London Borough of Bexley

# Level 2 Strategic Flood Risk Assessment

Wood Environment & Infrastructure Solutions UK Limited – March 2021

## Report for

John Luckhurst
London Borough of Bexley
2 Watling Street
Bexleyheath
DA6 7AT

## Main contributors

Francesca Hurt
Angela Dhaliwal
Jack Park

## Issued by

Angela. Dhaliwal

Digitally signed by Angela.Dhaliwal
Date: 2021.05.12 09:05:27 +01'00'

.....

Angela Dhaliwal

## Approved by

francesca. hurt

Digitally signed by francesca.hurt
Date: 2021.05.10 13:07:52 +01'00'

.....

Francesca Hurt


## Wood

Floor 23
25 Canada Square
Canary Wharf
London E14 5LB
United Kingdom
Tel +44 (0) 203 215 1610


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| 1 | Draft report | May 2020 |
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# Contents

# 1. Introduction

## 1.1 Overview

1.1.1 The National Planning Policy Framework (NPPF) requires local planning authorities to assess the risk of flooding in their areas through undertaking a Strategic Flood Risk Assessment (SFRA)[1]. The SFRA for the London Borough of Bexley (LBB) supports the borough's long-term growth plans by providing an evidence base to steer planning decisions in a way that ensures new development will be safe from flooding now and in the future.

1.1.2 The SFRA is intended to inform the development of the new Local Plan related to flood risk management and the allocation of land for future development. This is achieved through a thorough analysis of flood risk within the Borough (see SFRA Level 1 report), enabling a more informed response to development proposals and planning, and helping to identify strategic solutions to flood risk. The SFRA takes account of all sources of flooding, incorporating the latest information on climate change and how this may change the pattern of flood risk in the future. This Level 2 report provides analyses of the sites being considered for allocation and enables the application of the Sequential and Exception tests. It also includes guidance for developers on how to use the Level 1 report to inform site-specific flood risk assessments.

1.1.3 This report provides an update to the Level 2 SFRA for the London Borough of Bexley (LBB). Level 1 and 2 SFRAs were produced by Entec (now Wood) in 2010 and 2014 respectively. Newly available data and updates to legislation, planning policy and strategy have been incorporated into this latest version of the SFRA.

## 1.2 Purpose of the Level 2 SFRA and report structure

1.1.1 The purpose of the Level 2 SFRA is to support decision making about the design and location of new, planned development. The LBB uses the detailed outputs of the Level 2 and Level 1 SFRAs to inform the production of planning policy documents, namely the new Local Plan. Prospective developers will use the SFRA for up to date guidance on the requirement and details of a site-specific Flood Risk Assessment (FRA) to support a planning application.

1.1.2 There are four main sections in this Level 2 report. Each section supports a specific purpose:

- **Section 2**: Overview of flood risk in the sustainable development locations.
- **Section 3 and Appendix A**: Flood screening exercise to assist the council to perform the **Sequential Test** by allocating development to the areas with the lowest level of risk. This is commensurate with the principle of managing flood risk through planning and avoidance (as described in Section 5 of Level 1 report).
- **Section 4 and Appendix B**: Detailed site assessments to bring out the information required by developers to undertake the **Exception Test**, for those exceptional cases when development within higher risk zones is unavoidable. Section 4 furthermore provides guidance on the application of the Exception Test.
- **Section 5**: Guidance to steer developers to the relevant information and principles to assess flood risk for **windfall sites** and site allocations, and enabling LBB to establish whether windfall

[1] National Planning Policy Framework - Paragraph: 156, accessed 26/05/2020 at 19.00 GMT, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/740441/National_Planning_Policy_Framework_web_accessible_version.pdf

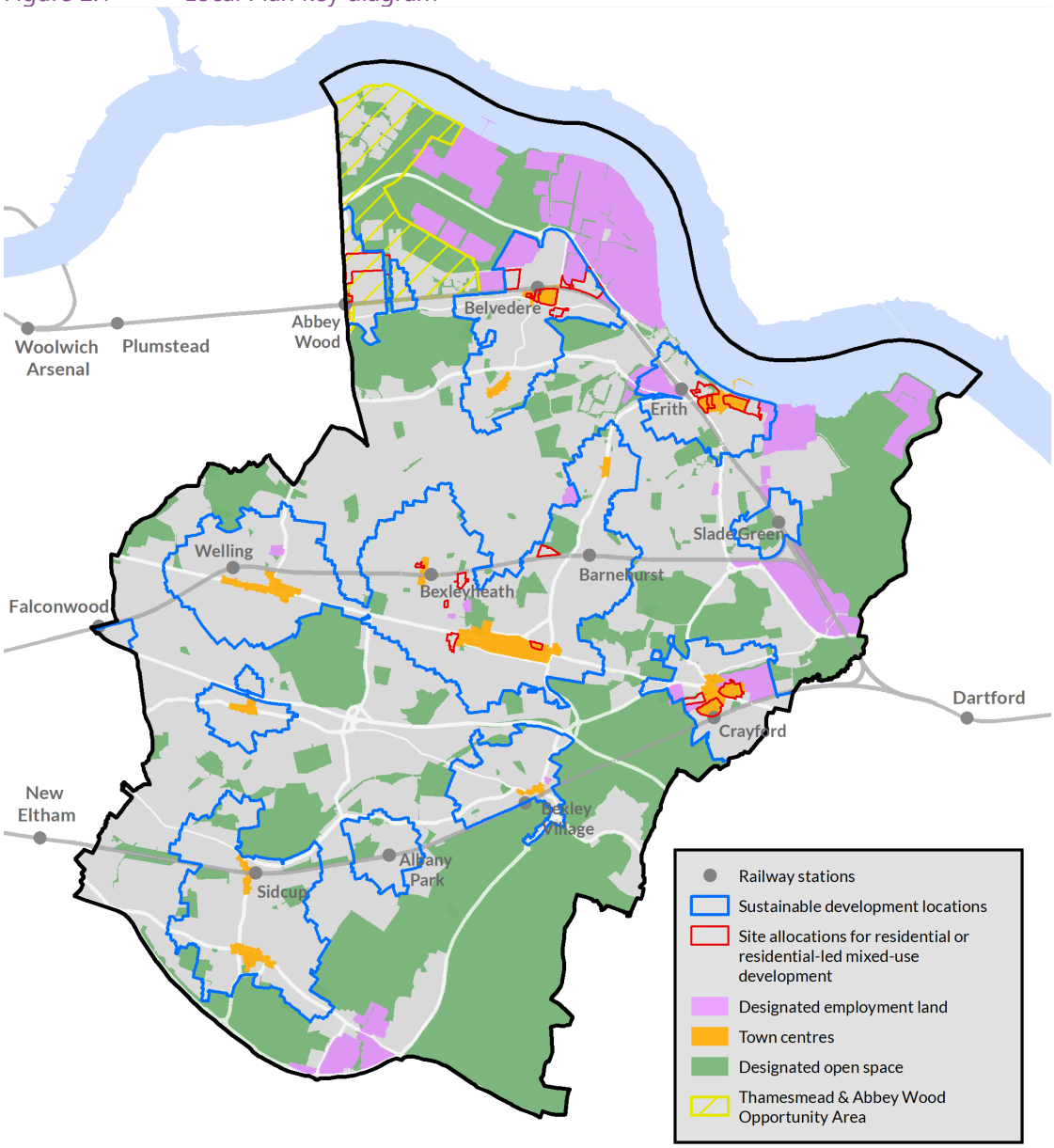
sites are capable of being made safe throughout their lifetime without increasing flood risk elsewhere.

# 2. Sustainable development locations

Figure 2.1 illustrates the Local Plan spatial strategy. The Local Plan spatial strategy directs development to areas in and around the borough's main town centres and transport hubs. These are the borough's sustainable development locations, as shown in Figure 2.1. These are grouped into three broad areas of the borough:

- **North Bexley**: This includes the sustainable development locations in the north, namely Abbey Wood, Belvedere, Upper Belvedere, Erith and Slade Green.
- **Central Bexley**: In the central belt of the borough, Falconwood, Welling, Bexleyheath and Barnehurst, Northumberland Heath and Crayford.
- **South Bexley**: These are the Southern settlements, Blackfen, Sidcup through Albany Park and to up to Bexley Village.

Figure 2.1 Local Plan key diagram



## 2.1 North Bexley

In north Bexley, parts of the communities of Abbey Wood, Belvedere, Erith and Slade Green are at residual risk of tidal flooding from the River Thames. Large parts of Abbey Wood and Belvedere, as well as western parts of Slade Green, suffered tidal flooding in 1953. The land between the riverbank and the Woolwich to Erith railway line is at risk of residual flooding, should the flood defences along the River Thames be breached or overtopped during a flood event. Proposed developments within the tidal Flood Zones 2 and 3 will require a site-specific FRA, which needs to consider flood warnings, evacuation and safe refuge options.

Abbey Wood and Belvedere are at widespread risk of surface water flooding. Rainfall on the higher ground to the south of the B213 road collects in distinct flow paths towards the north, and then distributes across the flat area north of the B213. In Erith, surface water flood risk is mostly concentrated along roads and drains. The Fraser Road industrial estate shows extensive but low risk of surface water flooding. In Slade Green there is a very high localised risk of surface water flooding. All four communities lie within critical drainage areas, except for the land south of the B213 road in Abbey Wood, and south of Bexley Road and Queens Road in Erith. There are records of historic surface water flooding, flooding from blocked gullies and small drains in all four communities. All proposed developments within a critical drainage area, as well as those exceeding 1ha outside of critical drainage areas, will need to be accompanied by a site-specific FRA. The FRA needs to set out how surface water flood risk will be managed following best practice, such as avoidance of development in areas of high risk, use of SuDS, and thus ensuring the development will not increase flood risk elsewhere.

Slade Green is at risk of reservoir flooding in the event of a breach. Proposed developments in areas of reservoir flood risk will need to be accompanied by a site-specific FRA. The FRA needs to demonstrate how the development will be kept safe in the event of reservoir flooding through the use of warning systems and evacuation procedures.

## 2.2 Central Bexley

### Northumberland Heath, Barnehurst, Bexleyheath, Welling and Falconwood

Central Bexley encompasses the communities of Northumberland Heath, Barnehurst, Bexleyheath, Welling and Falconwood. The main source of flood risk in these sustainable development locations is from surface water. Much of the area is designated as suffering from critical drainage problems and there are numerous records of historical flooding from surface water, sewers, blocked gullies and unrecorded causes. However, surface water flow routes are well defined due to the undulating terrain.

All proposed developments within a critical drainage area, as well as those exceeding 1ha outside of critical drainage areas, will need to be accompanied by a site-specific FRA. The FRA needs to set out how surface water flood risk will be managed following best practice, such as avoidance of development in areas of high risk, use of SuDS, and thus ensuring the development will not increase flood risk elsewhere. The best way to achieve this, will be to ensure existing surface water flow routes are maintained.

There are no main rivers in these sustainable development locations to pose any fluvial flood risk. There is no risk of tidal flooding due to the absence of tidal rivers or the coast.

The southern parts of Bexleyheath downstream of Danson Park reservoir are at risk of flooding in the event of a breach. Proposed developments in areas of reservoir flood risk will need to be accompanied by a site-specific FRA. The FRA needs to demonstrate how the development will be kept safe in the event of reservoir flooding through the use of warning systems and evacuation procedures.

### Crayford

The corridor around the River Cray is at risk of fluvial flooding. From the Hall Place flood storage area through the town centre, Flood Zone 3 extends approximately 300m to the south of the river and suffered widespread flooding in 1968. Flood Zones 2 and 3 also extend northwards from the river channel in the reach between Hall Place and Crayford Way bridge. A small part of the town centre benefits from defences along the riverbanks and the Hall Place flood storage area.

The River Cray was relocated in the past further up the side of the natural valley providing a head of water to drive a mill. As such it is situated at a higher level than much of Crayford town centre which sits in the valley bottom. This means that the flooding mechanism is slightly different than for a natural fluvial watercourse – instead of floodwater slowly spreading out across the floodplain, in Crayford if water spills over the right bank it will collect at the bottom of the valley. This will potentially result in deep, rapid onset flooding in areas where the ground level is lowest and consequently a greater risk compared with other sites in the borough with a similar probability of flooding but where the onset of flooding may be more gradual. Future redevelopment within the town centre, in particular any change in use that increases vulnerability, should be considered carefully. Site specific FRAs will have to consider the rate of onset of flooding and the effect this would have on the safety of occupants of a site.

There is also a risk from tidal flooding associated with the River Cray, namely only on its south-eastern bank in the open space east of Maiden Lane, which is designated as functional floodplain; and in the industrial area north of Thames Road (A206), which benefits from defences. The eastern fringe of this area suffered tidal flooding in 1953.

Proposed developments within the tidal or fluvial Flood Zones 2 and 3 will require a site-specific FRA, that takes into account all sources of flooding and ensures the development will not increase flood risk elsewhere.

Critical drainage problems are declared only for the area north of London Road and some 350m either side of Perry Street. There are some distinct surface water flow routes, namely from the north into River Cray, from west to east north of the Iron Mill Lane residential area and along the River Cray through the town centre, which coincides with risk from fluvial flooding. All proposed developments within a critical drainage area, as well as those exceeding 1ha outside of critical drainage areas, will need to be accompanied by a site-specific FRA. The FRA needs to set out how surface water flood risk will be managed following best practice, such as avoidance of development in areas of high risk, use of SuDS, and thus ensuring the development will not increase flood risk elsewhere.

The corridor around the River Cray is at risk of reservoir flooding in the event of a breach. Proposed developments in areas of reservoir flood risk will need to be accompanied by a site-specific FRA. The FRA needs to demonstrate how the development will be kept safe in the event of reservoir flooding through the use of warning systems and evacuation procedures.

## 2.3 South Bexley

South Bexley include Bexley Village, Albany Park Sidcup and Blackfen. They are broadly located between the River Shuttle in the north and the River Cray in the south. Only Bexley Village is exposed to risk of fluvial flood risk, since the River Cray passes the Village. At its widest, Flood Zone 3 spans approximately 300m and extends on both sides of the river.

The main source of flood risk across this broad area is from surface water. However, surface water flow routes are well defined and mostly along small drains. The Crayford to Lewisham railway line acts as a barrier to flow, leaving the area south of the railway line in Sidcup and the area north of the railway line in Bexley Village as critical drainage areas.

All proposed developments within a critical drainage area, as well as those exceeding 1ha outside of critical drainage areas, will need to be accompanied by a site-specific FRA. The FRA needs to set out how surface

water flood risk will be managed following best practice, such as avoidance of development in areas of high risk, use of SuDS, and thus ensuring the development will not increase flood risk elsewhere. The best way to achieve this, will be to ensure existing surface water flow routes are maintained and managed on their way through the railway line.

The corridor around the River Shuttle downstream of Lamorbey Park reservoir and the corridor along Elmwood Drive in Bexley are at risk of flooding in the event of a breach. Proposed developments in areas of reservoir flood risk will need to be accompanied by a site-specific FRA. The FRA needs to demonstrate how the development will be kept safe in the event of reservoir flooding through the use of warning systems and evacuation procedures.

There is no risk of tidal flooding due to the absence of tidal rivers or the coast.

# 3. Level 2 flood risk screening

## 3.1 Site selection

3.1.1 A total of 24 potential Local Plan site allocations (2026-2036) have been assessed in this Level 2 SFRA update; the sites are listed in Appendix A as part of the screening exercise. These are potential development sites for the Bexley Local Plan[2], including the release of some Strategic Industrial Land (SIL) and Locally Significant Industrial Sites (LSIS) for residential development.

## 3.2 Screening approach

3.2.1 The 24 potential Local Plan site allocations (2026-2036) identified underwent an initial screening exercise. Sites were screened to fall into one of the following categories and put forward for the detailed site assessments (Section 4), assigned advisory commentary for site-specific Flood Risk Assessment (FRA), or identified as not requiring an FRA, based on their category:

- **Category 1**: Development at the site requires a site-specific FRA, as the site is at risk of fluvial or tidal flooding, or at risk of reservoir flooding. A more detailed assessment was undertaken and is described in Section 4. Advisory commentary is provided in the screening table (Table 3.3 and Appendix A), and a detailed summary sheet for each site in category 1 is available in Appendix B.
- **Category 2**: Development at the site requires a site-specific FRA due to exceeding medium or high risk of surface water flooding, or there are records of historic flooding. A more detailed assessment was undertaken and is described in Section 4. Advisory commentary is provided in the screening table (Table 3.3 and Appendix A), and a detailed summary sheet for each site in category 2 is available in Appendix B
- **Category 3**: Development at the site requires a site-specific FRA, as the site lies within an area with critical drainage problems. Advisory commentary is provided in the screening table (Table 3.3 and Appendix A).
- **Category 4**: Development at site requires a site-specific FRA, solely due to the site area exceeding 1ha. The site is at low risk of surface water flooding only, does not lie within a Critical Drainage Area and there are no records of historic flooding. Advisory commentary is provided in the screening table (Table 3.3 and Appendix A).
- **Category 5**: Development at site does not require a site-specific FRA, as the site is less than 1 ha in size, there is no risk of flooding from any sources, and the site has not been identified by the LBB as having critical drainage problems. Advisory commentary is provided in the screening table (Table 3.3).

[2] Draft Local Plan Regulation 19 Stage Proposed Submission Document, 2021

3.2.2 The screening is based on the data sources listed in Table 3.1.

Table 3.1 GIS data used to inform the flood risk screening

| Data | Source, Date | Element used for screening |
|---|---|---|
| **Site boundaries** | LBB, 2020 | Area exceeding 1 ha |
| **EA Flood Zones** | EA via LBB, 2019 | Flood Zone 2 or 3 present |
| **Future EA Flood Zone 3 (with climate change)** | EA via LBB, 2019 | Future Flood Zone 3 present |
| **Risk of surface water flooding** | EA via LBB, 2019 | Any mapped risk of surface water flooding |
| **Risk of flooding from reservoirs** | EA web mapping service, 2020 | Any mapped risk of flooding from reservoir failure |
| **Critical Drainage Areas** | EA via LBB, 2011 | Site wholly or partially within a Critical Drainage Area |
| **Historical flooding from all sources** | LBB, 2018 | Historical flooding recorded at site |

## 3.3 Screening results

3.3.1 The screening assigns one of the five categories to each of the 24 sites. Table 3.2 and Table 3.3 provides a summary. Of the 24 sites 23 fall into category 1, 2, 3 or 4 all require a site-specific FRA to be undertaken prior to seeking permission for development.

3.3.2 Sites at risk of fluvial, tidal and/or reservoir flooding (category 1) make up the largest group with 15 sites, followed by sites exposed to medium or high risk of surface water flooding, or where there are records of historic flooding (category 2) with 6 sites. Detailed summary sheets have been prepared advising on sources of flooding and giving recommendations on managing flood risk for these 21 sites, as explained in Section 4. The summary sheets are provided in Appendix B.

3.3.3 There are 2 sites that are not exposed to a particular flood hazard but are located within a critical drainage area (category 3). The careful management of surface water is crucial for all category 3 sites, and SuDS should be used to ensure development of the site does not increase flood risk elsewhere. On the contrary, category 3 sites provide an opportunity to improve drainage problems more widely in the borough.

3.3.4 The remaining site falls into category 5, as it is located wholly within Flood Zone 1 and has no indication or history of flooding from any sources other than a low risk of surface water flooding. However, it is recommended that SuDS (e.g. permeable paving, rainwater harvesting, green roofs and walls) be considered and incorporated where possible within the developments.

3.3.5 The outcomes of the flood risk screening enable the application of the sequential test. The full screening process is provided in Appendix A.

Table 3.2 Results of Level 2 SFRA flood risk screening – Summary

| Screening Category | Number of sites | Site IDs | Flood characteristics | FRA required? | Detailed summary sheet (Appendix B)? |
|---|---|---|---|---|---|
| **1** | 15 | MS23, MS24, MS26, MS27, MS28, MS29, MS32, MS33, MS34, MS36, MS39, MS40, MS48, MS49, AS58 | at risk of fluvial, tidal and/or reservoir flooding | Yes | Yes |

| Screening Category | Number of sites | Site IDs | Flood characteristics | FRA required? | Detailed summary sheet (Appendix B)? |
|---|---|---|---|---|---|
| **2** | 6 | MS12, MS17, MS37, MS38, MS54, AS56 | medium or high risk of surface water flooding, or there are records of historic flooding | Yes | Yes |
| **3** | 2 | MS18, MS22 | within a critical drainage area | Yes | No |
| **4** | 0 | | site area exceeds 1 ha, not at particular risk of flooding, except possibly at low risk of surface water flooding | Yes | No |
| **5** | 1 | MS15 | low risk of surface water flooding only | No | No |

Table 3.3 Results of Level 2 SFRA flood risk screening – Site list with screening category and commentary

| Site ID | Local Plan Ref | Site name / address | Category | Advisory commentary |
|---|---|---|---|---|
| **MS48** | Reg19:SA1<br>Reg18:TA002 | ABW01<br>Felixstowe Road Car Park, Felixstowe Road, Abbey Wood | 1 | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |
| **MS49** | Reg19:SA2<br>Reg18:TA003 | ABW02<br>Lesnes Estate and Coraline Walk | 1 | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |
| **MS23** | Reg19:SA3<br>Reg18:BV001 | BEL01<br>ASDA and B&Q Belvedere, Lower Road, Belvedere | 1 | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |
| **MS24** | Reg19:SA4<br>Reg18:BV002 | BEL02<br>Station Road East, Station Road, Belvedere | 1 | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |
| **MS26** | Reg19:SA5<br>Reg18:BV004 | BEL03<br>Station Road West, Station Road, Belvedere | 1 | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |
| **AS56** | Reg19:SA6<br>Reg18:BV013 | BEL04<br>Land adjacent Woodside School, Halt Robin Road, Belvedere | 2 | Parts of the site are at high risk of flooding from surface water. The site lies wholly or partly within an area identified as having critical drainage problems. A site-specific FRA is required to support a development application. The FRA needs to set out how surface water flood risk will be managed following best practice, such as avoidance of development in areas of high risk and ensuring the development will not increase flood risk elsewhere. |
| **MS27** | Reg19:SA7<br>Reg18:BV007 | BEL05<br>Belvedere Gas Holders, Yarnton Way, Belvedere | 1 | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |

| | | | | |
|---|---|---|---|---|
| **MS28** | Reg19:SA8<br>Reg18:BV010 | BEL06<br>Monarch Works, Station Road North, Belvedere | 1 | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |
| **MS29** | Reg19:SA9<br>Reg18:BV012 | BEL07<br>Crabtree Manorway South, Belvedere | 1 | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |
| **MS36** | Reg19:SA10<br>Reg18:ER006 | ERI01<br>Erith Western Gateway, Saltford Close, Erith | 1 | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |
| **MS37** | Reg19:SA11<br>Reg18:ER007 | ERI02<br>Pier Road West, Bexley Road, Pier Road and Queen Street, Erith | 2 | Parts of the site are at high risk of flooding from surface water. The site lies wholly or partially within an area identified at risk of reservoir flooding. A site-specific FRA is required to support a development application. The FRA needs to set out how surface water flood risk will be managed following best practice, such as avoidance of development in areas of high risk, use of SuDS and thus ensuring the development will not increase flood risk elsewhere. |
| **MS38** | Reg19:SA12<br>Reg18:ER008 | ERI03<br>Pier Road East, Bexley Road and Pier Road, Erith | 2 | Parts of the site are at high risk of flooding from surface water. The site lies wholly or partially within an area identified at risk of reservoir flooding. A site-specific FRA is required to support a development application. The FRA needs to set out how surface water flood risk will be managed following best practice, such as avoidance of development in areas of high risk, use of SuDS and thus ensuring the development will not increase flood risk elsewhere. |
| **MS40** | Reg19:SA13<br>Reg18:ER012 | ERI04<br>Erith Riverside, Wheatley Terrace Road | 1 | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |
| **MS39** | Reg19:SA14<br>Reg18:ER011 | ERI05<br>Morrisons, James Watt Way, Erith | 1 | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |
| **MS12** | Reg19:SA15<br>Reg18:BH002 | BXH01<br>Former Bexley CCG Offices and GP Practice, Erith Road, Barnehurst | 2 | Parts of the site are at high risk of flooding from surface water. The site lies wholly or partially within an area identified at risk of reservoir flooding. A site-specific FRA is required to support a development application. The FRA needs to set out how surface water flood risk will be managed following best practice, such as avoidance of development in areas of high risk, use of SuDS and thus ensuring the development will not increase flood risk elsewhere. |
| **MS15** | Reg19:SA16<br>Reg18:BH005 | BXH02<br>Bexleyheath Town Centre East, Broadway, Bexleyheath | 5 | Development at site does not require a site-specific FRA, as the site is less than 1ha in size, there is no known risk of flooding from any sources, and the site has not been identified as having critical drainage problems. However, it is recommended that SuDS (e.g. permeable paving, rainwater harvesting, green roofs and walls) be considered and incorporated where possible within the development. |

| | | | | |
|---|---|---|---|---|
| **MS17** | Reg19:SA17<br>Reg18:BH010 | BXH03<br>EDF Energy Site, Broadway, Bexleyheath | 2 | Parts of the site are at high risk of flooding from surface water. The site lies wholly or partially within an area identified at risk of reservoir flooding. A site-specific FRA is required to support a development application. The FRA needs to set out how surface water flood risk will be managed following best practice, such as avoidance of development in areas of high risk, use of SuDS and thus ensuring the development will not increase flood risk elsewhere. |
| **MS22** | Reg19:SA18<br>Reg18:BH016 | BXH04<br>Buildbase, Pickford Lane, Bexleyheath | 3 | The site lies wholly or partly within an area identified as having critical drainage problems. A site-specific FRA is required to support a development application. The FRA needs to set out how surface water flood risk will be managed following best practice, such as avoidance of development in areas of high risk, use of SuDS, and thus ensuring the development will not increase flood risk elsewhere. |
| **MS18** | Reg19:SA19<br>Reg18:BH012 | BXH05<br>Pepper's Builders Merchants, Rowan Road, Bexleyheath | 3 | The site lies wholly or partly within an area identified as having critical drainage problems. A site-specific FRA is required to support a development application. The FRA needs to set out how surface water flood risk will be managed following best practice, such as avoidance of development in areas of high risk, use of SuDS, and thus ensuring the development will not increase flood risk elsewhere. |
| **MS54** | Reg19:SA20<br>Reg18:BH001 | BXH06<br>Land behind Belvedere Road, Bexleyheath | 2 | The site area exceeds 1ha. Parts of the site are at high risk of flooding from surface water. The site lies wholly or partly within an area identified as having critical drainage problems. A site-specific FRA is required to support a development application. The FRA needs to set out how surface water flood risk will be managed following best practice, such as avoidance of development in areas of high risk, use of SuDS and thus ensuring the development will not increase flood risk elsewhere. |
| **MS34** | Reg19:SA21<br>Reg18:CR005 | CRA01<br>Former Electrobase/Wheatsheaf Works, Maxim Road, Crayford | 1 | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |
| **AS58** | Reg19:SA22<br>Reg18:CR001 | CRA02<br>Tower Retail Park, Tower Park Road, Crayford | 1 | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |
| **MS32** | Reg19:SA23<br>Reg18:CR003 | CRA03<br>Sainsbury's Crayford, Stadium Way | 1 | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |
| **MS33** | Reg19: N/A<br>Reg18:CR004 | CRA04 Crayford Greyhound Stadium | 1 | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |

# 4. Level 2 detailed site assessments

4.1.1 The detailed flood risk assessments are presented in the form of standardised summary sheets in Appendix B. A summary sheet was created for each of the 21 sites that were assessed in further detail, after having been screened into either category 1 or category 2. The summary sheets provide the following information (data permitting):

- Description (including mapping) of flood risk to the site from all sources, including details (where available) of:
  - Flood depth;
  - Flood Level;
  - Flood hazard; and
  - Time to inundation.
- Impact of site development on flood risk if no mitigation in place;
- Comment on sequential and exception testing;
- Effect of Climate Change;
- Comment on potential flood risk mitigation measures;
- Comment on SuDS strategy;
- Comment on development type suitability; and
- Requirements for site-specific Flood Risk Assessment.

4.1.2 The Level 2 detailed site assessments are based on the sources of flood risk information presented in the Level 1 report (see Section 3 and Appendix A), no new data has been generated.

# 5. Guidance for site-specific Flood Risk Assessments

5.1.1 The SFRA provides extensive information to support the preparation of a site-specific Flood Risk Assessment (FRA) within the London Borough of Bexley. This section signposts the reader to the relevant information within the Level 1 and Level 2 SFRA reports. In addition, all proposed development needs to adhere to NPPF and the accompanying planning practice guidance[3].

## 5.2 Screening for requirement of site-specific FRA

5.2.1 For allocated sites, Table 3.3 details the screening category. Sites falling into categories 1, 2 or 3 require an FRA. The commentary of each site provides further detail on the prominent sources of flood risk and how these should be addressed in the FRA. Detailed site assessments are available in Appendix B for sites falling into categories 1 or 2, except where the only stipulation for needing an FRA is the coincidence with a Critical Drainage Area.

5.2.2 For windfall sites, which are sites becoming available for development unexpectedly, developers should use the information given in the Level 1 report to help decide if a site-based FRA is required.

- Criteria for requiring an FRA: see Level 1 report, table 8.1. Overview of flood risk in the borough to inform risk at windfall sites: see Level 1 report, Section 3 & Appendix A (maps).

## 5.3 Scope of FRA

5.3.1 Site-specific FRAs should accurately define the baseline flood risk at development sites, infilling gaps in the understanding of flood risk as necessary to assess the risk to proposed development. This information can be assessed against the characteristics and vulnerability of the proposed development to understand the potential consequences and to inform the appropriate flood risk mitigation measures to manage flood risk. The FRA requirements are intended to ensure that development at each site is consistent with policy recommendations and the latest climate change allowances.

5.3.2 The SFRA contains ample guidance to help prospective developers to produce a complying FRA. The reader is referred to the following sections in the Level 1 and Level 2 reports:

- Minimum requirements for site-specific FRAs: see Level 1 report, Section 8.2.
- Background information and flood risk policy for developments within London Borough of Bexley: see Level 1 report, Section 2.
- Climate change policy and how to account for climate change within an FRA: see Level 1 report, Section 4. Also liaise with the EA for the most up to date guidance and allowances, as climate change science is a rapidly developing field.
- The FRA needs to adhere to the sequential approach: see Level 1 report, Section 5.

[3] National Planning Practice Guidance, accessed 26/05/2020 at 19.00 GMT, https://www.gov.uk/guidance/flood-risk-and-coastal-change

- Sustainable Drainage Systems (SuDS, e.g. permeable paving, rainwater harvesting, green roofs and walls) should be considered and incorporated where possible within the development. Detailed guidance is included in the Level 1 report, Section 7 & Appendix B.
- For allocated sites, the respective summary sheet in this Level 2 report, Appendix B provide a starting point for the production of the FRA. The summary sheets contain flood risk management recommendations for each site, which are key considerations for the site in question. However, application of these principles is good practice for all new developments, including windfall sites, which become available unexpectedly. The measures are intended to guide the approach to managing flood risk at the site from the earliest stages of site assessment, through to finalisation of the masterplan and development form.

## 5.4 Exception Test

5.4.1 In some exceptional circumstances development within higher risk zones may be unavoidable. In these cases, the Exception Test must be passed. The guidance in this chapter should be considered in conjunction with:

- The guidance on the Exception Test in the Level 1 report, Section 6.2, and
- The guidance on development controls see the Level 1 report, Section 6.3.

5.4.2 Developments are classified according to their flood risk vulnerability as set out in Table 2 (see Level 1 Report, Table D.2) of the NPPF planning guidance on Flood Risk and Coastal Change. The allocations assessed in this SFRA fall into two of the five vulnerability classes. The planned residential developments are classed as 'More Vulnerable' as they will provide permanent residential homes. The mixed use allocations will also fall into the 'More Vulnerable' class even though shops, restaurants, office space, and similar non-residential developments alone are classified as 'Less Vulnerable'. Table 3 of the NPPF guidance combines the information in Tables 1 and 2 of the guidance to provide flood risk vulnerability and flood zone 'compatibility' matrix as shown in Table 5.1.

Table 5.1 Flood Risk Vulnerability and Flood Zone 'Compatibility'

| Flood Zones | Highly Vulnerable Development | More Vulnerable (Residential, Mixed Use) | Less Vulnerable (Commercial) |
|---|---|---|---|
| **1** - Land having a less than 1 in 1,000 (0.1%) AEP of river or sea flooding | ✓ | ✓ | ✓ |
| **2** - Land having between a 1 in 100 (1%) and 1 in 1,000 (0.1%) AEP of river flooding; or land having between a 1 in 200 and 1 in 1,000 AEP of sea flooding | Exception Test required | ✓ | ✓ |
| **3a** - Land having a 1 in 100 (1%) or greater AEP of river flooding; or Land having a 1 in 200 (0.5%) or greater AEP of sea flooding. | ✗ | Exception Test required | ✓ |
| **3b** - This zone comprises land where water has to flow or be stored in times of flood. For the purposes of this report, and where appropriate modelling outputs are available, it has been defined as land having a less than or equal to 1 in 20 (5%) AEP risk of river or sea flooding. | ✗ | ✗ | ✗ |

Where: ✓ indicates development is appropriate and ✗ indicates development is inappropriate. The full table is provided in the NPPF.

### Application of the Exception Test

5.4.3 The Summary Sheets provided in Appendix B provide an overview of flooding from all sources, the baseline risk information and safe development recommendations that can be used to establish the likely type and scale of mitigation measures that will be required to make a site safe for habitation.

5.4.4 The Exception Test recognises that there will be some exceptional circumstances when development within higher risk zones is unavoidable. The allocation of necessary development must still follow the sequential approach and where exceptions are proposed, the Exception Test must be satisfied when the development is classified as:

- highly vulnerable and in flood zone 2;
- essential infrastructure in flood zone 3a or 3b; and
- more vulnerable in flood zone 3a.

### Passing the Exception Test

5.4.5 NPPF states that the Exception Test should only be undertaken after the Sequential Test has been applied. The successfully applied Sequential Test must demonstrate that there are no other reasonably alternative sites available in zones of lower flood risk. The allocation of the site by the London Borough of Bexley for residential purposes confirms that the Sequential Test for the Site has been passed.

5.4.6 Once the Sequential Test has been applied and passed, NPPF requires the following criteria to be met to pass the Exception Test:

- it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and
- a site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

5.4.7 Both elements of the test will have to be passed for development to be permitted. The London Borough of Bexley should be approached for information supporting the evidencing of the application of the Sequential Test during the site allocation process.

# Appendix A
# Flood Risk Screening

| Local Plan Ref | Site ID | Site Name/Address | Site Area | Sustainable Development Location | Site size >1ha? | Site within Fluvial/Tidal Flood Zone 2 or 3? | Site within Future Flood Zone 3? | Watercourse on site? | Flood defence on site? | Site within area at high risk of pluvial flooding (>3.3%AEP)? | Site history of pluvial flooding? | Site within a critical drainage area? | Site at risk of other sources of flooding? | FRA required? | Exception Test required? | Detailed Site Summary? | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SA1** | **MS48** | ABW01 Felixstowe Road Car Park, Felixstowe Road, Abbey Wood | 0.545 | Abbey Wood Station and Local Centre | NO | YES | NO | YES | NO | YES | NO | YES | NO | **YES** | **Yes** | **YES** | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |
| **SA2** | **MS49** | ABW02 Lesnes Estate and Coraline Walk | 11.07 | Thamesmead and Abbeywood OA | YES | YES | NO | NO | NO | YES | YES | YES | NO | **YES** | **YES** | **YES** | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |
| **SA3** | **MS23** | BEL01 ASDA and B&Q Belvedere, Lower Road, Belvedere | 3.315 | Belvedere Station and District Centre | YES | YES | NO | NO | NO | YES | NO | YES | NO | **YES** | **Yes** | **YES** | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |
| **SA4** | **MS24** | BEL02 Station Road East, Station Road, Belvedere | 0.63 | Belvedere Station and District Centre | NO | YES | NO | NO | NO | YES | NO | YES | NO | **YES** | **Yes** | **YES** | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |
| **SA5** | **MS26** | BEL03 Station Road West, Station Road and Picardy Street, Belvedere | 0.304 | Belvedere Station and District Centre | NO | YES | NO | NO | NO | YES | YES | YES | NO | **YES** | **Yes** | **YES** | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |
| **SA6** | **AS56** | BEL04 Land adjacent Woodside School, Halt Robin Road, Belvedere | 1.32 | Belvedere Station and District Centre | YES | NO | NO | NO | NO | YES | NO | YES | NO | **YES** | No | **YES** | Parts of the site are at high risk of flooding from surface water. The site lies wholly or partly within an area identified as having critical drainage problems. A site-specific FRA is required to support a development application. The FRA needs to set out how surface water flood risk will be managed following best practice, such as avoidance of development in areas of high risk and ensuring the development will not increase flood risk elsewhere. |
| **SA7** | **MS27** | BEL05 Belvedere Gas Holders, Yarnton Way, Belvedere | 3.48 | Belvedere Station and District Centre | YES | YES | NO | NO | NO | YES | NO | YES | NO | **YES** | **Yes** | **YES** | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |
| **SA8** | **MS28** | BEL06 Monarch Works, Station Road North, Belvedere | 0.63 | Belvedere Station and District Centre | NO | YES | NO | NO | NO | YES | NO | YES | NO | **YES** | **Yes** | **YES** | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |
| **SA9** | **MS29** | BEL07 Crabtree Manorway South, Belvedere | 5.971 | Belvedere Station and District Centre | YES | YES | NO | YES | NO | YES | NO | YES | NO | **YES** | **Yes** | **YES** | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |
| **SA10** | **MS36** | ERI01 Erith Western Gateway, Saltford Close, Erith | 3 | Erith Station and District Centre | YES | YES | NO | NO | NO | YES | NO | YES | NO | **YES** | **Yes** | **YES** | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |
| **SA11** | **MS38** | ERI02 Pier Road West, Bexley Road, Pier Road and Queen Street, Erith | 1.391 | Erith Station and District Centre | YES | NO | NO | NO | NO | YES | NO | YES | NO | **YES** | No | **YES** | Parts of the site are at high risk of flooding from surface water. The site lies wholly or partially within an area identified at risk of reservoir flooding. A site-specific FRA is required to support a development application. The FRA needs to set out how surface water flood risk will be managed following best practice, such as avoidance of development in areas of high risk, use of SuDS and thus ensuring the development will not increase flood risk elsewhere. |
| **SA12** | **MS37** | ERI03 Pier Road East, Bexley Road and Pier Road, Erith | 0.841 | Erith Station and District Centre | NO | NO | NO | NO | NO | YES | NO | YES | NO | **YES** | No | **YES** | Parts of the site are at high risk of flooding from surface water. The site lies wholly or partially within an area identified at risk of reservoir flooding. A site-specific FRA is required to support a development application. The FRA needs to set out how surface water flood risk will be managed following best practice, such as avoidance of development in areas of high risk, use of SuDS and thus ensuring the development will not increase flood risk elsewhere. |
| **SA13** | **MS40** | ERI04 Erith Riverside, Wheatley Terrace Road, Erith | 2.62 | Erith Station and District Centre | YES | YES | NO | NO | NO | YES | NO | YES | NO | **YES** | **Yes** | **YES** | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |
| **SA14** | **MS39** | ERI05 Morrisons Erith, James Watt Way, Erith | 3.19 | Erith Station and District Centre | YES | YES | NO | NO | NO | YES | NO | YES | NO | **YES** | **Yes** | **YES** | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |

| Local Plan Ref | Site ID | Site Name/Address | Site Area | Sustainable Development Location | Site size >1ha? | Site within Fluvial/Tidal Flood Zone 2 or 3? | Site within Future Flood Zone 3? | Watercourse on site? | Flood defence on site? | Site within area at high risk of pluvial flooding (>3.3%AEP)? | Site history of pluvial flooding? | Site within a critical drainage area? | Site at risk of other sources of flooding? | FRA required? | Exception Test required? | Detailed Site Summary? | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SA15** | **MS12** | BXH01 Former Bexley CCG Offices, Erith Road, Barnehurst | 1.85 | Barnehurst Station | YES | NO | NO | NO | NO | YES | NO | YES | NO | **YES** | No | **YES** | Parts of the site are at high risk of flooding from surface water. The site lies wholly or partially within an area identified at risk of reservoir flooding. A site-specific FRA is required to support a development application. The FRA needs to set out how surface water flood risk will be managed following best practice, such as avoidance of development in areas of high risk, use of SuDS and thus ensuring the development will not increase flood risk elsewhere. |
| **SA16** | **MS15** | BXH02 Bexleyheath Town Centre East, Broadway, Bexleyheath | 0.81 | Bexleyheath Major Town Centre | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO | No | NO | Development at site does not require a site-specific FRA, as the site is less than 1ha in size, there is no known risk of flooding from any sources, and the site has not been identified as having critical drainage problems. However, it is recommended that SuDS (e.g. permeable paving, rainwater harvesting, green roofs and walls) be considered and incorporated where possible within the development. |
| **SA17** | **MS17** | BXH03 EDF Energy Site, Broadway, Bexleyheath | 1.482 | Bexleyheath Major Town Centre | YES | NO | NO | NO | NO | YES | NO | YES | NO | **YES** | NO | **YES** | Parts of the site are at high risk of flooding from surface water. The site lies wholly or partially within an area identified at risk of reservoir flooding. A site-specific FRA is required to support a development application. The FRA needs to set out how surface water flood risk will be managed following best practice, such as avoidance of development in areas of high risk, use of SuDS and thus ensuring the development will not increase flood risk elsewhere. |
| **SA18** | **MS22** | BXH04 Buildbase Bexleyheath, Pickford Lane, Bexleyheath | 0.302 | Bexleyheath Station and Local Centre | NO | NO | NO | NO | NO | NO | NO | YES | NO | **YES** | No | NO | The site lies wholly or partly within an area identified as having critical drainage problems. A site-specific FRA is required to support a development application. The FRA needs to set out how surface water flood risk will be managed following best practice, such as avoidance of development in areas of high risk, use of SuDS, and thus ensuring the development will not increase flood risk elsewhere. |
| **SA19** | **MS18** | BXH05 Pepper's Builders Merchants, Rowan Road, Bexleyheath | 0.282 | Bexleyheath Station and Local Centre | NO | NO | NO | NO | NO | NO | NO | YES | NO | **YES** | No | NO | The site lies wholly or partly within an area identified as having critical drainage problems. A site-specific FRA is required to support a development application. The FRA needs to set out how surface water flood risk will be managed following best practice, such as avoidance of development in areas of high risk, use of SuDS, and thus ensuring the development will not increase flood risk elsewhere. |
| **SA20** | **MS54** | BXH06 Land behind Belvedere Road, Bexleyheath | 1.344 | Bexleyheath Station and Local Centre | YES | NO | NO | NO | NO | YES | NO | YES | NO | **YES** | No | **YES** | The site area exceeds 1ha. Parts of the site are at high risk of flooding from surface water. The site lies wholly or partly within an area identified as having critical drainage problems. A site-specific FRA is required to support a development application. The FRA needs to set out how surface water flood risk will be managed following best practice, such as avoidance of development in areas of high risk, use of SuDS and thus ensuring the development will not increase flood risk elsewhere. |
| **SA21** | **MS34** | CRA01 Former Electrobase/Wheatsheaf Works, Maxim Road, Crayford | 1.744 | Crayford Station and District Centre | YES | YES | YES | NO | NO | NO | NO | NO | YES | **YES** | **Yes** | **YES** | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |
| **SA22** | **AS58** | CRA02 Tower Retail Park, Tower Park Road, Crayford | 3.45 | Crayford Station and District Centre | YES | YES | YES | YES | NO | YES | YES | NO | YES | **YES** | **Yes** | **YES** | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |
| **SA23** | **MS32** | CRA03 Sainsbury's Crayford, Stadium Way, Crayford | 3.69 | Crayford Station and District Centre | YES | YES | YES | NO | NO | NO | NO | NO | YES | **YES** | **Yes** | **YES** | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |
| **N/A** | **MS33** | CRA04 Crayford Greyhound Stadium, Stadium Way, Crayford | 1.66 | Crayford Station and District Centre | YES | YES | YES | NO | NO | YES | YES | NO | YES | **YES** | **Yes** | **YES** | The site is at risk of fluvial or tidal flooding, as indicated by the presence of Flood Zone 2 and/or Flood Zone 3, or at risk of reservoir flooding. A site-specific FRA is required to support a development application. |

# Appendix B
# Detailed Flood Risk Assessment Summary Sheets

# Bexley Level 2 SFRA

Flood Risk Information Sheet

| General information | | | |
|---|---|---|---|
| ***Site name / address*** | **ABW01 Felixstowe Road Car Park, Felixstowe Road, Abbey Wood** | | |
| ***Site ID*** | MS48 | **Local Plan Reg19 Ref** | SA1 |
| **Sustainable development location** | Abbey Wood Station and Local Centre | **Area (ha)** | 0.545 |
| ***Allocation type*** | residential-led mixed use | | |
| | Mixed use % (A1-A5) | Residential % | Design led net capacity |
| | 25 | 75 | 90 |

| Baseline Flood Risk Summary | | | |
|---|---|---|---|
| ***Fluvial/Tidal*** | | | |
| ***Overview*** | | | |
| Source of risk | Tidal | Watercourse | Great Breach Dyke |
| % site in Flood Zone 1 | 0% | % site in Flood Zone 3a | 100% |
| % site in Flood Zone 2 | 0% | % site in Flood Zone 3b | 0% |
| Flood Defences | Yes | % site in ABD | 100% |
| ***Residual tidal flood risk from defence failure*** | | | |
| Present day max 1 in 200 AEP flood level (mAOD) | 1.87 | Future max 1 in 200 AEP flood level (mAOD) | 2.5 |
| Present day max 1 in 200 AEP flood hazard | Danger for most | Future day max 1 in 200 AEP flood hazard | Danger for all |
| ***Impact of climate change*** | Sea levels are predicted to rise with future climate change, consequently levels in the Tidal River Thames are also predicted to increase. As a result, in the event of a breach in the tidal flood defences in the future peak flood levels and flood hazard on site will increase. | | |
| ***Historical information*** | The site flooded in 1953 as a result of the storm surge flood event along the Tidal Thames. Since then extensive defences have been constructed along the Tidal Thames which offer a 0.1% standard of protection. | | |
| ***Contextual commentary*** | The EA Flood Zone map shows the site is 100% within Flood Zone 3a. The source of risk is tidal flooding from the River Thames. There is no risk of fluvial flooding.<br>The entire site is shown as being an area benefitting from defences as it is protected by the Thames Tidal defences to a SOP of 0.1%AEP. However, there remains a residual risk associated with a breach in these defences. The peak flood level associated with a breach in the defences will increase with climate change. In the case of a breach, the site is anticipated to flood up to 1.5m deep under present day conditions and up to 2m in future conditions (2115). The majority of the site is subject to Significant hazard, with isolated pockets of Extreme hazard anticipated under future conditions.<br>The associated residual risk map shows how the depths and hazard vary across the site and with climate change. | | |
| ***Surface Water*** | | | |
| ***Overview*** | | | |
| % site at high risk (1:30 AEP) | 7% | % site at low risk (1:1000 AEP) | 37% |
| % site at medium risk (1:100 AEP) | 24% | % site with no mapped risk | 31% |
| % site in critical drainage area | 100% | | |
| ***Impact of climate change*** | Rainfall intensity is predicted to increase with climate change. The increase in intensity will result in an increase in risk of flooding from surface water, resulting in increases in depth, extent and hazard of flooding. | | |
| ***Historical information*** | There is no evidence of the site flooding in the past. But a historic flood event has been recorded on the adjacent road to the south east of the site. | | |
| ***Contextual commentary*** | Detailed combined modelling of the Marsh Dykes suggests an area of surface water flooding in the eastern half of the site in 3.33% AEP and 1% AEP events, with a flow route along an adjacent road along the western edge of the site. The region of flood risk expands to cover the majority of the site in events greater than 1% AEP. | | |
| ***Other sources of flooding*** | | | |
| ***Contextual commentary*** | This area is shown to be potentially at risk of elevated groundwater levels. | | |

## Policy and Recommendations

### *Site suitability*

| | | | |
|---|---|---|---|
| ***Highest Flood Zone*** | Flood Zone 3a | ***Development vulnerability*** | More Vulnerable |
| ***Suitability*** | Yes | ***Exception Test required?*** | Yes |

### *Policy recommendations for flood risk management*

In accordance with NPPF PPG Tables 2 & 3 (reproduced in Appendix D of the Level 1 SFRA), mixed use development, where it contains residential development, is classed as more vulnerable and should not be permitted within FZ3a unless the exception test can be passed.
The Exception test would need to robustly demonstrate that the wider sustainability benefits outweigh flood risk, and that the development will be safe throughout its lifetime and will not increase flood risk elsewhere, including allowances for climate change.
In accordance with NPPF a site-specific FRA would be required as the site is in FZ3a, see Section 8 of the Level 1 SFRA details the requirements of an FRA.

