records of localised flooding affecting the site.

4.21 The site is contained in the valley bottom between the main channel of the River Wye and the Backstream as such the area may be prone to ground water flooding, this would need to be assessed in any FRA for the site.

4.22 Overview of Flood Risk (PPS 25)

4.23 There are recorded instances of flooding of the Kingsmead recreation area. The River Wye and the Backstream were the subject of a flood improvement scheme in the 1970's. This was carried out by the Thames Conservancy with co-operation from the District Council.

4.24 A small section of this site is within flood zone 3b with the remainder of the site classified as 3a, 2 and 1 in approximately equal proportions. The depth of flooding, a maximum of 500mm, and the speed of flow leads to the conclusion that the risk to life within the site is low.

4.25 The use of the site for sports and recreation is compatible with the designation of flood plain in accordance with Table D2 in PPS 25. There are areas of lower flood risk within the site that could be designated for residential use, but no residential development should be proposed in zone 3a unless the requirements of the exceptions test (as set out in Annex D of PPS25) have been satisfied. Careful consideration would need to be made of access to and egress from any residential area.

4.26 **Planning Recommendations**

4.27 Spatial Planning

4.28 Future development within Site KR1 must be supported by a robust planning argument that clearly demonstrates that there are no alternative suitable sites within areas at lesser risk of flooding (i.e. application of the sequential test). **Only if this planning argument can be put into place may any further consideration be taken of Site KR1.**

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4.34 The configuration and design of development within the site must follow the guiding principles set out in Section 7.4 of the Level 1 SFRA. In summary however, the following development control recommendations must be incorporated into all development within Site KR1 as a minimum:

- A positive reduction in the risk of flooding within the District must be demonstrated as an outcome of the proposed development;
- Floor levels must be situated a minimum of 300mm above the 1% (1 in 100) fluvial predicted maximum flood level plus climate change;
- Basements are not permitted within Flood Zone 3b Function Floodplain. Sleeping accommodation must not be provided at basement level within Flood Zone 3a, and an access point for escape must be provided that is situated above the 1% (1 in 100) peak design flood level, including climate change;
- Implement SUDS to ensure that the volume and rate of runoff from the site (post development) does not exceed the equivalent greenfield runoff rates. Any SUDS design must take due account of groundwater and geological conditions (refer Section 7.6.3 of the SFRA);
- To ensure the safety of residents and employees during a flood, access and egress routes must be designed to meet Environment Agency defined criteria, as set out in Appendix I of the SFRA;
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