### *Passing the exception test*

To pass the Exception test:
- it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and
-a site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

A number of factors which need to be considered when looking to pass the Exception test include:
- Design of development to manage and reduce flood risk wherever possible;
- Finished floor levels;
- Safe access and egress;
- Operation and maintenance;
- Resident awareness;
- Flood warning; and
- Evacuation procedures and funding arrangements.

See section 6 of the Level 1 SFRA for more information.

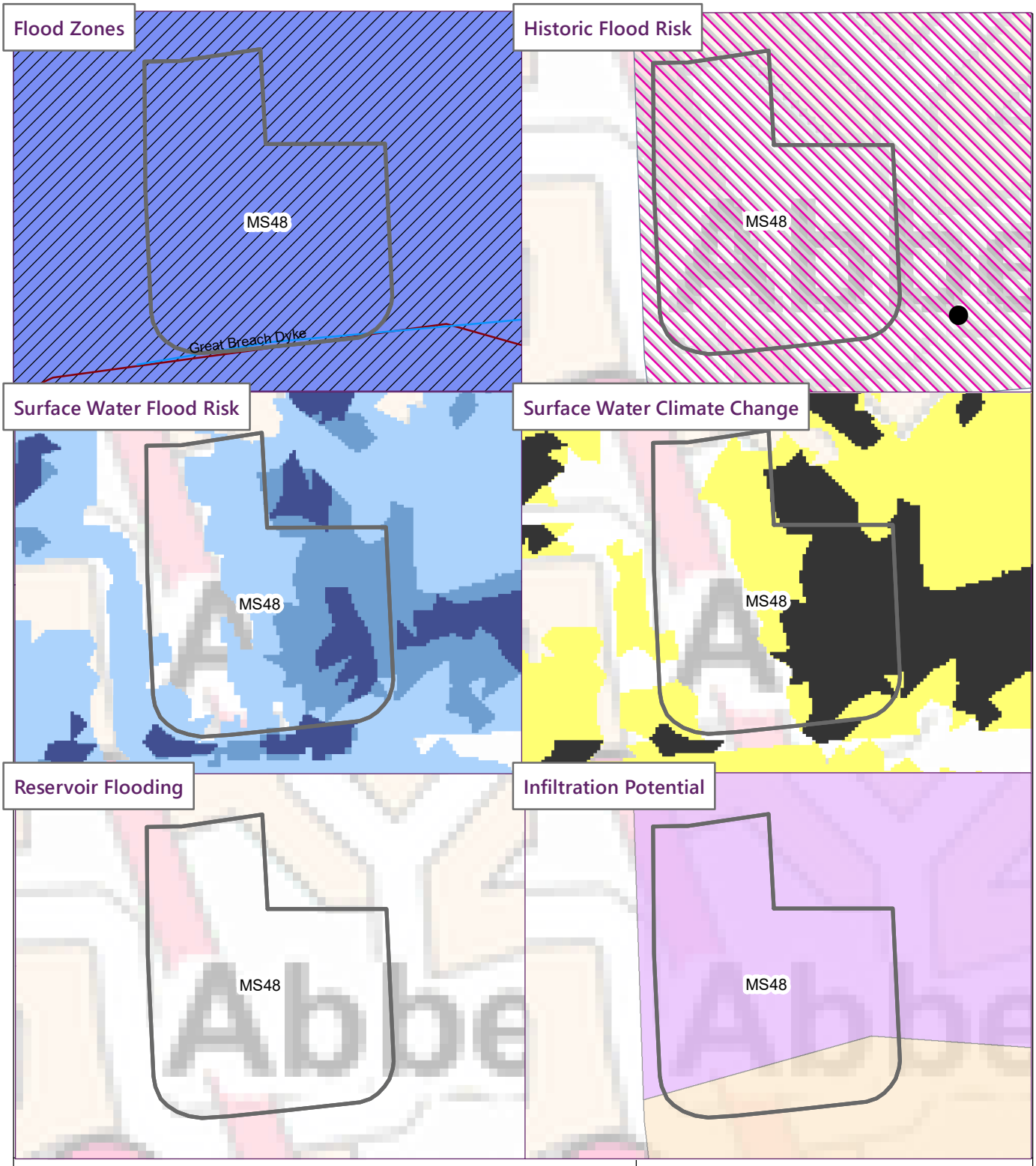
### *Site-Specific Recommendations for NPPF Compliant Development*

To make the development safe, the FRA should consider:
● Safe access and egress - noting that the current access road would flood deeply and significant hazard would develop in the event of breach in the tidal defences. The FRA may consider if safe shelter where residents would reside in situ until the flood water has receded within the building could be an option;
● Observing an 8m gap between the proposed development and the Great Breach Dyke watercourse. For work within this buffer zone, a Flood Risk Activity Permit will be required.
● Design of development to manage and reduce flood risk wherever possible, including siting all living accommodation above the maximum future (2115) flood level;
● Siting development in accordance with the sequential approach, placing the most vulnerable uses in the areas of least risk;
● Resident awareness;
● Flood warning - making use of breach modelling outputs to determine the time from the breach happening to the site being inundated; and
● Evacuation procedures and funding arrangements.
Further detail on the above points is given in the Level 1 SFRA, Section 6.3.

Development of housing should be directed away from areas of surface water flood risk across the site to preserve the existing surface water storage and flow routes so as not to increase flood risk elsewhere. Where development in areas of surface water flooding is unavoidable, surface water should be directed away from the housing, without increasing flood risk to 3rd parties and this should be detailed in a drainage strategy. The construction of the development should not exacerbate surface water flood risk in the wider critical drainage area. Sustainable drainage solutions should be implemented (see drainage management recommendations below).

Site investigations would be required to assess the risk of groundwater flooding.

| *Drainage Management Recommendations* |
| --- |
| Although the site is < 1ha it is within a critical drainage area, where surface water flooding is prevalent. Therefore, it will be imperative that surface water runoff is managed appropriately to ensure flood risk is not increased elsewhere. All feasible SuDS options should be assessed, whilst adhering to the SuDS hierarchy as set out in the Level 1 SRFA report (see chapter 7 and Appendix B of the Level 1 SFRA), although it is recognised that given the small size of the site options may be limited.<br>The site is currently developed, but betterment in surface water runoff should be sought ideally, and as such the greenfield runoff rate should be determined for the site using current best practice. This will allow for the appropriate sizing of attenuation and conveyance SuDS if feasible to ensure that sufficient space for drainage infrastructure is provided in developing site masterplans.<br>Infiltration would be the preferred method of partially/wholly discharging water from the site. The infiltration potential in this area is labelled as medium in the majority of the site, and high in the south, which alongside the underlying geology, could indicate that infiltration may be possible. Site investigations would be required to fully assess the feasibly of using infiltration SuDS techniques.<br>Drainage design should include recommended allowances for climate change.<br>The topography of the site should be taken in to consideration to ensure that gravity drainage is possible throughout the whole site. An appropriate discharge location should be identified (if not all infiltration) and appropriate consultations should be had. |




Key

LBB Site

**Flood Zone Summary**
- Main Rivers
- Ordinary Watercourses
- Flood defences (SoP over 1 in 100 year AEP)
- Flood Storage Areas
- Functional Floodplain
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

**Surface Water Flood Risk**
- 3.33% AEP Extent
- 1% AEP Extent
- 0.1% AEP Extent

**Risk of Flooding from Reservoirs Max Depth**
- < 0.3
- 0.3 - 2.0
- > 2.0

**Historic Flood Risk**

Recorded Flood Events Bexley Borough (1960-2019)
- Cause unrecorded
- Blocked Culvert
- Blocked Gulley
- Blocked Gully
- Burst Water Main
- Fluvial
- Groundwater
- Sewer
- Surface Water (Pluvial)
- Surface Water, Fluvial and Groundwater
- Surface and Fluvial
- Surface and Groundwater
- Surface and Sewer

Recorded flood outlines
- 1953 Event
- 1968 Event
- 1977 Event

**Surface Water Climate Change**
- 1% AEP
- Areas potentially vulnerable to climate change

**Infiltration Potential**
- High
- Med
- Low

0 — 100 m

Scale at A4: 1:1,735



Client

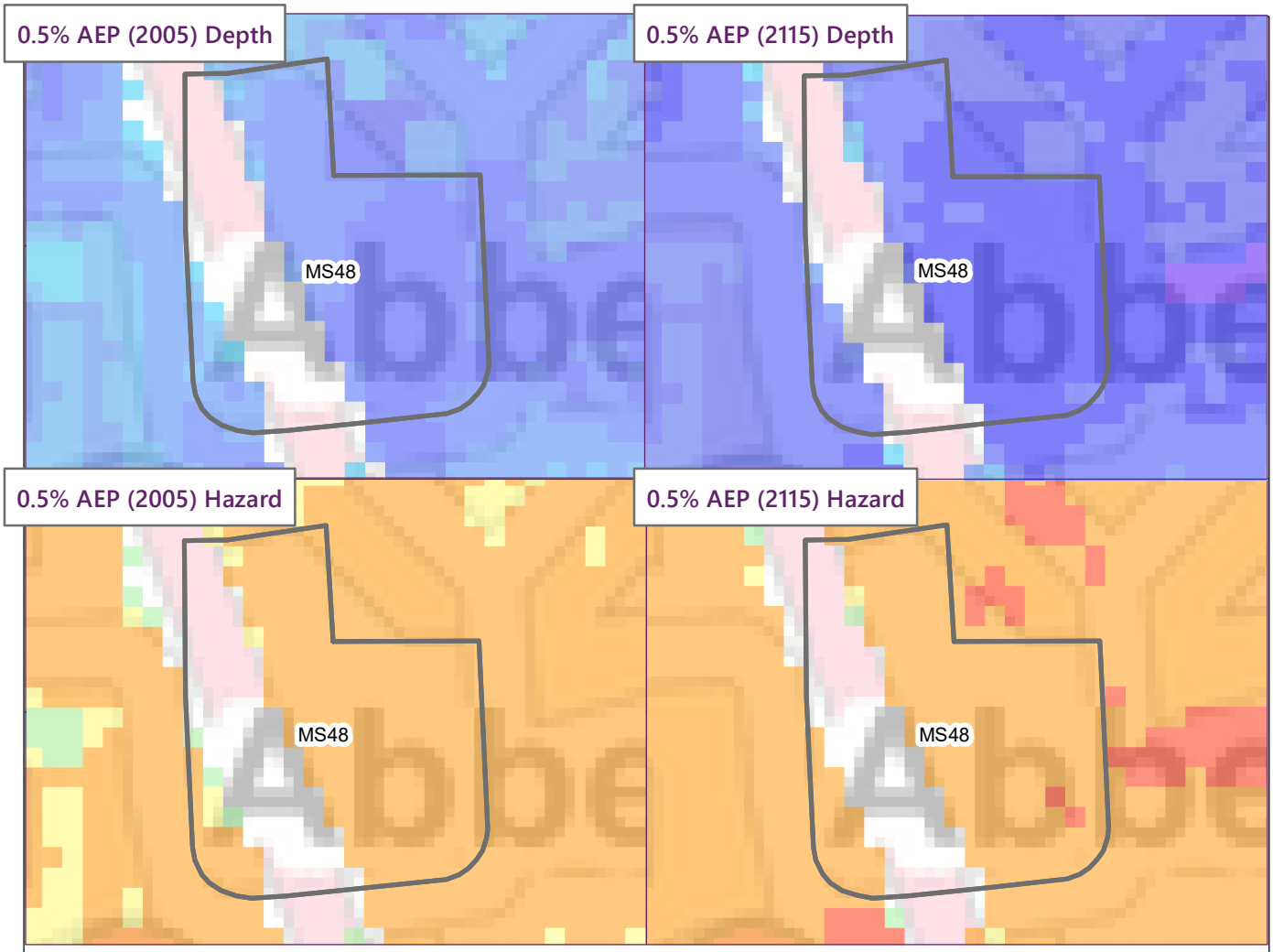
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS48**
**Flood Risk Overview Map**

October 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0 - 0.05
- 0.05 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- 3 - 3.5
- 3.5 - 4
- 4 - 5
- 5+

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 m

Scale at A4: 1:1,725



Client

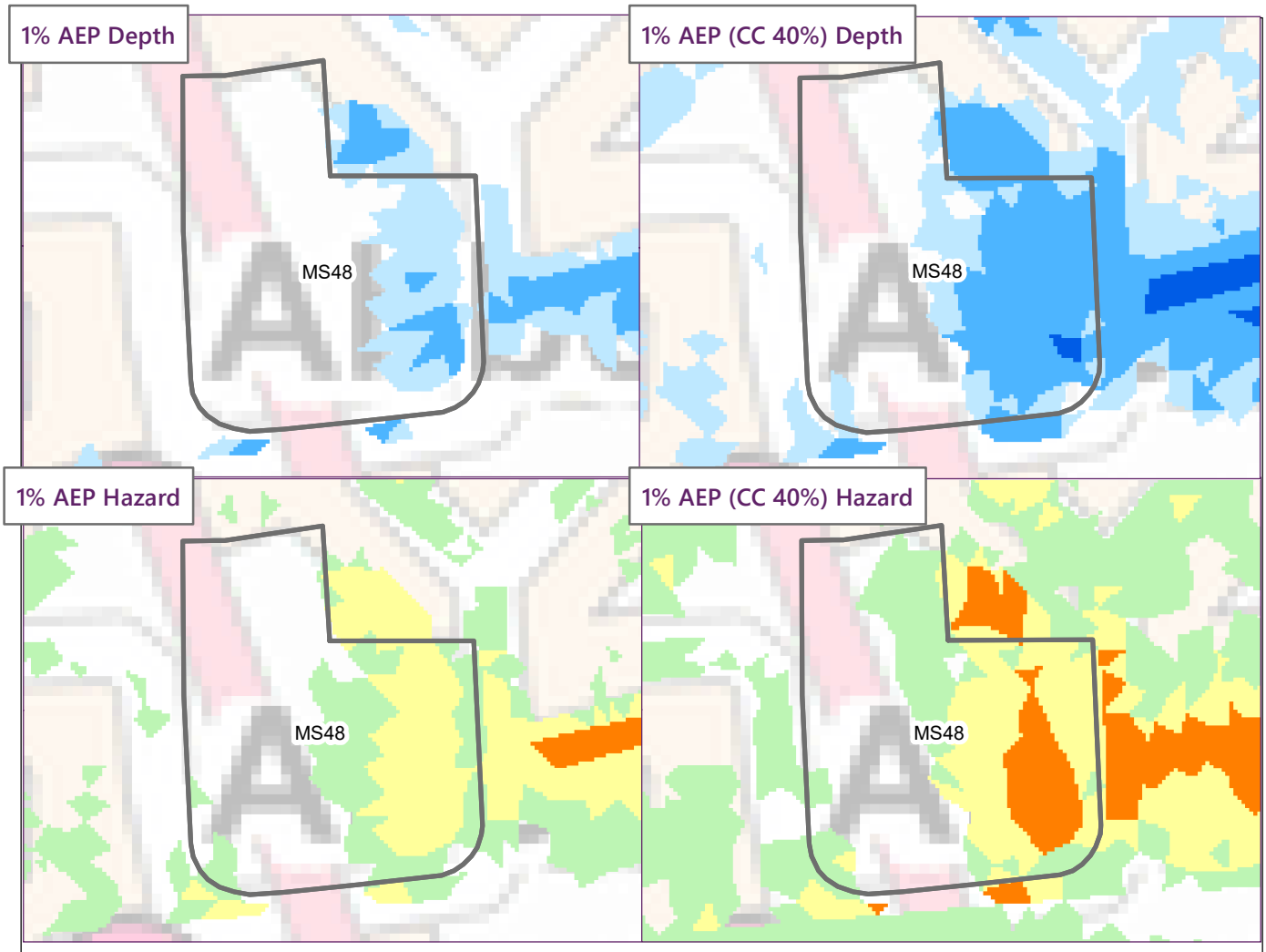
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS48**
**Residual tidal flood risk - River Thames**

June 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 m

Scale at A4: 1:1,740



Client

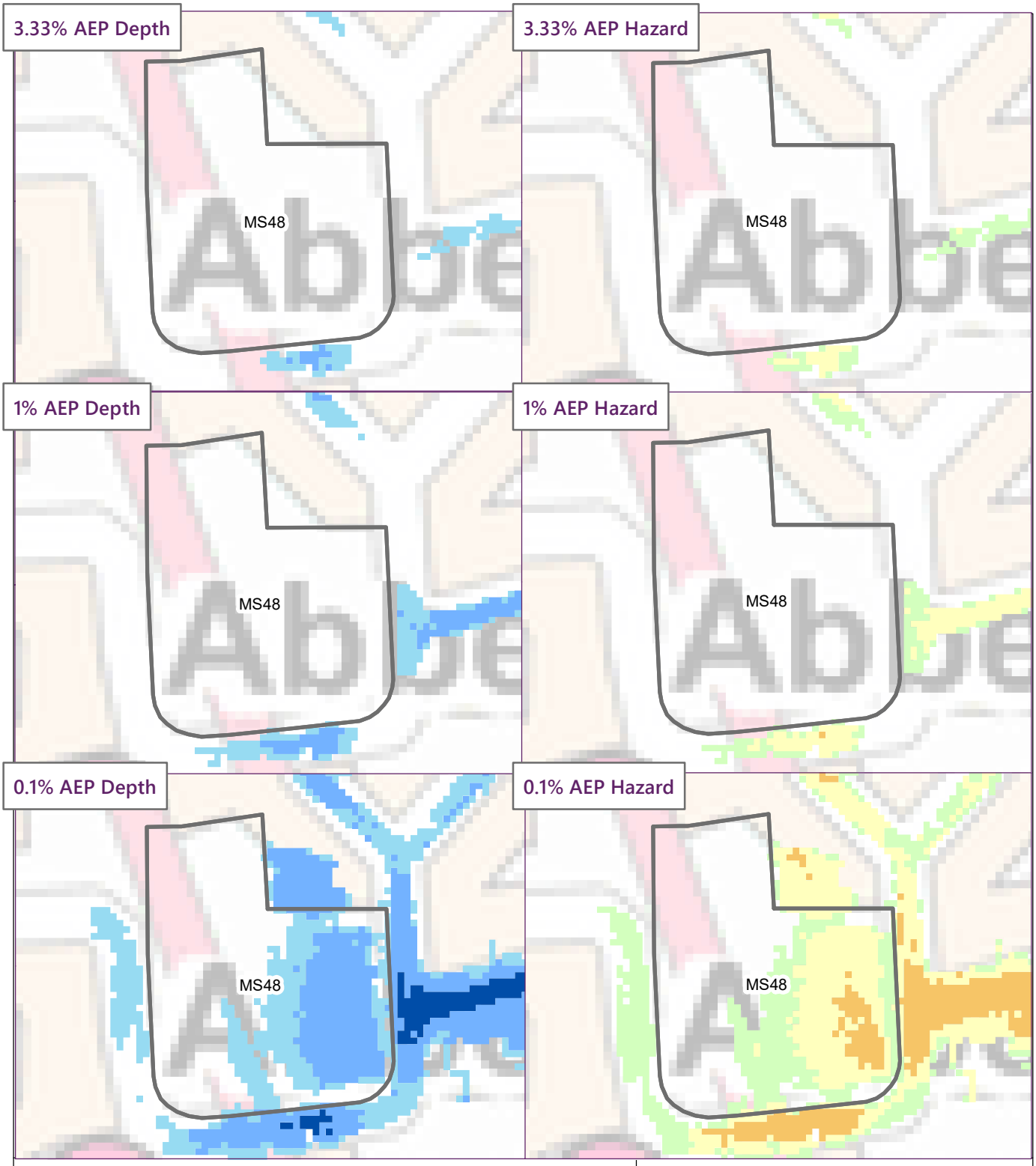
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS48**
**Combined Risk Modelling Results: Marsh Dykes**

October 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 — 100 m

Scale at A4: 1:1,735



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS48**
**Risk of Flooding from Surface Water (EA Dataset)**

May 2020

wood.

# Bexley Level 2 SFRA

Flood Risk Information Sheet

| General information | | | |
|---|---|---|---|
| ***Site name / address*** | **ABW02 Lesnes Estates and Coraline Walk, Wolvercote Rd/Harrow Manorway, Abbey Wood** | | |
| ***Site ID*** | MS49 | ***Local Plan Reg19 Ref*** | SA2 |
| ***Sustainable development location*** | Thamesmead and Abbey Wood OA | ***Area (ha)*** | 11.070 |
| ***Allocation type*** | Residential led estate regeneration | | |
| | Mixed use % (A1-A5) | Residential % | design led net capacity |
| | 0 | 100 | 1103 |

| Baseline Flood Risk Summary | | | |
|---|---|---|---|
| ***Fluvial/Tidal*** | | | |
| ***Overview*** | | | |
| Source of risk | Tidal | Watercourse | River Thames |
| % site in Flood Zone 1 | 0% | % site in Flood Zone 3a | 100% |
| % site in Flood Zone 2 | 0% | % site in Flood Zone 3b | 0% |
| Flood Defences | Yes | % site in ABD | 100% |
| ***Residual tidal flood risk from defence failure*** | | | |
| Present day max 1 in 200 AEP flood level (mAOD) | 1.89 | Future max 1 in 200 AEP flood level (mAOD) | 2.5 |
| Present day max 1 in 200 AEP flood hazard | Danger for most | Future day max 1 in 200 AEP flood hazard | Danger for all |
| ***Impact of climate change*** | Sea levels are predicted to rise with future climate change, consequently levels in the Tidal River Thames are also predicted to increase. As a result, in the event of a breach in the tidal flood defences in the future peak flood levels and flood hazard on site will increase. | | |
| ***Historical information*** | The site flooded in 1953 as a result of the storm surge flood event along the Tidal Thames. Since then extensive defences have been constructed along the Tidal Thames which offer a 0.1% standard of protection. | | |
| ***Contextual commentary*** | The EA Flood Zone map shows the site is 100% within Flood Zone 3a. The source of risk is tidal flooding from the River Thames. There is no risk of fluvial flooding.<br>The entire site is shown as being an area benefitting from defences as it is protected by the Thames Tidal defences to a SOP of 0.1%AEP. However, there remains a residual risk associated with a breach in these defences. The peak flood level associated with a breach in the defences will increase with climate change. In the case of a breach, the site is anticipated to flood up to 1.5m deep under present day conditions and up to 2m in future conditions (2115). The majority of the site is subject to Significant hazard, with isolated pockets of Extreme hazard anticipated in the North and North-East portions of the site under future conditions.<br>The associated residual risk map shows how the depths and hazard vary across the site and with climate change. | | |
| ***Surface Water*** | | | |
| ***Overview*** | | | |
| % site at high risk (1:30 AEP) | 1% | % site at low risk (1:1000 AEP) | 66% |
| % site at medium risk (1:100 AEP) | 6% | % site with no mapped risk | 27% |
| % site in critical drainage area | 100% | | |
| ***Impact of climate change*** | Rainfall intensity is predicted to increase with climate change. The increase in intensity will result in an increase in risk of flooding from surface water, resulting in increases in depth, extent and hazard of flooding. | | |
| ***Historical information*** | There is evidence that flooding has occurred on site in the past. Records attribute some events to surface water (pluvial) flooding, with others having no specific cause reported. There are also a cluster of historic flood events recorded on the adjacent roads to the north west of the site. | | |
| ***Contextual commentary*** | Detailed modelling of the Marsh Dykes suggests a strip of surface water flooding across the northern half of the site in the 1% AEP event. In the 0.1% AEP event the flood risk expands to cover the majority of the site. | | |
| ***Other sources of flooding*** | | | |
| ***Contextual commentary*** | This area is shown to be potentially at risk of elevated groundwater levels. | | |

## Policy and Recommendations

### *Site suitability*

| | | | |
|---|---|---|---|
| ***Highest Flood Zone*** | Flood Zone 3a | ***Development vulnerability*** | More Vulnerable |
| ***Suitability*** | Yes | ***Exception Test required?*** | Yes |

### *Policy recommendations for flood risk management*

In accordance with NPPF PPG Tables 2 & 3 (reproduced in Appendix D of the Level 1 SFRA), residential development is classed as more vulnerable and should not be permitted within FZ3a unless the exception test can be passed.
The Exception test would need to robustly demonstrate that the wider sustainability benefits outweigh flood risk, and that the development will be safe throughout its lifetime and will not increase flood risk elsewhere, including allowances for climate change.
In accordance with NPPF a site-specific FRA would be required as the site is in FZ3a, see Section 8 of the Level 1 SFRA details the requirements of an FRA.

### *Passing the exception test*

To pass the Exception test:
- it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and
-a site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

A number of factors which need to be considered when looking to pass the Exception test include:
- Design of development to manage and reduce flood risk wherever possible;
- Finished floor levels;
- Safe access and egress;
- Operation and maintenance;
- Resident awareness;
- Flood warning; and
- Evacuation procedures and funding arrangements.

See section 6 of the Level 1 SFRA for more information.

### *Site-Specific Recommendations for NPPF Compliant Development*

To make the development safe, the FRA should consider:
● Safe access and egress - noting that the current access road would flood deeply and significant hazard would develop in the event of breach in the tidal defences. The FRA may consider if safe shelter where residents would reside in situ until the flood water has receded within the building could be an option;
● Design of development to manage and reduce flood risk wherever possible, including siting all living accommodation above the maximum future (2115) flood level;
● Siting development in accordance with the sequential approach, placing the most vulnerable uses in the areas of least risk;
● Resident awareness;
● Flood warning - making use of breach modelling outputs to determine the time from the breach happening to the site being inundated; and
● Evacuation procedures and funding arrangements.
Further detail on the above points is given in the Level 1 SFRA, Section 6.3.

Development of housing should be directed away from areas of surface water flood risk across the site to preserve the existing surface water storage and flow routes so as not to increase flood risk elsewhere. Where development in areas of surface water flooding is unavoidable, surface water should be directed away from the housing, without increasing flood risk to 3rd parties and this should be detailed in a drainage strategy. The construction of the development should not exacerbate surface water flood risk in the wider critical drainage area. Sustainable drainage solutions should be implemented (see drainage management recommendations below).

Site investigations would be required to assess the risk of groundwater flooding.

| *Drainage Management Recommendations* |
| --- |
| The site is within a critical drainage area, where surface water flooding is prevalent. Therefore, it will be imperative that surface water runoff is managed appropriately to ensure flood risk is not increased elsewhere. All feasible SuDS options should be assessed, whilst adhering to the SuDS hierarchy as set out in the Level 1 SRFA report (see chapter 7 and Appendix B of the Level 1 SFRA).<br>Part of the site is undeveloped. The greenfield runoff rate should be determined for the site using current best practice. This will allow for the appropriate sizing of attenuation and conveyance SuDS to ensure that sufficient space for drainage infrastructure is provided in developing site masterplans.<br>Site investigations should be undertaken to fully assess the feasibly of using infiltration techniques . The infiltration potential in this area is labelled as medium, which alongside the underlying geology, could indicating that infiltration may be possible and, if it is, this would be the preferred method of partially/wholly discharging water from the site.<br>Drainage design should include recommended allowances for climate change.<br>The topography of the site should be taken in to consideration to ensure that gravity drainage is possible throughout the whole site. An appropriate discharge location should be identified (if not all infiltration) and appropriate consultations should be had. |


Key

LBB Site

**Flood Zone Summary**
- Main Rivers
- Ordinary Watercourses
- Flood defences (SoP over 1 in 100 year AEP)
- Flood Storage
- Functional Floodplain
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

**Surface Water Flood Risk**
- 3.33% AEP Extent
- 1% AEP Extent
- 0.1% AEP Extent

**Risk of Flooding from Reservoirs Max Depth**
- < 0.3
- 0.3 - 2.0
- > 2.0

**Historic Flood Risk**

Recorded Flood Events Bexley Borough (1960-2019)
- Cause unrecorded
- Blocked Culvert
- Blocked Gulley
- Blocked Gully
- Burst Water Main
- Fluvial
- Groundwater
- Sewer
- Surface Water (Pluvial)
- Surface Water, Fluvial and Groundwater
- Surface and Fluvial
- Surface and Groundwater
- Surface and Sewer

Recorded flood outlines
- 1953 Event
- 1968 Event
- 1977 Event

**Surface Water Climate Change**
- 1% AEP
- Areas potentially vulnerable to climate change

**Infiltration Potential**
- High
- Med
- Low

0 100 200 300 m

Scale at A4: 1:5,201



Client

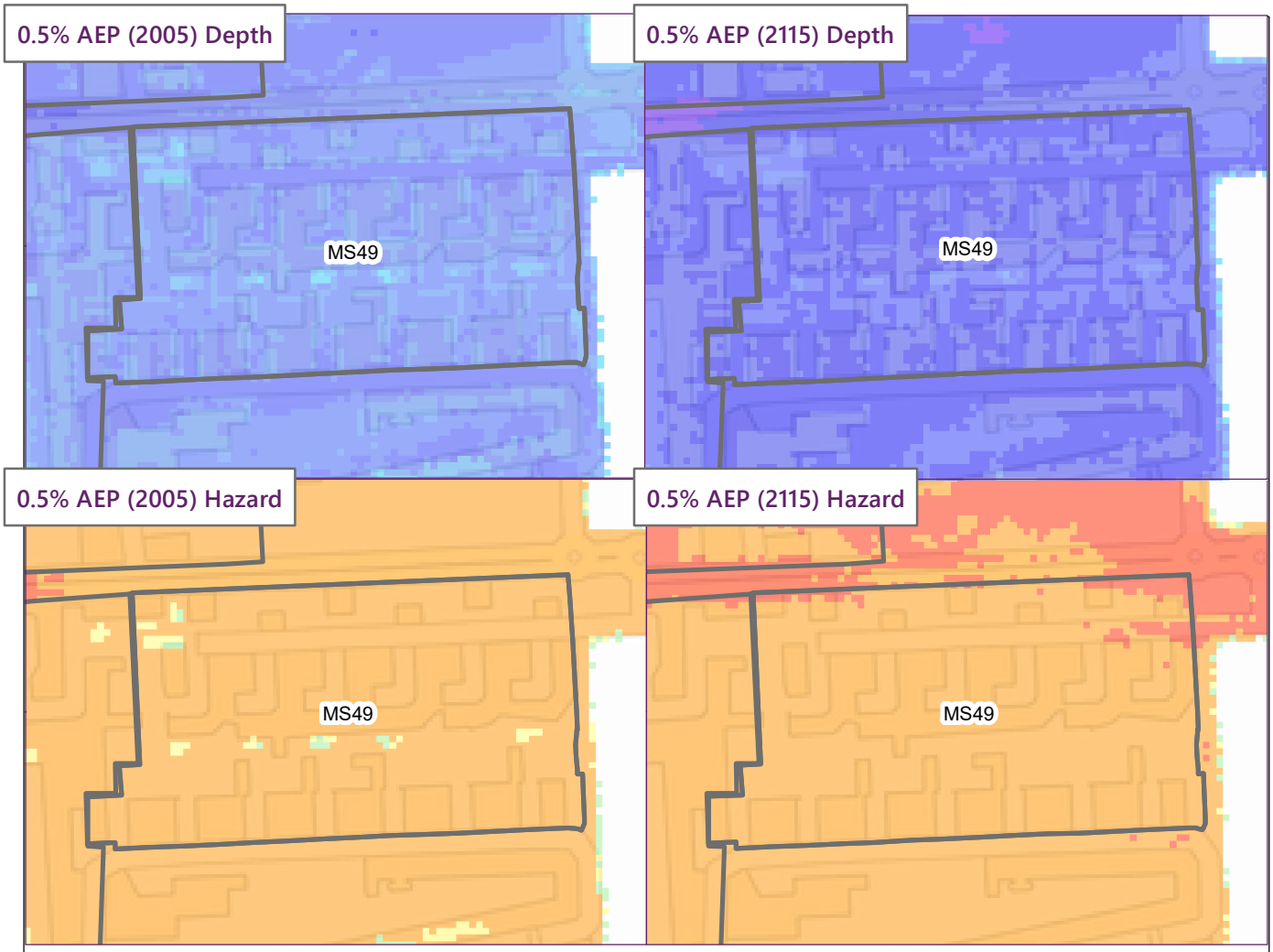
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS49**
**Flood Risk Overview Map**

May 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0 - 0.05
- 0.05 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- 3 - 3.5
- 3.5 - 4
- 4 - 5
- 5+

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 200 300 m

Scale at A4: 1:5,216



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS49**
**Residual tidal flood risk - River Thames**

June 2020

wood.


Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 200 300 m

Scale at A4: 1:5,201



Client

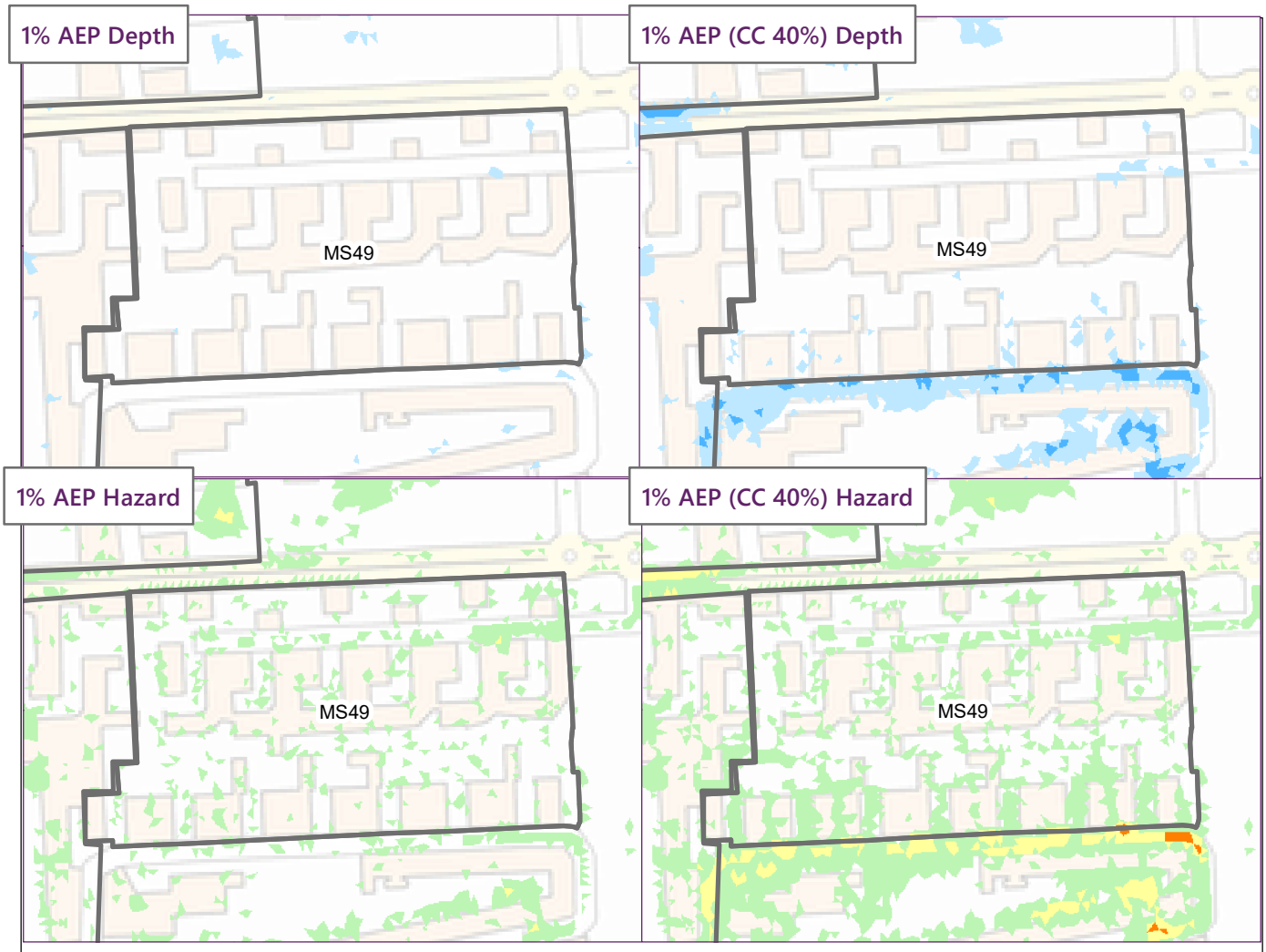
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS49**
**Risk of Flooding from Surface Water (EA Dataset)**

May 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 200 300 m

Scale at A4: 1:5,216



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS49**
**Combined Risk Modelling Results: Marsh Dykes**

October 2020

wood.

# Bexley Level 2 SFRA

Flood Risk Information Sheet

| General information | | | |
|---|---|---|---|
| ***Site name / address*** | **BEL01 ASDA and B&Q Belvedere, Lower Road** | | |
| ***Site ID*** | MS23 | **Local Plan Reg19 Ref** | SA3 |
| **Sustainable development location** | Belvedere Station and District Centre | ***Area (ha)*** | 3.315 |
| ***Allocation type*** | residential-led mixed use | | |
| | Mixed use % (A1-A5) | Residentail % | Design led net capacity |
| | 25 | 75 | 457 |

| Baseline Flood Risk Summary | | | |
|---|---|---|---|
| ***Fluvial/Tidal*** | | | |
| ***Overview*** | | | |
| Source of risk | Tidal | Watercourse | River Thames |
| % site in Flood Zone 1 | 0% | % site in Flood Zone 3a | 100% |
| % site in Flood Zone 2 | 0% | % site in Flood Zone 3b | 0% |
| Flood Defences | Yes | % site in ABD | 100% |
| ***Residual tidal flood risk from defence failure*** | | | |
| Present day max 1 in 200 AEP flood level (mAOD) | 1.97 | Future max 1 in 200 AEP flood level (mAOD) | 2.49 |
| Present day max 1 in 200 AEP flood hazard | Danger for all | Future day max 1 in 200 AEP flood hazard | Danger for all |
| ***Impact of climate change*** | Sea levels are predicted to rise with future climate change, consequently levels in the Tidal River Thames are also predicted to increase. As a result, in the event of a breach in the tidal flood defences in the future peak flood levels on site will increase. | | |
| ***Historical information*** | The site flooded in 1953 as a result of the storm surge flood event along the Tidal Thames. Since then extensive defences have been constructed along the Tidal Thames which offer a 0.1% standard of protection. | | |
| ***Contextual commentary*** | The EA Flood Zone map shows the site is 100% within Flood Zone 3a. The source of risk is tidal flooding from the River Thames. There is no risk of fluvial flooding.<br>The entire site is shown as being an area benefitting from defences as it is protected by the Thames Tidal defences to a SOP of 0.1%AEP. However, there remains a residual risk associated with a breach in these defences. The peak flood level associated with a breach in the defences will increase with climate change. In the case of a breach, the site is anticipated to flood up to 2m deep under present day conditions and up to 3m in future conditions (2115). The majority of the site is subject to Significant hazard, with isolated pockets of Extreme hazard.<br>The associated residual risk map shows how the depths and hazard vary across the site and with climate change. | | |
| ***Surface Water*** | | | |
| ***Overview*** | | | |
| % site at high risk (1:30 AEP) | 10% | % site at low risk (1:1000 AEP) | 40% |
| % site at medium risk (1:100 AEP) | 31% | % site with no mapped risk | 19% |
| % site in critical drainage area | 100% | | |
| ***Impact of climate change*** | Rainfall intensity is predicted to increase with climate change. The increase in intensity will result in an increase in risk of flooding from surface water, resulting in increases in depth, extent and hazard of flooding. | | |
| ***Historical information*** | There is evidence of the site being flooded in the past, but no cause was recorded. There are also a cluster of historic flood events recorded on the adjacent roads to the east of the site. | | |
| ***Contextual commentary*** | Detailed combined modelling of the Marsh Dykes indicates southern portion of the site is at high risk of surface water flooding in the more frequent 3.33% event. Additional regions of risk are anticipated in the north west and north east corners of the site in events of 1% AEP and greater. | | |
| ***Other sources of flooding*** | | | |
| ***Contextual commentary*** | This area is shown to be potentially at risk of elevated groundwater levels. | | |

## Policy and Recommendations

### *Site suitability*

| | | | |
|---|---|---|---|
| ***Highest Flood Zone*** | Flood Zone 3a | ***Development vulnerability*** | More Vulnerable |
| ***Suitability*** | Yes | ***Exception Test required?*** | Yes |

### *Policy recommendations for flood risk management*

In accordance with NPPF PPG Tables 2 & 3 (reproduced in Appendix D of the Level 1 SFRA), mixed use development, where it contains residential development, is classed as more vulnerable and should not be permitted within FZ3a unless the exception test can be passed.
The Exception test would need to robustly demonstrate that the wider sustainability benefits outweigh flood risk, and that the development will be safe throughout its lifetime and will not increase flood risk elsewhere, including allowances for climate change.
In accordance with NPPF a site-specific FRA would be required as the site is in FZ3a, see Section 8 of the Level 1 SFRA details the requirements of an FRA.

### *Passing the exception test*

To pass the Exception test:
- it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and
-a site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

A number of factors which need to be considered when looking to pass the Exception test include:
- Design of development to manage and reduce flood risk wherever possible;
- Finished floor levels;
- Safe access and egress;
- Operation and maintenance;
- Resident awareness;
- Flood warning; and
- Evacuation procedures and funding arrangements.

See section 6 of the Level 1 SFRA for more information.

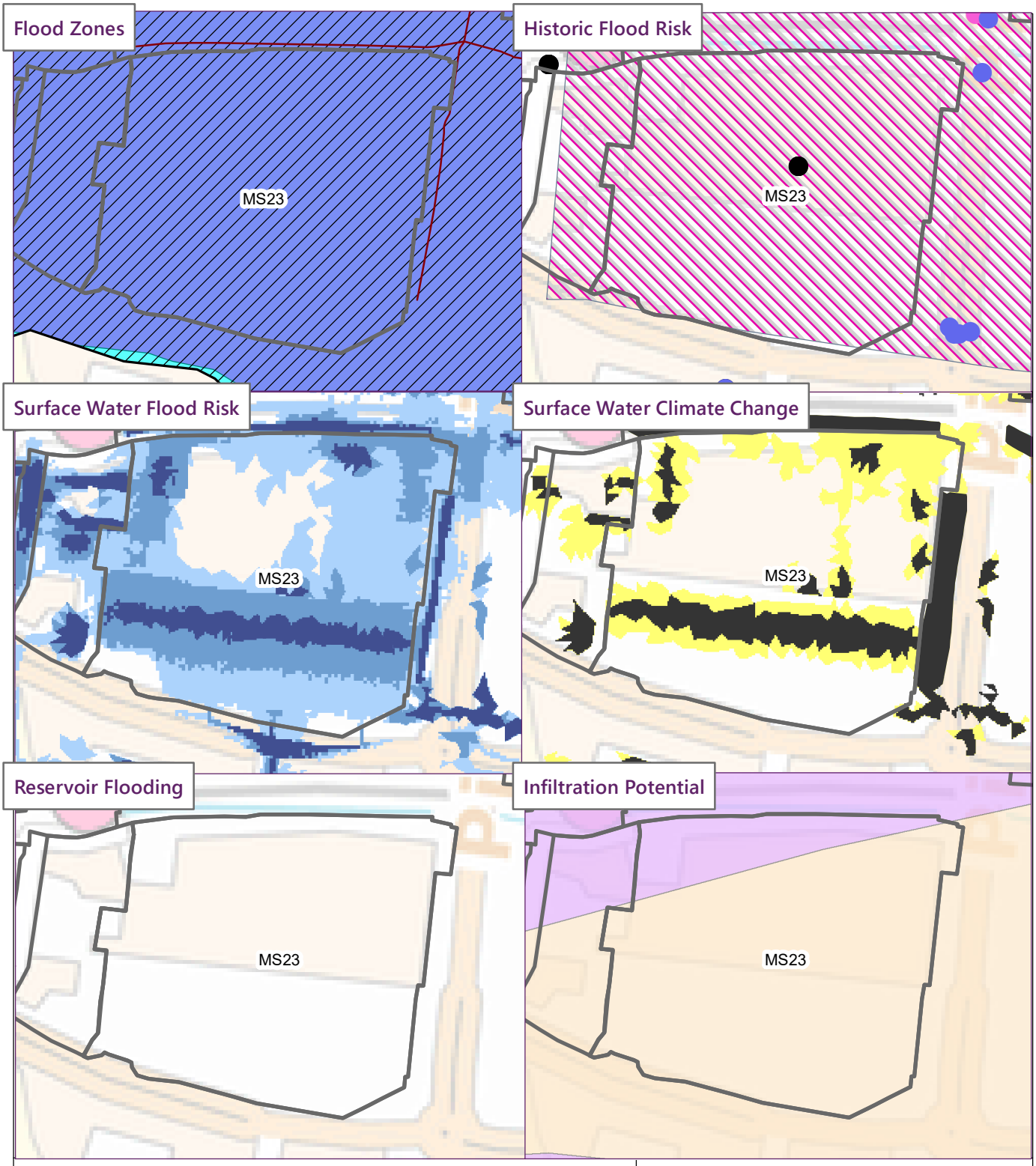
### *Site-Specific Recommendations for NPPF Compliant Development*

To make the development safe, the FRA should consider:
● Safe access and egress - placing the site access at the south-western tip residual tidal risk is lowest and there is no surface water flood risk;
● Design of development to manage and reduce flood risk wherever possible, including siting all living accommodation above the maximum future (2115) flood level;
● Siting development in accordance with the sequential approach, placing the most vulnerable uses in the areas of least risk;
● Resident awareness;
● Flood warning - making use of breach modelling outputs to determine the time from the breach happening to the site being inundated; and
● Evacuation procedures and funding arrangements.
Further detail on the above points is given in the Level 1 SFRA, Section 6.3.

Development of housing should be directed away from areas of surface water flood risk across the site to preserve the existing surface water storage and flow routes so as not to increase flood risk elsewhere. Where development in areas of surface water flooding is unavoidable, surface water should be directed away from the housing, without increasing flood risk to 3rd parties and this should be detailed in a drainage strategy. The construction of the development should not exacerbate surface water flood risk in the wider critical drainage area. Sustainable drainage solutions should be implemented (see drainage management recommendations below).

Site investigations would be required to assess the risk of groundwater flooding.

| ***Drainage Management Recommendations*** |
| --- |
| The site is within a critical drainage area, where surface water flooding is prevalent. Therefore, it will be imperative that surface water runoff is managed appropriately to ensure flood risk is not increased elsewhere. All feasible SuDS options should be assessed, whilst adhering to the SuDS hierarchy as set out in the Level 1 SRFA report (see chapter 7 and Appendix B of the Level 1 SFRA).<br>Part of the site is undeveloped. The greenfield runoff rate should be determined for the site using current best practice. This will allow for the appropriate sizing of attenuation and conveyance SuDS to ensure that sufficient space for drainage infrastructure is provided in developing site masterplans.<br>Site investigations should be undertaken to fully assess the feasibly of using infiltration techniques . The infiltration potential in this area is labelled as high across the majority of the site, but medium in the northern corner, which alongside the underlying geology, could indicating that infiltration may be possible and, if it is, this would be the preferred method of partially/wholly discharging water from the site.<br>Drainage design should include recommended allowances for climate change.<br>The topography of the site should be taken in to consideration to ensure that gravity drainage is possible throughout the whole site. An appropriate discharge location should be identified (if not all infiltration) and appropriate consultations should be had. |




Key

LBB Site

**Flood Zone Summary**
- Main Rivers
- Ordinary Watercourses
- Flood defences (SoP over 1 in 100 year AEP)
- Flood Storage Areas
- Functional Floodplain
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

**Surface Water Flood Risk**
- 3.33% AEP Extent
- 1% AEP Extent
- 0.1% AEP Extent

**Risk of Flooding from Reservoirs Max Depth**
- < 0.3
- 0.3 - 2.0
- > 2.0

**Historic Flood Risk**

Recorded Flood Events Bexley Borough (1960-2019)
- Cause unrecorded
- Blocked Culvert
- Blocked Gulley
- Blocked Gully
- Burst Water Main
- Fluvial
- Groundwater
- Sewer
- Surface Water (Pluvial)
- Surface Water, Fluvial and Groundwater
- Surface and Fluvial
- Surface and Groundwater
- Surface and Sewer

Recorded flood outlines
- 1953 Event
- 1968 Event
- 1977 Event

**Surface Water Climate Change**
- 1% AEP
- Areas potentially vulnerable to climate change

**Infiltration Potential**
- High
- Med
- Low

N

0 100 200 m

Scale at A4: 1:3,488



Client

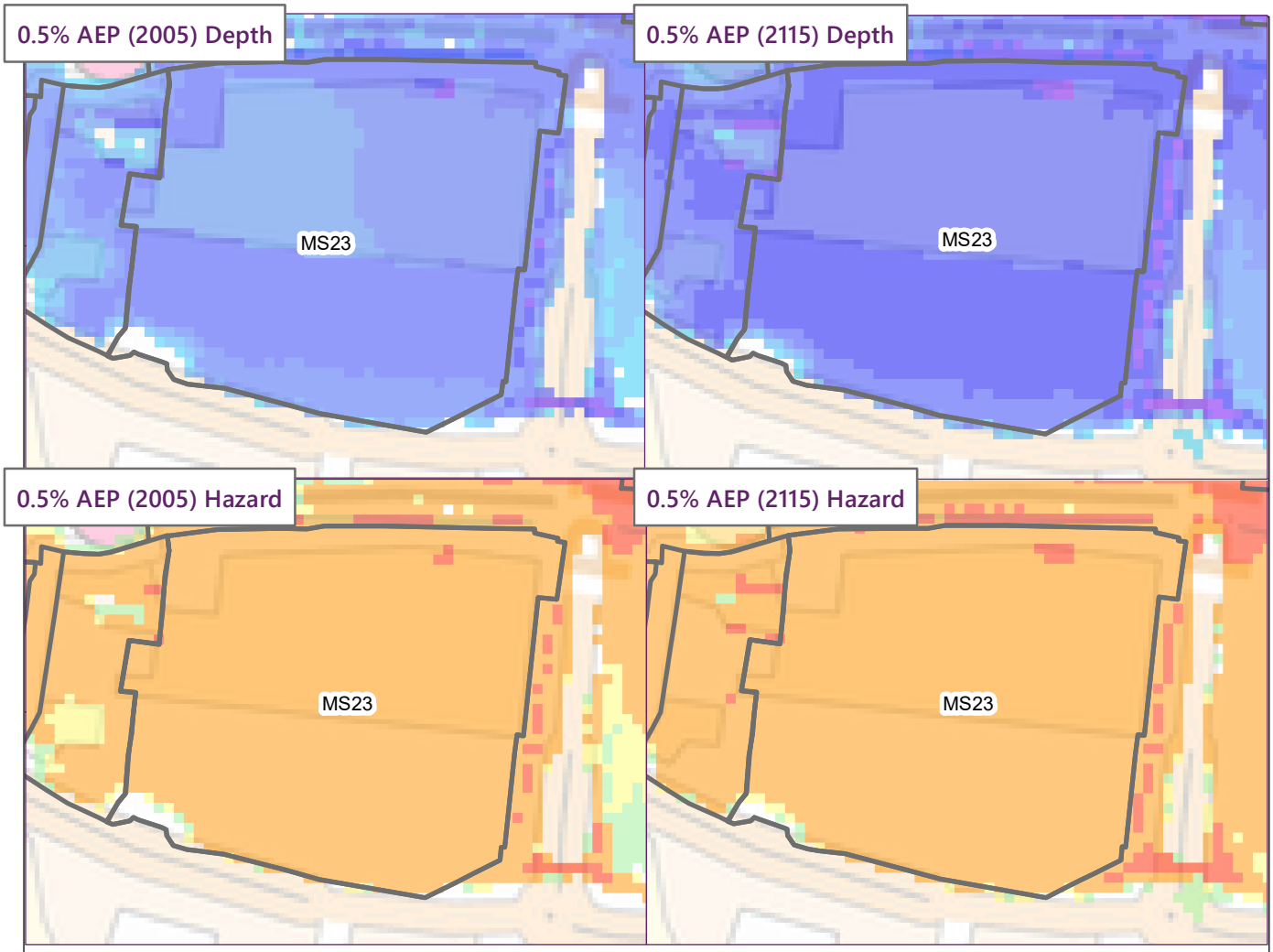
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS23**
**Flood Risk Overview Map**

October 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0 - 0.05
- 0.05 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- 3 - 3.5
- 3.5 - 4
- 4 - 5
- 5+

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 200 m

Scale at A4: 1:3,480



Client

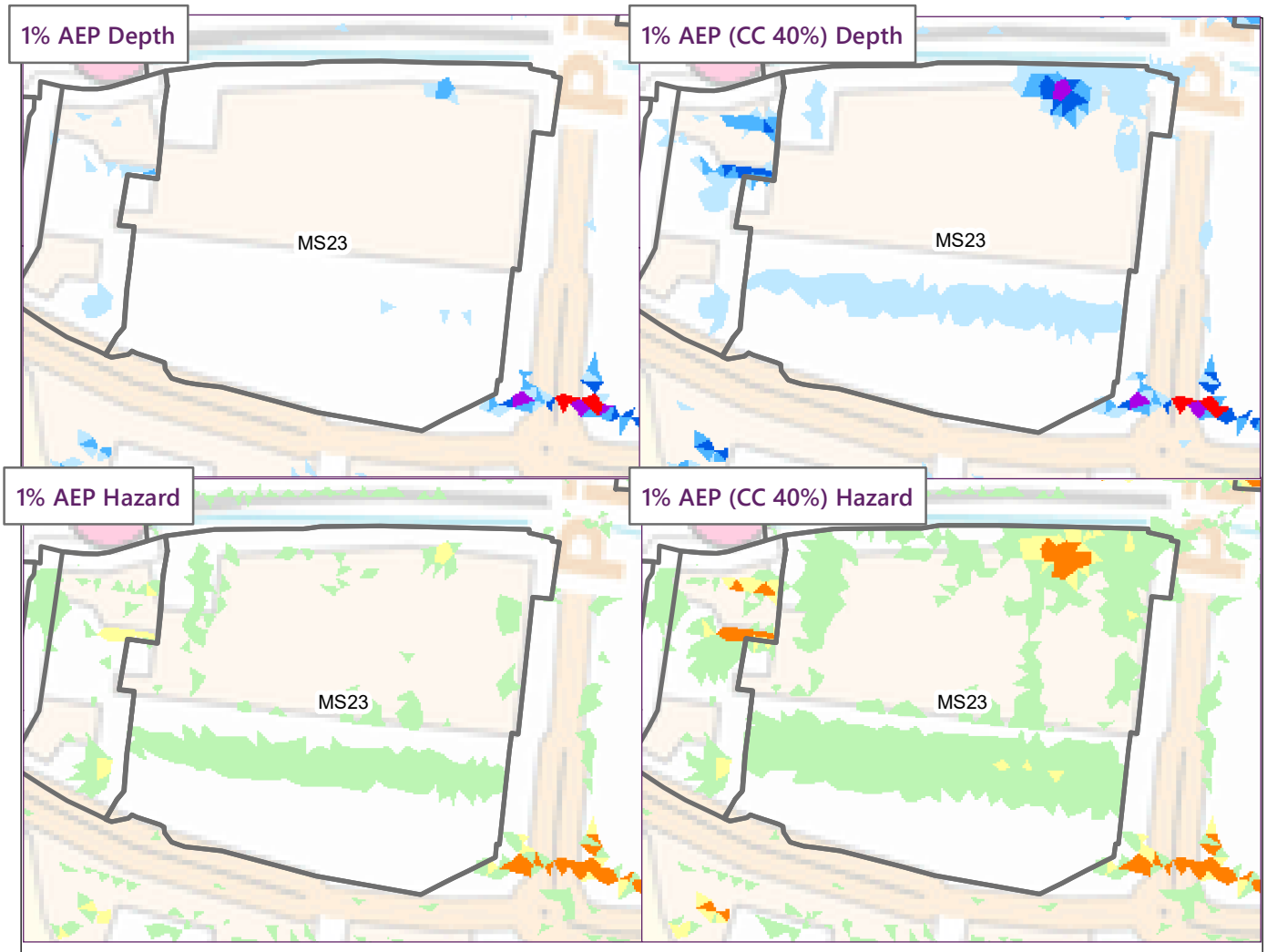
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS23**
**Residual tidal flood risk - River Thames**

June 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 200 m

Scale at A4: 1:3,498



Client

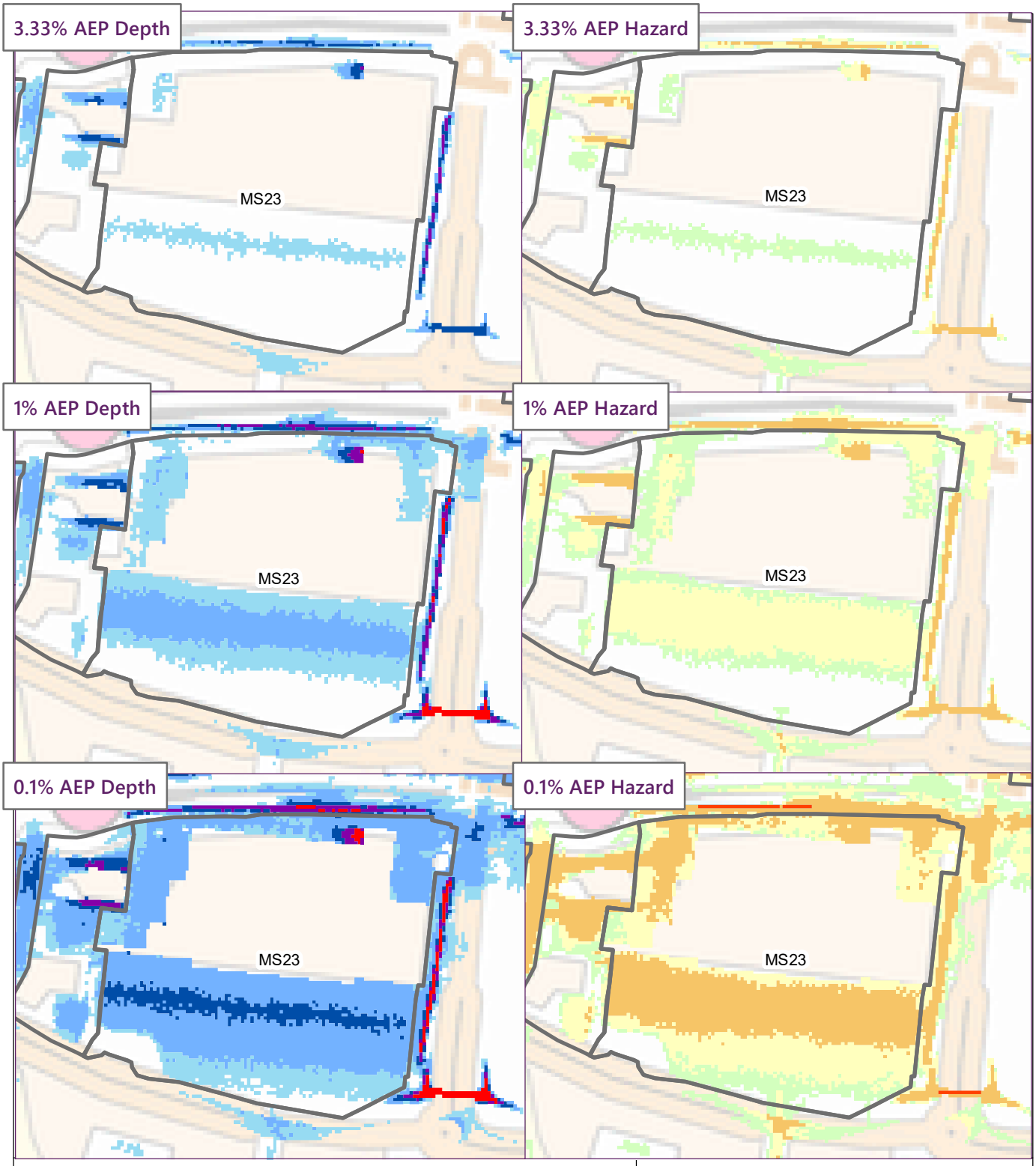
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS23**
**Combined Risk Modelling Results: Marsh Dykes**

October 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 200 m

Scale at A4: 1:3,488



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS23**
**Risk of Flooding from Surface Water (EA Dataset)**

May 2020

wood.

# Bexley Level 2 SFRA

Flood Risk Information Sheet

| General information | | | |
|---|---|---|---|
| ***Site name / address*** | **BEL02 Station Road East, Station Road, Belvedere** | | |
| ***Site ID*** | MS24 | **Local Plan Reg19 Ref** | SA4 |
| **Sustainable development location** | Belvedere Station and District Centre | **Area (ha)** | 0.63 |
| ***Allocation type*** | residential-led mixed use | | |
| | Mixed use % (A1-A5) | Residential % | Design led net capacity |
| | 25 | 75 | 81 |

| Baseline Flood Risk Summary | | | |
|---|---|---|---|
| ***Fluvial/Tidal*** | | | |
| ***Overview*** | | | |
| Source of risk | Tidal | Watercourse | River Thames |
| % site in Flood Zone 1 | 0% | % site in Flood Zone 3a | 100% |
| % site in Flood Zone 2 | 0% | % site in Flood Zone 3b | 0% |
| Flood Defences | Yes | % site in ABD | 100% |
| ***Residual tidal flood risk from defence failure*** | | | |
| Present day max 1 in 200 AEP flood level (mAOD) | 1.95 | Future max 1 in 200 AEP flood level (mAOD) | 2.49 |
| Present day max 1 in 200 AEP flood hazard | Danger for all | Future day max 1 in 200 AEP flood hazard | Danger for all |
| ***Impact of climate change*** | Sea levels are predicted to rise with future climate change, consequently levels in the Tidal River Thames are also predicted to increase. As a result, in the event of a breach in the tidal flood defences in the future peak flood levels on site will increase. | | |
| ***Historical information*** | The site flooded in 1953 as a result of the storm surge flood event along the Tidal Thames. Since then extensive defences have been constructed along the Tidal Thames which offer a 0.1% standard of protection. | | |
| ***Contextual commentary*** | The EA Flood Zone map shows the site is 100% within Flood Zone 3a. The source of risk is tidal flooding from the River Thames. There is no risk of fluvial flooding.<br>The entire site is shown as being an area benefitting from defences as it is protected by the Thames Tidal defences to a SOP of 0.1%AEP. However, there remains a residual risk associated with a breach in these defences. The peak flood level associated with a breach in the defences will increase with climate change. In the case of a breach, the site is anticipated to flood up to 2m deep under present day conditions and up to 3m in future conditions (2115). The majority of the site is subject to Significant hazard, with isolated pockets of Extreme hazard.<br>The associated residual risk map shows how the depths and hazard vary across the site and with climate change. | | |
| ***Surface Water*** | | | |
| ***Overview*** | | | |
| % site at high risk (1:30 AEP) | 19% | % site at low risk (1:1000 AEP) | 33% |
| % site at medium risk (1:100 AEP) | 11% | % site with no mapped risk | 37% |
| % site in critical drainage area | 100% | | |
| ***Impact of climate change*** | Rainfall intensity is predicted to increase with climate change. The increase in intensity will result in an increase in risk of flooding from surface water, resulting in increases in depth, extent and hazard of flooding. | | |
| ***Historical information*** | There is no evidence of the site flooding in the past. But there are a cluster of historic flood events recorded on the adjacent roads to the west of the site. | | |
| ***Contextual commentary*** | Detailed combined modelling of the Marsh Dykes indicates northern and central portions of the site are at high risk of surface water flooding in the more frequent 3.33% and 1% AEP events. Significant risk is anticipated in the central portion of the site in events greater than 1% AEP. | | |
| ***Other sources of flooding*** | | | |
| ***Contextual commentary*** | This area is shown to be potentially at risk of elevated groundwater levels. | | |

## Policy and Recommendations

### *Site suitability*

| | | | |
|---|---|---|---|
| ***Highest Flood Zone*** | Flood Zone 3a | ***Development vulnerability*** | More Vulnerable |
| ***Suitability*** | Yes | ***Exception Test required?*** | Yes |

### *Policy recommendations for flood risk management*

In accordance with NPPF PPG Tables 2 & 3 (reproduced in Appendix D of the Level 1 SFRA), mixed use development, where it contains residential development, is classed as more vulnerable and should not be permitted within FZ3a unless the exception test can be passed.
The Exception test would need to robustly demonstrate that the wider sustainability benefits outweigh flood risk, and that the development will be safe throughout its lifetime and will not increase flood risk elsewhere, including allowances for climate change.
In accordance with NPPF a site-specific FRA would be required as the site is in FZ3a, see Section 8 of the Level 1 SFRA details the requirements of an FRA.

### *Passing the exception test*

To pass the Exception test:
- it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and
-a site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

A number of factors which need to be considered when looking to pass the Exception test include:
- Design of development to manage and reduce flood risk wherever possible;
- Finished floor levels;
- Safe access and egress;
- Operation and maintenance;
- Resident awareness;
- Flood warning; and
- Evacuation procedures and funding arrangements.

See section 6 of the Level 1 SFRA for more information.

### *Site-Specific Recommendations for NPPF Compliant Development*

To make the development safe, the FRA should consider:
● Safe access and egress - placing the site access at the south-western tip where residual tidal risk is lowest. Surface water must be managed to keep the access safe;
● Design of development to manage and reduce flood risk wherever possible, including siting all living accommodation above the maximum future (2115) flood level;
● Siting development in accordance with the sequential approach, placing the most vulnerable uses in the areas of least risk;
● Resident awareness;
● Flood warning - making use of breach modelling outputs to determine the time from the breach happening to the site being inundated; and
● Evacuation procedures and funding arrangements.
Further detail on the above points is given in the Level 1 SFRA, Section 6.3.

Development of housing should be directed away from areas of surface water flood risk across the site to preserve the existing surface water storage and flow routes so as not to increase flood risk elsewhere. Where development in areas of surface water flooding is unavoidable, surface water should be directed away from the housing, without increasing flood risk to 3rd parties and this should be detailed in a drainage strategy. The construction of the development should not exacerbate surface water flood risk in the wider critical drainage area. Sustainable drainage solutions should be implemented (see drainage management recommendations below).

Site investigations would be required to assess the risk of groundwater flooding.

| *Drainage Management Recommendations* |
| --- |
| Although the site is < 1ha it is within a critical drainage area, where surface water flooding is prevalent. Therefore, it will be imperative that surface water runoff is managed appropriately to ensure flood risk is not increased elsewhere. All feasible SuDS options should be assessed, whilst adhering to the SuDS hierarchy as set out in the Level 1 SRFA report (see chapter 7 and Appendix B of the Level 1 SFRA), although it is recognised that given the small size of the site options may be limited.<br>The site is currently developed, but betterment in surface water runoff should be sought ideally, and as such the greenfield runoff rate should be determined for the site using current best practice. This will allow for the appropriate sizing of attenuation and conveyance SuDS if feasible to ensure that sufficient space for drainage infrastructure is provided in developing site masterplans.<br>Infiltration would be the preferred method of partially/wholly discharging water from the site. The infiltration potential in this area is labelled as medium in the northern half of the site, and high in the southern half, which alongside the underlying geology, could indicate that infiltration may be possible. Site investigations would be required to fully assess the feasibly of using infiltration SuDS techniques.<br>Drainage design should include recommended allowances for climate change.<br>The topography of the site should be taken in to consideration to ensure that gravity drainage is possible throughout the whole site. An appropriate discharge location should be identified (if not all infiltration) and appropriate consultations should be had. |


Key

LBB Site

**Flood Zone Summary**
- Main Rivers
- Ordinary Watercourses
- Flood defences (SoP over 1 in 100 year AEP)
- Flood Storage Areas
- Functional Floodplain
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

**Surface Water Flood Risk**
- 3.33% AEP Extent
- 1% AEP Extent
- 0.1% AEP Extent

**Risk of Flooding from Reservoirs Max Depth**
- < 0.3
- 0.3 - 2.0
- > 2.0

**Historic Flood Risk**

Recorded Flood Events Bexley Borough (1960-2019)
- Cause unrecorded
- Blocked Culvert
- Blocked Gulley
- Blocked Gully
- Burst Water Main
- Fluvial
- Groundwater
- Sewer
- Surface Water (Pluvial)
- Surface Water, Fluvial and Groundwater
- Surface and Fluvial
- Surface and Groundwater
- Surface and Sewer

Recorded flood outlines
- 1953 Event
- 1968 Event
- 1977 Event

**Surface Water Climate Change**
- 1% AEP
- Areas potentially vulnerable to climate change

**Infiltration Potential**
- High
- Med
- Low

0 100 m

Scale at A4: 1:2,679



Client

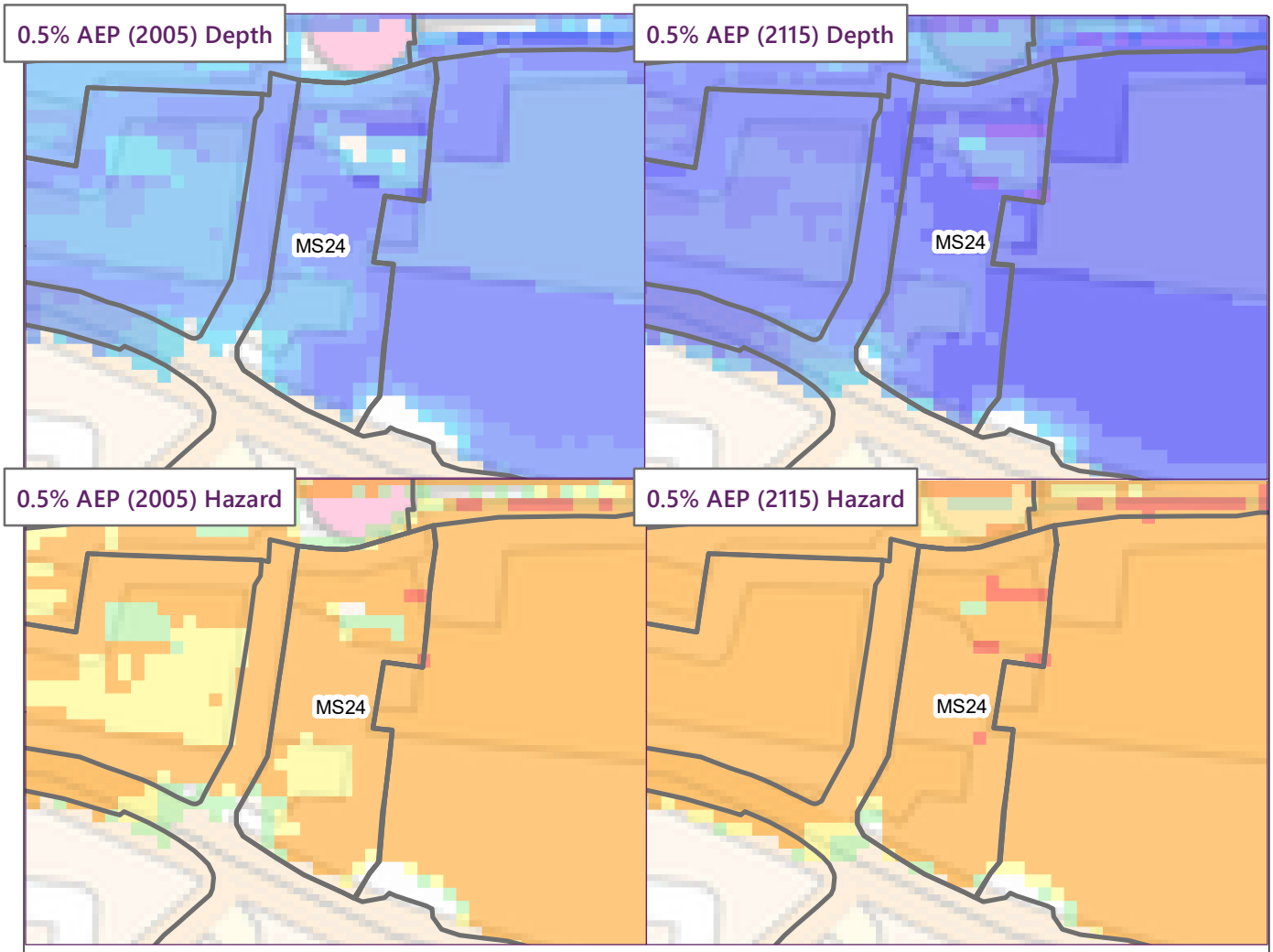
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS24**
**Flood Risk Overview Map**

October 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0 - 0.05
- 0.05 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- 3 - 3.5
- 3.5 - 4
- 4 - 5
- 5+

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 m

Scale at A4: 1:2,668



Client

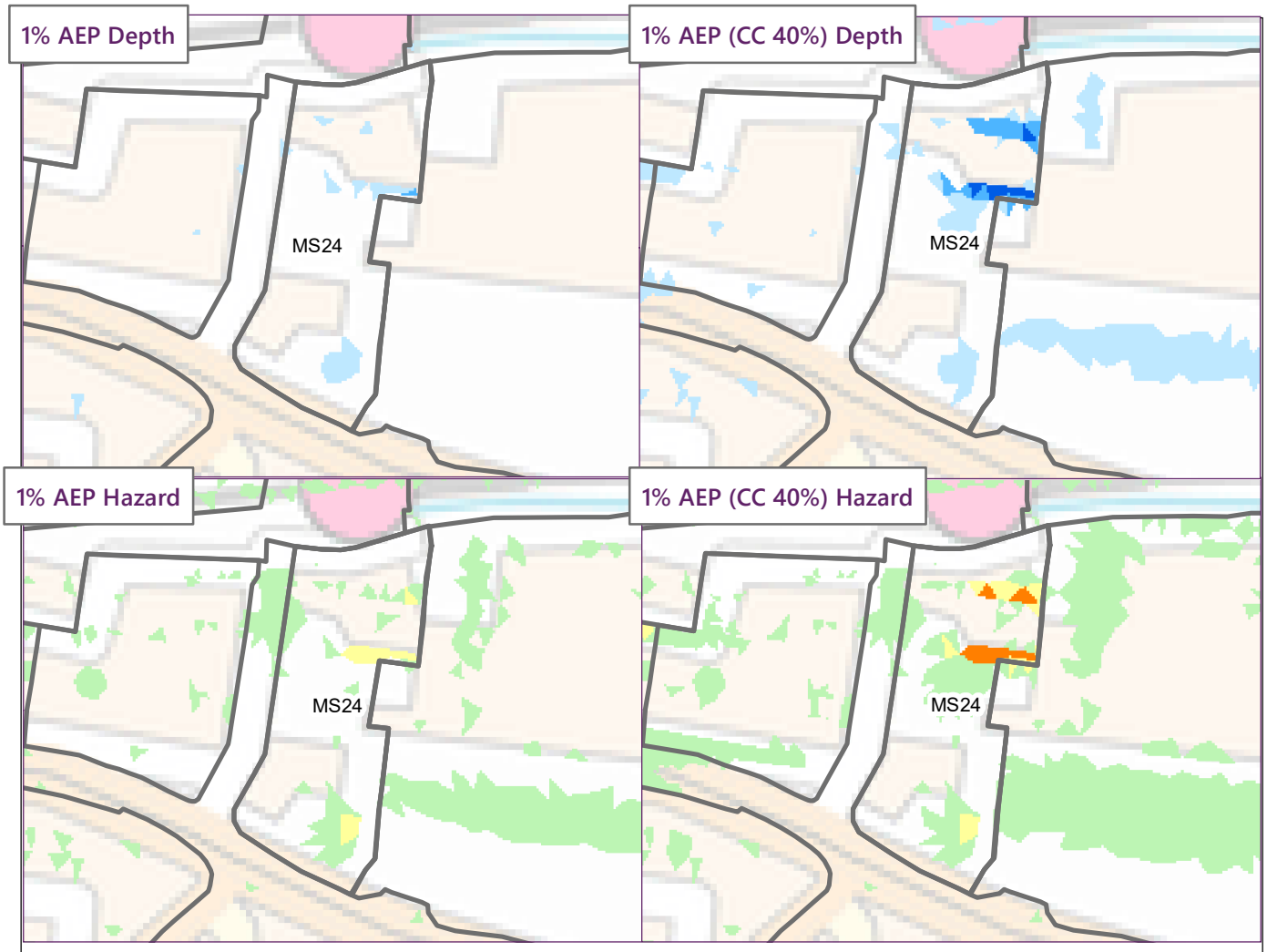
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS24**
**Residual tidal flood risk - River Thames**

June 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 m

Scale at A4: 1:2,686



Client

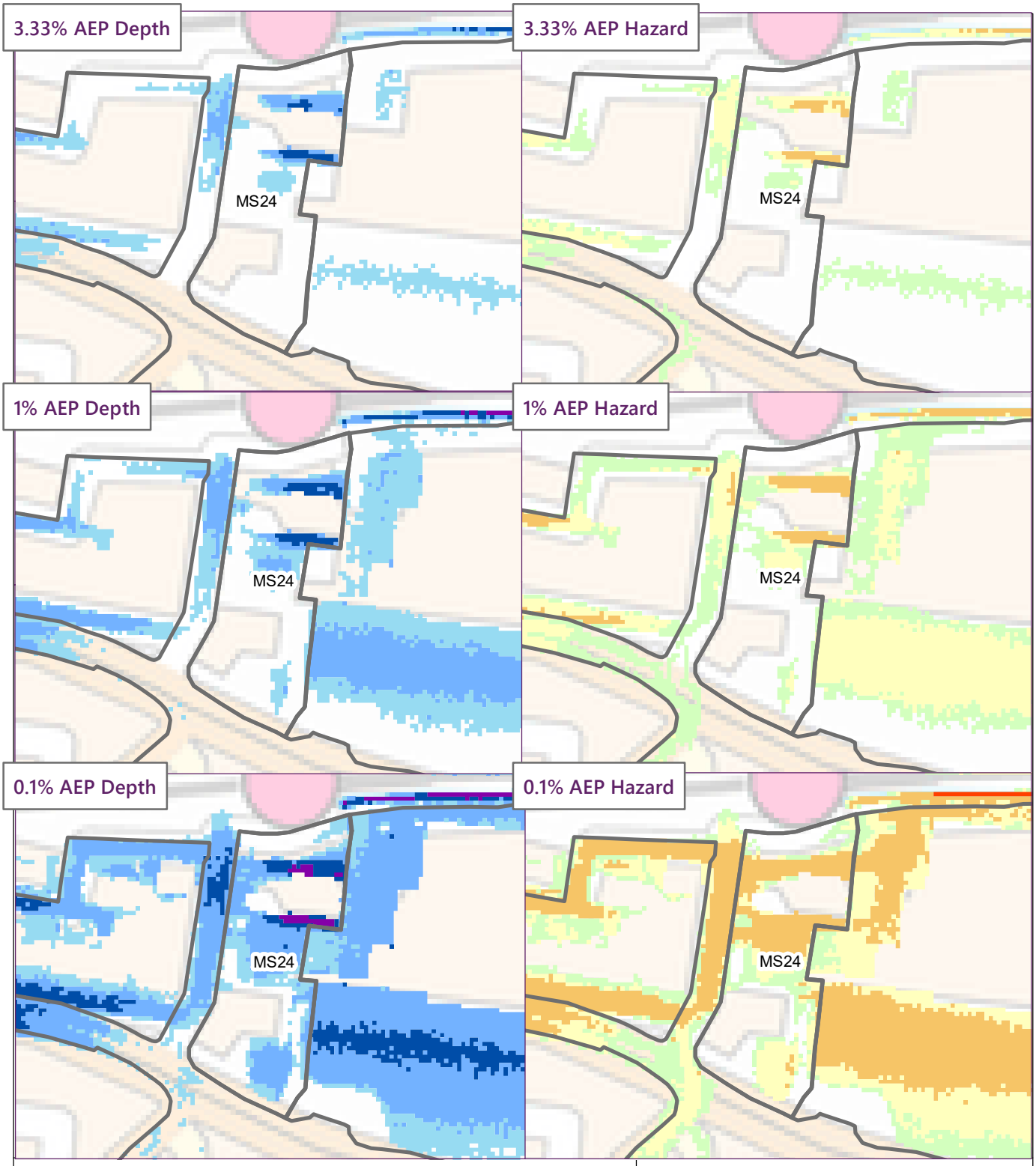
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS24**
**Combined Risk Modelling Results: Marsh Dykes**

October 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 m

Scale at A4: 1:2,679



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS24**
**Risk of Flooding from Surface Water (EA Dataset)**

May 2020

wood.

# Bexley Level 2 SFRA

Flood Risk Information Sheet

| General information | | | |
|---|---|---|---|
| ***Site name / address*** | **BEL03 Station Road West, Station Road, Belvedere** | | |
| ***Site ID*** | MS26 | **Local Plan Reg19 Ref** | SA5 |
| **Sustainable development location** | Belvedere Station and District Centre | **Area (ha)** | 0.304 |
| ***Allocation type*** | residential-led mixed use | | |
| | Mixed use % (A1-A5) | residential % | Design led net capacity |
| | 25 | 75 | 21 |

| Baseline Flood Risk Summary | | | |
|---|---|---|---|
| ***Fluvial/Tidal*** | | | |
| ***Overview*** | | | |
| Source of risk | Tidal | Watercourse | River Thames |
| % site in Flood Zone 1 | 0% | % site in Flood Zone 3a | 100% |
| % site in Flood Zone 2 | 0% | % site in Flood Zone 3b | 0% |
| Flood Defences | Yes | % site in ABD | 100% |
| ***Residual tidal flood risk from defence failure*** | | | |
| Present day max 1 in 200 AEP flood level (mAOD) | 1.9 | Future max 1 in 200 AEP flood level (mAOD) | 2.49 |
| Present day max 1 in 200 AEP flood hazard | Danger for most | Future day max 1 in 200 AEP flood hazard | Danger for most |
| ***Impact of climate change*** | Sea levels are predicted to rise with future climate change, consequently levels in the Tidal River Thames are also predicted to increase. As a result, in the event of a breach in the tidal flood defences in the future peak flood levels on site will increase. | | |
| ***Historical information*** | There is no evidence of the site flooding in the past. | | |
| ***Contextual commentary*** | The EA Flood Zone map shows the site is 100% within Flood Zone 3a. The source of risk is tidal flooding from the River Thames. There is no risk of fluvial flooding.<br>The entire site is shown as being an area benefitting from defences as it is protected by the Thames Tidal defences to a SOP of 0.1%AEP. However, there remains a residual risk associated with a breach in these defences. The peak flood level associated with a breach in the defences will increase with climate change. In the case of a breach, the site is anticipated to flood up to 0.75m deep under present day conditions and up to 2m in future conditions (2115). The majority of the site is subject to Significant hazard under present day conditions, extending to the entire site under future conditions.<br>The associated residual risk map shows how the depths and hazard vary across the site and with climate change. | | |
| ***Surface Water*** | | | |
| ***Overview*** | | | |
| % site at high risk (1:30 AEP) | 13% | % site at low risk (1:1000 AEP) | 38% |
| % site at medium risk (1:100 AEP) | 14% | % site with no mapped risk | 35% |
| % site in critical drainage area | 100% | | |
| ***Impact of climate change*** | Rainfall intensity is predicted to increase with climate change. The increase in intensity will result in an increase in risk of flooding from surface water, resulting in increases in depth, extent and hazard of flooding. | | |
| ***Historical information*** | There is evidence that flooding has occurred on site in the past. Records attribute some events to surface water (pluvial) flooding, with others having no specific cause reported. There are also a cluster of historic flood events recorded on the adjacent roads to the south west of the site. | | |
| ***Contextual commentary*** | Detailed combined modelling of the Marsh Dykes indicates a strip of high risk of surface water flooding along the north, west and southern boundaries of the site in the more frequent 3.33% and 1% AEP events. In the 0.1% AEP event the flood risk expands to include the centre of the site. | | |
| ***Other sources of flooding*** | | | |
| ***Contextual commentary*** | This area is shown to be potentially at risk of elevated groundwater levels. | | |

## Policy and Recommendations

### *Site suitability*

| | | | |
|---|---|---|---|
| ***Highest Flood Zone*** | Flood Zone 3a | ***Development vulnerability*** | More Vulnerable |
| ***Suitability*** | Yes | ***Exception Test required?*** | Yes |

### *Policy recommendations for flood risk management*

In accordance with NPPF PPG Tables 2 & 3 (reproduced in Appendix D of the Level 1 SFRA), mixed use development, where it contains residential development, is classed as more vulnerable and should not be permitted within FZ3a unless the exception test can be passed.
The Exception test would need to robustly demonstrate that the wider sustainability benefits outweigh flood risk, and that the development will be safe throughout its lifetime and will not increase flood risk elsewhere, including allowances for climate change.
In accordance with NPPF a site-specific FRA would be required as the site is in FZ3a, see Section 8 of the Level 1 SFRA details the requirements of an FRA.

### *Passing the exception test*

To pass the Exception test:
- it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and
-a site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

A number of factors which need to be considered when looking to pass the Exception test include:
- Design of development to manage and reduce flood risk wherever possible;
- Finished floor levels;
- Safe access and egress;
- Operation and maintenance;
- Resident awareness;
- Flood warning; and
- Evacuation procedures and funding arrangements.

See section 6 of the Level 1 SFRA for more information.

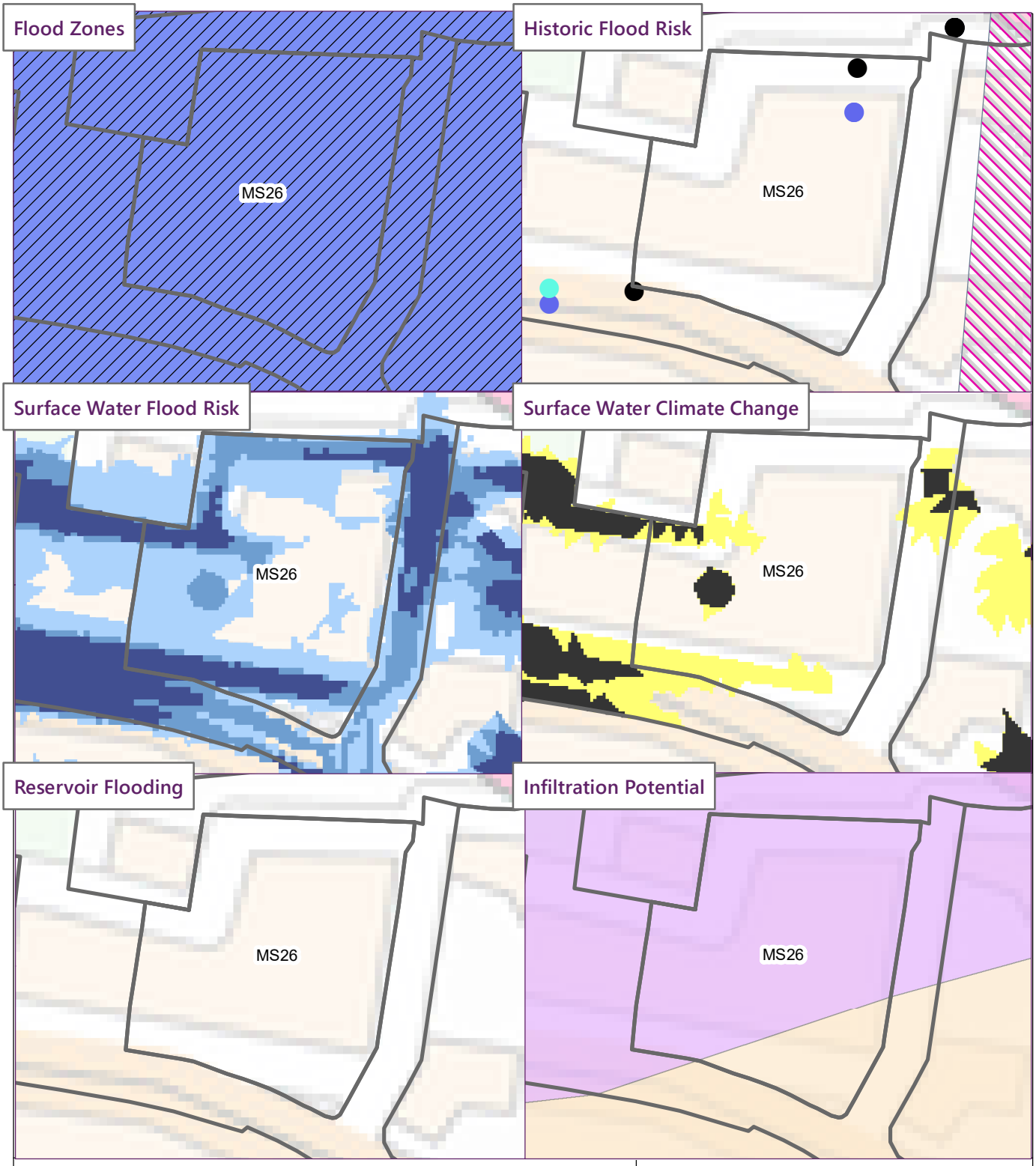
### *Site-Specific Recommendations for NPPF Compliant Development*

To make the development safe, the FRA should consider:
● Safe access and egress - placing the site access at the south-eastern tip where residual tidal risk is lowest. Surface water must be managed to keep the access safe;
● Design of development to manage and reduce flood risk wherever possible, including siting all living accommodation above the maximum future (2115) flood level;
● Siting development in accordance with the sequential approach, placing the most vulnerable uses in the areas of least risk;
● Resident awareness;
● Flood warning - making use of breach modelling outputs to determine the time from the breach happening to the site being inundated; and
● Evacuation procedures and funding arrangements.
Further detail on the above points is given in the Level 1 SFRA, Section 6.3.

Development of housing should be directed away from areas of surface water flood risk across the site to preserve the existing surface water storage and flow routes so as not to increase flood risk elsewhere. Where development in areas of surface water flooding is unavoidable, surface water should be directed away from the housing, without increasing flood risk to 3rd parties and this should be detailed in a drainage strategy. The construction of the development should not exacerbate surface water flood risk in the wider critical drainage area. Sustainable drainage solutions should be implemented (see drainage management recommendations below).

Site investigations would be required to assess the risk of groundwater flooding.

| *Drainage Management Recommendations* |
| --- |
| Although the site is < 1ha it is within a critical drainage area, where surface water flooding is prevalent. Therefore, it will be imperative that surface water runoff is managed appropriately to ensure flood risk is not increased elsewhere. All feasible SuDS options should be assessed, whilst adhering to the SuDS hierarchy as set out in the Level 1 SRFA report (see chapter 7 and Appendix B of the Level 1 SFRA), although it is recognised that given the small size of the site options may be limited.<br>The site is currently developed, but betterment in surface water runoff should be sought ideally, and as such the greenfield runoff rate should be determined for the site using current best practice. This will allow for the appropriate sizing of attenuation and conveyance SuDS if feasible to ensure that sufficient space for drainage infrastructure is provided in developing site masterplans.<br>Infiltration would be the preferred method of partially/wholly discharging water from the site. The infiltration potential in this area is labelled as medium in the majority of the site, and high in the southern corner, which alongside the underlying geology, could indicate that infiltration may be possible. Site investigations would be required to fully assess the feasibly of using infiltration SuDS techniques.<br>Drainage design should include recommended allowances for climate change.<br>The topography of the site should be taken in to consideration to ensure that gravity drainage is possible throughout the whole site. An appropriate discharge location should be identified (if not all infiltration) and appropriate consultations should be had. |




Key

LBB Site

**Flood Zone Summary**
- Main Rivers
- Ordinary Watercourses
- Flood defences (SoP over 1 in 100 year AEP)
- Flood Storage Areas
- Functional Floodplain
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

**Surface Water Flood Risk**
- 3.33% AEP Extent
- 1% AEP Extent
- 0.1% AEP Extent

**Risk of Flooding from Reservoirs Max Depth**
- < 0.3
- 0.3 - 2.0
- > 2.0

**Historic Flood Risk**

Recorded Flood Events Bexley Borough (1960-2019)
- Cause unrecorded
- Blocked Culvert
- Blocked Gulley
- Blocked Gully
- Burst Water Main
- Fluvial
- Groundwater
- Sewer
- Surface Water (Pluvial)
- Surface Water, Fluvial and Groundwater
- Surface and Fluvial
- Surface and Groundwater
- Surface and Sewer

Recorded flood outlines
- 1953 Event
- 1968 Event
- 1977 Event

**Surface Water Climate Change**
- 1% AEP
- Areas potentially vulnerable to climate change

**Infiltration Potential**
- High
- Med
- Low

0 100 m

Scale at A4: 1:1,799



Client

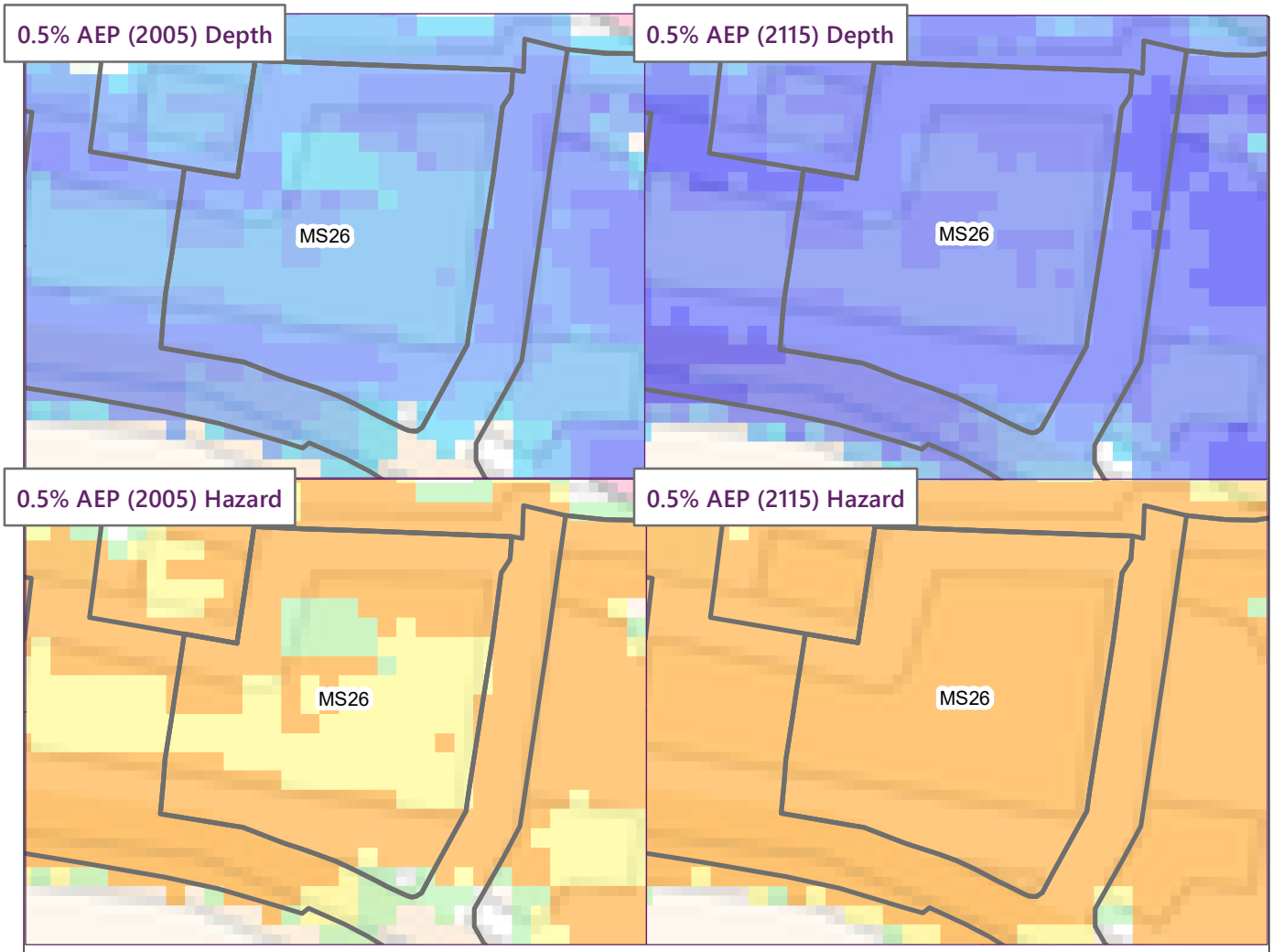
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS26**
**Flood Risk Overview Map**

October 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0 - 0.05
- 0.05 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- 3 - 3.5
- 3.5 - 4
- 4 - 5
- 5+

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 m

Scale at A4: 1:1,804



Client

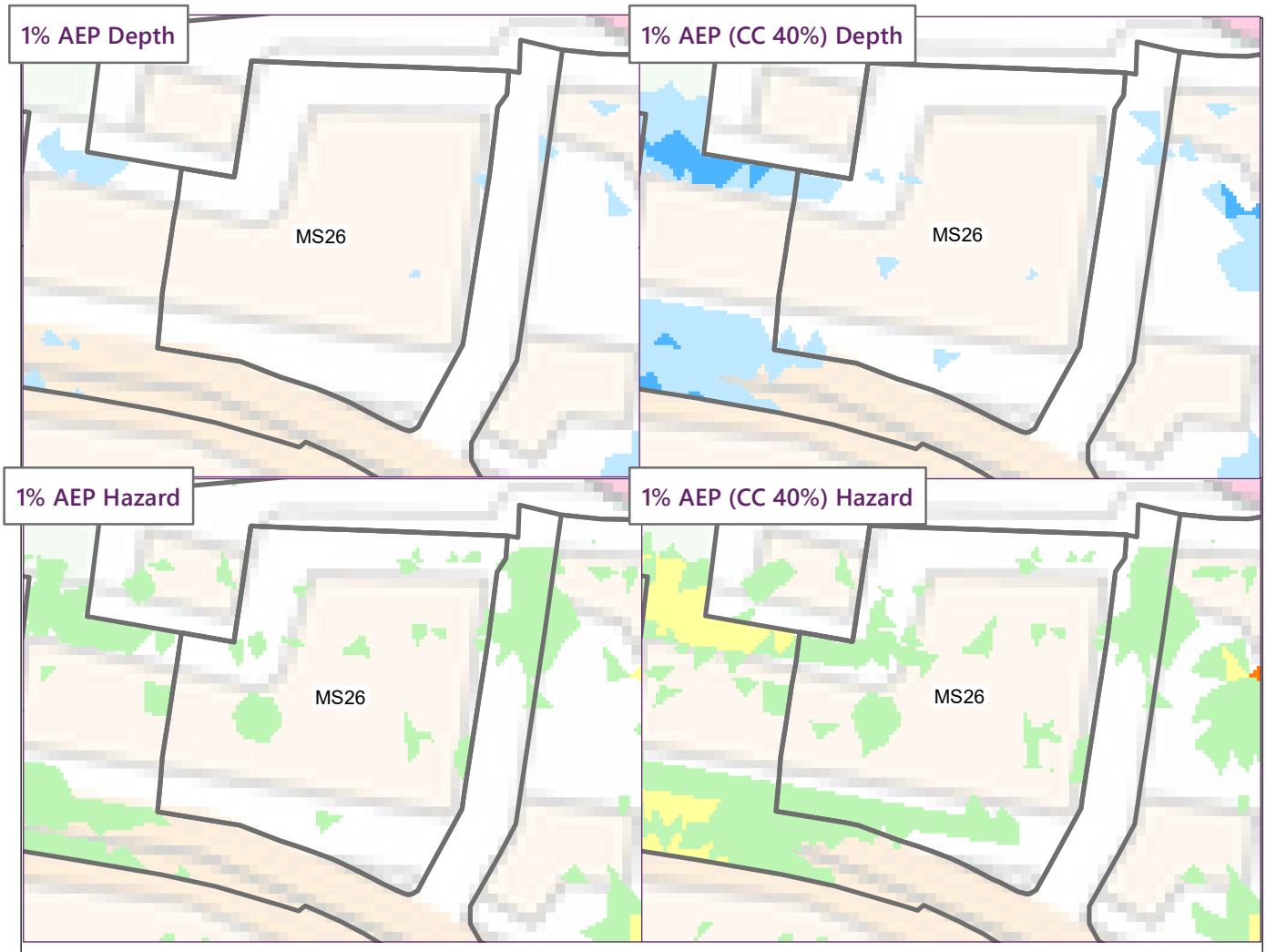
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS26**
**Residual tidal flood risk - River Thames**

September 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 m

Scale at A4: 1:1,804



Client

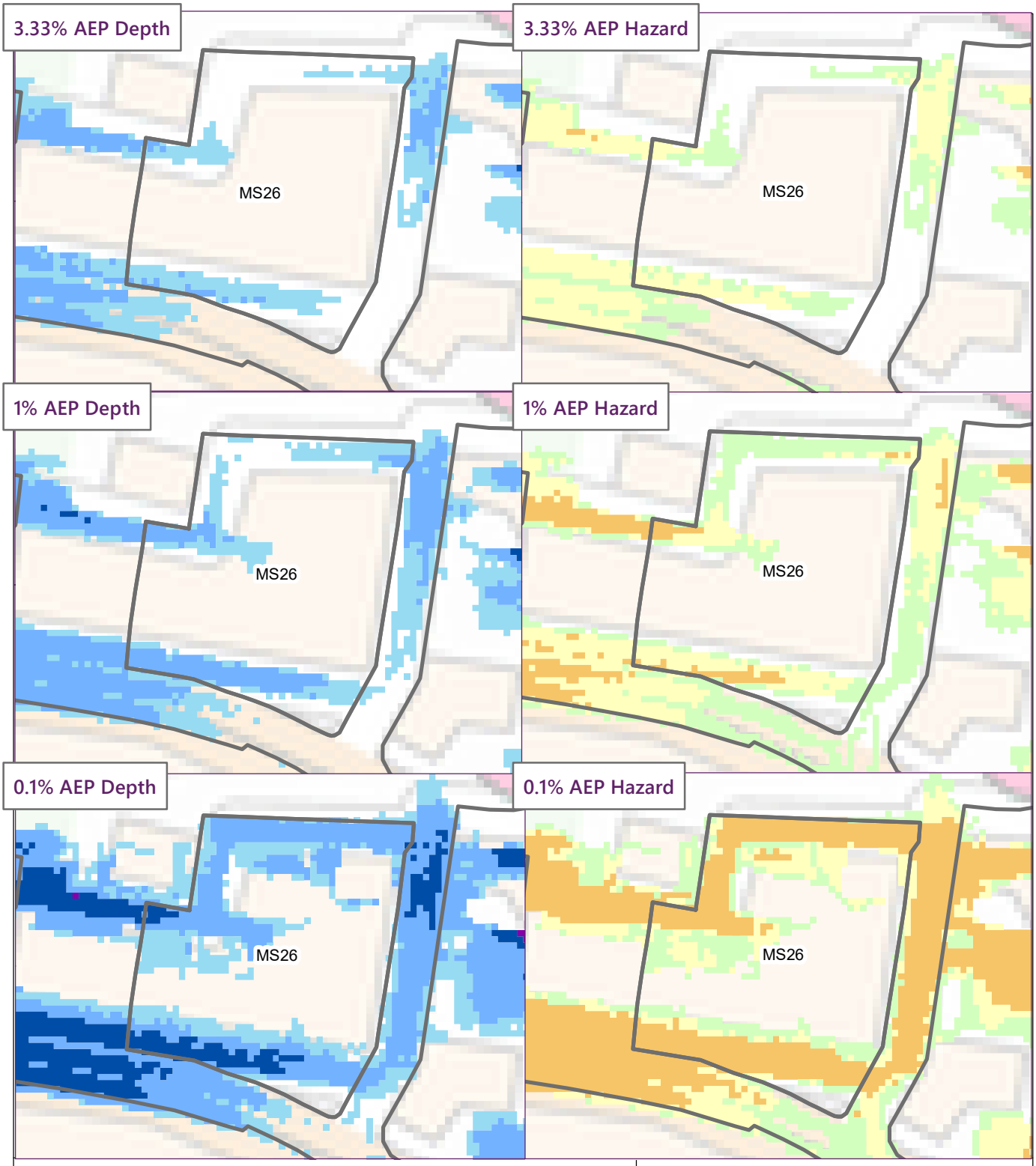
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS26**
**Combined Risk Modelling Results: Marsh Dykes**

October 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 m

Scale at A4: 1:1,810



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS26**
**Risk of Flooding from Surface Water (EA Dataset)**

September 2020

wood.

# Bexley Level 2 SFRA

Flood Risk Information Sheet

| General information | | | |
|---|---|---|---|
| ***Site name / address*** | **BEL04 Land adjacent Woodside School, Halt Robin Road, Belvedere** | | |
| ***Site ID*** | AS56 | ***Local Plan Reg 19 Ref*** | SA6 |
| ***Sustainable development location*** | Belvedere Station & District Centre | ***Area (ha)*** | 1.32 |
| ***Allocation type*** | Residential | | |
| | Mixed use % (A1-A5) | Residential % | Design led net capacity |
| | 0 | 100 | 138 |

| Baseline Flood Risk Summary | | | |
|---|---|---|---|
| ***Fluvial/Tidal*** | | | |
| ***Overview*** | | | |
| Source of risk | Other | Watercourse | N/A |
| % site in Flood Zone 1 | 100% | % site in Flood Zone 3a | 0% |
| % site in Flood Zone 2 | 0% | % site in Flood Zone 3b | 0% |
| Flood Defences | No | % site in ABD | 0% |
| ***Fluvial flood risk (including presence of defences)*** | | | |
| Present day max 1 in 100 AEP flood level (mAOD) | 0 | Future max 1 in 100 AEP flood level (mAOD) | 0 |
| Present day max 1 in 100 AEP flood depth (m) | 0 | Future day max 1 in 100 AEP flood depth (m) | 0 |
| ***Impact of climate change*** | - | | |
| ***Historical information*** | - | | |
| ***Contextual commentary*** | The site is in Flood Zone 1 and therefore not at risk from either fluvial or tidal flooding. | | |
| ***Surface Water*** | | | |
| ***Overview*** | | | |
| % site at high risk (1:30 AEP) | 9% | % site at low risk (1:1000 AEP) | 11% |
| % site at medium risk (1:100 AEP) | 5% | % site with no mapped risk | 76% |
| % site in critical drainage area | 100% | | |
| ***Impact of climate change*** | Rainfall intensity is predicted to increase with climate change. The increase in intensity will result in an increase in risk of flooding from surface water, resulting in increases in depth, extent and hazard of flooding. | | |
| ***Historical information*** | There is no evidence of the site flooding in the past. | | |
| ***Contextual commentary*** | Detailed modelling of the Marsh Dykes suggests an area of surface water flooding through the centre of the site, with some isolated flooding predicted in the western edge of the site . | | |
| ***Other sources of flooding*** | | | |
| ***Contextual commentary*** | There is no known flood risk from other sources. | | |

## Policy and Recommendations

### Site suitability

| | | | |
|---|---|---|---|
| ***Highest Flood Zone*** | Flood Zone 1 | ***Development vulnerability*** | More Vulnerable |
| ***Suitability*** | Yes | ***Exception Test required?*** | No |

### Policy recommendations for flood risk management

In accordance with NPPF PPG Tables 2 & 3 (reproduced in Appendix D of the Level 1 SFRA), residential development is classed as more vulnerable, so development in FZ1 is appropriate.
In accordance with NPPF a site-specific FRA would be required, as the site area is >1 ha as well as being in an identified critical drainage area. See Section 8 of the Level 1 SFRA details the requirements of an FRA.

### Passing the exception test

There is no need to pass the exception test, the site is Flood Zone 1 and 'more vulnerable' residential development is suitable for this location.

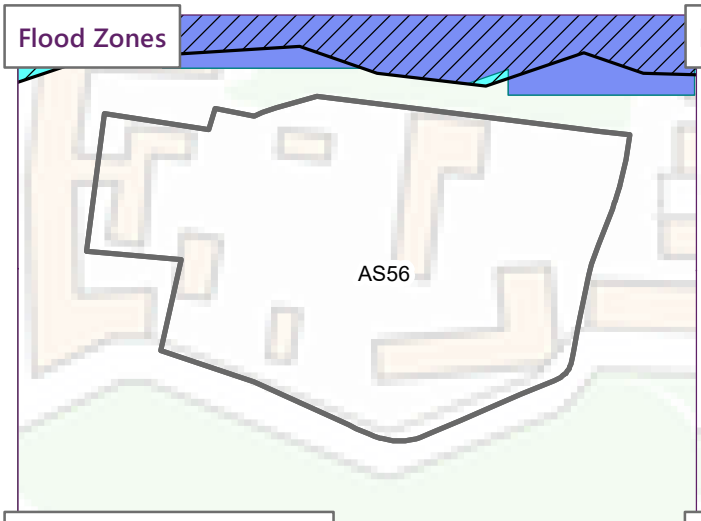
### Site-Specific Recommendations for NPPF Compliant Development

Modelling indicates parts of the site are at risk of surface water flooding. If the site is to be reconfigured as part of development housing should be directed away from areas of surface water flood risk where possible to avoid the flood risk. Where development in areas of surface water flooding is unavoidable, housing should be raised above the flood level and/or surface water should be directed away from the housing, without increasing flood risk to 3rd parties.
Existing surface water flow routes across the site should be preserved to ensure flood risk is not increased elsewhere. The construction of the development should not exacerbate surface water flood risk in the wider critical drainage area. Any changes to the site configuration which will alter how surface water is stored and/or flows across the site will need to be detailed in an accompanying drainage strategy.
Sustainable drainage solutions should be implemented (see drainage management recommendations below).

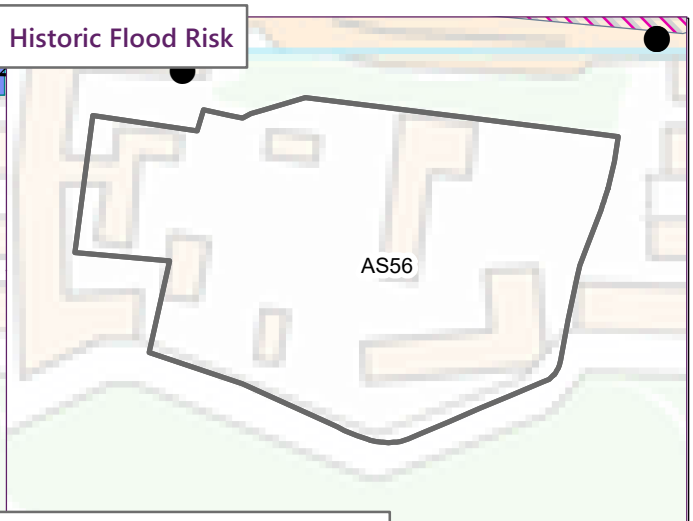
### Drainage Management Recommendations

The site is within a critical drainage area, where surface water flooding is prevalent. Therefore, it will be imperative that surface water runoff is managed appropriately to ensure flood risk is not increased elsewhere. All feasible SuDS options should be assessed, whilst adhering to the SuDS hierarchy as set out in the Level 1 SFRA report (see chapter 7 and Appendix B of the Level 1 SFRA).
The site is currently developed, but betterment in surface water runoff should be sought ideally, and as such the greenfield runoff rate should be determined for the site using current best practice. This will allow for the appropriate sizing of attenuation and conveyance SuDS to ensure that sufficient space for drainage infrastructure is provided in developing site masterplans.
Infiltration would be the preferred method of partially/wholly discharging water from the site. The infiltration potential in this area is labelled as medium, which alongside the underlying geology, could indicate that infiltration may be possible. Site investigations would be required to fully assess the feasibly of using infiltration SuDS techniques.
Drainage design should include recommended allowances for climate change.
The topography of the site should be taken in to consideration to ensure that gravity drainage is possible throughout the whole site. An appropriate discharge location should be identified (if not all infiltration) and appropriate consultations should be had.

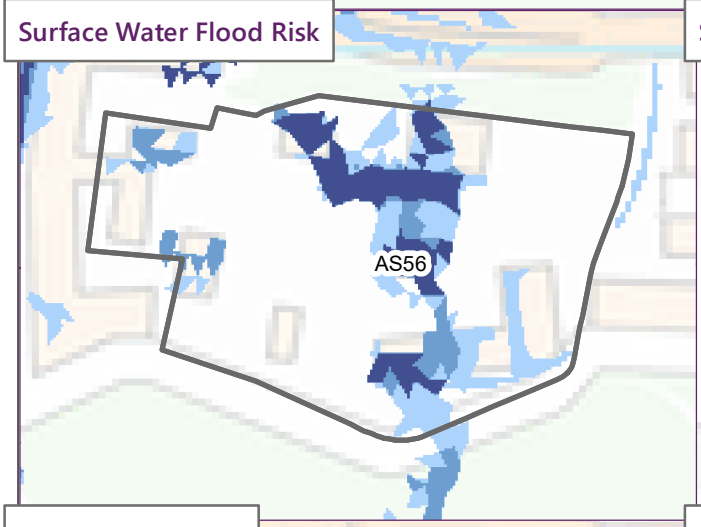
## Flood Zones



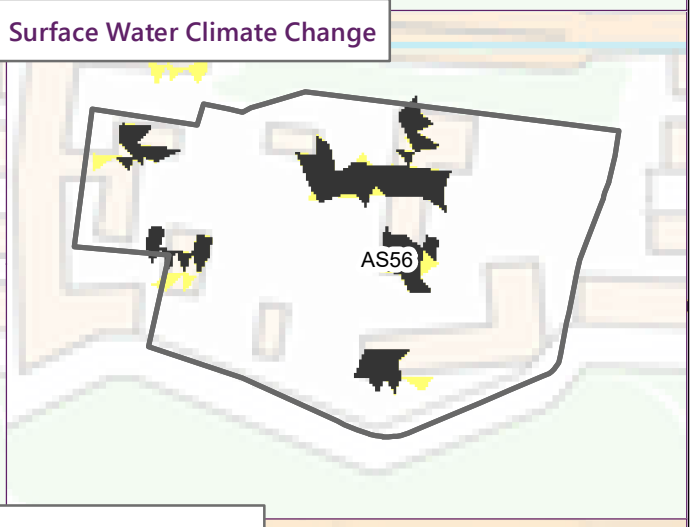

## Historic Flood Risk



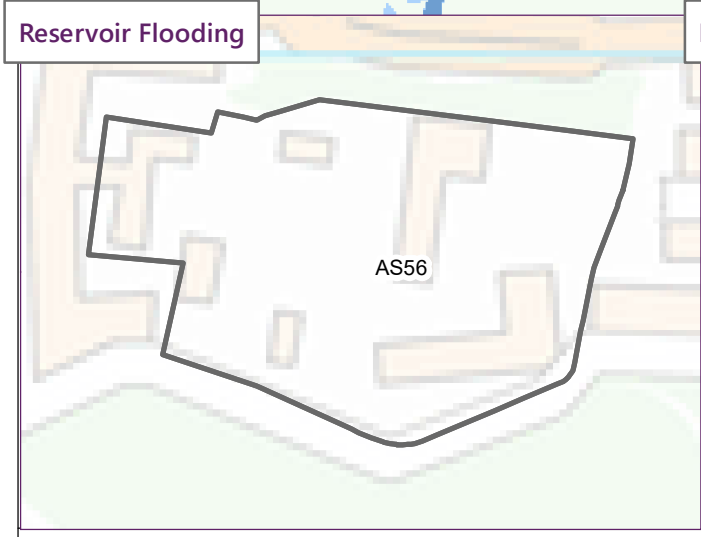

## Surface Water Flood Risk



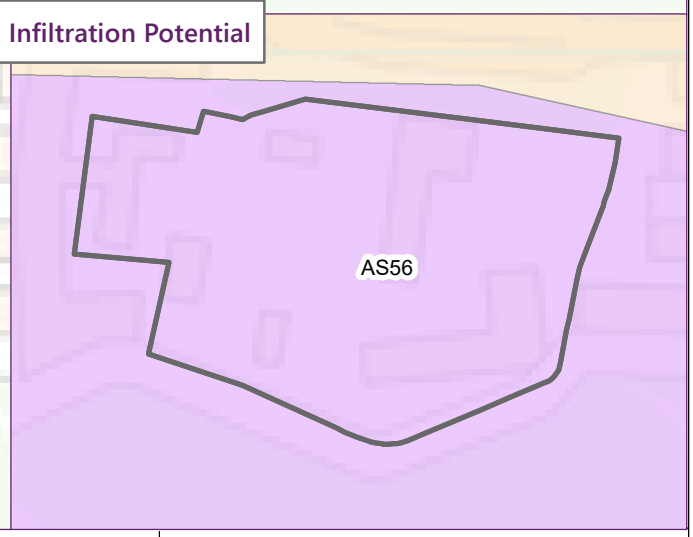

## Surface Water Climate Change




## Reservoir Flooding




## Infiltration Potential




Key

LBB Site

**Flood Zone Summary**
- Main Rivers
- Ordinary Watercourses
- Flood defences (SoP over 1 in 100 year AEP)
- Flood Storage Areas
- Functional Floodplain
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

**Surface Water Flood Risk**
- 3.33% AEP Extent
- 1% AEP Extent
- 0.1% AEP Extent

**Risk of Flooding from Reservoirs Max Depth**
- < 0.3
- 0.3 - 2.0
- > 2.0

**Historic Flood Risk**

Recorded Flood Events Bexley Borough (1960-2019)
- Cause unrecorded
- Blocked Culvert
- Blocked Gulley
- Blocked Gully
- Burst Water Main
- Fluvial
- Groundwater
- Sewer
- Surface Water (Pluvial)
- Surface Water, Fluvial and Groundwater
- Surface and Fluvial
- Surface and Groundwater
- Surface and Sewer

Recorded flood outlines
- 1953 Event
- 1968 Event
- 1977 Event

**Surface Water Climate Change**
- 1% AEP
- Areas potentially vulnerable to climate change

**Infiltration Potential**
- High
- Med
- Low

N

0 100 m

Scale at A4: 1:2,839



Client

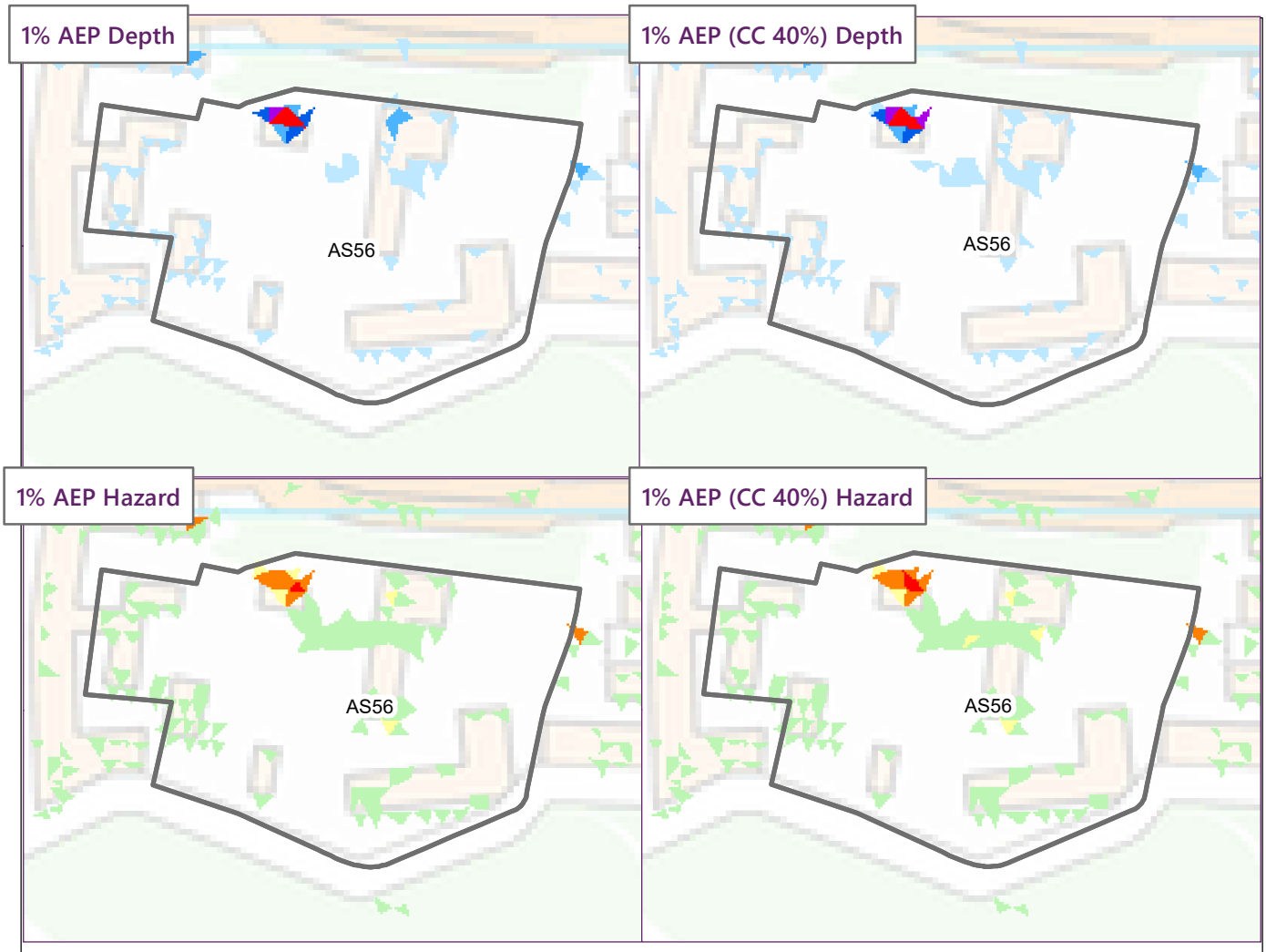
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: AS56**
**Flood Risk Overview Map**

October 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 m

Scale at A4: 1:2,847



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: AS56**
**Combined Risk Modelling Results: Marsh Dykes**

October 2020

wood.

# Bexley Level 2 SFRA

Flood Risk Information Sheet

| General information | | | |
|---|---|---|---|
| ***Site name / address*** | **BEL05 Belvedere Gas Holders, Yarnton Way, Belvedere** | | |
| ***Site ID*** | MS27 | **Local Plan Reg19 Ref** | SA7 |
| **Sustainable development location** | Belvedere Station and District Centre | **Area (ha)** | 3.48 |
| ***Allocation type*** | Residential | | |
| | Mixed use % (A1-A5) | Residential % | Design led net capacity |
| | 0 | 100 | 395 |

| Baseline Flood Risk Summary | | | |
|---|---|---|---|
| ***Fluvial/Tidal*** | | | |
| ***Overview*** | | | |
| Source of risk | Tidal | Watercourse | River Thames |
| % site in Flood Zone 1 | 0% | % site in Flood Zone 3a | 100% |
| % site in Flood Zone 2 | 0% | % site in Flood Zone 3b | 0% |
| Flood Defences | Yes | % site in ABD | 100% |
| ***Residual tidal flood risk from defence failure*** | | | |
| Present day max 1 in 200 AEP flood level (mAOD) | 1.88 | Future max 1 in 200 AEP flood level (mAOD) | 2.49 |
| Present day max 1 in 200 AEP flood hazard | Danger for all | Future day max 1 in 200 AEP flood hazard | Danger for all |
| ***Impact of climate change*** | Sea levels are predicted to rise with future climate change, consequently levels in the Tidal River Thames are also predicted to increase. As a result, in the event of a breach in the tidal flood defences in the future peak flood levels on site will increase. | | |
| ***Historical information*** | The site flooded in 1953 as a result of the storm surge flood event along the Tidal Thames. Since then extensive defences have been constructed along the Tidal Thames which offer a 0.1% standard of protection. | | |
| ***Contextual commentary*** | The EA Flood Zone map shows the site is 100% within Flood Zone 3a. The source of risk is tidal flooding from the River Thames. There is no risk of fluvial flooding.<br>The entire site is shown as being an area benefitting from defences as it is protected by the Thames Tidal defences to a SOP of 0.1%AEP. However, there remains a residual risk associated with a breach in these defences. The peak flood level associated with a breach in the defences will increase with climate change. In the case of a breach, the site is anticipated to flood up to 3m deep under present day conditions and up to 3.5m in future conditions (2115). The majority of the site is subject to Significant hazard, with isolated pockets of Extreme hazard increasing in extent under future conditions.<br>The associated residual risk map shows how the depths and hazard vary across the site and with climate change. | | |
| ***Surface Water*** | | | |
| ***Overview*** | | | |
| % site at high risk (1:30 AEP) | 14% | % site at low risk (1:1000 AEP) | 17% |
| % site at medium risk (1:100 AEP) | 5% | % site with no mapped risk | 63% |
| % site in critical drainage area | 100% | | |
| ***Impact of climate change*** | Rainfall intensity is predicted to increase with climate change. The increase in intensity will result in an increase in risk of flooding from surface water, resulting in increases in depth, extent and hazard of flooding. | | |
| ***Historical information*** | There is no evidence of the site flooding in the past. But there are a cluster of historic flood events recorded on the adjacent roads to the east of the site. | | |
| ***Contextual commentary*** | Detailed combined modelling of the Marsh Dykes suggests isolated areas of surface water flooding across the site in the more frequent 3.33% and 1% AEP events. | | |
| ***Other sources of flooding*** | | | |
| ***Contextual commentary*** | This area is shown to be potentially at risk of elevated groundwater levels. | | |

## Policy and Recommendations

### *Site suitability*

| | | | |
|---|---|---|---|
| ***Highest Flood Zone*** | Flood Zone 3a | ***Development vulnerability*** | More Vulnerable |
| ***Suitability*** | Yes | ***Exception Test required?*** | Yes |

### *Policy recommendations for flood risk management*

In accordance with NPPF PPG Tables 2 & 3 (reproduced in Appendix D of the Level 1 SFRA), mixed use development, where it contains residential development, is classed as more vulnerable and should not be permitted within FZ3a unless the exception test can be passed.
The Exception test would need to robustly demonstrate that the wider sustainability benefits outweigh flood risk, and that the development will be safe throughout its lifetime and will not increase flood risk elsewhere, including allowances for climate change.
In accordance with NPPF a site-specific FRA would be required as the site is in FZ3a, see Section 8 of the Level 1 SFRA details the requirements of an FRA.

### *Passing the exception test*

To pass the Exception test:
- it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and
-a site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

A number of factors which need to be considered when looking to pass the Exception test include:
- Design of development to manage and reduce flood risk wherever possible;
- Finished floor levels;
- Safe access and egress;
- Operation and maintenance;
- Resident awareness;
- Flood warning; and
- Evacuation procedures and funding arrangements.

See section 6 of the Level 1 SFRA for more information.

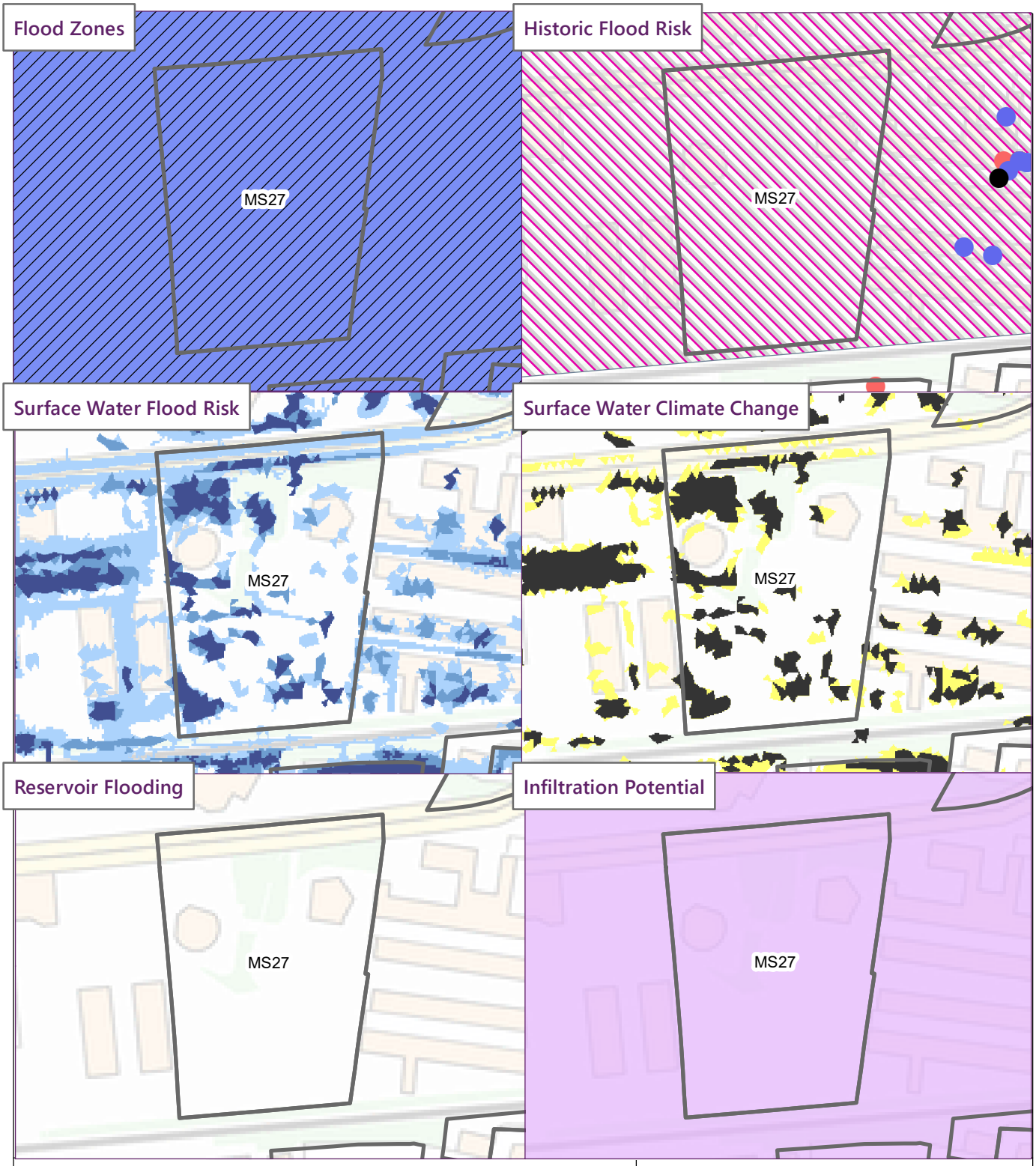
### *Site-Specific Recommendations for NPPF Compliant Development*

To make the development safe, the FRA should consider:
● Safe access and egress - noting that the current access road would flood deeply and significant hazard would develop in the event of breach in the tidal defences. The FRA may consider if safe shelter where residents would reside in situ until the flood water has receded within the building could be an option;
● Design of development to manage and reduce flood risk wherever possible, including siting all living accommodation above the maximum future (2115) flood level;
● Siting development in accordance with the sequential approach, placing the most vulnerable uses in the areas of least risk;
● Resident awareness;
● Flood warning - making use of breach modelling outputs to determine the time from the breach happening to the site being inundated; and
● Evacuation procedures and funding arrangements.
Further detail on the above points is given in the Level 1 SFRA, Section 6.3.

Development of housing should be directed away from areas of surface water flood risk across the site to preserve the existing surface water storage and flow routes so as not to increase flood risk elsewhere. Where development in areas of surface water flooding is unavoidable, surface water should be directed away from the housing, without increasing flood risk to 3rd parties and this should be detailed in a drainage strategy. The construction of the development should not exacerbate surface water flood risk in the wider critical drainage area. Sustainable drainage solutions should be implemented (see drainage management recommendations below).

Site investigations would be required to assess the risk of groundwater flooding.

| ***Drainage Management Recommendations*** |
| --- |
| The site is within a critical drainage area, where surface water flooding is prevalent. Therefore, it will be imperative that surface water runoff is managed appropriately to ensure flood risk is not increased elsewhere. All feasible SuDS options should be assessed, whilst adhering to the SuDS hierarchy as set out in the Level 1 SRFA report (see chapter 7 and Appendix B of the Level 1 SFRA).<br>Part of the site is undeveloped. The greenfield runoff rate should be determined for the site using current best practice. This will allow for the appropriate sizing of attenuation and conveyance SuDS to ensure that sufficient space for drainage infrastructure is provided in developing site masterplans.<br>Site investigations should be undertaken to fully assess the feasibly of using infiltration techniques . The infiltration potential in this area is labelled as medium, which alongside the underlying geology, could indicating that infiltration may be possible and, if it is, this would be the preferred method of partially/wholly discharging water from the site.<br>Drainage design should include recommended allowances for climate change.<br>The topography of the site should be taken in to consideration to ensure that gravity drainage is possible throughout the whole site. An appropriate discharge location should be identified (if not all infiltration) and appropriate consultations should be had. |




Key

LBB Site

**Flood Zone Summary**
- Main Rivers
- Ordinary Watercourses
- Flood defences (SoP over 1 in 100 year AEP)
- Flood Storage Areas
- Functional Floodplain
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

**Surface Water Flood Risk**
- 3.33% AEP Extent
- 1% AEP Extent
- 0.1% AEP Extent

**Risk of Flooding from Reservoirs Max Depth**
- < 0.3
- 0.3 - 2.0
- > 2.0

**Historic Flood Risk**

Recorded Flood Events Bexley Borough (1960-2019)
- Cause unrecorded
- Blocked Culvert
- Blocked Gulley
- Blocked Gully
- Burst Water Main
- Fluvial
- Groundwater
- Sewer
- Surface Water (Pluvial)
- Surface Water, Fluvial and Groundwater
- Surface and Fluvial
- Surface and Groundwater
- Surface and Sewer

Recorded flood outlines
- 1953 Event
- 1968 Event
- 1977 Event

**Surface Water Climate Change**
- 1% AEP
- Areas potentially vulnerable to climate change

**Infiltration Potential**
- High
- Med
- Low

0 100 200 m

Scale at A4: 1:4,682



Client

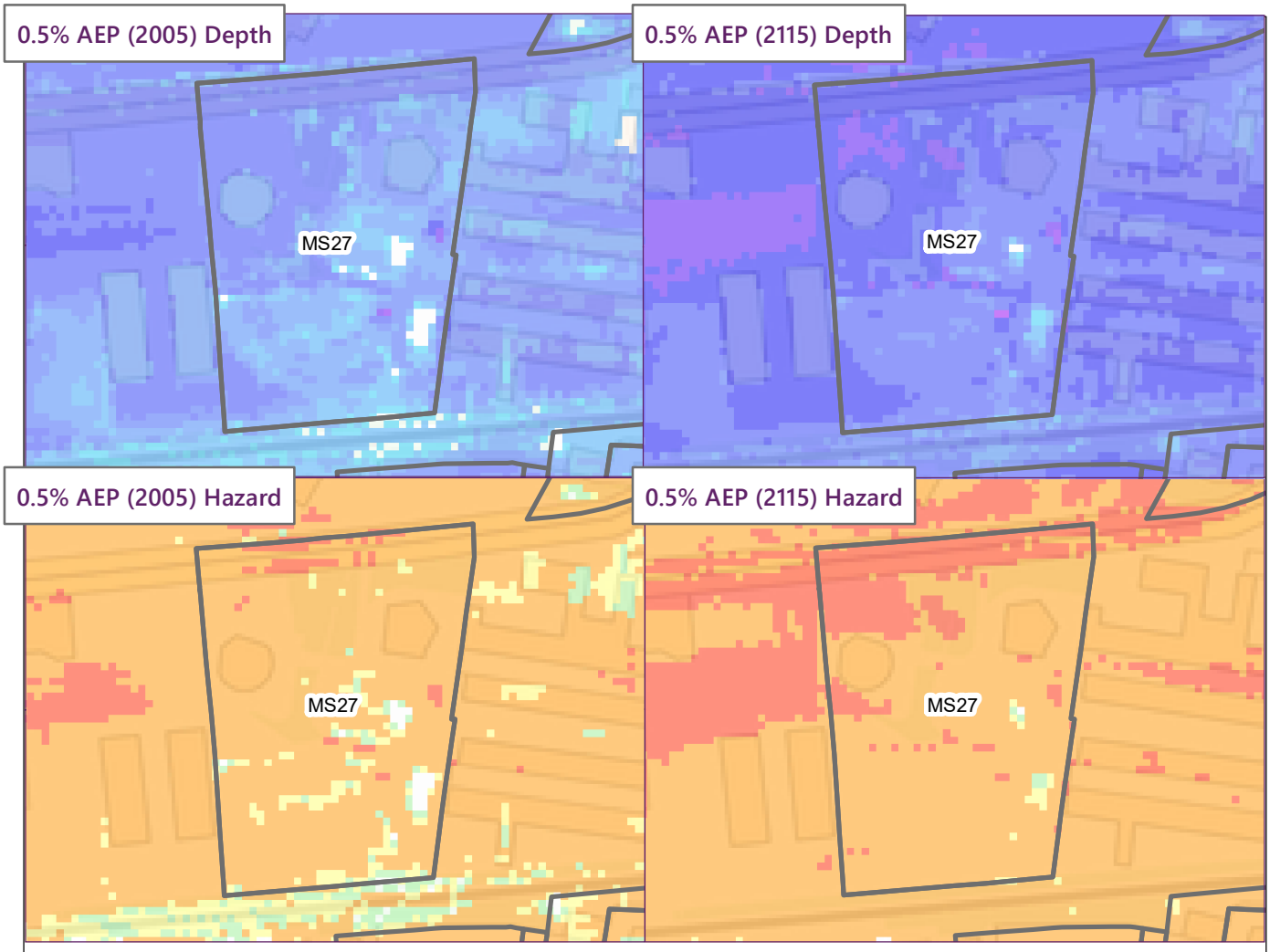
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS27**
**Flood Risk Overview Map**

October 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0 - 0.05
- 0.05 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- 3 - 3.5
- 3.5 - 4
- 4 - 5
- 5+

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 200 m

Scale at A4: 1:4,664



Client

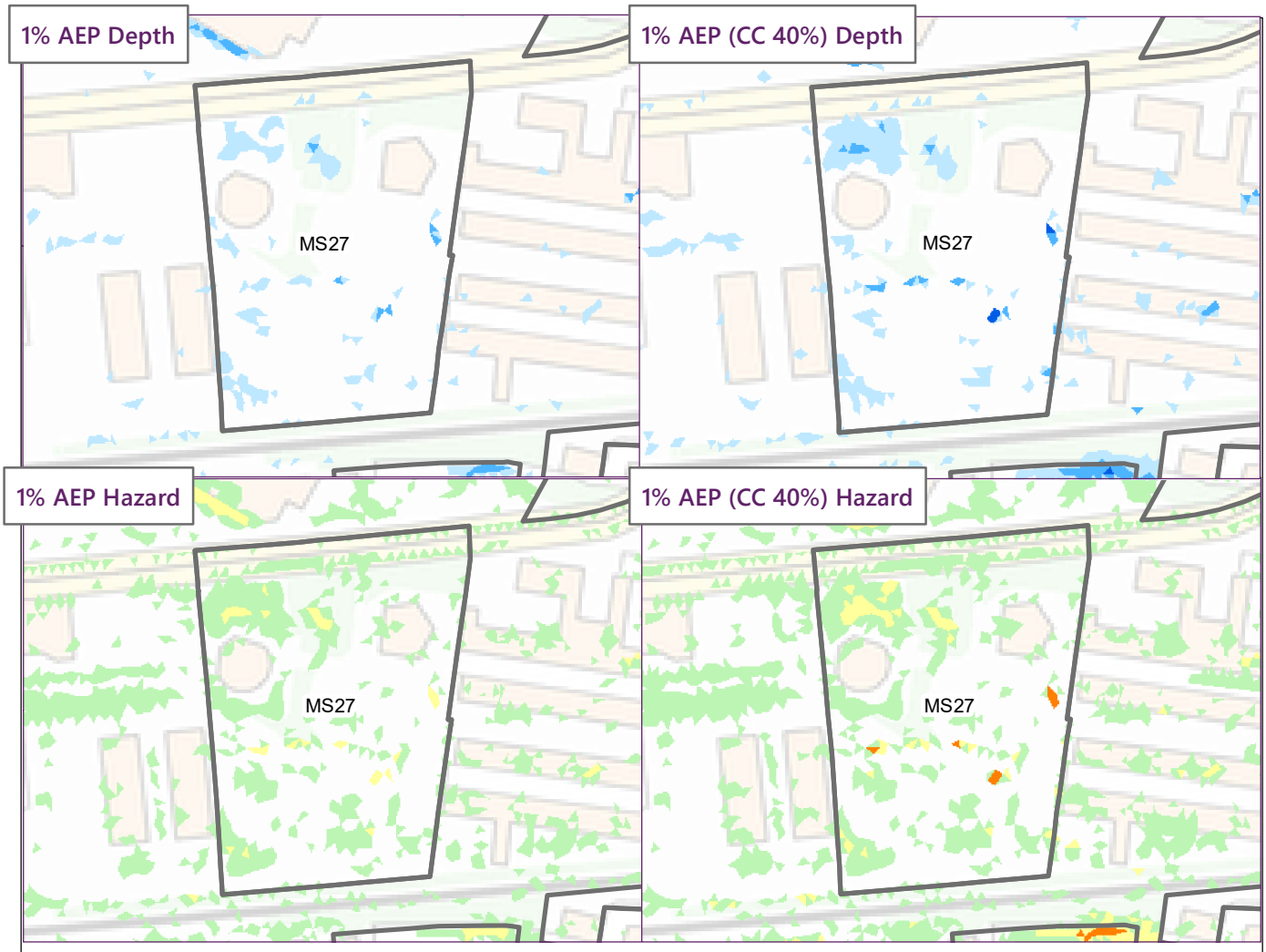
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS27**
**Residual tidal flood risk - River Thames**

June 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 200 m

Scale at A4: 1:4,696



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS27**
**Combined Risk Modelling Results: Marsh Dykes**

October 2020

wood.


Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

0 100 200 m

Scale at A4: 1:4,682



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS27**
**Risk of Flooding from Surface Water (EA Dataset)**

May 2020

wood.

# Bexley Level 2 SFRA

Flood Risk Information Sheet

| General information | | | |
|---|---|---|---|
| ***Site name / address*** | **BEL06 Monarch Works, Station Road North, Belvedere** | | |
| ***Site ID*** | MS28 | **Local Plan Reg19 Ref** | SA8 |
| **Sustainable development location** | Belvedere Station and District Centre | **Area (ha)** | 0.63 |
| ***Allocation type*** | Residential | | |
| | Mixed use % (A1-A5) | Residential % | Design led net capacity |
| | 0 | 100 | 90 |

| Baseline Flood Risk Summary | | | |
|---|---|---|---|
| ***Fluvial/Tidal*** | | | |
| ***Overview*** | | | |
| Source of risk | Tidal | Watercourse | River Thames |
| % site in Flood Zone 1 | 0% | % site in Flood Zone 3a | 100% |
| % site in Flood Zone 2 | 0% | % site in Flood Zone 3b | 0% |
| Flood Defences | Yes | % site in ABD | 100% |
| ***Residual tidal flood risk from defence failure*** | | | |
| Present day max 1 in 200 AEP flood level (mAOD) | 2.14 | Future max 1 in 200 AEP flood level (mAOD) | 2.49 |
| Present day max 1 in 200 AEP flood hazard | Danger for all | Future day max 1 in 200 AEP flood hazard | Danger for all |
| ***Impact of climate change*** | Sea levels are predicted to rise with future climate change, consequently levels in the Tidal River Thames are also predicted to increase. As a result, in the event of a breach in the tidal flood defences in the future peak flood levels on site will increase. | | |
| ***Historical information*** | The site flooded in 1953 as a result of the storm surge flood event along the Tidal Thames. Since then extensive defences have been constructed along the Tidal Thames which offer a 0.1% standard of protection. | | |
| ***Contextual commentary*** | The EA Flood Zone map shows the site is 100% within Flood Zone 3a. The source of risk is tidal flooding from the River Thames. There is no risk of fluvial flooding.<br>The entire site is shown as being an area benefitting from defences as it is protected by the Thames Tidal defences to a SOP of 0.1%AEP. However, there remains a residual risk associated with a breach in these defences. The peak flood level associated with a breach in the defences will increase with climate change. In the case of a breach, the site is anticipated to flood up to 2m deep under present day conditions and up to 2.5m in future conditions (2115). The majority of the site is subject to Extreme hazard.<br>The associated residual risk map shows how the depths and hazard vary across the site and with climate change. | | |
| ***Surface Water*** | | | |
| ***Overview*** | | | |
| % site at high risk (1:30 AEP) | 38% | % site at low risk (1:1000 AEP) | 46% |
| % site at medium risk (1:100 AEP) | 14% | % site with no mapped risk | 2% |
| % site in critical drainage area | 100% | | |
| ***Impact of climate change*** | Rainfall intensity is predicted to increase with climate change. The increase in intensity will result in an increase in risk of flooding from surface water, resulting in increases in depth, extent and hazard of flooding. | | |
| ***Historical information*** | There is no evidence of the site flooding in the past. But there are a cluster of historic flood events recorded on the adjacent roads to the south west of the site. | | |
| ***Contextual commentary*** | Detailed combined modelling of the Marsh Dykes indicates southern half of the site is at high risk of surface water flooding in the more frequent 3.33% and 1% AEP events. In the 0.1% AEP event the flood risk expands to cover the entire site. | | |
| ***Other sources of flooding*** | | | |
| ***Contextual commentary*** | This area is shown to be potentially at risk of elevated groundwater levels. | | |

## Policy and Recommendations

### *Site suitability*

| | | | |
|---|---|---|---|
| ***Highest Flood Zone*** | Flood Zone 3a | ***Development vulnerability*** | More Vulnerable |
| ***Suitability*** | Yes | ***Exception Test required?*** | Yes |

### *Policy recommendations for flood risk management*

In accordance with NPPF PPG Tables 2 & 3 (reproduced in Appendix D of the Level 1 SFRA), residential development is classed as more vulnerable and should not be permitted within FZ3a unless the exception test can be passed.
The Exception test would need to robustly demonstrate that the wider sustainability benefits outweigh flood risk, and that the development will be safe throughout its lifetime and will not increase flood risk elsewhere, including allowances for climate change.
In accordance with NPPF a site-specific FRA would be required as the site is in FZ3a, see Section 8 of the Level 1 SFRA details the requirements of an FRA.

### *Passing the exception test*

To pass the Exception test:
- it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and
-a site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

A number of factors which need to be considered when looking to pass the Exception test include:
- Design of development to manage and reduce flood risk wherever possible;
- Finished floor levels;
- Safe access and egress;
- Operation and maintenance;
- Resident awareness;
- Flood warning; and
- Evacuation procedures and funding arrangements.

See section 6 of the Level 1 SFRA for more information.

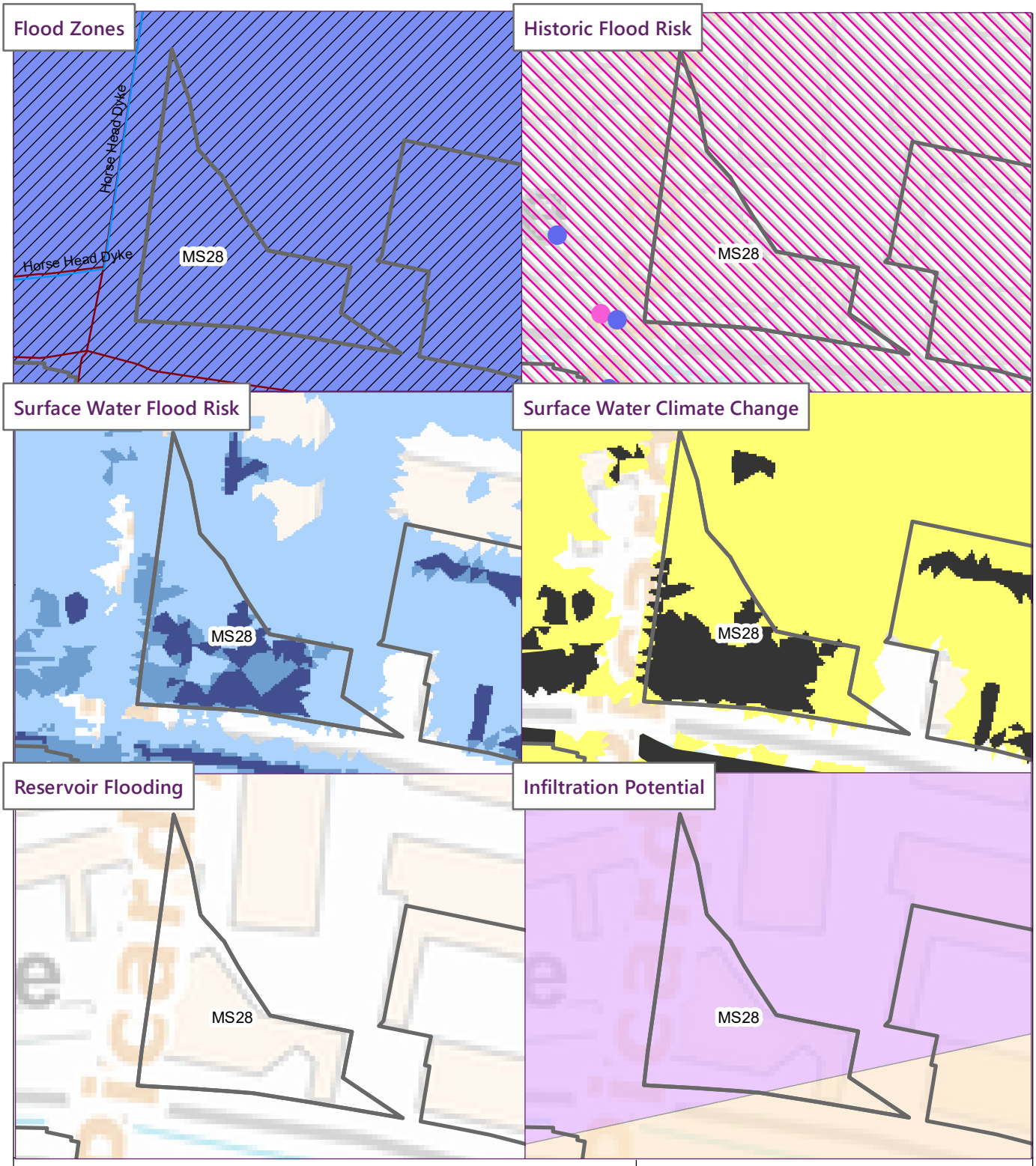
### *Site-Specific Recommendations for NPPF Compliant Development*

To make the development safe, the FRA should consider:
● Safe access and egress - noting that the current access road would flood deeply and significant hazard would develop in the event of breach in the tidal defences. The FRA may consider if safe shelter where residents would reside in situ until the flood water has receded within the building could be an option;
● Design of development to manage and reduce flood risk wherever possible, including siting all living accommodation above the maximum future (2115) flood level;
● Siting development in accordance with the sequential approach, placing the most vulnerable uses in the areas of least risk;
● Resident awareness;
● Flood warning - making use of breach modelling outputs to determine the time from the breach happening to the site being inundated; and
● Evacuation procedures and funding arrangements.
Further detail on the above points is given in the Level 1 SFRA, Section 6.3.

Development of housing should be directed away from areas of surface water flood risk across the site to preserve the existing surface water storage and flow routes so as not to increase flood risk elsewhere. Where development in areas of surface water flooding is unavoidable, surface water should be directed away from the housing, without increasing flood risk to 3rd parties and this should be detailed in a drainage strategy. The construction of the development should not exacerbate surface water flood risk in the wider critical drainage area. Sustainable drainage solutions should be implemented (see drainage management recommendations below).

Site investigations would be required to assess the risk of groundwater flooding.

| *Drainage Management Recommendations* |
| --- |
| Although the site is < 1ha it is within a critical drainage area, where surface water flooding is prevalent. Therefore, it will be imperative that surface water runoff is managed appropriately to ensure flood risk is not increased elsewhere. All feasible SuDS options should be assessed, whilst adhering to the SuDS hierarchy as set out in the Level 1 SRFA report (see chapter 7 and Appendix B of the Level 1 SFRA), although it is recognised that given the small size of the site options may be limited.<br>The site is currently developed, but betterment in surface water runoff should be sought ideally, and as such the greenfield runoff rate should be determined for the site using current best practice. This will allow for the appropriate sizing of attenuation and conveyance SuDS if feasible to ensure that sufficient space for drainage infrastructure is provided in developing site masterplans.<br>Infiltration would be the preferred method of partially/wholly discharging water from the site. The infiltration potential in this area is labelled as medium in the majority of the site, and high in the southern corner, which alongside the underlying geology, could indicate that infiltration may be possible. Site investigations would be required to fully assess the feasibly of using infiltration SuDS techniques.<br>Drainage design should include recommended allowances for climate change.<br>The topography of the site should be taken in to consideration to ensure that gravity drainage is possible throughout the whole site. An appropriate discharge location should be identified (if not all infiltration) and appropriate consultations should be had. |




Key

LBB Site

**Flood Zone Summary**
- Main Rivers
- Ordinary Watercourses
- Flood defences (SoP over 1 in 100 year AEP)
- Flood Storage Areas
- Functional Floodplain
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

**Surface Water Flood Risk**
- 3.33% AEP Extent
- 1% AEP Extent
- 0.1% AEP Extent

**Risk of Flooding from Reservoirs Max Depth**
- < 0.3
- 0.3 - 2.0
- > 2.0

**Historic Flood Risk**

Recorded Flood Events Bexley Borough (1960-2019)
- Cause unrecorded
- Blocked Culvert
- Blocked Gulley
- Blocked Gully
- Burst Water Main
- Fluvial
- Groundwater
- Sewer
- Surface Water (Pluvial)
- Surface Water, Fluvial and Groundwater
- Surface and Fluvial
- Surface and Groundwater
- Surface and Sewer

Recorded flood outlines
- 1953 Event
- 1968 Event
- 1977 Event

**Surface Water Climate Change**
- 1% AEP
- Areas potentially vulnerable to climate change

**Infiltration Potential**
- High
- Med
- Low

0 100 m

Scale at A4: 1:2,726



Client

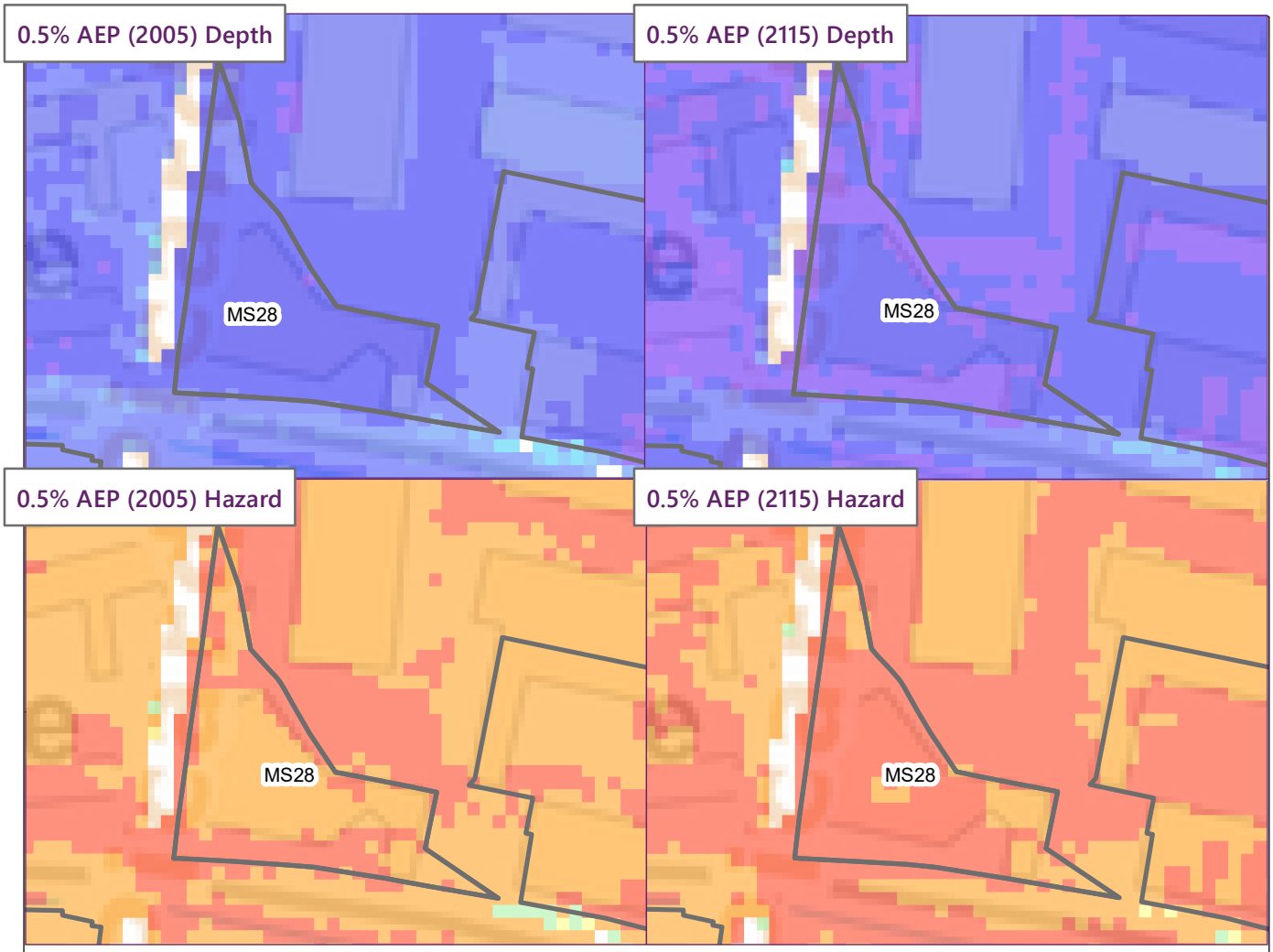
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS28**
**Flood Risk Overview Map**

October 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0 - 0.05
- 0.05 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- 3 - 3.5
- 3.5 - 4
- 4 - 5
- 5+

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 m

Scale at A4: 1:2,718



Client

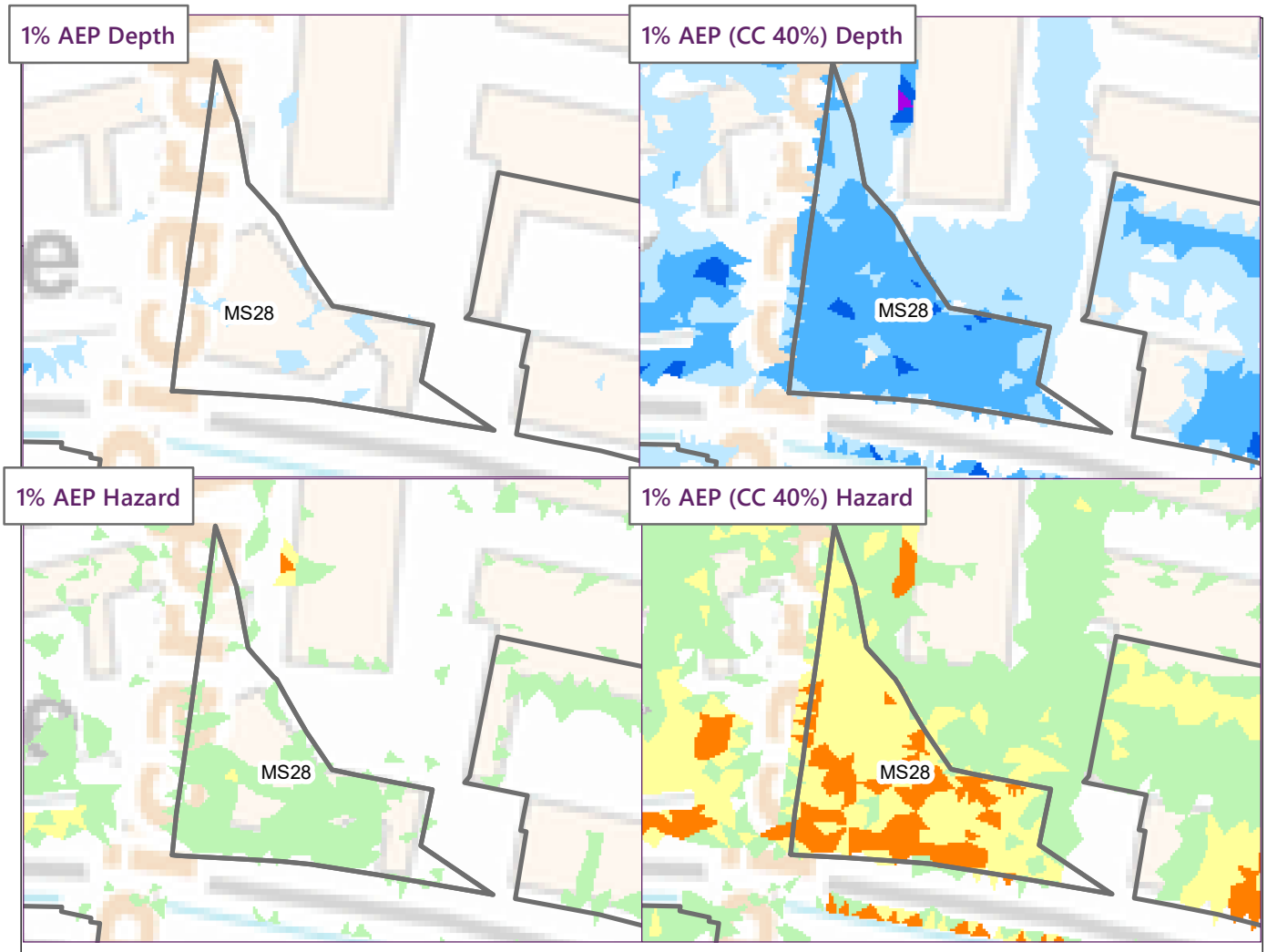
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS28**
**Residual tidal flood risk - River Thames**

June 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 m

Scale at A4: 1:2,734



Client

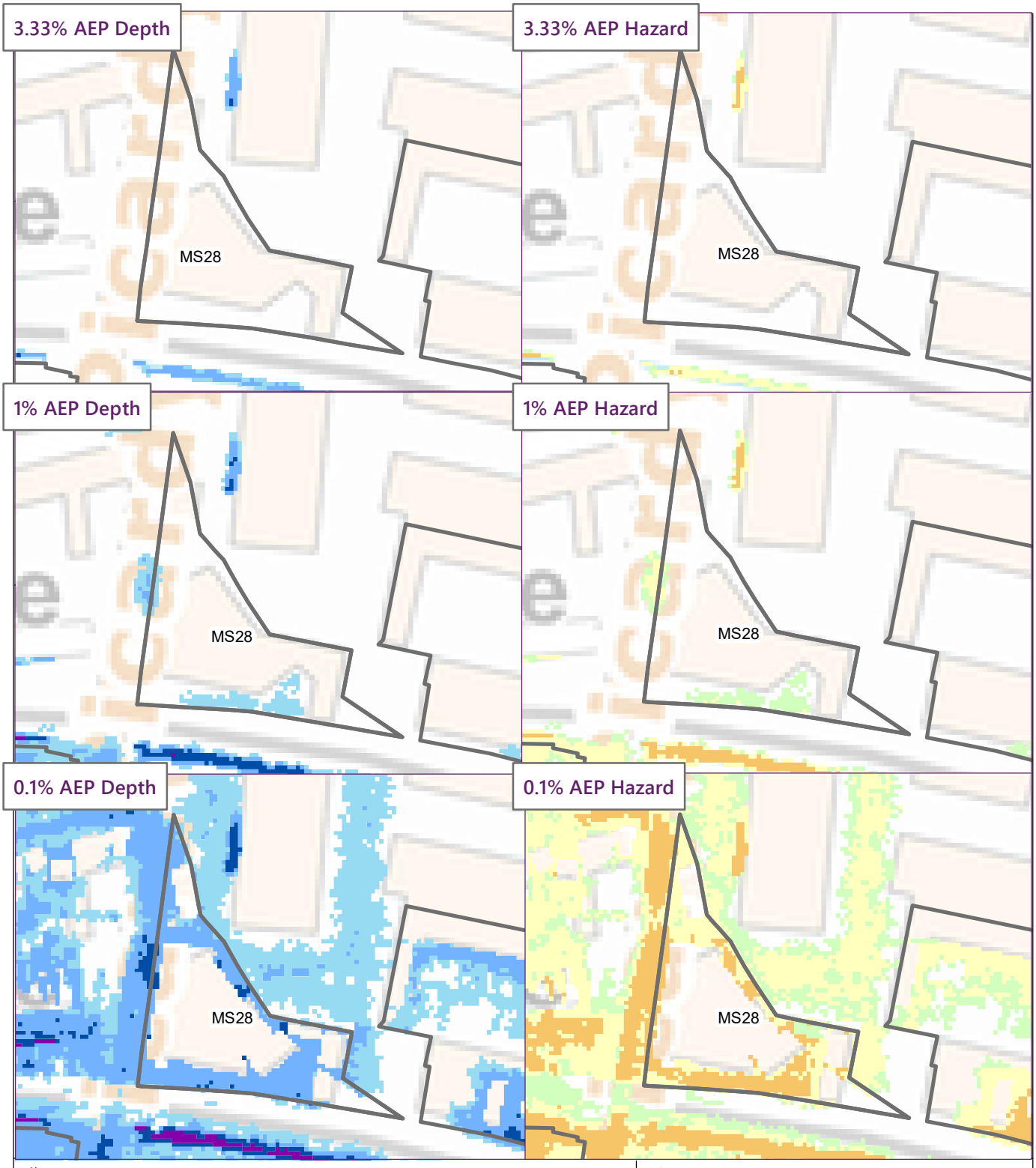
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS28**
**Combined Risk Modelling Results: Marsh Dykes**

October 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 m

Scale at A4: 1:2,726



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS28**
**Risk of Flooding from Surface Water (EA Dataset)**

May 2020

wood.

# Bexley Level 2 SFRA

Flood Risk Information Sheet

| General information | | | |
|---|---|---|---|
| ***Site name / address*** | **BEL07 Crabtree Manorway South, Belvedere** | | |
| ***Site ID*** | MS29 | **Local Plan Reg19 Ref** | SA9 |
| **Sustainable development location** | Belvedere Station and District Centre | **Area (ha)** | 5.971 |
| ***Allocation type*** | Residential | | |
| | Mixed use % (A1-A5) | Residential % | Design led net capacity |
| | 0 | 100 | 741 |

| Baseline Flood Risk Summary | | | |
|---|---|---|---|
| ***Fluvial/Tidal*** | | | |
| ***Overview*** | | | |
| Source of risk | Tidal | Watercourse | Corinthian Dyke |
| % site in Flood Zone 1 | 0% | % site in Flood Zone 3a | 100% |
| % site in Flood Zone 2 | 0% | % site in Flood Zone 3b | 0% |
| Flood Defences | Yes | % site in ABD | 100% |
| ***Residual tidal flood risk from defence failure*** | | | |
| Present day max 1 in 200 AEP flood level (mAOD) | 2.28 | Future max 1 in 200 AEP flood level (mAOD) | 2.49 |
| Present day max 1 in 200 AEP flood hazard | Danger for all | Future day max 1 in 200 AEP flood hazard | Danger for all |
| ***Impact of climate change*** | Sea levels are predicted to rise with future climate change, consequently levels in the Tidal River Thames are also predicted to increase. As a result, in the event of a breach in the tidal flood defences in the future peak flood levels on site will increase. | | |
| ***Historical information*** | The site flooded in 1953 as a result of the storm surge flood event along the Tidal Thames. Since then extensive defences have been constructed along the Tidal Thames which offer a 0.1% standard of protection. | | |
| ***Contextual commentary*** | The EA Flood Zone map shows the site is 100% within Flood Zone 3a. The source of risk is tidal flooding from the River Thames. There is no risk of fluvial flooding.<br>The entire site is shown as being an area benefitting from defences as it is protected by the Thames Tidal defences to a SOP of 0.1%AEP. However, there remains a residual risk associated with a breach in these defences. The peak flood level associated with a breach in the defences will increase with climate change. In the case of a breach, the site is anticipated to flood up to 2.5m deep under present day conditions and future conditions (2115). The majority of the site is subject to extreme hazard.<br>The associated residual risk map shows how the depths and hazard vary across the site and with climate change. | | |
| ***Surface Water*** | | | |
| ***Overview*** | | | |
| % site at high risk (1:30 AEP) | 11% | % site at low risk (1:1000 AEP) | 48% |
| % site at medium risk (1:100 AEP) | 16% | % site with no mapped risk | 24% |
| % site in critical drainage area | 100% | | |
| ***Impact of climate change*** | Rainfall intensity is predicted to increase with climate change. The increase in intensity will result in an increase in risk of flooding from surface water, resulting in increases in depth, extent and hazard of flooding. | | |
| ***Historical information*** | There is evidence that the site has flooded in the past as a result of a blocked culvert. There are also a cluster of historic flood events recorded on the adjacent roads to the south of the site. | | |
| ***Contextual commentary*** | Detailed combined modelling of the Marsh Dykes suggests isolated areas of surface water flooding across the site in the more frequent 3.33% and 1% AEP events. In the 0.1% AEP event the flood risk expands to cover the majority of the southeast and northern portions of the site. | | |
| ***Other sources of flooding*** | | | |
| ***Contextual commentary*** | This area is shown to be potentially at risk of elevated groundwater levels. | | |

## Policy and Recommendations

### *Site suitability*

| | | | |
|---|---|---|---|
| ***Highest Flood Zone*** | Flood Zone 3a | ***Development vulnerability*** | More Vulnerable |
| ***Suitability*** | Yes | ***Exception Test required?*** | Yes |

### *Policy recommendations for flood risk management*

In accordance with NPPF PPG Tables 2 & 3 (reproduced in Appendix D of the Level 1 SFRA), residential development is classed as more vulnerable and should not be permitted within FZ3a unless the exception test can be passed.
The Exception test would need to robustly demonstrate that the wider sustainability benefits outweigh flood risk, and that the development will be safe throughout its lifetime and will not increase flood risk elsewhere, including allowances for climate change.
In accordance with NPPF a site-specific FRA would be required as the site is in FZ3a, see Section 8 of the Level 1 SFRA details the requirements of an FRA.

### *Passing the exception test*

To pass the Exception test:
- it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and
-a site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

A number of factors which need to be considered when looking to pass the Exception test include:
- Design of development to manage and reduce flood risk wherever possible;
- Finished floor levels;
- Safe access and egress;
- Operation and maintenance;
- Resident awareness;
- Flood warning; and
- Evacuation procedures and funding arrangements.

See section 6 of the Level 1 SFRA for more information.

### *Site-Specific Recommendations for NPPF Compliant Development*

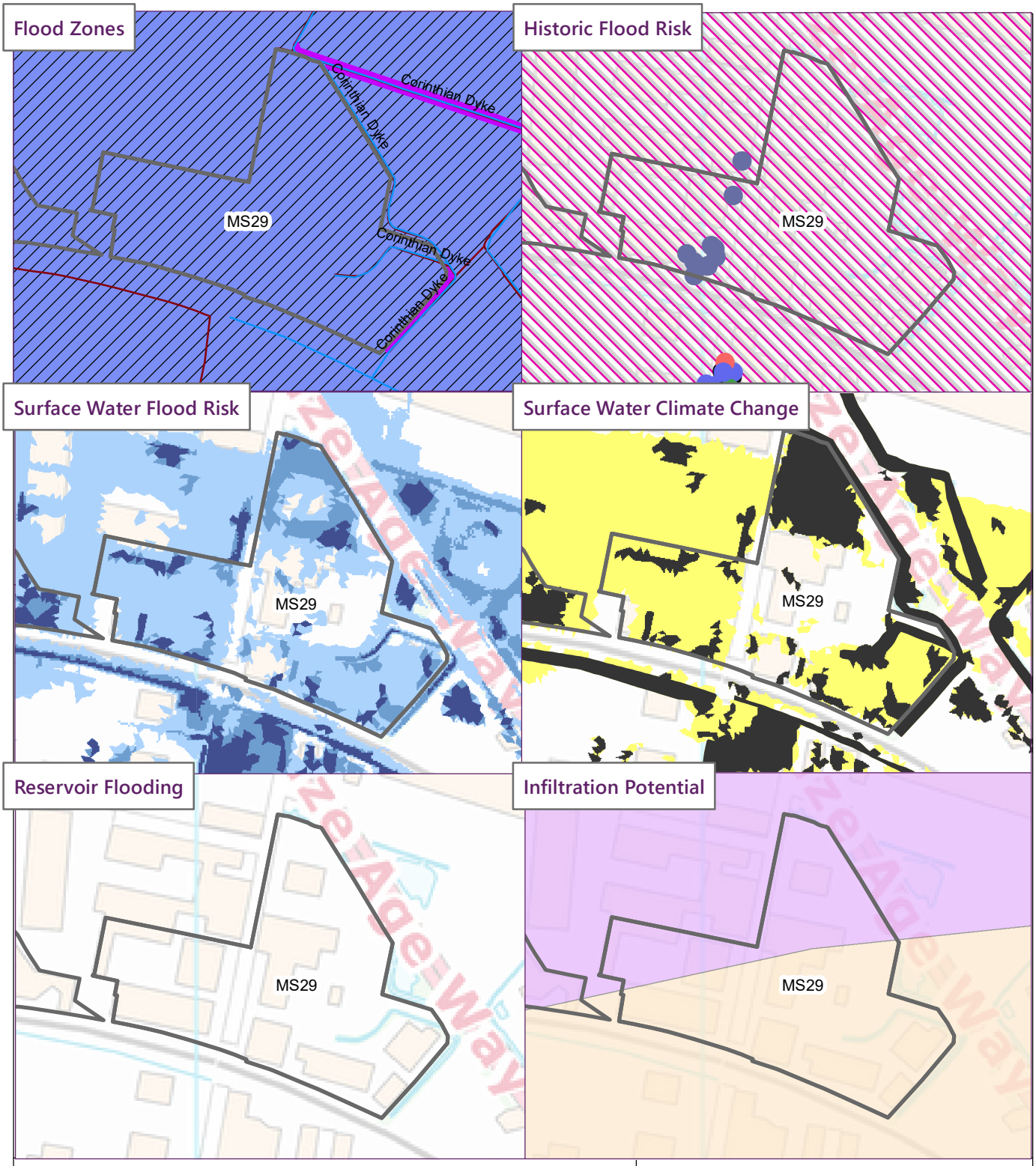
To make the development safe, the FRA should consider:
● Safe access and egress - noting that the current access road would flood deeply and significant hazard would develop in the event of breach in the tidal defences. The FRA may consider if safe shelter where residents would reside in situ until the flood water has receded within the building could be an option;
● Design of development to manage and reduce flood risk wherever possible, including siting all living accommodation above the maximum future (2115) flood level;
● Siting development in accordance with the sequential approach, placing the most vulnerable uses in the areas of least risk;
● Resident awareness;
● Flood warning - making use of breach modelling outputs to determine the time from the breach happening to the site being inundated; and
● Evacuation procedures and funding arrangements.
Further detail on the above points is given in the Level 1 SFRA, Section 6.3.

Development of housing should be directed away from areas of surface water flood risk across the site to preserve the existing surface water storage and flow routes so as not to increase flood risk elsewhere. Where development in areas of surface water flooding is unavoidable, surface water should be directed away from the housing, without increasing flood risk to 3rd parties and this should be detailed in a drainage strategy. The construction of the development should not exacerbate surface water flood risk in the wider critical drainage area. Sustainable drainage solutions should be implemented (see drainage management recommendations below).

Site investigations would be required to assess the risk of groundwater flooding.

An 8m gap should be observed between the proposed development and the Corinthian Dyke and it's associated defences. For work within this buffer zone, a Flood Risk Activity Permit will be required.

| ***Drainage Management Recommendations*** |
| --- |
| The site is within a critical drainage area, where surface water flooding is prevalent. Therefore, it will be imperative that surface water runoff is managed appropriately to ensure flood risk is not increased elsewhere. All feasible SuDS options should be assessed, whilst adhering to the SuDS hierarchy as set out in the Level 1 SRFA report (see chapter 7 and Appendix B of the Level 1 SFRA).<br>Part of the site is undeveloped. The greenfield runoff rate should be determined for the site using current best practice. This will allow for the appropriate sizing of attenuation and conveyance SuDS to ensure that sufficient space for drainage infrastructure is provided in developing site masterplans.<br>Site investigations should be undertaken to fully assess the feasibly of using infiltration techniques . The infiltration potential in this area is labelled as high in the southern half of the site, and medium in the northern half, which alongside the underlying geology, could indicating that infiltration may be possible and, if it is, this would be the preferred method of partially/wholly discharging water from the site.<br>Drainage design should include recommended allowances for climate change.<br>The topography of the site should be taken in to consideration to ensure that gravity drainage is possible throughout the whole site. An appropriate discharge location should be identified (if not all infiltration) and appropriate consultations should be had. |




Key

LBB Site

**Flood Zone Summary**
- Main Rivers
- Ordinary Watercourses
- Flood defences (SoP over 1 in 100 year AEP)
- Flood Storage Areas
- Functional Floodplain
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

**Surface Water Flood Risk**
- 3.33% AEP Extent
- 1% AEP Extent
- 0.1% AEP Extent

**Risk of Flooding from Reservoirs Max Depth**
- < 0.3
- 0.3 - 2.0
- > 2.0

**Historic Flood Risk**

Recorded Flood Events Bexley Borough (1960-2019)
- Cause unrecorded
- Blocked Culvert
- Blocked Gulley
- Blocked Gully
- Burst Water Main
- Fluvial
- Groundwater
- Sewer
- Surface Water (Pluvial)
- Surface Water, Fluvial and Groundwater
- Surface and Fluvial
- Surface and Groundwater
- Surface and Sewer

Recorded flood outlines
- 1953 Event
- 1968 Event
- 1977 Event

**Surface Water Climate Change**
- 1% AEP
- Areas potentially vulnerable to climate change

**Infiltration Potential**
- High
- Med
- Low

0 100 200 300 m

Scale at A4: 1:5,638



Client

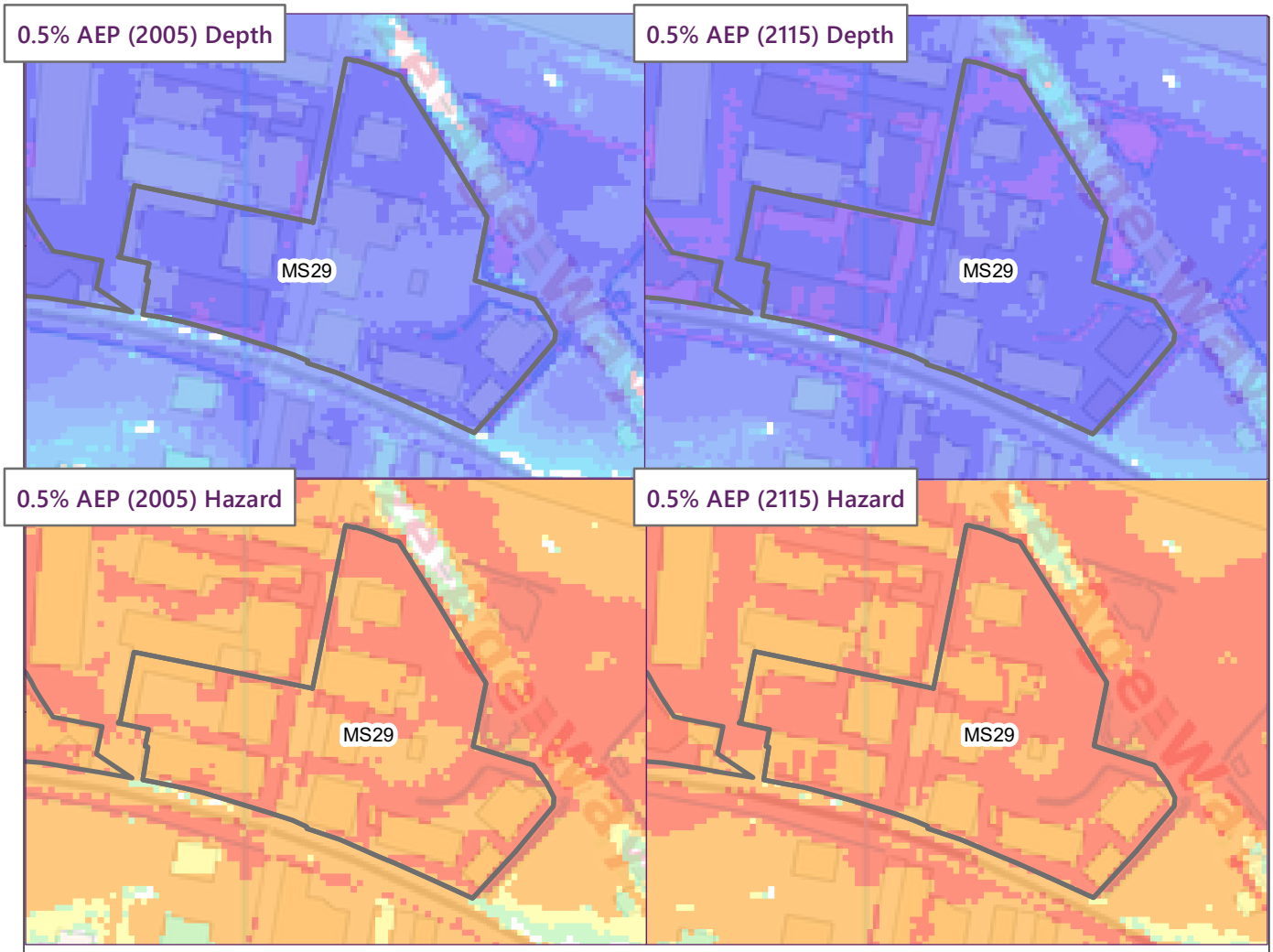
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS29**
**Flood Risk Overview Map**

October 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0 - 0.05
- 0.05 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- 3 - 3.5
- 3.5 - 4
- 4 - 5
- 5+

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 200 300 m

Scale at A4: 1:5,617



Client

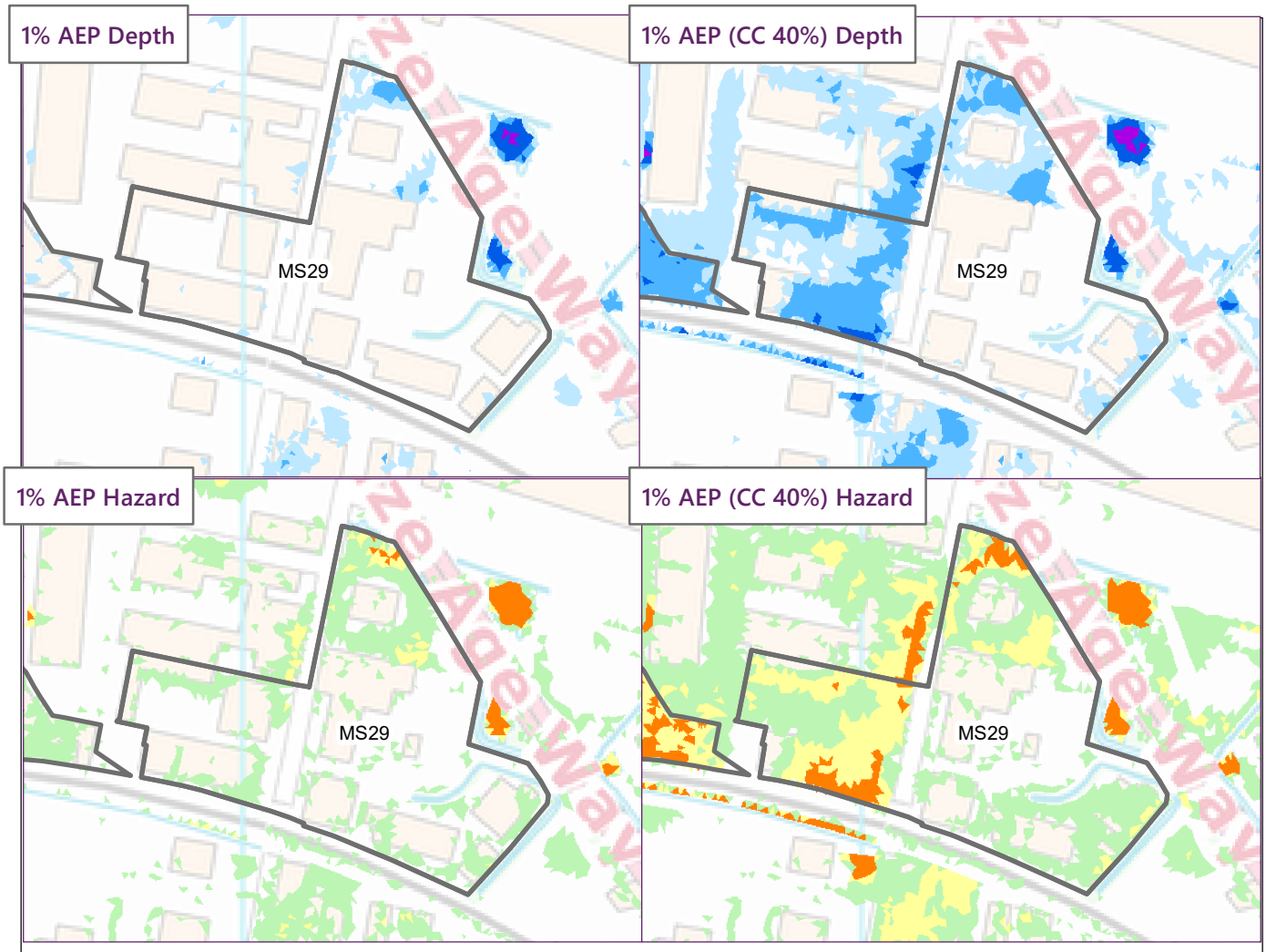
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS29**
**Residual tidal flood risk - River Thames**

June 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 200 300 m

Scale at A4: 1:5,654



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS29**
**Combined Risk Modelling Results: Marsh Dykes**

October 2020

wood.


Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

0 100 200 300 m

Scale at A4: 1:5,638



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS29**
**Risk of Flooding from Surface Water (EA Dataset)**

May 2020

wood.

# Bexley Level 2 SFRA

Flood Risk Information Sheet

| General information | | | |
|---|---|---|---|
| ***Site name / address*** | **ERI01 Erith Western Gateway, Salford Close, Erith** | | |
| ***Site ID*** | MS36 | **Local Plan Reg19 Ref** | SA10 |
| **Sustainable development location** | Erith station and District Centre | **Area (ha)** | 3 |
| ***Allocation type*** | Residential led mixed use | | |
| | Mixed use % (A1-A5) | Residential % | Design led net capacity |
| | 25 | 75 | 314 |

| Baseline Flood Risk Summary | | | |
|---|---|---|---|
| ***Fluvial/Tidal*** | | | |
| ***Overview*** | | | |
| Source of risk | Tidal | Watercourse | River Thames |
| % site in Flood Zone 1 | 86% | % site in Flood Zone 3a | 10% |
| % site in Flood Zone 2 | 3% | % site in Flood Zone 3b | 0% |
| Flood Defences | Yes | % site in ABD | 13% |
| ***Residual tidal flood risk from defence failure*** | | | |
| Present day max 1 in 200 AEP flood level (mAOD) | 5.6 | Future max 1 in 200 AEP flood level (mAOD) | 6.44 |
| Present day max 1 in 200 AEP flood hazard | Danger for all | Future day max 1 in 200 AEP flood hazard | Danger for all |
| ***Impact of climate change*** | Sea levels are predicted to rise with future climate change, consequently levels in the Tidal River Thames are also predicted to increase. As a result, in the event of a breach in the tidal flood defences in the future peak flood levels on site will increase. | | |
| ***Historical information*** | There is no evidence of the site flooding in the past. | | |
| ***Contextual commentary*** | The EA Flood Zone map shows the vast majority of the site (86.6%) lies within Flood Zone 1, with the remainder in Flood Zone 2 (2.8%) and Flood Zone 3a (10.6%). The source of risk is tidal flooding from the River Thames. There is no risk of fluvial flooding.<br>A portion of the site is shown as being an area benefitting from defences as it is protected by the Thames Tidal defences to a SOP of 0.1%AEP. However, there remains a residual risk associated with a breach in these defences. The peak flood level associated with a breach in the defences will increase with climate change.<br>In the case of a breach, the North-West portion of the site is anticipated to flood up to 4m deep under present day conditions and up to 5m in future conditions (2115). Owing to the deep water, the hazard classification for this area of the site is primarily Extreme. The majority of the site is predicted to be unimpacted however.<br>The associated residual risk map shows how the depths and hazard vary across the site and with climate change. | | |
| ***Surface Water*** | | | |
| ***Overview*** | | | |
| % site at high risk (1:30 AEP) | 2% | % site at low risk (1:1000 AEP) | 6% |
| % site at medium risk (1:100 AEP) | 3% | % site with no mapped risk | 88% |
| % site in critical drainage area | 100% | | |
| ***Impact of climate change*** | Rainfall intensity is predicted to increase with climate change. The increase in intensity will result in an increase in risk of flooding from surface water, resulting in increases in depth, extent and hazard of flooding. | | |
| ***Historical information*** | There is no evidence of the site flooding in the past. But a number of historic surface water flood events have been recorded in adjacent roads. | | |
| ***Contextual commentary*** | Detailed modelling only predicts small isolated areas of shallow low hazard surface water ponding in the south east of the site in the future 1% AEP event. The EA RoFfSW predicts a broader extent in the north corner of the site. | | |
| ***Other sources of flooding*** | | | |
| ***Contextual commentary*** | There is no known flood risk from other sources. | | |

## Policy and Recommendations

### *Site suitability*

| | | | |
|---|---|---|---|
| ***Highest Flood Zone*** | Flood Zone 3a | ***Development vulnerability*** | More Vulnerable |
| ***Suitability*** | Yes | ***Exception Test required?*** | Yes |

### *Policy recommendations for flood risk management*

In accordance with NPPF PPG Tables 2 & 3 (reproduced in Appendix D of the Level 1 SFRA), residential development is classed as more vulnerable and should not be permitted within FZ3a unless the exception test can be passed.
The Exception test would need to robustly demonstrate that the wider sustainability benefits outweigh flood risk, and that the development will be safe throughout its lifetime and will not increase flood risk elsewhere, including allowances for climate change.
In accordance with NPPF a site-specific FRA would be required as the site is in FZ3a, see Section 8 of the Level 1 SFRA details the requirements of an FRA.

### *Passing the exception test*

To pass the Exception test:
- it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and
-a site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

A number of factors which need to be considered when looking to pass the Exception test include:
- Design of development to manage and reduce flood risk wherever possible;
- Finished floor levels;
- Safe access and egress;
- Operation and maintenance;
- Resident awareness;
- Flood warning; and
- Evacuation procedures and funding arrangements.

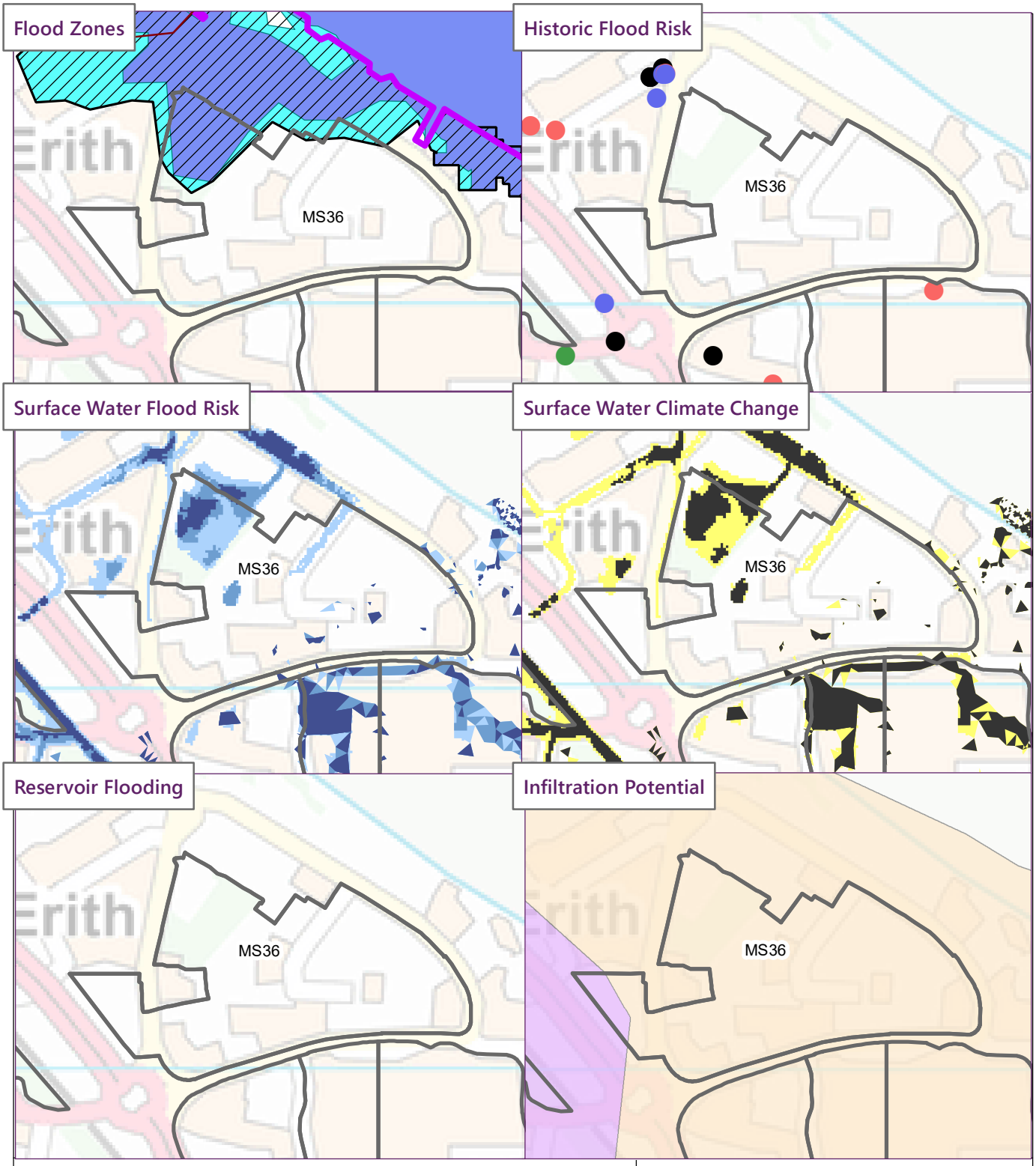
See section 6 of the Level 1 SFRA for more information.

### *Site-Specific Recommendations for NPPF Compliant Development*

To make the development safe, the FRA should consider:
● Safe access and egress - placing the site access away from the northern site boundary, which is at residual risk from tidal flooding;
● The site is situated within 40m of the Thames tidal defences. The EA suggest consideration has to be given to keeping the area within 40 metres of the Tidal defences safeguarded for future defence raising. Development must observe a 16m gap between the proposed development and the landward side of the Thames Tidal Flood Defences, noting that the landward extent of the flood defence may not always be visible as they are often buried underground. Intrusive investigations may be required to determine the exact location. For work within this buffer zone, a Flood Risk Activity Permit will be required.
● Design of development to manage and reduce flood risk wherever possible, including siting all living accommodation above the maximum future (2115) flood level;
● Siting development in accordance with the sequential approach, placing the most vulnerable uses in the areas of least risk;
● Resident awareness;
● Flood warning - making use of breach modelling outputs to determine the time from the breach happening to the site being inundated; and
● Evacuation procedures and funding arrangements.
Further detail on the above points is given in the Level 1 SFRA, Section 6.3.

Development of housing should be directed away from areas of surface water flood risk across the site to preserve the existing surface water storage and flow routes so as not to increase flood risk elsewhere. Where development in areas of surface water flooding is unavoidable, surface water should be directed away from the housing, without increasing flood risk to 3rd parties and this should be detailed in a drainage strategy. The construction of the development should not exacerbate surface water flood risk in the wider critical drainage area. Sustainable drainage solutions should be implemented (see drainage management recommendations below).

| ***Drainage Management Recommendations*** |
| --- |
| The site is within a critical drainage area, where surface water flooding is prevalent. Therefore, it will be imperative that surface water runoff is managed appropriately to ensure flood risk is not increased elsewhere. All feasible SuDS options should be assessed, whilst adhering to the SuDS hierarchy as set out in the Level 1 SRFA report (see chapter 7 and Appendix B of the Level 1 SFRA).<br>The site is currently developed, but betterment in surface water runoff should be sought ideally, and as such the greenfield runoff rate should be determined for the site using current best practice. This will allow for the appropriate sizing of attenuation and conveyance SuDS to ensure that sufficient space for drainage infrastructure is provided in developing site masterplans.<br>Infiltration would be the preferred method of partially/wholly discharging water from the site. The infiltration potential in this area is labelled as high, which alongside the underlying geology, could indicate that infiltration may be possible. Site investigations would be required to fully assess the feasibly of using infiltration SuDS techniques.<br>Drainage design should include recommended allowances for climate change.<br>The topography of the site should be taken in to consideration to ensure that gravity drainage is possible throughout the whole site. An appropriate discharge location should be identified (if not all infiltration) and appropriate consultations should be had. |




Key

LBB Site

**Flood Zone Summary**
- Main Rivers
- Ordinary Watercourses
- Flood defences (SoP over 1 in 100 year AEP)
- Flood Storage Areas
- Functional Floodplain
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

**Surface Water Flood Risk**
- 3.33% AEP Extent
- 1% AEP Extent
- 0.1% AEP Extent

**Risk of Flooding from Reservoirs Max Depth**
- < 0.3
- 0.3 - 2.0
- > 2.0

**Historic Flood Risk**

Recorded Flood Events Bexley Borough (1960-2019)
- Cause unrecorded
- Blocked Culvert
- Blocked Gulley
- Blocked Gully
- Burst Water Main
- Fluvial
- Groundwater
- Sewer
- Surface Water (Pluvial)
- Surface Water, Fluvial and Groundwater
- Surface and Fluvial
- Surface and Groundwater
- Surface and Sewer

Recorded flood outlines
- 1953 Event
- 1968 Event
- 1977 Event

**Surface Water Climate Change**
- 1% AEP
- Areas potentially vulnerable to climate change

**Infiltration Potential**
- High
- Med
- Low

0 100 200 m

Scale at A4: 1:4,474



Client

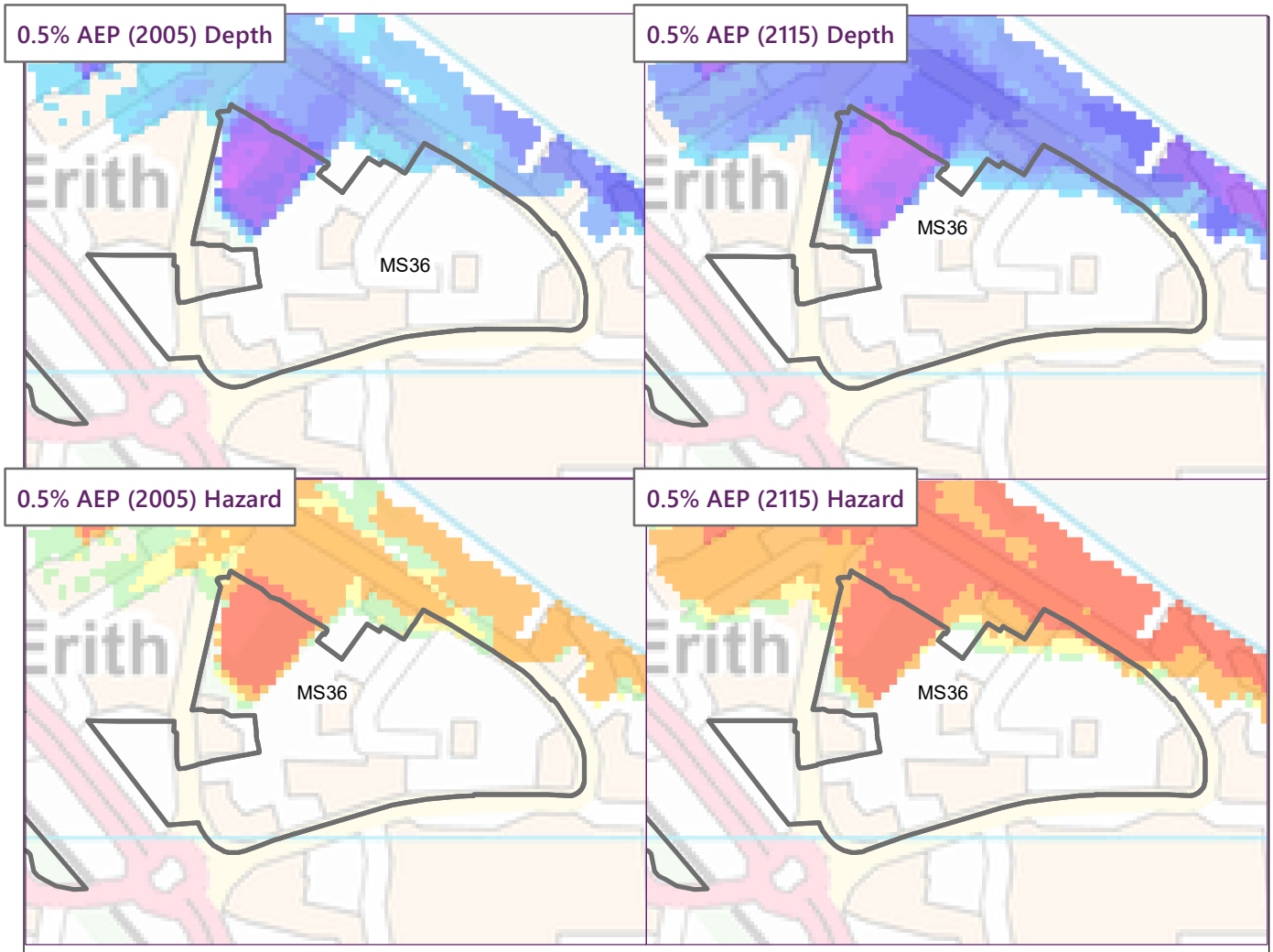
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS36**
**Flood Risk Overview Map**

October 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0 - 0.05
- 0.05 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- 3 - 3.5
- 3.5 - 4
- 4 - 5
- 5+

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 200 m

Scale at A4: 1:4,473



Client

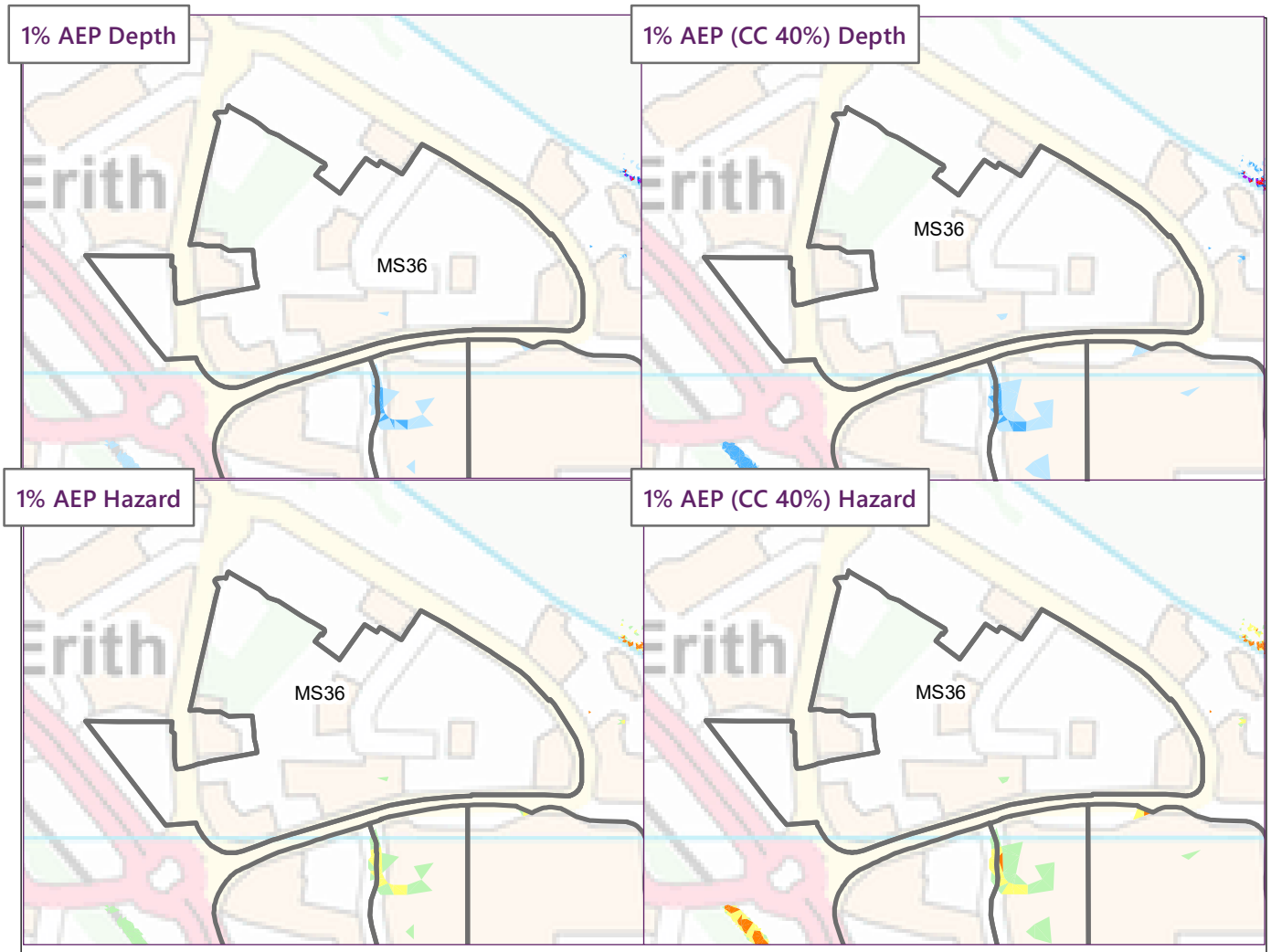
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS36**
**Residual tidal flood risk - River Thames**

November 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 200 m

Scale at A4: 1:4,473



Client

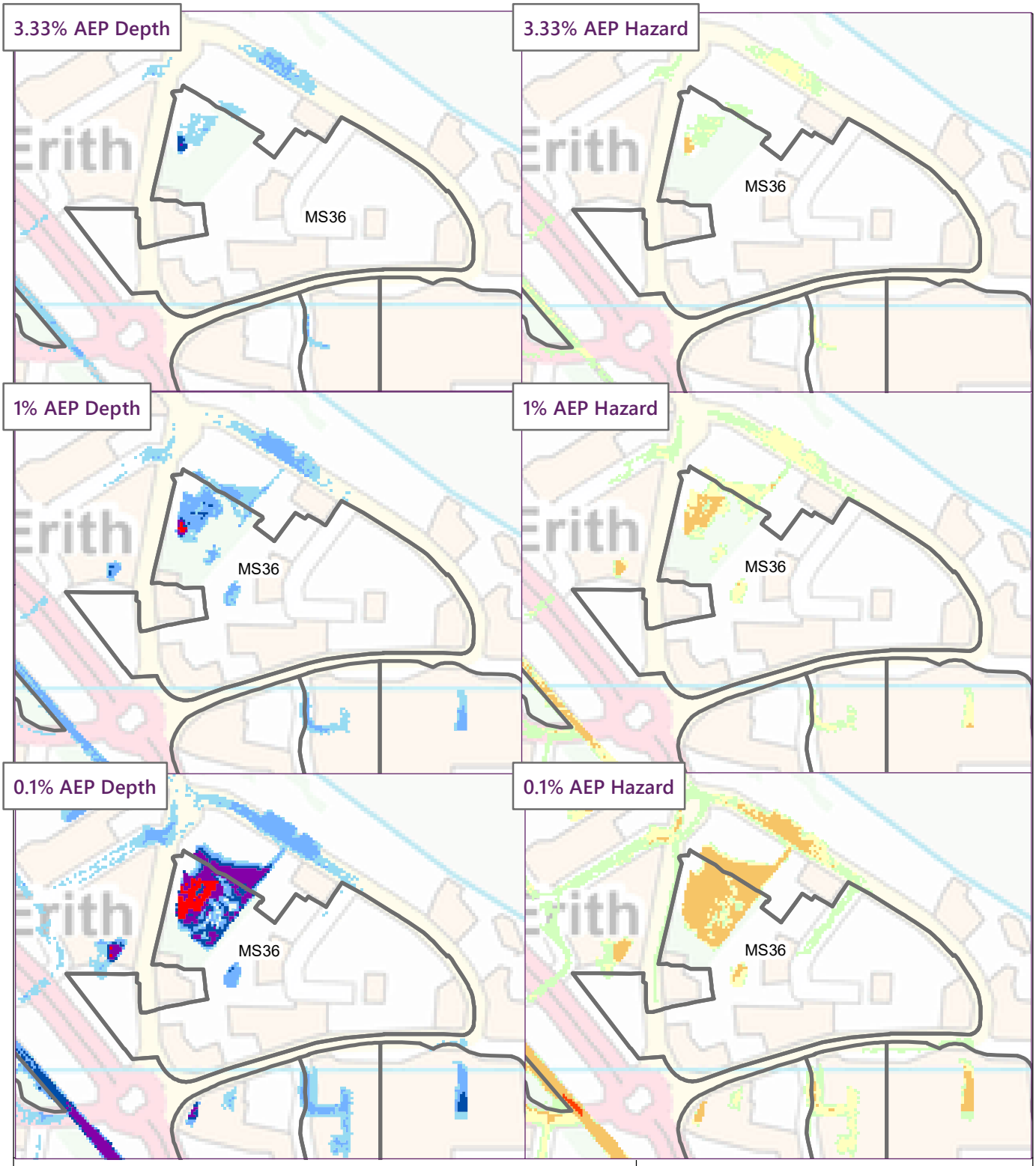
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS36**
**Surface Water Modelling Results: Darent Industrial Estate**

September 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 200 m

Scale at A4: 1:4,460



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS36**
**Risk of Flooding from Surface Water (EA Dataset)**

September 2020

wood.

# Bexley Level 2 SFRA

Flood Risk Information Sheet

| General information | | | |
|---|---|---|---|
| ***Site name / address*** | **ERI02 Pier Road West, Bexley Road,Pier Road and Queen Street, Erith** | | |
| ***Site ID*** | MS38 | **Local Plan Reg19 Ref** | SA11 |
| **Sustainable development location** | Erith Station and District Centre | **Area (ha)** | 1.391 |
| ***Allocation type*** | Residential-led mixed use | | |
| | Mixed use % (A1-A5) | Residential % | Design led net capacity |
| | 25 | 75 | 184 |

| Baseline Flood Risk Summary | | | |
|---|---|---|---|
| ***Fluvial/Tidal*** | | | |
| ***Overview*** | | | |
| Source of risk | Other | Watercourse | N/A |
| % site in Flood Zone 1 | 100% | % site in Flood Zone 3a | 0% |
| % site in Flood Zone 2 | 0% | % site in Flood Zone 3b | 0% |
| Flood Defences | No | % site in ABD | 0% |
| ***Fluvial flood risk (including presence of defences)*** | | | |
| Present day max 1 in 100 AEP flood level (mAOD) | 0 | Future max 1 in 100 AEP flood level (mAOD) | 0 |
| Present day max 1 in 100 AEP flood depth (m) | 0 | Future day max 1 in 100 AEP flood depth (m) | 0 |
| ***Impact of climate change*** | - | | |
| ***Historical information*** | - | | |
| ***Contextual commentary*** | The site is in Flood Zone 1 and therefore not at risk from either fluvial or tidal flooding. | | |
| ***Surface Water*** | | | |
| ***Overview*** | | | |
| % site at high risk (1:30 AEP) | 3% | % site at low risk (1:1000 AEP) | 1% |
| % site at medium risk (1:100 AEP) | 1% | % site with no mapped risk | 95% |
| % site in critical drainage area | 100% | | |
| ***Impact of climate change*** | Rainfall intensity is predicted to increase with climate change. The increase in intensity will result in an increase in risk of flooding from surface water, resulting in increases in depth, extent and hazard of flooding. | | |
| ***Historical information*** | There is evidence of the site being flooded in the past, but no cause was recorded. | | |
| ***Contextual commentary*** | Isolated areas of surface water ponding are predicted across the site. The areas they cover are small but potentially deep. There is an area of surface water flooding just outside the site on the road in the southeast corner with hazard moderate to high and depths of up to 0.6m. | | |
| ***Other sources of flooding*** | | | |
| ***Contextual commentary*** | There is no known flood risk from other sources. | | |

| Policy and Recommendations | | | |
|---|---|---|---|
| ***Site suitability*** | | | |
| ***Highest Flood Zone*** | Flood Zone 1 | ***Development vulnerability*** | More Vulnerable |
| ***Suitability*** | Yes | ***Exception Test required?*** | No |

***Policy recommendations for flood risk management***

In accordance with NPPF PPG Tables 2 & 3 (reproduced in Appendix D of the Level 1 SFRA), mixed use development, if it includes residential is classed as more vulnerable, so development in FZ1 is appropriate.
A site-specific FRA would be required, as the site is located in an identified critical drainage area, and there is historic evidence it has flooded in the past. See Section 8 of the Level 1 SFRA details the requirements of an FRA.

***Passing the exception test***

There is no need to pass the exception test, the site is Flood Zone 1 and 'more vulnerable' residential development is suitable for this location.

***Site-Specific Recommendations for NPPF Compliant Development***

Detailed modelling indicates small isolated areas of surface water flooding across the site, and there has been a record of flooding on site. However, any development will need to be mindful of the predicted flooding on the road adjacent to the site in the south east corner.
Existing surface water flow routes across the site should be preserved to ensure flood risk is not increased elsewhere. The construction of the development should not exacerbate surface water flood risk in the wider critical drainage area. Any changes to the site configuration which will alter how surface water flows across the site will need to be detailed in an accompanying drainage strategy to ensure flood risk is not increased elsewhere.
Sustainable drainage solutions should be implemented (see drainage management recommendations below).

***Drainage Management Recommendations***

The site is within a critical drainage area, where surface water flooding is prevalent. Therefore, it will be imperative that surface water runoff is managed appropriately to ensure flood risk is not increased elsewhere. All feasible SuDS options should be assessed, whilst adhering to the SuDS hierarchy as set out in the Level 1 SFRA report (see chapter 7 and Appendix B of the Level 1 SFRA).
The site is currently developed, but betterment in surface water runoff should be sought ideally, and as such the greenfield runoff rate should be determined for the site using current best practice. This will allow for the appropriate sizing of attenuation and conveyance SuDS to ensure that sufficient space for drainage infrastructure is provided in developing site masterplans.
Infiltration would be the preferred method of partially/wholly discharging water from the site. The infiltration potential in this area is labelled as high, which alongside the underlying geology, could indicate that infiltration may be possible. Site investigations would be required to fully assess the feasibly of using infiltration SuDS techniques.
Drainage design should include recommended allowances for climate change.
The topography of the site should be taken in to consideration to ensure that gravity drainage is possible throughout the whole site. An appropriate discharge location should be identified (if not all infiltration) and appropriate consultations should be had.


Key

LBB Site

**Flood Zone Summary**
- Main Rivers
- Ordinary Watercourses
- Flood defences (SoP over 1 in 100 year AEP)
- Flood Storage Areas
- Functional Floodplain
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

**Surface Water Flood Risk**
- 3.33% AEP Extent
- 1% AEP Extent
- 0.1% AEP Extent

**Risk of Flooding from Reservoirs Max Depth**
- < 0.3
- 0.3 - 2.0
- > 2.0

**Historic Flood Risk**

Recorded Flood Events Bexley Borough (1960-2019)
- Cause unrecorded
- Blocked Culvert
- Blocked Gulley
- Blocked Gully
- Burst Water Main
- Fluvial
- Groundwater
- Sewer
- Surface Water (Pluvial)
- Surface Water, Fluvial and Groundwater
- Surface and Fluvial
- Surface and Groundwater
- Surface and Sewer

Recorded flood outlines
- 1953 Event
- 1968 Event
- 1977 Event

**Surface Water Climate Change**
- 1% AEP
- Areas potentially vulnerable to climate change

**Infiltration Potential**
- High
- Med
- Low

N

0 100 200 m

Scale at A4: 1:3,563



Client

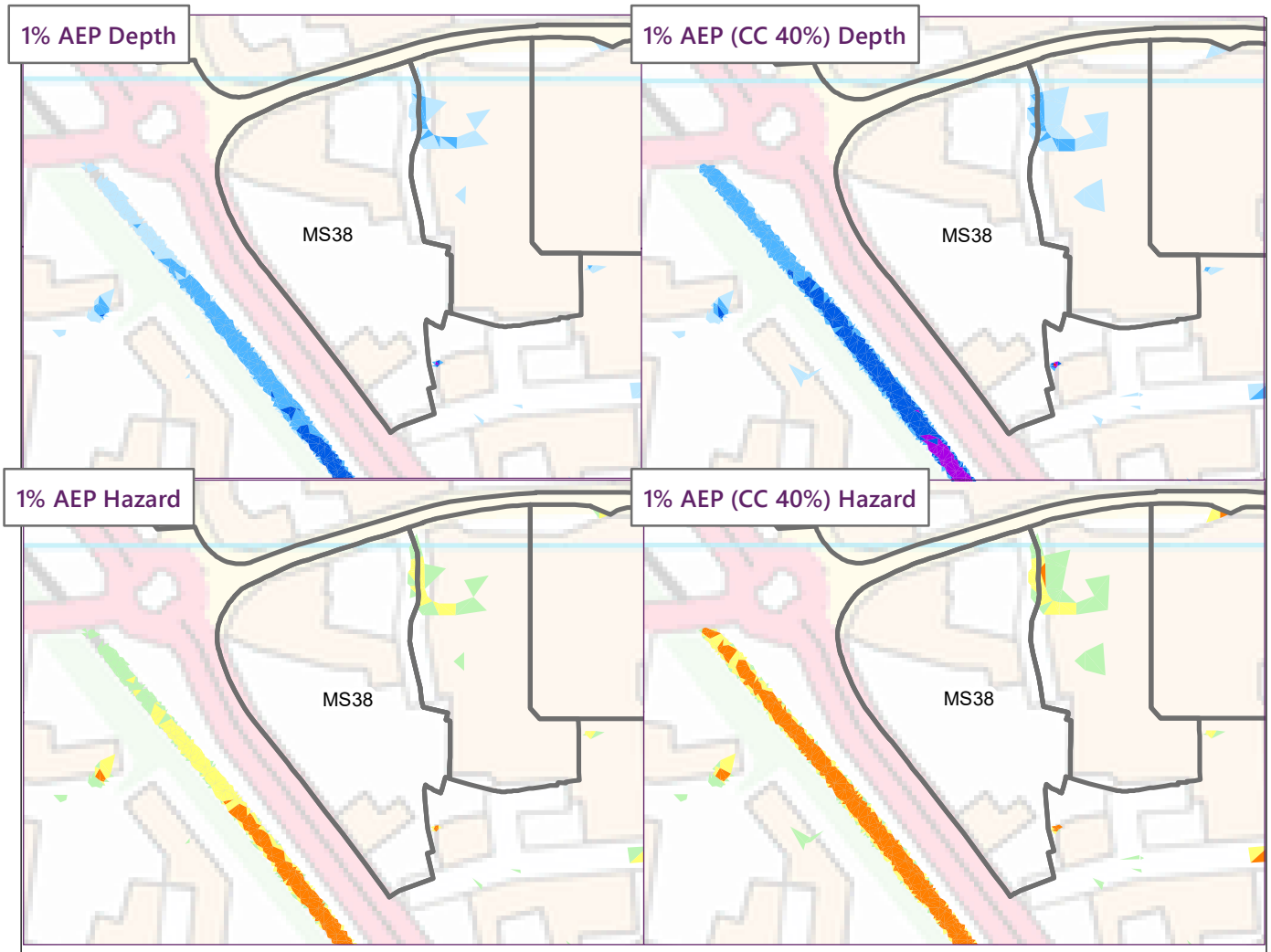
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS38**
**Flood Risk Overview Map**

October 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 200 m

Scale at A4: 1:3,621



Client

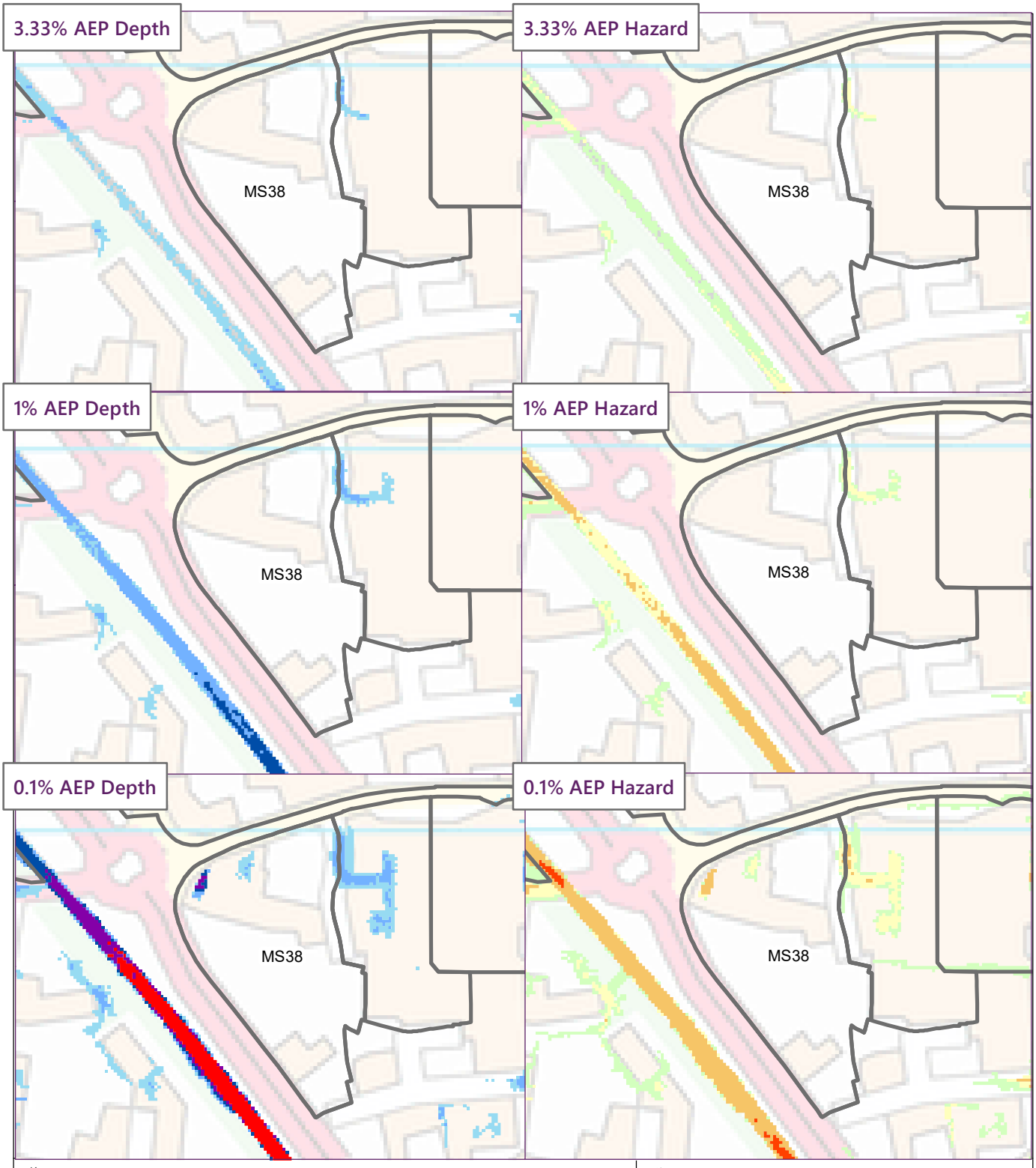
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS38**
**Surface Water Modelling Results: Darent Industrial Estate**

September 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

0 100 200 m

Scale at A4: 1:3,630



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS38**
**Risk of Flooding from Surface Water (EA Dataset)**

September 2020

wood.

# Bexley Level 2 SFRA

Flood Risk Information Sheet

| General information | | | |
|---|---|---|---|
| ***Site name / address*** | **ERI03 Pier Road East, Bexley Road and Pier Road, Erith** | | |
| ***Site ID*** | MS37 | **Local Plan Reg19 Ref** | SA12 |
| **Sustainable development location** | Erith Station and District Centre | **Area (ha)** | 0.841 |
| ***Allocation type*** | residential led mixed use | | |
| | Mixed use % (A1-A5) | Residential % | Design led net capacity |
| | 25 | 75 | 112 |

| Baseline Flood Risk Summary | | | |
|---|---|---|---|
| ***Fluvial/Tidal*** | | | |
| ***Overview*** | | | |
| Source of risk | Other | Watercourse | N/A |
| % site in Flood Zone 1 | 100% | % site in Flood Zone 3a | 0% |
| % site in Flood Zone 2 | 0% | % site in Flood Zone 3b | 0% |
| Flood Defences | No | % site in ABD | 0% |
| ***Fluvial flood risk (including presence of defences)*** | | | |
| Present day max 1 in 100 AEP flood level (mAOD) | 0 | Future max 1 in 100 AEP flood level (mAOD) | 0 |
| Present day max 1 in 100 AEP flood depth (m) | 0 | Future day max 1 in 100 AEP flood depth (m) | 0 |
| ***Impact of climate change*** | - | | |
| ***Historical information*** | - | | |
| ***Contextual commentary*** | The site is in Flood Zone 1 and therefore not at risk from either fluvial or tidal flooding. | | |
| ***Surface Water*** | | | |
| ***Overview*** | | | |
| % site at high risk (1:30 AEP) | 20% | % site at low risk (1:1000 AEP) | 6% |
| % site at medium risk (1:100 AEP) | 7% | % site with no mapped risk | 67% |
| % site in critical drainage area | 100% | | |
| ***Impact of climate change*** | Rainfall intensity is predicted to increase with climate change. The increase in intensity will result in an increase in risk of flooding from surface water, resulting in increases in depth, extent and hazard of flooding. | | |
| ***Historical information*** | There is evidence of the site flooding in the past. The cases recorded are attributed to blocked gullies, with other incidents where the cause was unrecorded. | | |
| ***Contextual commentary*** | Detailed modelling indicates that for more frequent events (3.33% and 1% AEP) now and into the future the centre of the site is at risk of surface water flooding, with hazard predicted to be low to moderate and depths predicted to reach up to 0.6m potentially. | | |
| ***Other sources of flooding*** | | | |
| ***Contextual commentary*** | There is no known flood risk from other sources. | | |

## Policy and Recommendations

### *Site suitability*

| | | | |
|---|---|---|---|
| ***Highest Flood Zone*** | Flood Zone 1 | ***Development vulnerability*** | More Vulnerable |
| ***Suitability*** | Yes | ***Exception Test required?*** | No |

### *Policy recommendations for flood risk management*

In accordance with NPPF PPG Tables 2 & 3 (reproduced in Appendix D of the Level 1 SFRA), mixed use development, if it includes residential is classed as more vulnerable, so development in FZ1 is appropriate.
A site-specific FRA would be required, as the site is located in an identified critical drainage area, and there is historic evidence it has flooded in the past. See Section 8 of the Level 1 SFRA details the requirements of an FRA.

### *Passing the exception test*

There is no need to pass the exception test, the site is Flood Zone 1 and 'more vulnerable' residential development is suitable for this location.

### *Site-Specific Recommendations for NPPF Compliant Development*

Detailed modelling indicates an area of surface water flood risk through the centre of the site, there is also a history of flooding on site. If the site is to be reconfigured as part of development housing should be directed away from areas of surface water flood risk where possible to avoid the flood risk. Where development in areas of surface water flooding is unavoidable, housing should be raised above the flood level and/or surface water should be directed away from the housing, without increasing flood risk to 3rd parties.
Existing surface water flow routes across the site should be preserved to ensure flood risk is not increased elsewhere. The construction of the development should not exacerbate surface water flood risk in the wider critical drainage area. Any changes to the site configuration which will alter how surface water is stored and/or flows across the site will need to be detailed in an accompanying drainage strategy.
Sustainable drainage solutions should be implemented (see drainage management recommendations below).

### *Drainage Management Recommendations*

The site is within a critical drainage area, where surface water flooding is prevalent. Therefore, it will be imperative that surface water runoff is managed appropriately to ensure flood risk is not increased elsewhere. All feasible SuDS options should be assessed, whilst adhering to the SuDS hierarchy as set out in the Level 1 SFRA report (see chapter 7 and Appendix B of the Level 1 SFRA).
The site is currently developed, but betterment in surface water runoff should be sought ideally, and as such the greenfield runoff rate should be determined for the site using current best practice. This will allow for the appropriate sizing of attenuation and conveyance SuDS to ensure that sufficient space for drainage infrastructure is provided in developing site masterplans.
Infiltration would be the preferred method of partially/wholly discharging water from the site. The infiltration potential in this area is labelled as high, which alongside the underlying geology, could indicate that infiltration may be possible. Site investigations would be required to fully assess the feasibly of using infiltration SuDS techniques.
Drainage design should include recommended allowances for climate change.
The topography of the site should be taken in to consideration to ensure that gravity drainage is possible throughout the whole site. An appropriate discharge location should be identified (if not all infiltration) and appropriate consultations should be had.


Key

LBB Site

**Flood Zone Summary**
- Main Rivers
- Ordinary Watercourses
- Flood defences (SoP over 1 in 100 year AEP)
- Flood Storage Areas
- Functional Floodplain
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

**Surface Water Flood Risk**
- 3.33% AEP Extent
- 1% AEP Extent
- 0.1% AEP Extent

**Risk of Flooding from Reservoirs Max Depth**
- < 0.3
- 0.3 - 2.0
- > 2.0

**Historic Flood Risk**

Recorded Flood Events Bexley Borough (1960-2019)
- Cause unrecorded
- Blocked Culvert
- Blocked Gulley
- Blocked Gully
- Burst Water Main
- Fluvial
- Groundwater
- Sewer
- Surface Water (Pluvial)
- Surface Water, Fluvial and Groundwater
- Surface and Fluvial
- Surface and Groundwater
- Surface and Sewer

Recorded flood outlines
- 1953 Event
- 1968 Event
- 1977 Event

**Surface Water Climate Change**
- 1% AEP
- Areas potentially vulnerable to climate change

**Infiltration Potential**
- High
- Med
- Low

0 100 m

Scale at A4: 1:2,769



Client

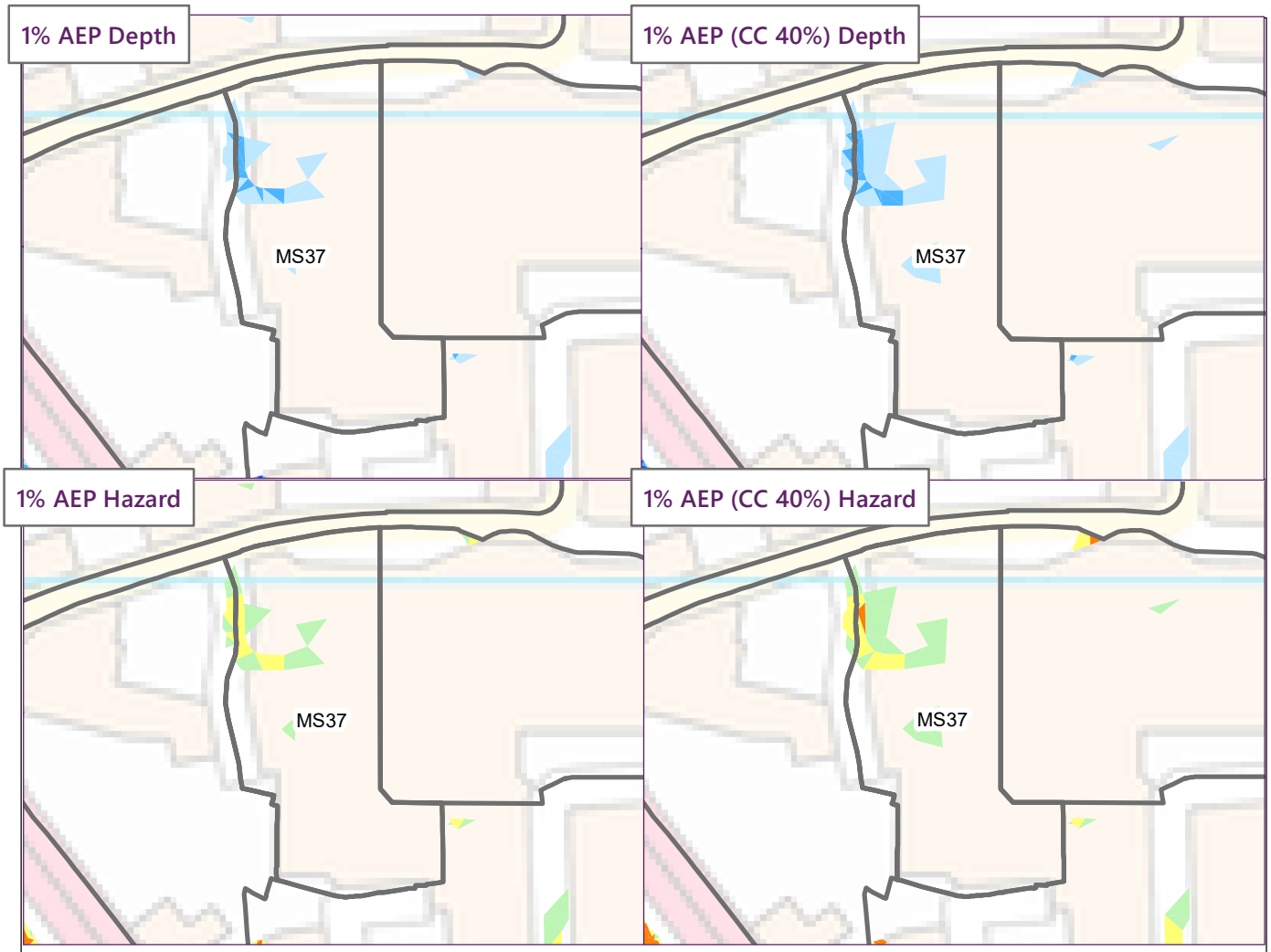
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS37**
**Flood Risk Overview Map**

October 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 m

Scale at A4: 1:2,814



Client

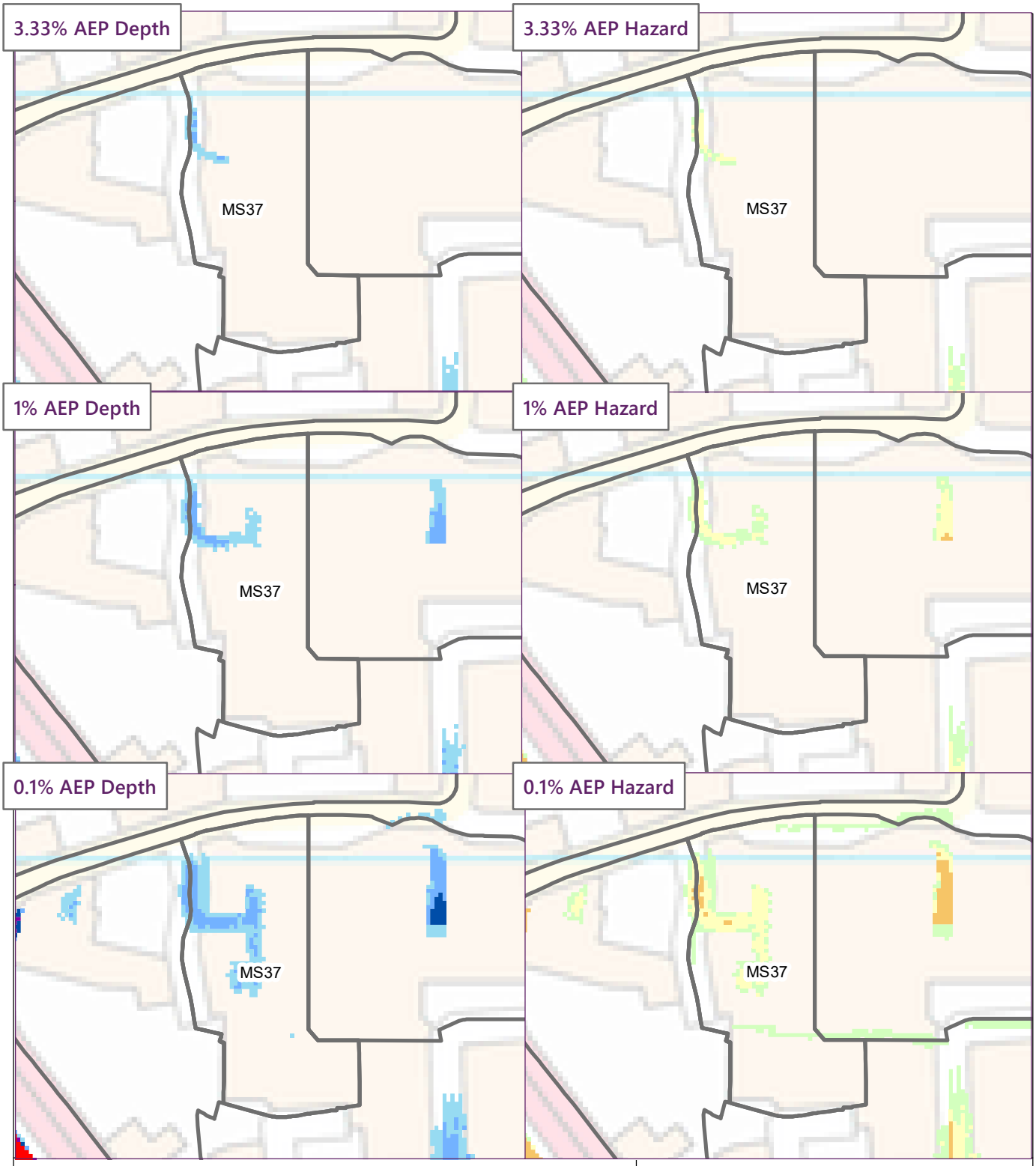
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS37**
**Surface Water Modelling Results: Darent Industrial Estate**

September 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 m

Scale at A4: 1:2,820



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS37**
**Risk of Flooding from Surface Water (EA Dataset)**

September 2020

wood.

# Bexley Level 2 SFRA

Flood Risk Information Sheet

| General information | | | |
|---|---|---|---|
| ***Site name / address*** | **ERI04 Erith Riverside, Wheatley Terrace Road, Erith** | | |
| ***Site ID*** | MS40 | **Local plan Reg19 Ref** | SA13 |
| **Sustainable development location** | Erith Station and District Centre | **Area (ha)** | 2.62 |
| ***Allocation type*** | Residential led | | |
| | Mixed use % (A1-A5) | Residential % | Design led net capacity |
| | 0 | 100 | 287 |

| Baseline Flood Risk Summary | | | |
|---|---|---|---|
| ***Fluvial/Tidal*** | | | |
| ***Overview*** | | | |
| Source of risk | Tidal | Watercourse | River Thames |
| % site in Flood Zone 1 | 26% | % site in Flood Zone 3a | 61% |
| % site in Flood Zone 2 | 13% | % site in Flood Zone 3b | 0% |
| Flood Defences | Yes | % site in ABD | 65% |
| ***Residual tidal flood risk from defence failure*** | | | |
| Present day max 1 in 200 AEP flood level (mAOD) | 5.71 | Future max 1 in 200 AEP flood level (mAOD) | 6.56 |
| Present day max 1 in 200 AEP flood hazard | Danger for all | Future day max 1 in 200 AEP flood hazard | Danger for all |
| ***Impact of climate change*** | Sea levels are predicted to rise with future climate change, consequently levels in the Tidal River Thames are also predicted to increase. As a result, in the event of a breach in the tidal flood defences in the future peak flood levels on site will increase. | | |
| ***Historical information*** | There is no evidence of the site flooding in the past. | | |
| ***Contextual commentary*** | The EA Flood Zone map shows the majority of the site (61%) lies within Flood Zone 3a, with the remainder in Flood Zone 2 (13%) and Flood Zone 1 (26%). The source of risk is tidal flooding from the River Thames. There is no risk of fluvial flooding.<br>The site is shown as being an area benefitting from defences as it is protected by the Thames Tidal defences to a SOP of 0.1%AEP. However, there remains a residual risk associated with a breach in these defences. The peak flood level associated with a breach in the defences will increase with climate change.<br>In the case of a breach, the site is anticipated to flood up to 1.5m deep in the South-East and North-East portions of the site under present day conditions and up to 2m in future conditions (2115). The Northern portion of the site is subject to Significant-Extreme hazard.<br>The associated residual risk map shows how the depths and hazard vary across the site and with climate change. | | |
| ***Surface Water*** | | | |
| ***Overview*** | | | |
| % site at high risk (1:30 AEP) | 18% | % site at low risk (1:1000 AEP) | 16% |
| % site at medium risk (1:100 AEP) | 4% | % site with no mapped risk | 63% |
| % site in critical drainage area | 100% | | |
| ***Impact of climate change*** | Rainfall intensity is predicted to increase with climate change. The increase in intensity will result in an increase in risk of flooding from surface water, resulting in increases in depth, extent and hazard of flooding. | | |
| ***Historical information*** | There is no evidence of the site flooding in the past. But a cluster historic surface water flood events have been recorded in adjacent roads to the south and west of the site. | | |
| ***Contextual commentary*** | Detailed modelling only predicts isolated areas of moderate hazard surface water ponding in the south east and north west of the site in the future 1% AEP event, with depths predicted to be up to 0.6m. | | |
| ***Other sources of flooding*** | | | |
| ***Contextual commentary*** | There is no known flood risk from other sources. | | |

## Policy and Recommendations

### *Site suitability*

| | | | |
|---|---|---|---|
| ***Highest Flood Zone*** | Flood Zone 3a | ***Development vulnerability*** | More Vulnerable |
| ***Suitability*** | Yes | ***Exception Test required?*** | Yes |

### *Policy recommendations for flood risk management*

In accordance with NPPF PPG Tables 2 & 3 (reproduced in Appendix D of the Level 1 SFRA), residential development is classed as more vulnerable and should not be permitted within FZ3a unless the exception test can be passed.
The Exception test would need to robustly demonstrate that the wider sustainability benefits outweigh flood risk, and that the development will be safe throughout its lifetime and will not increase flood risk elsewhere, including allowances for climate change.
In accordance with NPPF a site-specific FRA would be required as the site is in FZ3a, see Section 8 of the Level 1 SFRA details the requirements of an FRA.

### *Passing the exception test*

To pass the Exception test:
- it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and
-a site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

A number of factors which need to be considered when looking to pass the Exception test include:
- Design of development to manage and reduce flood risk wherever possible;
- Finished floor levels;
- Safe access and egress;
- Operation and maintenance;
- Resident awareness;
- Flood warning; and
- Evacuation procedures and funding arrangements.

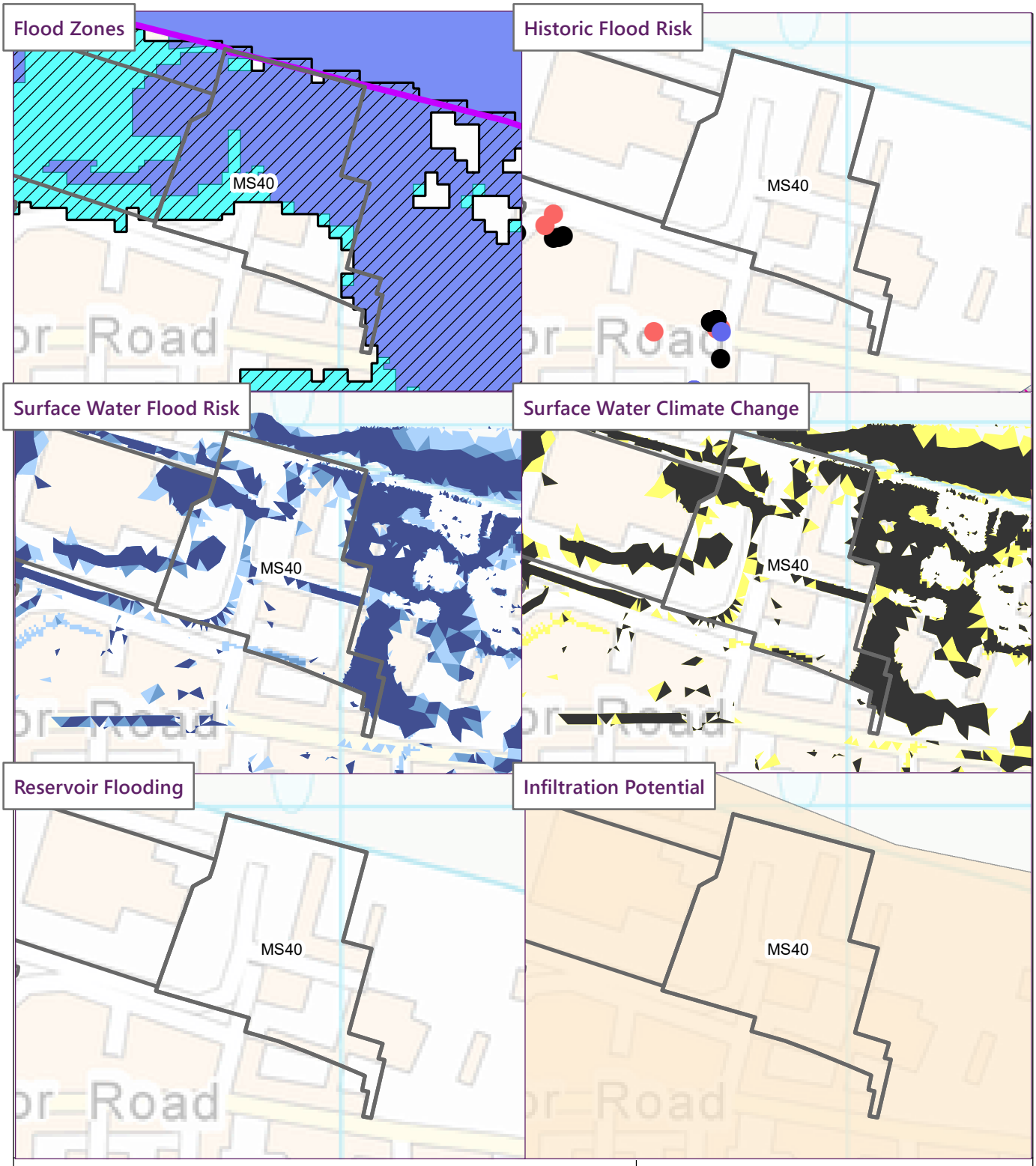
See section 6 of the Level 1 SFRA for more information.

### *Site-Specific Recommendations for NPPF Compliant Development*

To make the development safe, the FRA should consider:
● Safe access and egress - placing the site access on the south-western site boundary, where the residual risk from tidal flooding is lowest;
● The site is situated within 40m of the Thames tidal defences. The EA suggest consideration has to be given to keeping the area within 40 metres of the Tidal defences safeguarded for future defence raising. Development must observe a 16m gap between the proposed development and the landward side of the Thames Tidal Flood Defences, noting that the landward extent of the flood defence may not always be visible as they are often buried underground. Intrusive investigations may be required to determine the exact location. For work within this buffer zone, a Flood Risk Activity Permit will be required.
● Design of development to manage and reduce flood risk wherever possible, including siting all living accommodation above the maximum future (2115) flood level;
● Siting development in accordance with the sequential approach, placing the most vulnerable uses in the areas of least risk;
● Resident awareness;
● Flood warning - making use of breach modelling outputs to determine the time from the breach happening to the site being inundated; and
● Evacuation procedures and funding arrangements.
Further detail on the above points is given in the Level 1 SFRA, Section 6.3.

Development of housing should be directed away from areas of surface water flood risk across the site to preserve the existing surface water storage and flow routes so as not to increase flood risk elsewhere. Where development in areas of surface water flooding is unavoidable, surface water should be directed away from the housing, without increasing flood risk to 3rd parties and this should be detailed in a drainage strategy. The construction of the development should not exacerbate surface water flood risk in the wider critical drainage area. Sustainable drainage solutions should be implemented (see drainage management recommendations below).

| ***Drainage Management Recommendations*** |
| --- |
| The site is within a critical drainage area, where surface water flooding is prevalent. Therefore, it will be imperative that surface water runoff is managed appropriately to ensure flood risk is not increased elsewhere. All feasible SuDS options should be assessed, whilst adhering to the SuDS hierarchy as set out in the Level 1 SRFA report (see chapter 7 and Appendix B of the Level 1 SFRA).<br>The site is currently developed, but betterment in surface water runoff should be sought ideally, and as such the greenfield runoff rate should be determined for the site using current best practice. This will allow for the appropriate sizing of attenuation and conveyance SuDS to ensure that sufficient space for drainage infrastructure is provided in developing site masterplans.<br>Infiltration would be the preferred method of partially/wholly discharging water from the site. The infiltration potential in this area is labelled as high, which alongside the underlying geology, could indicate that infiltration may be possible. Site investigations would be required to fully assess the feasibly of using infiltration SuDS techniques.<br>Drainage design should include recommended allowances for climate change.<br>The topography of the site should be taken in to consideration to ensure that gravity drainage is possible throughout the whole site. An appropriate discharge location should be identified (if not all infiltration) and appropriate consultations should be had. |




Key

LBB Site

**Flood Zone Summary**
- Main Rivers
- Ordinary Watercourses
- Flood defences (SoP over 1 in 100 year AEP)
- Flood Storage Areas
- Functional Floodplain
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

**Surface Water Flood Risk**
- 3.33% AEP Extent
- 1% AEP Extent
- 0.1% AEP Extent

**Risk of Flooding from Reservoirs Max Depth**
- < 0.3
- 0.3 - 2.0
- > 2.0

**Historic Flood Risk**

Recorded Flood Events Bexley Borough (1960-2019)
- Cause unrecorded
- Blocked Culvert
- Blocked Gulley
- Blocked Gully
- Burst Water Main
- Fluvial
- Groundwater
- Sewer
- Surface Water (Pluvial)
- Surface Water, Fluvial and Groundwater
- Surface and Fluvial
- Surface and Groundwater
- Surface and Sewer

Recorded flood outlines
- 1953 Event
- 1968 Event
- 1977 Event

**Surface Water Climate Change**
- 1% AEP
- Areas potentially vulnerable to climate change

**Infiltration Potential**
- High
- Med
- Low

0 100 200 m

Scale at A4: 1:4,747



Client

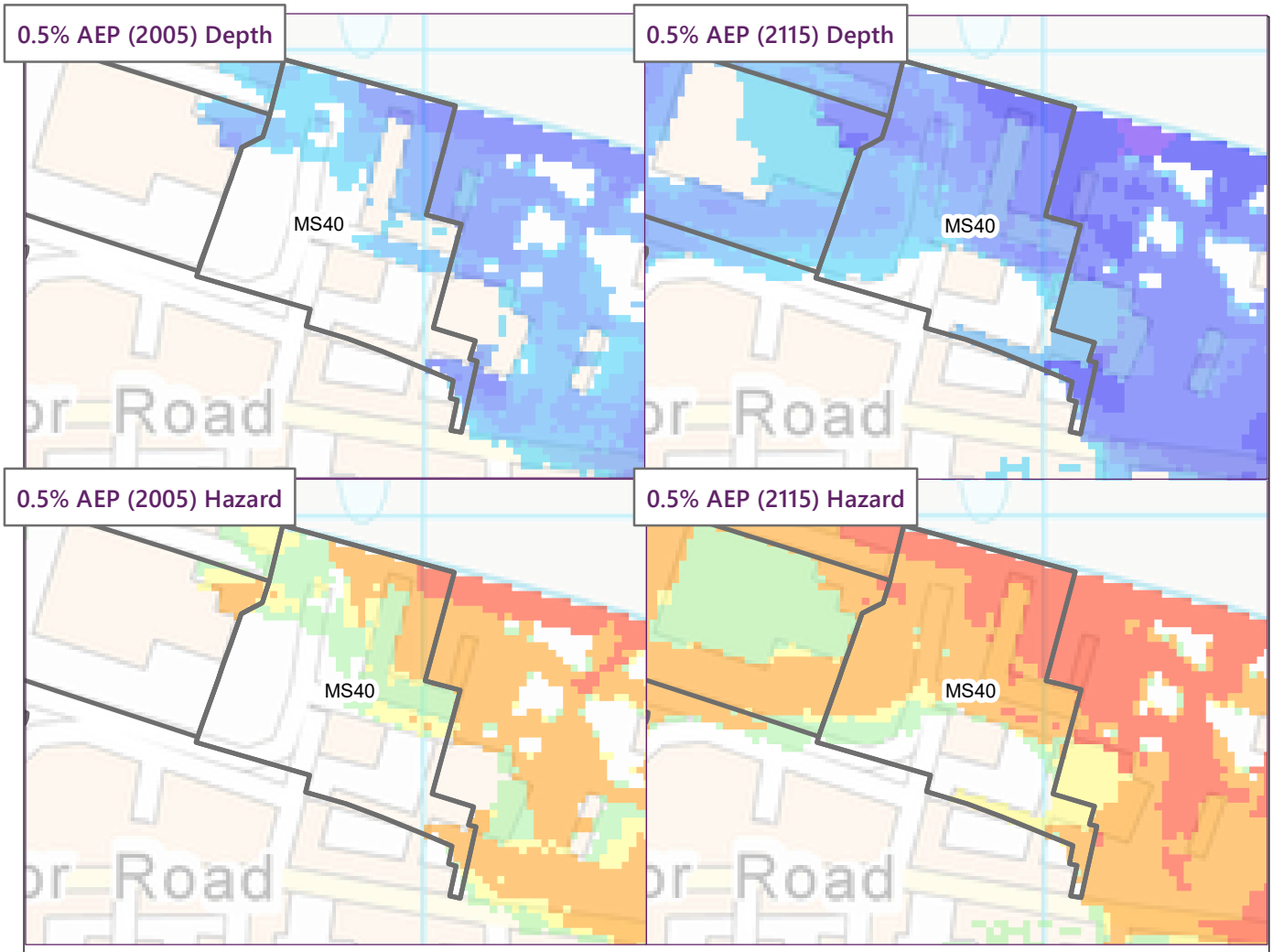
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS40**
**Flood Risk Overview Map**

June 2020

wood.




Key

LBB Site

| Max depth (m) | Max hazard |
|---|---|
| 0 - 0.05 | Caution |
| 0.05 - 0.25 | Danger for Some |
| 0.25 - 0.5 | Danger for Most |
| 0.5 - 0.75 | Danger for All |
| 0.75 - 1 | |
| 1 - 1.5 | |
| 1.5 - 2 | |
| 2 - 2.5 | |
| 2.5 - 3 | |
| 3 - 3.5 | |
| 3.5 - 4 | |
| 4 - 5 | |
| 5+ | |

N

0 100 200 m

Scale at A4: 1:4,734



Client

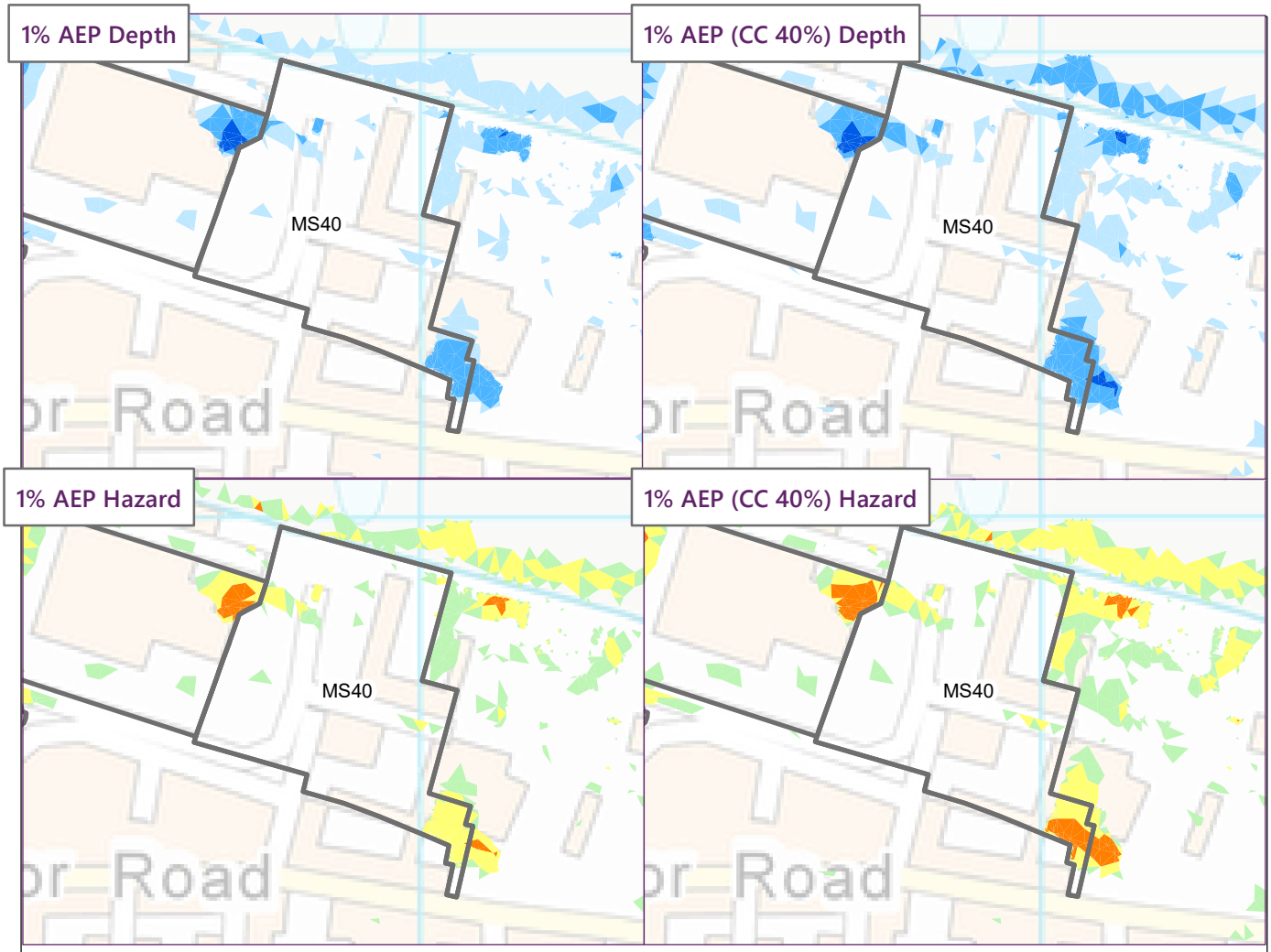
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS40**
**Residual tidal flood risk - River Thames**

June 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 200 m

Scale at A4: 1:4,761



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS40**
**Surface Water Modelling Results: Darent Industrial Estate**

May 2020

wood.


Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

0 100 200 m

Scale at A4: 1:4,747



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS40**
**Risk of Flooding from Surface Water (EA Dataset)**

May 2020

wood.

# Bexley Level 2 SFRA

Flood Risk Information Sheet

| General information | | | |
|---|---|---|---|
| ***Site name / address*** | **ERI05 Morrisons Erith, James Watt Way, Erith** | | |
| ***Site ID*** | MS39 | **Local Plan Reg19 Ref** | SA14 |
| **Sustainable development location** | Erith Station and District Centre | **Area (ha)** | 3.19 |
| ***Allocation type*** | Residential led mixed use | | |
| | Mixed use % (A1-A5) | Residential % | design led net capacity |
| | 25 | 75 | 421 |

| Baseline Flood Risk Summary | | | |
|---|---|---|---|
| ***Fluvial/Tidal*** | | | |
| ***Overview*** | | | |
| Source of risk | Tidal | Watercourse | River Thames |
| % site in Flood Zone 1 | 12% | % site in Flood Zone 3a | 33% |
| % site in Flood Zone 2 | 55% | % site in Flood Zone 3b | 0% |
| Flood Defences | Yes | % site in ABD | 34% |
| ***Residual tidal flood risk from defence failure*** | | | |
| Present day max 1 in 200 AEP flood level (mAOD) | 5.64 | Future max 1 in 200 AEP flood level (mAOD) | 6.48 |
| Present day max 1 in 200 AEP flood hazard | Danger for most | Future day max 1 in 200 AEP flood hazard | Danger for all |
| ***Impact of climate change*** | Sea levels are predicted to rise with future climate change, consequently levels in the Tidal River Thames are also predicted to increase. As a result, in the event of a breach in the tidal flood defences in the future peak flood levels and flood hazard on site will increase. | | |
| ***Historical information*** | There is no evidence of the site flooding in the past. | | |
| ***Contextual commentary*** | The EA Flood Zone map shows the majority of the site (55.2%) is situated within Flood Zone 2, with the remainder in Flood Zone 3a (32.5%) and Flood Zone 1 (12.2%). The source of risk is tidal flooding from the River Thames. There is no risk of fluvial flooding.<br>The site is shown as being an area benefitting from defences as it is protected by the Thames Tidal defences to a SOP of 0.1%AEP. However, there remains a residual risk associated with a breach in these defences. The peak flood level associated with a breach in the defences will increase with climate change.<br>In the case of a breach, the site is anticipated to flood up to 1m deep in the North-East and corner of the site under present day conditions, and up to 2m in future conditions (2115). The majority of the site is anticipated to be unimpacted under present day conditions with pockets of Low-Significant hazard in the North-East corner and West portions of the site. Under future conditions however, the majority of the site is anticipated to be subject to Significant hazard with pockets of Extreme hazard.<br>The associated residual risk map shows how the depths and hazard vary across the site and with climate change. | | |
| ***Surface Water*** | | | |
| ***Overview*** | | | |
| % site at high risk (1:30 AEP) | 28% | % site at low risk (1:1000 AEP) | 9% |
| % site at medium risk (1:100 AEP) | 2% | % site with no mapped risk | 60% |
| % site in critical drainage area | 100% | | |
| ***Impact of climate change*** | Rainfall intensity is predicted to increase with climate change. The increase in intensity will result in an increase in risk of flooding from surface water, resulting in increases in depth, extent and hazard of flooding. | | |
| ***Historical information*** | There is no evidence of the site flooding in the past. But a cluster historic surface water flood events have been recorded in adjacent roads to the south of the site. | | |
| ***Contextual commentary*** | Detailed modelling indicates that for more frequent events (3.33% and 1% AEP) now and into the future there is a band of flooding across site, with hazard predicted to be high in places and depths predicted to reach up to 0.6m. | | |
| ***Other sources of flooding*** | | | |
| ***Contextual commentary*** | There is no known flood risk from other sources. | | |

## Policy and Recommendations

### *Site suitability*

| | | | |
|---|---|---|---|
| ***Highest Flood Zone*** | Flood Zone 3a | ***Development vulnerability*** | More Vulnerable |
| ***Suitability*** | Yes | ***Exception Test required?*** | Yes |

### *Policy recommendations for flood risk management*

In accordance with NPPF PPG Tables 2 & 3 (reproduced in Appendix D of the Level 1 SFRA), mixed use development, where it contains residential development, is classed as more vulnerable and should not be permitted within FZ3a unless the exception test can be passed.
The Exception test would need to robustly demonstrate that the wider sustainability benefits outweigh flood risk, and that the development will be safe throughout its lifetime and will not increase flood risk elsewhere, including allowances for climate change.
In accordance with NPPF a site-specific FRA would be required as the site is in FZ3a, see Section 8 of the Level 1 SFRA details the requirements of an FRA.

### *Passing the exception test*

To pass the Exception test:
- it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and
-a site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

A number of factors which need to be considered when looking to pass the Exception test include:
- Design of development to manage and reduce flood risk wherever possible;
- Finished floor levels;
- Safe access and egress;
- Operation and maintenance;
- Resident awareness;
- Flood warning; and
- Evacuation procedures and funding arrangements.

See section 6 of the Level 1 SFRA for more information.

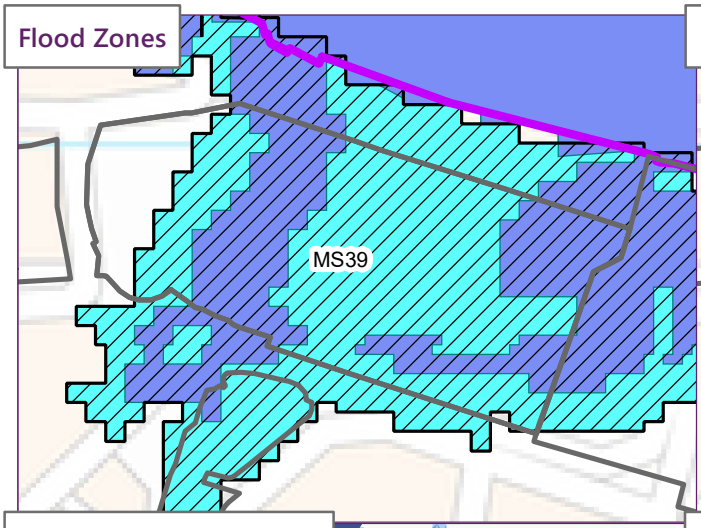
### *Site-Specific Recommendations for NPPF Compliant Development*

To make the development safe, the FRA should consider:
● Safe access and egress - placing the site access on the eastern site boundary, where the residual risk from tidal flooding is lowest;
● The site is situated within 40m of the Thames tidal defences. The EA suggest consideration has to be given to keeping the area within 40 metres of the Tidal defences safeguarded for future defence raising. Development must observe a 16m gap between the proposed development and the landward side of the Thames Tidal Flood Defences, noting that the landward extent of the flood defence may not always be visible as they are often buried underground. Intrusive investigations may be required to determine the exact location. For work within this buffer zone, a Flood Risk Activity Permit will be required.
● Design of development to manage and reduce flood risk wherever possible, including siting all living accommodation above the maximum future (2115) flood level;
● Siting development in accordance with the sequential approach, placing the most vulnerable uses in the areas of least risk;
● Resident awareness;
● Flood warning - making use of breach modelling outputs to determine the time from the breach happening to the site being inundated; and
● Evacuation procedures and funding arrangements.
Further detail on the above points is given in the Level 1 SFRA, Section 6.3.

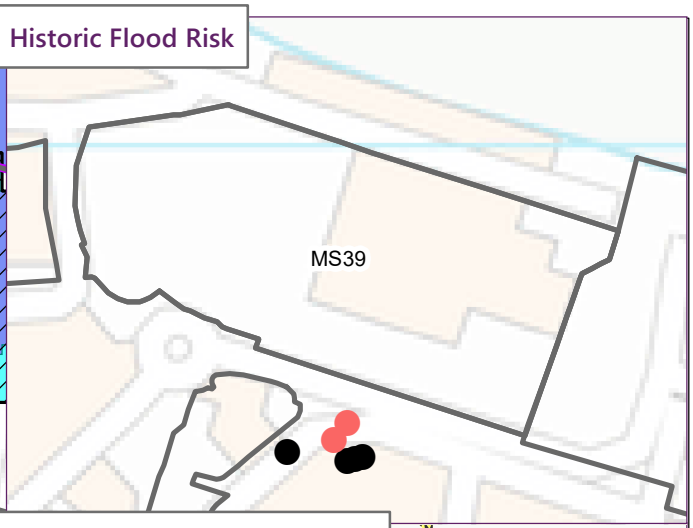
Development of housing should be directed away from areas of surface water flood risk across the site to preserve the existing surface water storage and flow routes so as not to increase flood risk elsewhere. Where development in areas of surface water flooding is unavoidable, surface water should be directed away from the housing, without increasing flood risk to 3rd parties and this should be detailed in a drainage strategy. The construction of the development should not exacerbate surface water flood risk in the wider critical drainage area. Sustainable drainage solutions should be implemented (see drainage management recommendations below).

| ***Drainage Management Recommendations*** |
| --- |
| The site is within a critical drainage area, where surface water flooding is prevalent. Therefore, it will be imperative that surface water runoff is managed appropriately to ensure flood risk is not increased elsewhere. All feasible SuDS options should be assessed, whilst adhering to the SuDS hierarchy as set out in the Level 1 SRFA report (see chapter 7 and Appendix B of the Level 1 SFRA).<br>The site is currently developed, but betterment in surface water runoff should be sought ideally, and as such the greenfield runoff rate should be determined for the site using current best practice. This will allow for the appropriate sizing of attenuation and conveyance SuDS to ensure that sufficient space for drainage infrastructure is provided in developing site masterplans.<br>Infiltration would be the preferred method of partially/wholly discharging water from the site. The infiltration potential in this area is labelled as high, which alongside the underlying geology, could indicate that infiltration may be possible. Site investigations would be required to fully assess the feasibly of using infiltration SuDS techniques.<br>Drainage design should include recommended allowances for climate change.<br>The topography of the site should be taken in to consideration to ensure that gravity drainage is possible throughout the whole site. An appropriate discharge location should be identified (if not all infiltration) and appropriate consultations should be had. |

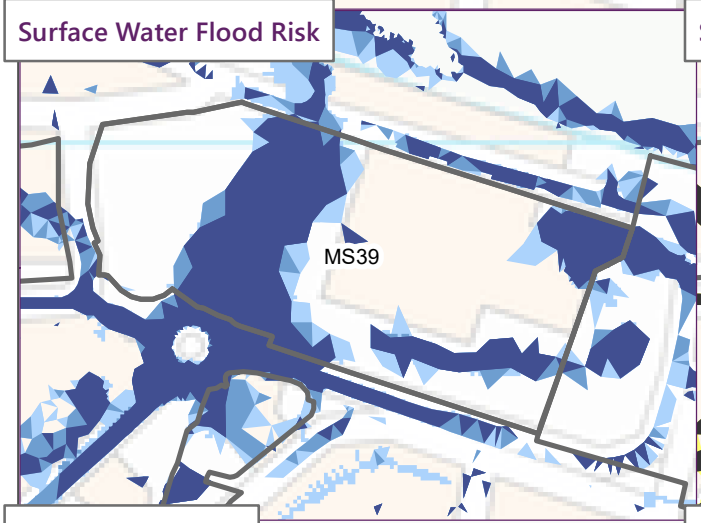
## Flood Zones



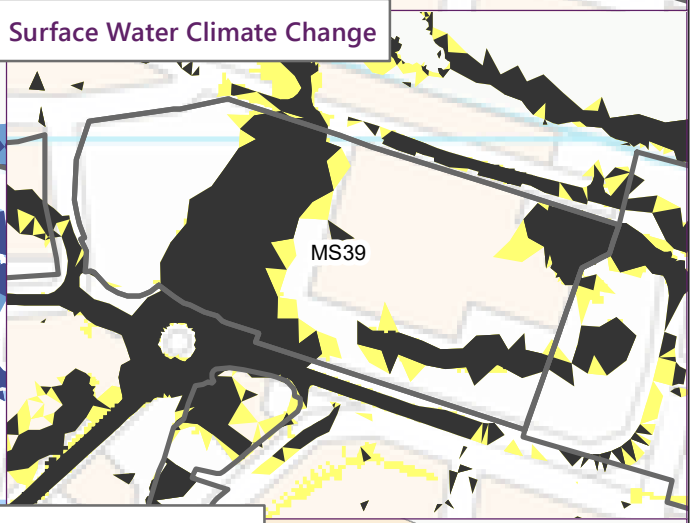

## Historic Flood Risk



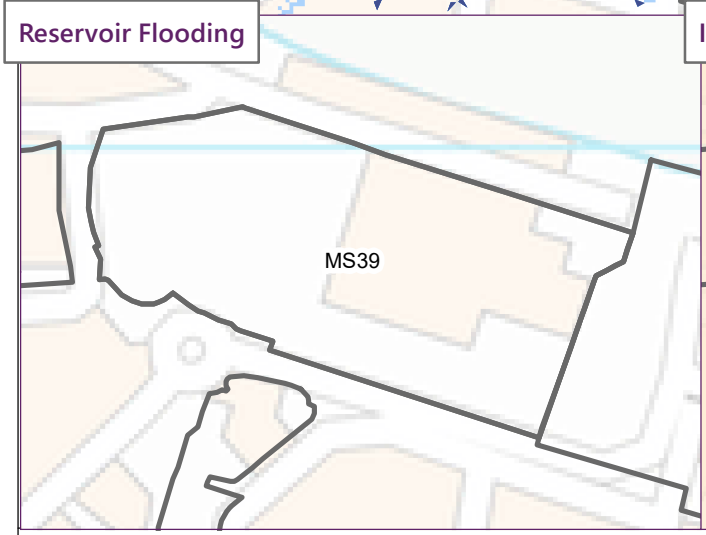

## Surface Water Flood Risk



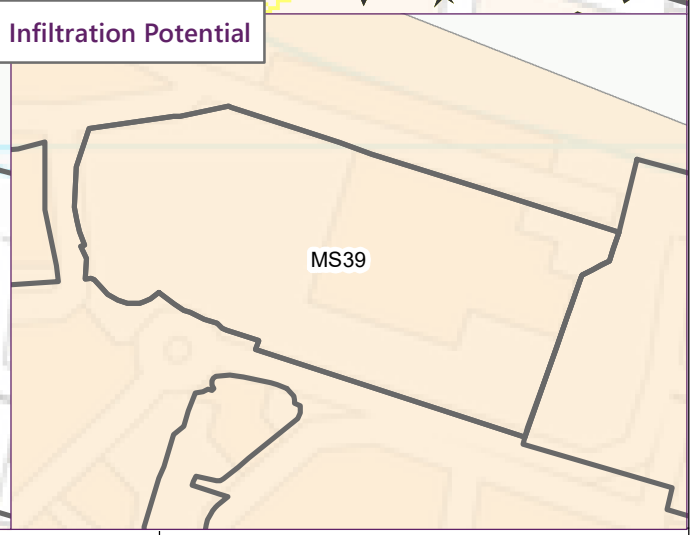

## Surface Water Climate Change




## Reservoir Flooding




## Infiltration Potential




Key

LBB Site

**Flood Zone Summary**
- Main Rivers
- Ordinary Watercourses
- Flood defences (SoP over 1 in 100 year AEP)
- Flood Storage
- Functional Floodplain
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

**Surface Water Flood Risk**
- 3.33% AEP Extent
- 1% AEP Extent
- 0.1% AEP Extent

**Risk of Flooding from Reservoirs Max Depth**
- < 0.3
- 0.3 - 2.0
- > 2.0

**Historic Flood Risk**

Recorded Flood Events Bexley Borough (1960-2019)
- Cause unrecorded
- Blocked Culvert
- Blocked Gulley
- Blocked Gully
- Burst Water Main
- Fluvial
- Groundwater
- Sewer
- Surface Water (Pluvial)
- Surface Water, Fluvial and Groundwater
- Surface and Fluvial
- Surface and Groundwater
- Surface and Sewer

Recorded flood outlines
- 1953 Event
- 1968 Event
- 1977 Event

**Surface Water Climate Change**
- 1% AEP
- Areas potentially vulnerable to climate change

**Infiltration Potential**
- High
- Med
- Low

N

0 100 200 m

Scale at A4: 1:3,927



Client

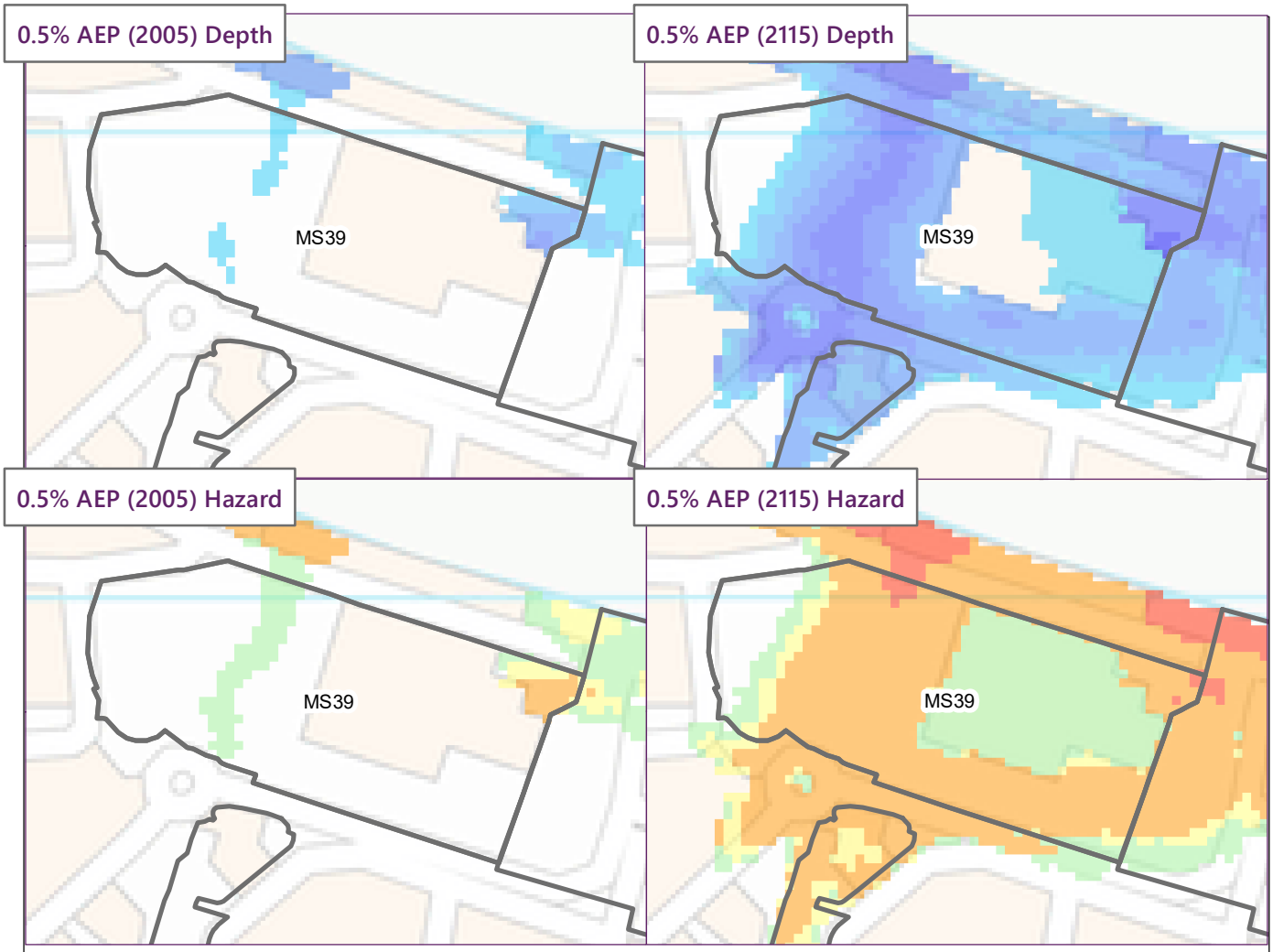
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS39**
**Flood Risk Overview Map**

June 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0 - 0.05
- 0.05 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- 3 - 3.5
- 3.5 - 4
- 4 - 5
- 5+

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 200 m

Scale at A4: 1:3,939



Client

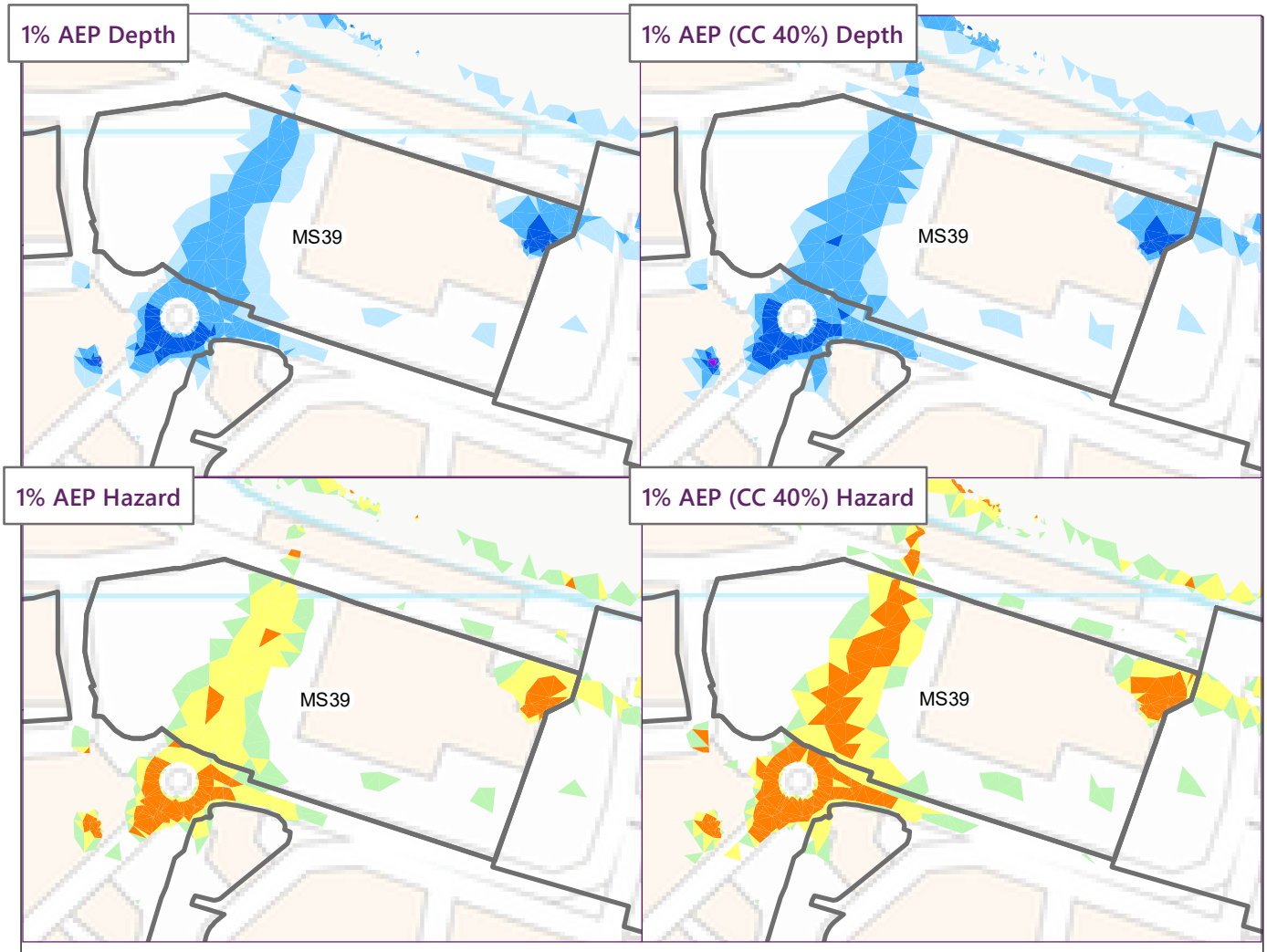
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS39**
**Residual tidal flood risk - River Thames**

June 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 200 m

Scale at A4: 1:3,939



Client

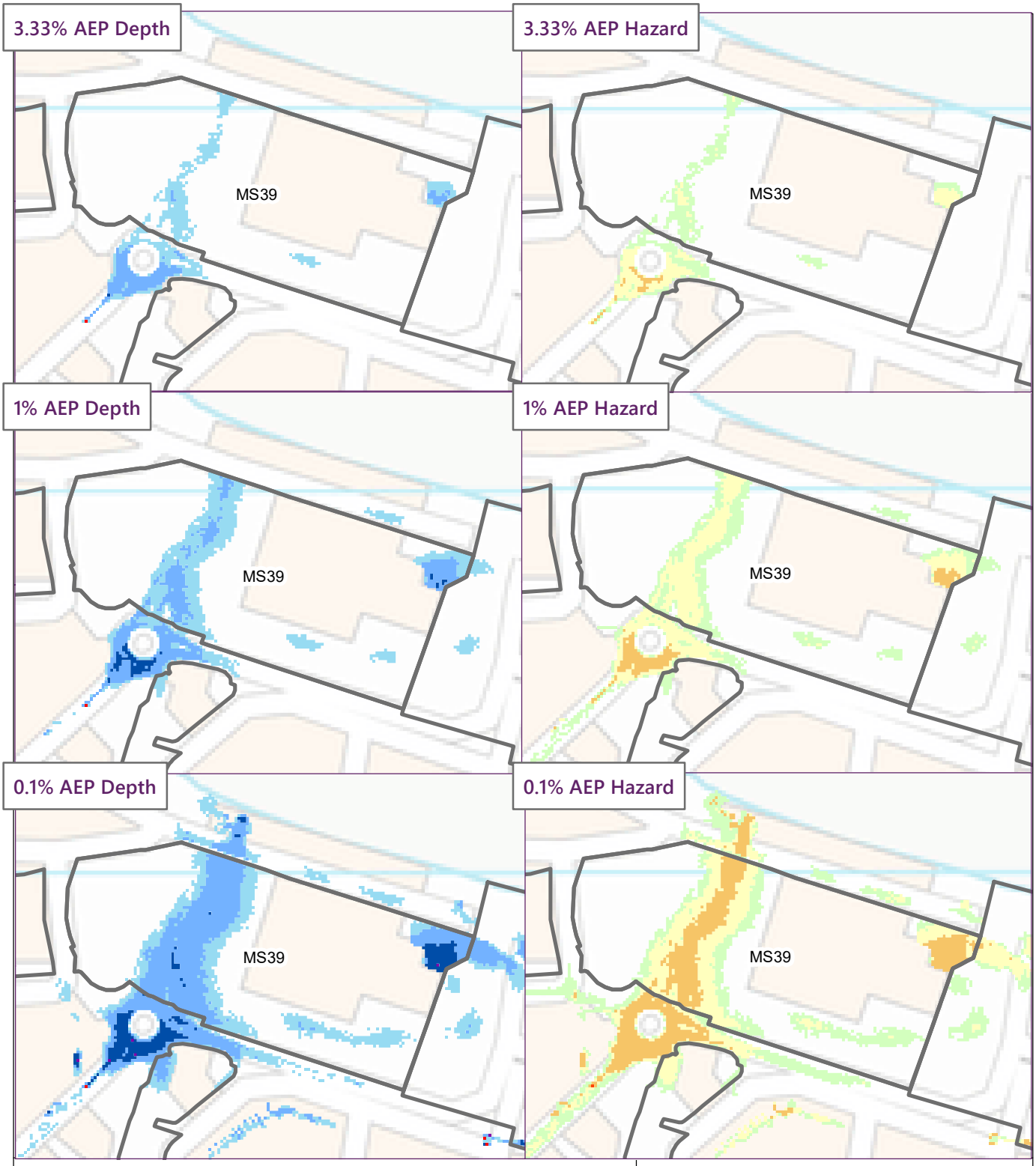
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS39**
**Surface Water Modelling Results: Darent Industrial Estate**

May 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

0 100 200 m

Scale at A4: 1:3,927



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS39**
**Risk of Flooding from Surface Water (EA Dataset)**

May 2020

wood.

# Bexley Level 2 SFRA

Flood Risk Information Sheet

| General information | | | |
|---|---|---|---|
| ***Site name / address*** | **BXH01 Former Bexley CCG Offices, Erith Road, Barnehurst** | | |
| ***Site ID*** | MS12 | ***Local Plan Reg 19 Ref*** | SA15 |
| ***Sustainable development location*** | Barnehurst Station | ***Area (ha)*** | 1.85 |
| ***Allocation type*** | Residential | | |
| | Mixed use % (A1-A5) | Residential % | Design led net capacity |
| | 0 | 100 | 182 |
| **Baseline Flood Risk Summary** | | | |
| ***Fluvial/Tidal*** | | | |
| ***Overview*** | | | |
| Source of risk | Other | Watercourse | N/A |
| % site in Flood Zone 1 | 100% | % site in Flood Zone 3a | 0% |
| % site in Flood Zone 2 | 0% | % site in Flood Zone 3b | 0% |
| Flood Defences | No | % site in ABD | 0% |
| ***Fluvial flood risk (including presence of defences)*** | | | |
| Present day max 1 in 100 AEP flood level (mAOD) | 0 | Future max 1 in 100 AEP flood level (mAOD) | 0 |
| Present day max 1 in 100 AEP flood depth (m) | 0 | Future day max 1 in 100 AEP flood depth (m) | 0 |
| ***Impact of climate change*** | - | | |
| ***Historical information*** | - | | |
| ***Contextual commentary*** | The site is in Flood Zone 1 and therefore not at risk from either fluvial or tidal flooding. | | |
| ***Surface Water*** | | | |
| ***Overview*** | | | |
| % site at high risk (1:30 AEP) | 6% | % site at low risk (1:1000 AEP) | 3% |
| % site at medium risk (1:100 AEP) | 3% | % site with no mapped risk | 88% |
| % site in critical drainage area | 100% | | |
| ***Impact of climate change*** | Rainfall intensity is predicted to increase with climate change. The increase in intensity will result in an increase in risk of flooding from surface water, resulting in increases in depth, extent and hazard of flooding. | | |
| ***Historical information*** | There is no evidence of the site flooding in the past. | | |
| ***Contextual commentary*** | Detailed modelling predicts an area of surface water ponding in the northerly point of the site, with a surface water flow route located through the centre of the site along an existing road. Depths are predicted to be shallow (up to 0.3m) and hazard is low. The site is also fully within an area of critical drainage. | | |
| ***Other sources of flooding*** | | | |
| ***Contextual commentary*** | There is no known flood risk from other sources. | | |

## Policy and Recommendations

### Site suitability

| | | | |
|---|---|---|---|
| ***Highest Flood Zone*** | Flood Zone 1 | ***Development vulnerability*** | More Vulnerable |
| ***Suitability*** | Yes | ***Exception Test required?*** | No |

### Policy recommendations for flood risk management

In accordance with NPPF PPG Tables 2 & 3 (reproduced in Appendix D of the Level 1 SFRA), residential development is classed as more vulnerable, so development in FZ1 is appropriate.
In accordance with NPPF a site-specific FRA would be required, as the site area is >1 ha as well as being in an identified critical drainage area. See Section 8 of the Level 1 SFRA details the requirements of an FRA.

### Passing the exception test

There is no need to pass the exception test, the site is Flood Zone 1 and 'more vulnerable' residential development is suitable for this location.

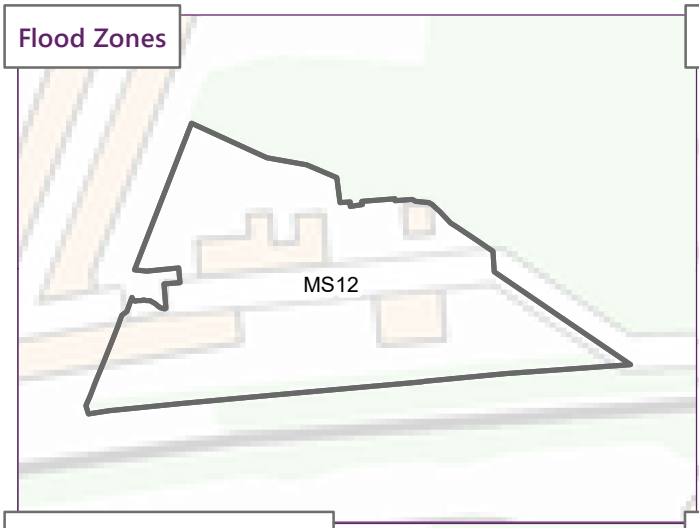
### Site-Specific Recommendations for NPPF Compliant Development

Development of housing should be directed away from areas of high surface water flood risk across the site.
Where development in areas of surface water flooding is unavoidable, houses should be raised above the flood level or surface water should be directed away from the housing, without increasing flood risk to 3rd parties.
The construction of the development should not exacerbate surface water flood risk in the wider area. Any changes to the site configuration which will alter how surface water is stored and/or flows across the site will need to be detailed in an accompanying drainage strategy.
Sustainable drainage solutions should be implemented (see drainage management recommendations below).

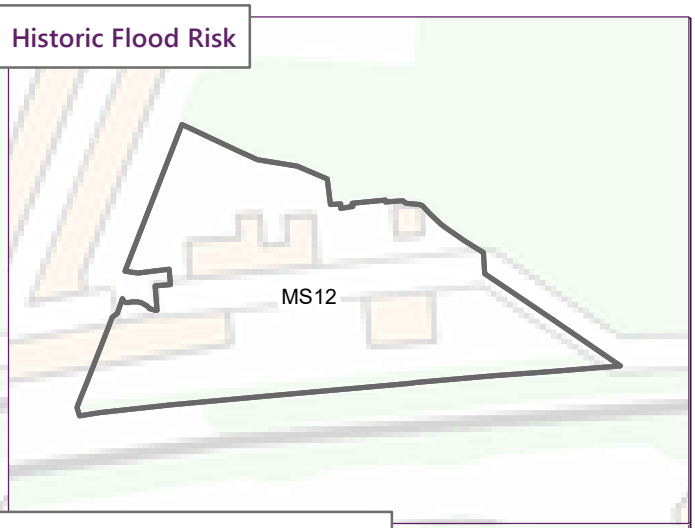
### Drainage Management Recommendations

The site is within a critical drainage area, where surface water flooding is prevalent. Therefore, it will be imperative that surface water runoff is managed appropriately to ensure flood risk is not increased elsewhere. All feasible SuDS options should be assessed, whilst adhering to the SuDS hierarchy as set out in the Level 1 SFRA report (see chapter 7 and Appendix B of the Level 1 SFRA).
The site is currently developed, but betterment in surface water runoff should be sought ideally, and as such the greenfield runoff rate should be determined for the site using current best practice. This will allow for the appropriate sizing of attenuation and conveyance SuDS to ensure that sufficient space for drainage infrastructure is provided in developing site masterplans.
Infiltration would be the preferred method of partially/wholly discharging water from the site. The infiltration potential in this area is labelled as medium, which alongside the underlying geology, could indicate that infiltration may be possible. However the site is in SPZ 3, therefore consultation with the EA will be required for infiltration SuDS. Site investigations would be required to fully assess the feasibly of using infiltration SuDS techniques.
Drainage design should include recommended allowances for climate change.
The topography of the site should be taken in to consideration to ensure that gravity drainage is possible throughout the whole site. An appropriate discharge location should be identified (if not all infiltration) and appropriate consultations should be had.

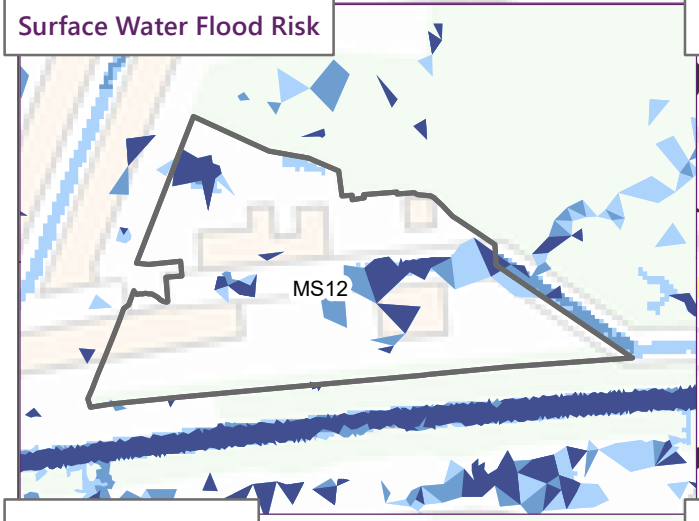
## Flood Zones



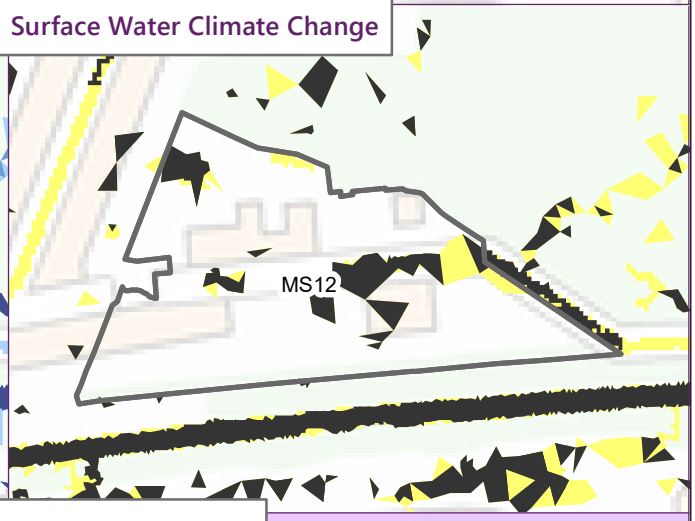

## Historic Flood Risk



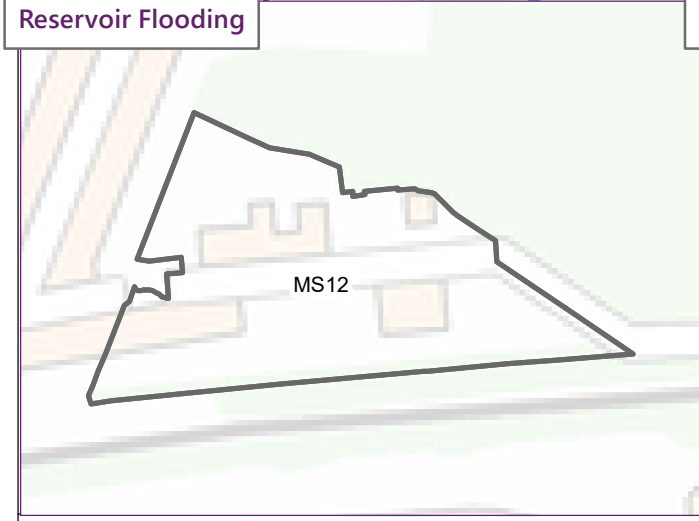

## Surface Water Flood Risk



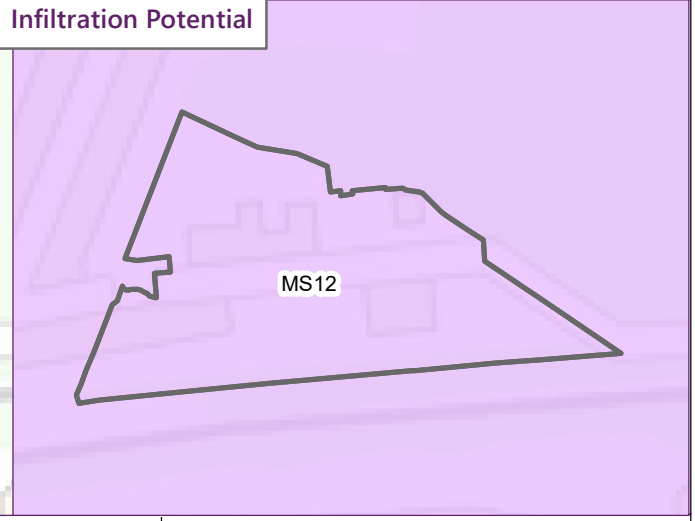

## Surface Water Climate Change




## Reservoir Flooding




## Infiltration Potential




Key

LBB Site

**Flood Zone Summary**
- Main Rivers
- Ordinary Watercourses
- Flood defences (SoP over 1 in 100 year AEP)
- Flood Storage Areas
- Functional Floodplain
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

**Surface Water Flood Risk**
- 3.33% AEP Extent
- 1% AEP Extent
- 0.1% AEP Extent

**Risk of Flooding from Reservoirs Max Depth**
- < 0.3
- 0.3 - 2.0
- > 2.0

**Historic Flood Risk**

Recorded Flood Events Bexley Borough (1960-2019)
- Cause unrecorded
- Blocked Culvert
- Blocked Gulley
- Blocked Gully
- Burst Water Main
- Fluvial
- Groundwater
- Sewer
- Surface Water (Pluvial)
- Surface Water, Fluvial and Groundwater
- Surface and Fluvial
- Surface and Groundwater
- Surface and Sewer

Recorded flood outlines
- 1953 Event
- 1968 Event
- 1977 Event

**Surface Water Climate Change**
- 1% AEP
- Areas potentially vulnerable to climate change

**Infiltration Potential**
- High
- Med
- Low

N

0 100 200 m

Scale at A4: 1:3,480



Client

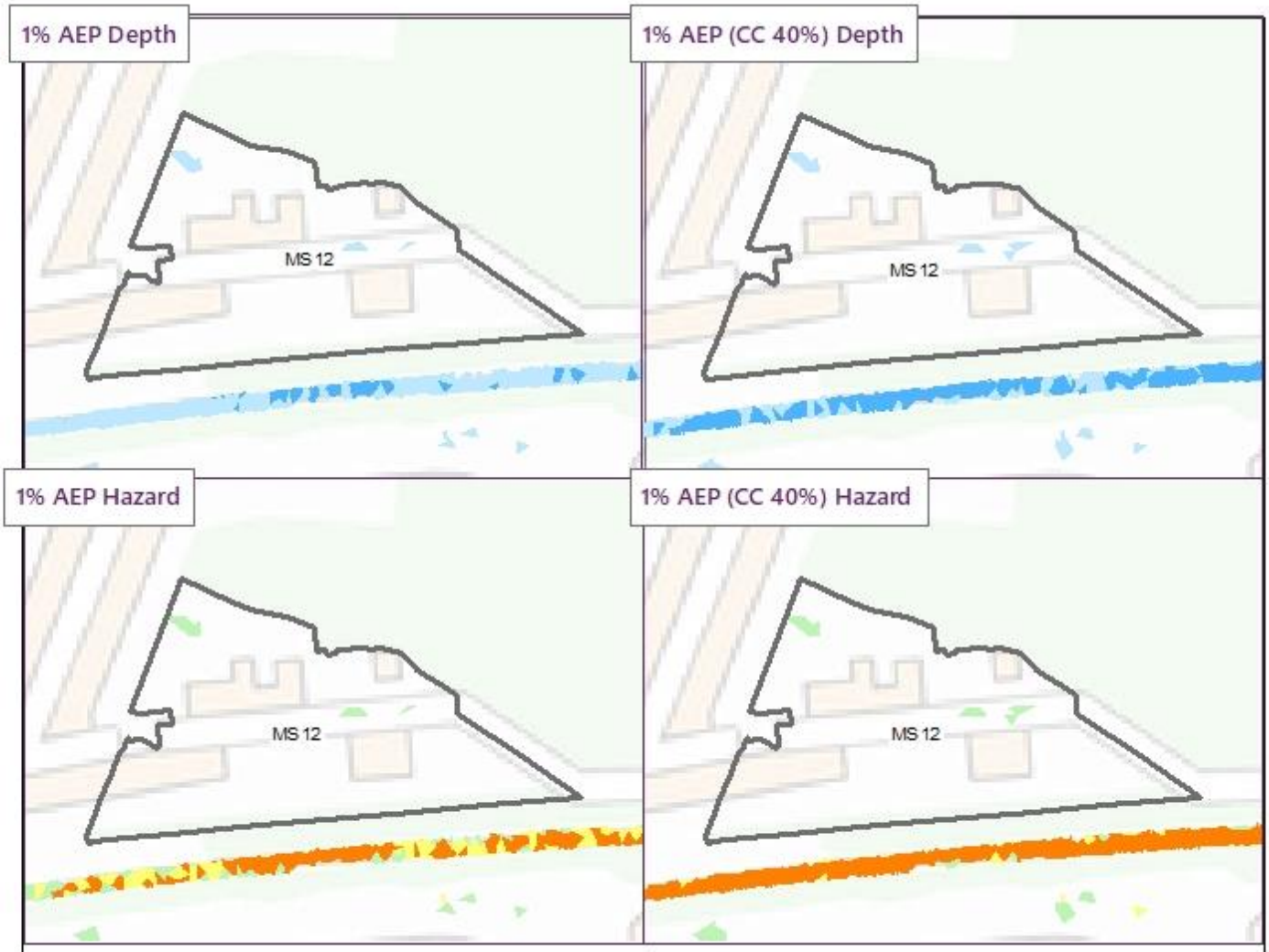
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS12**
**Flood Risk Overview Map**

June 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

0 100 200 m

Scale at A4: 1:3,490



Client

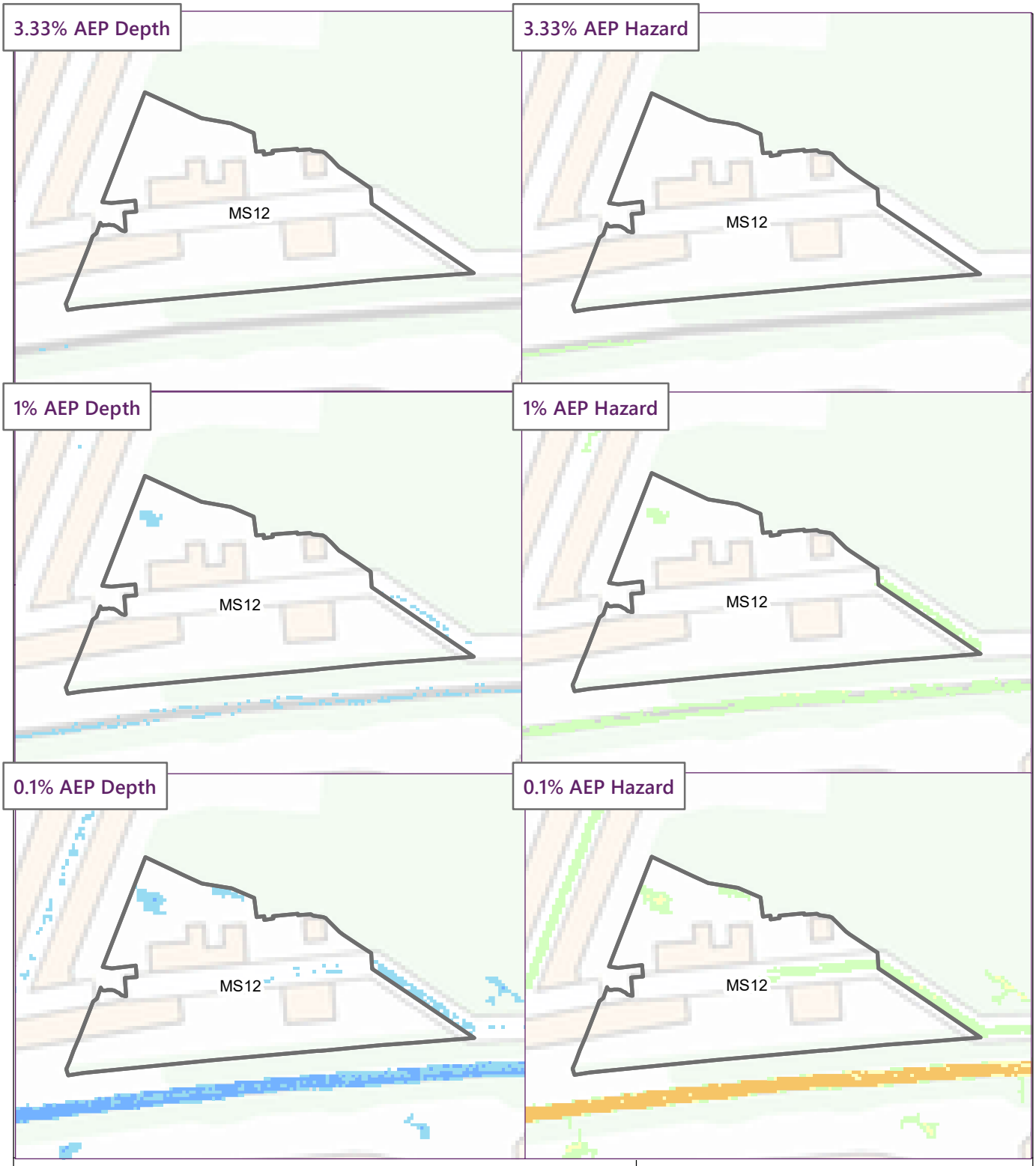
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS12**
**Surface Water Modelling Results: Darent Industrial Estate**

June 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 200 m

Scale at A4: 1:3,480



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS12**
**Risk of Flooding from Surface Water (EA Dataset)**

May 2020

wood.

# Bexley Level 2 SFRA

Flood Risk Information Sheet

| General information | | | |
|---|---|---|---|
| ***Site name / address*** | **BXH03 EDF Energy Site, Broadway, Bexleyheath** | | |
| ***Site ID*** | MS17 | ***Local Plan Reg19 Ref*** | SA17 |
| ***Sustainable development location*** | Bexleyheath Major Town Centre | ***Area (ha)*** | 1.482 |
| ***Allocation type*** | Residential | | |
| | Mixed use % (A1-A5) | Residential % | Design led net capacity |
| | 0 | 100 | 200 |

| Baseline Flood Risk Summary | | | |
|---|---|---|---|
| ***Fluvial/Tidal*** | | | |
| ***Overview*** | | | |
| Source of risk | Other | Watercourse | N/A |
| % site in Flood Zone 1 | 100% | % site in Flood Zone 3a | 0% |
| % site in Flood Zone 2 | 0% | % site in Flood Zone 3b | 0% |
| Flood Defences | No | % site in ABD | 0% |
| ***Fluvial flood risk (including presence of defences)*** | | | |
| Present day max 1 in 100 AEP flood level (mAOD) | 0 | Future max 1 in 100 AEP flood level (mAOD) | 0 |
| Present day max 1 in 100 AEP flood depth (m) | 0 | Future day max 1 in 100 AEP flood depth (m) | 0 |
| ***Impact of climate change*** | - | | |
| ***Historical information*** | - | | |
| ***Contextual commentary*** | The site is in Flood Zone 1 and therefore not at risk from either fluvial or tidal flooding. | | |
| ***Surface Water*** | | | |
| ***Overview*** | | | |
| % site at high risk (1:30 AEP) | 2% | % site at low risk (1:1000 AEP) | 7% |
| % site at medium risk (1:100 AEP) | 3% | % site with no mapped risk | 89% |
| % site in critical drainage area | 100% | | |
| ***Impact of climate change*** | Rainfall intensity is predicted to increase with climate change. The increase in intensity will result in an increase in risk of flooding from surface water, resulting in increases in depth, extent and hazard of flooding. | | |
| ***Historical information*** | There is no evidence of the site flooding in the past. But a number of historic surface water flood events have been recorded in adjacent roads. | | |
| ***Contextual commentary*** | The EA RoFfSW map indicates two areas of surface water flooding across the site. There is an area of ponding along the central roadway which currently runs through the site. Additionally a surface water flow route is shown along the south-eastern boundary flowing north. For more frequent events (3.33% and 1% AEP) depths are predicted to be up to 0.9m, with hazard predicted to be high in places. The site is also fully within an area of critical drainage. | | |
| ***Other sources of flooding*** | | | |
| ***Contextual commentary*** | There is no known flood risk from other sources. | | |

## Policy and Recommendations

### Site suitability

| | | | |
|---|---|---|---|
| ***Highest Flood Zone*** | Flood Zone 1 | ***Development vulnerability*** | More Vulnerable |
| ***Suitability*** | Yes | ***Exception Test required?*** | No |

### Policy recommendations for flood risk management

In accordance with NPPF PPG Tables 2 & 3 (reproduced in Appendix D of the Level 1 SFRA), residential development is classed as more vulnerable, so development in FZ1 is appropriate.
In accordance with NPPF a site-specific FRA would be required, as the site area is >1 ha as well as being in an identified critical drainage area. See Section 8 of the Level 1 SFRA details the requirements of an FRA.

### Passing the exception test

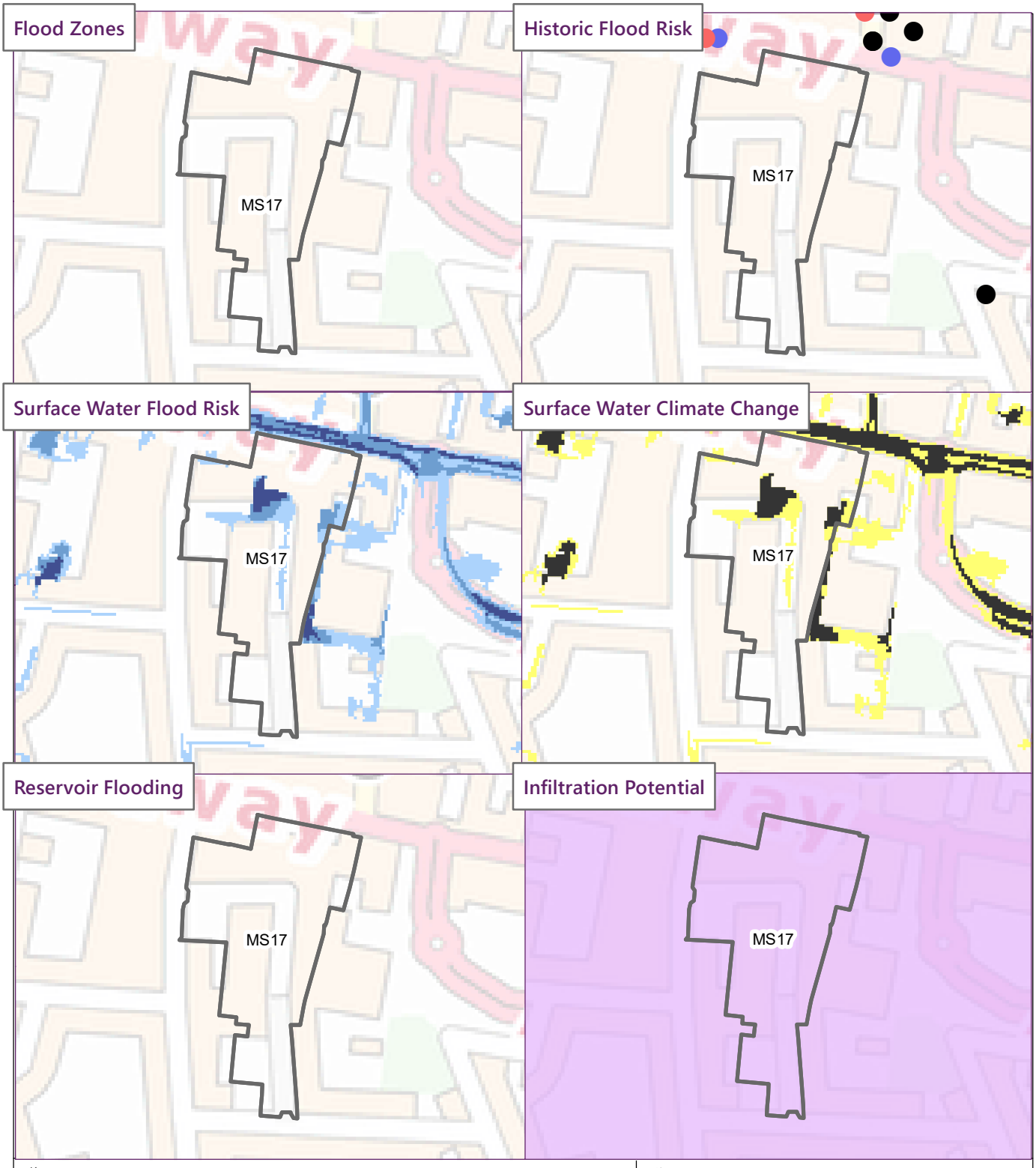
There is no need to pass the exception test, the site is Flood Zone 1 and 'more vulnerable' residential development is suitable for this location.

### Site-Specific Recommendations for NPPF Compliant Development

The EA RoFfSW map indicates the site is at surface water flood risk, and historic flooding has been predicted in adjacent roads. If the site is to be reconfigured as part of development housing should be directed away from areas of surface water flood risk where possible to avoid the flood risk. Where development in areas of surface water flooding is unavoidable, housing should be raised above the flood level and/or surface water should be directed away from the housing, without increasing flood risk to 3rd parties.
The construction of the development should not exacerbate surface water flood risk in the wider critical drainage area. Any changes to the site configuration which will alter how surface water is stored and/or flows across the site will need to be detailed in an accompanying drainage strategy.
Sustainable drainage solutions should be implemented (see drainage management recommendations below).

### Drainage Management Recommendations

The site is within a critical drainage area, where surface water flooding is prevalent. Therefore, it will be imperative that surface water runoff is managed appropriately to ensure flood risk is not increased elsewhere. All feasible SuDS options should be assessed, whilst adhering to the SuDS hierarchy as set out in the Level 1 SFRA report (see chapter 7 and Appendix B of the Level 1 SFRA).
The site is currently developed, but betterment in surface water runoff should be sought ideally, and as such the greenfield runoff rate should be determined for the site using current best practice. This will allow for the appropriate sizing of attenuation and conveyance SuDS to ensure that sufficient space for drainage infrastructure is provided in developing site masterplans.
Infiltration would be the preferred method of partially/wholly discharging water from the site. The infiltration potential in this area is labelled as medium, which alongside the underlying geology, could indicate that infiltration may be possible. However the site is in SPZ 2, therefore consultation with the EA will be required for infiltration SuDS. Site investigations would be required to fully assess the feasibly of using infiltration SuDS techniques.
Drainage design should include recommended allowances for climate change.
The topography of the site should be taken in to consideration to ensure that gravity drainage is possible throughout the whole site. An appropriate discharge location should be identified (if not all infiltration) and appropriate consultations should be had.




Key

LBB Site

**Flood Zone Summary**
- Main Rivers
- Ordinary Watercourses
- Flood defences (SoP over 1 in 100 year AEP)
- Flood Storage Areas
- Functional Floodplain
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

**Surface Water Flood Risk**
- 3.33% AEP Extent
- 1% AEP Extent
- 0.1% AEP Extent

**Risk of Flooding from Reservoirs Max Depth**
- < 0.3
- 0.3 - 2.0
- > 2.0

**Historic Flood Risk**

Recorded Flood Events Bexley Borough (1960-2019)
- Cause unrecorded
- Blocked Culvert
- Blocked Gulley
- Blocked Gully
- Burst Water Main
- Fluvial
- Groundwater
- Sewer
- Surface Water (Pluvial)
- Surface Water, Fluvial and Groundwater
- Surface and Fluvial
- Surface and Groundwater
- Surface and Sewer

Recorded flood outlines
- 1953 Event
- 1968 Event
- 1977 Event

**Surface Water Climate Change**
- 1% AEP
- Areas potentially vulnerable to climate change

**Infiltration Potential**
- High
- Med
- Low

N

0 100 200 m

Scale at A4: 1:4,051



Client

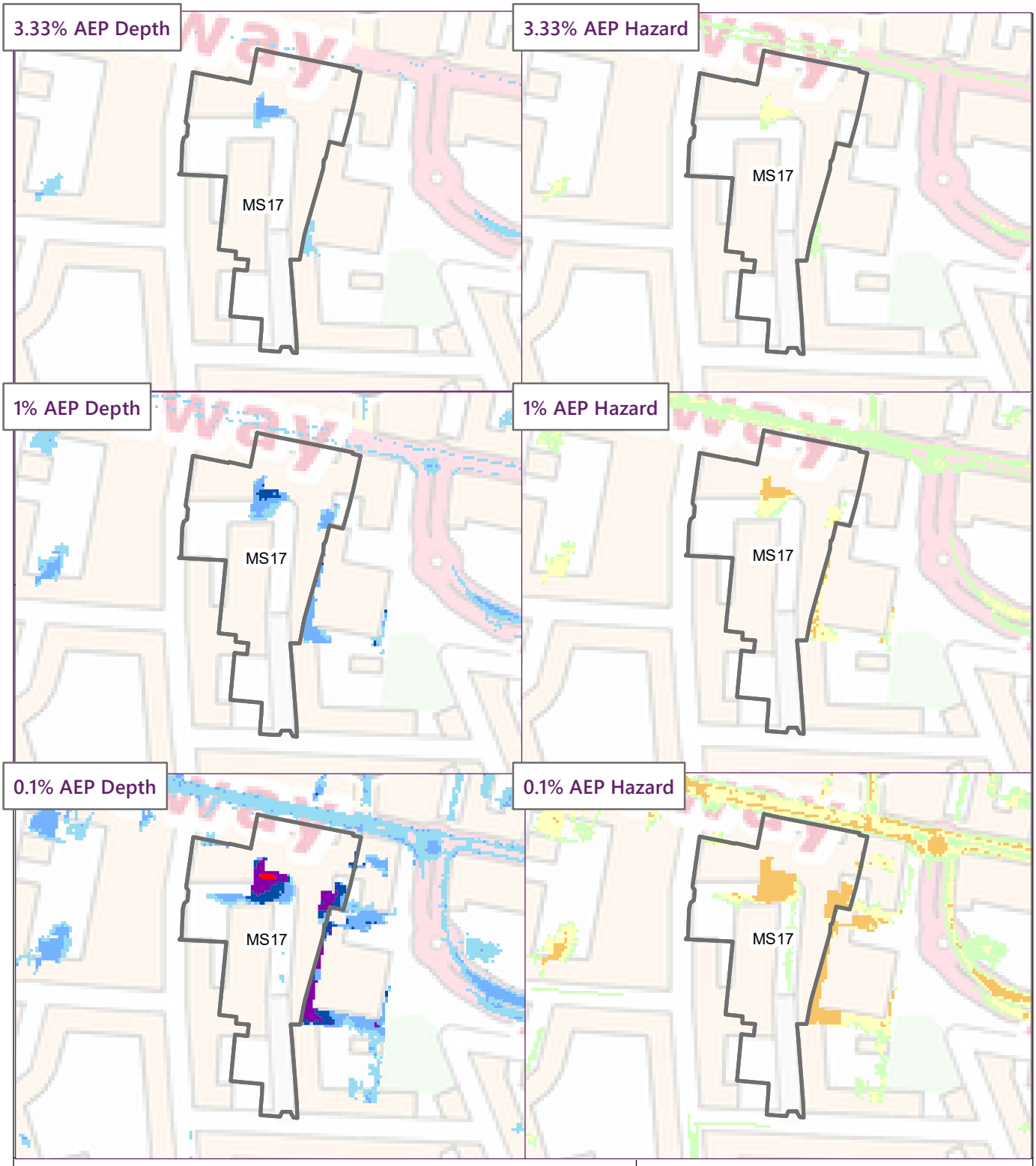
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS17**
**Flood Risk Overview Map**

June 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 200 m

Scale at A4: 1:4,051



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS17**
**Risk of Flooding from Surface Water (EA Dataset)**

May 2020

wood.

# Bexley Level 2 SFRA

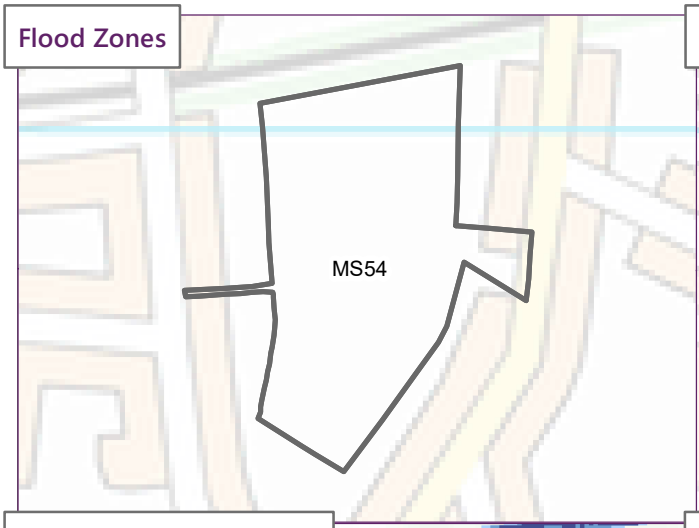
Flood Risk Information Sheet

| General information | | | |
|---|---|---|---|
| ***Site name / address*** | **BXH06Land behind Belvedere Road, Bexleyheath** | | |
| ***Site ID*** | MS54 | **Local Plan Reg19 Ref** | SA20 |
| **Sustainable development location** | Bexleyheath Station and Local Centre | **Area (ha)** | 1.344 |
| ***Allocation type*** | Residential | | |
| | Mixed use % (A1-A5) | Residential % | Design led net capacity |
| | 0 | 100 | 85 |

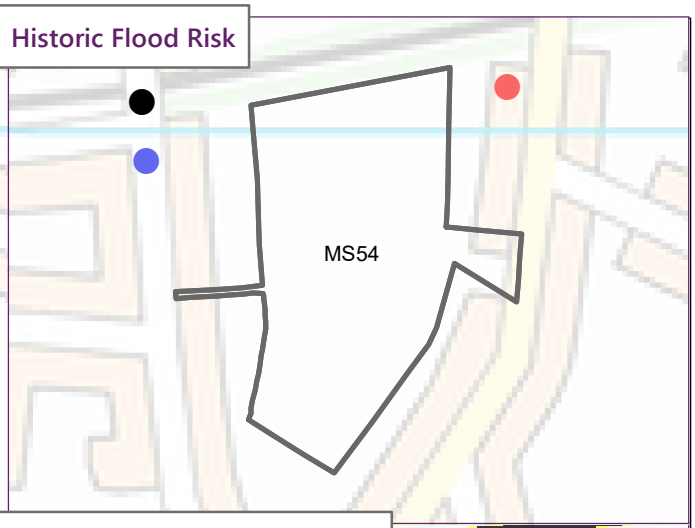
| Baseline Flood Risk Summary | | | |
|---|---|---|---|
| ***Fluvial/Tidal*** | | | |
| ***Overview*** | | | |
| Source of risk | Other | Watercourse | N/A |
| % site in Flood Zone 1 | 100% | % site in Flood Zone 3a | 0% |
| % site in Flood Zone 2 | 0% | % site in Flood Zone 3b | 0% |
| Flood Defences | No | % site in ABD | 0% |
| ***Fluvial flood risk (including presence of defences)*** | | | |
| Present day max 1 in 100 AEP flood level (mAOD) | 0 | Future max 1 in 100 AEP flood level (mAOD) | 0 |
| Present day max 1 in 100 AEP flood depth (m) | 0 | Future day max 1 in 100 AEP flood depth (m) | 0 |
| ***Impact of climate change*** | - | | |
| ***Historical information*** | - | | |
| ***Contextual commentary*** | The site is in Flood Zone 1 and therefore not at risk from either fluvial or tidal flooding. | | |
| ***Surface Water*** | | | |
| ***Overview*** | | | |
| % site at high risk (1:30 AEP) | 1% | % site at low risk (1:1000 AEP) | 7% |
| % site at medium risk (1:100 AEP) | 4% | % site with no mapped risk | 89% |
| % site in critical drainage area | 2% | | |
| ***Impact of climate change*** | Rainfall intensity is predicted to increase with climate change. The increase in intensity will result in an increase in risk of flooding from surface water, resulting in more extensive, deeper flooding. | | |
| ***Historical information*** | There is no evidence of the site flooding in the past. | | |
| ***Contextual commentary*** | The EA RoFfSW flood map indicates surface water flooding in the Northwest portion of the site in 3.33% AEP events and above. Max depths are predicted to be up to 0.3m in events of 3.33% AEP and less, with an associated flood hazard of Low. The anticipated depths increase up to 0.6m depth for events of 1% AEP and greater, with an associated peak hazard of Moderate-High. | | |
| ***Other sources of flooding*** | | | |
| ***Contextual commentary*** | There is no known flood risk from other sources. | | |

| Policy and Recommendations | | | |
|---|---|---|---|
| ***Site suitability*** | | | |
| ***Highest Flood Zone*** | Flood Zone 1 | ***Development vulnerability*** | More Vulnerable |
| ***Suitability*** | Yes | ***Exception Test required?*** | No |
| ***Policy recommendations for flood risk management*** | | | |
| In accordance with NPPF PPG Tables 2 & 3 (reproduced in Appendix D of the Level 1 SFRA), residential development is classed as more vulnerable, so development in FZ1 is appropriate. In accordance with NPPF a site-specific FRA would be required, as the site area is >1 ha as well as being in an identified critical drainage area. See Section 8 of the Level 1 SFRA details the requirements of an FRA. | | | |
| ***Passing the exception test*** | | | |
| There is no need to pass the exception test, the site is Flood Zone 1 and 'more vulnerable' residential development is suitable for this location. | | | |
| ***Site-Specific Recommendations for NPPF Compliant Development*** | | | |
| The EA RoFfSW map indicates an area of surface water flood risk in the Northwest portion of the site. If the site is to be reconfigured as part of development housing should be directed away from areas of surface water flood risk where possible to avoid the flood risk. Where development in areas of surface water flooding is unavoidable, housing should be raised above the flood level and/or surface water should be directed away from the housing, without increasing flood risk to 3rd parties.<br>Existing surface water flow routes across the site should be preserved to ensure flood risk is not increased elsewhere. The construction of the development should not exacerbate surface water flood risk in the wider critical drainage area. Any changes to the site configuration which will alter how surface water is stored and/or flows across the site will need to be detailed in an accompanying drainage strategy.<br>Where feasible sustainable drainage solutions should be implemented (see drainage management recommendations below). | | | |
| ***Drainage Management Recommendations*** | | | |
| The site is within a critical drainage area, where surface water flooding is prevalent. Therefore, it will be imperative that surface water runoff is managed appropriately to ensure flood risk is not increased elsewhere. All feasible SuDS options should be assessed, whilst adhering to the SuDS hierarchy as set out in the Level 1 SRFA report (see chapter 7 and Appendix B of the Level 1 SFRA). | | | |

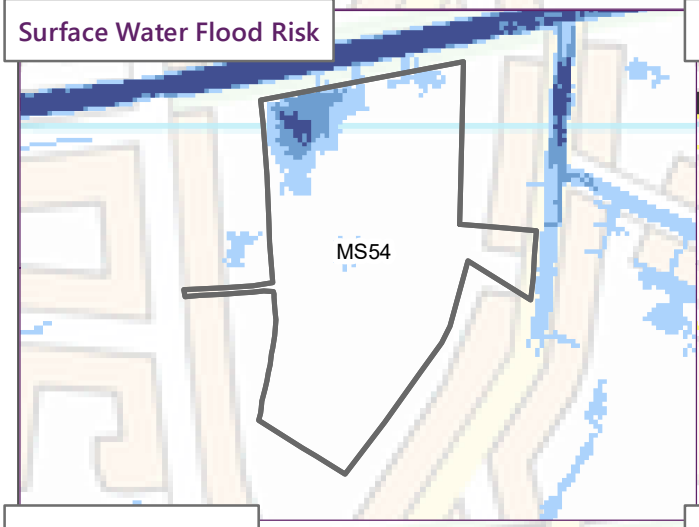
## Flood Zones



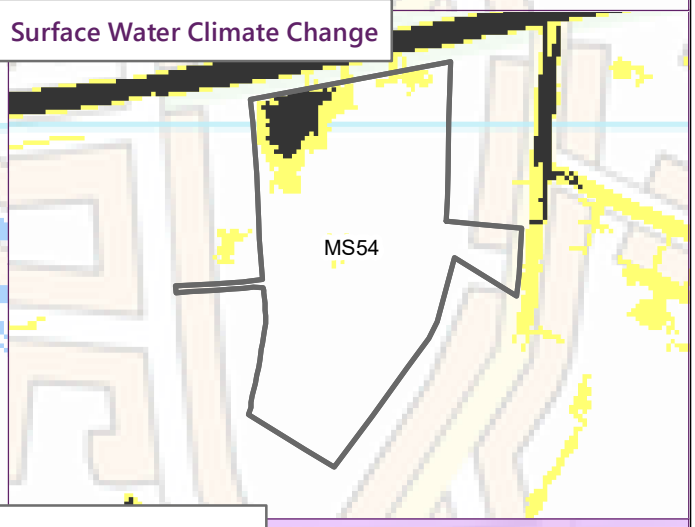

## Historic Flood Risk



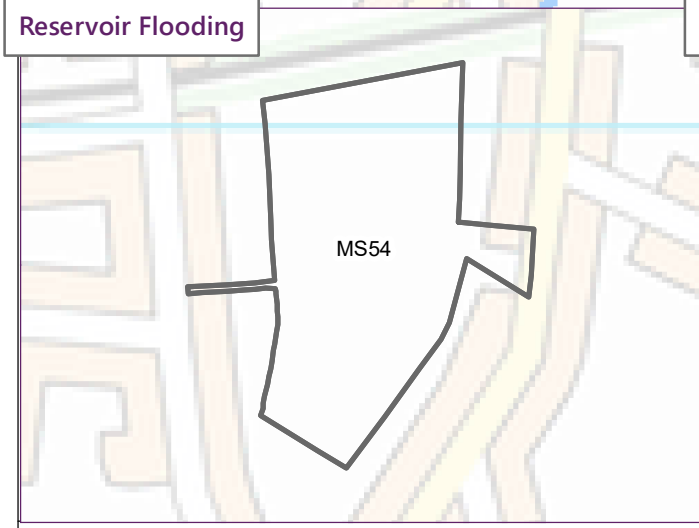

## Surface Water Flood Risk



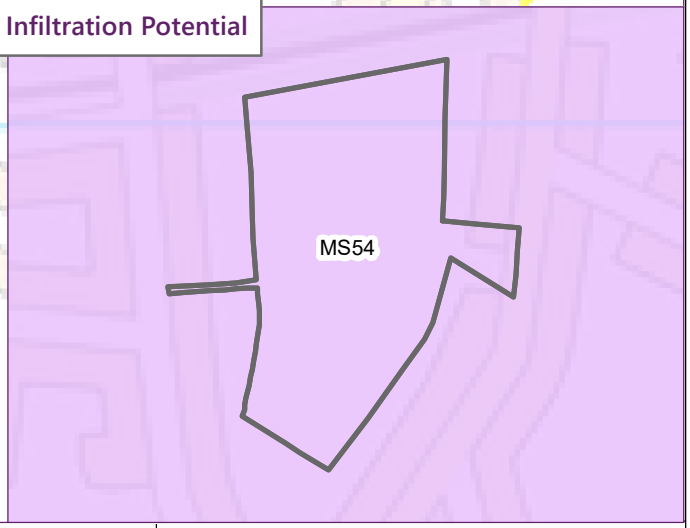

## Surface Water Climate Change




## Reservoir Flooding




## Infiltration Potential




Key

LBB Site

**Flood Zone Summary**
- Main Rivers
- Ordinary Watercourses
- Flood defences (SoP over 1 in 100 year AEP)
- Flood Storage Areas
- Functional Floodplain
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

**Surface Water Flood Risk**
- 3.33% AEP Extent
- 1% AEP Extent
- 0.1% AEP Extent

**Risk of Flooding from Reservoirs Max Depth**
- < 0.3
- 0.3 - 2.0
- > 2.0

**Historic Flood Risk**

Recorded Flood Events Bexley Borough (1960-2019)
- Cause unrecorded
- Blocked Culvert
- Blocked Gulley
- Blocked Gully
- Burst Water Main
- Fluvial
- Groundwater
- Sewer
- Surface Water (Pluvial)
- Surface Water, Fluvial and Groundwater
- Surface and Fluvial
- Surface and Groundwater
- Surface and Sewer

Recorded flood outlines
- 1953 Event
- 1968 Event
- 1977 Event

**Surface Water Climate Change**
- 1% AEP
- Areas potentially vulnerable to climate change

**Infiltration Potential**
- High
- Med
- Low

N

0 100 200 m

Scale at A4: 1:3,388



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS54**
**Flood Risk Overview Map**

October 2020

wood.


Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 200 m

Scale at A4: 1:3,433



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS54**
**Risk of Flooding from Surface Water (EA Dataset)**

October 2020

wood.

# Bexley Level 2 SFRA

Flood Risk Information Sheet

| General information | | | |
|---|---|---|---|
| ***Site name / address*** | **CRA01 Former Electrobase/Wheatsheaf Works, Maxim Road, Crayford** | | |
| ***Site ID*** | MS34 | **Local Plan Reg19 Ref** | SA21 |
| **Sustainable development location** | Crayford Station and District Centre | **Area (ha)** | 1.744 |
| ***Allocation type*** | Residential | | |
| | Mixed use % (A1- A5) | Residential % | Design led net capacity |
| | 0 | 100 | 300 |

| Baseline Flood Risk Summary | | | |
|---|---|---|---|
| ***Fluvial/Tidal*** | | | |
| ***Overview*** | | | |
| Source of risk | Fluvial | Watercourse | River Cray |
| % site in Flood Zone 1 | 0% | % site in Flood Zone 3a | 97% |
| % site in Flood Zone 2 | 3% | % site in Flood Zone 3b | 0% |
| Flood Defences | No | % site in ABD | 0% |
| ***Fluvial flood risk (including presence of defences)*** | | | |
| Present day max 1 in 100 AEP flood level (mAOD) | 7.52 | Future max 1 in 100 AEP flood level (mAOD) | 7.67 |
| Present day max 1 in 100 AEP flood depth (m) | 1.84 | Future day max 1 in 100 AEP flood depth (m) | 1.94 |
| ***Impact of climate change*** | In the future climate change is predicted to increase river flows, consequently peak flood levels will increase. This will result in an increase in flood levels and depths across the site. | | |
| ***Historical information*** | The site is shown to have flooded during the 1968 fluvial flood event along the River Cray. | | |
| ***Contextual commentary*** | The EA Flood Zone Map shows the site is 3% covered by Flood Zone 2 and 97% covered by Flood Zone 3a. The source of risk is fluvial flooding from the River Cray that forms the Northern boundary of the site. There is no risk of tidal flooding. Detailed modelling results indicate that minor flooding along the Northern boundary of the site is anticipated in the 5% AEP event. Significant flooding is predicted across the site in the 1% AEP event. The extent and depth of flooding is anticipated to increase with climate change. | | |
| ***Surface Water*** | | | |
| ***Overview*** | | | |
| % site at high risk (1:30 AEP) | 0% | % site at low risk (1:1000 AEP) | 36% |
| % site at medium risk (1:100 AEP) | 3% | % site with no mapped risk | 61% |
| % site in critical drainage area | 0% | | |
| ***Impact of climate change*** | Rainfall intensity is predicted to increase with climate change. The increase in intensity will result in an increase in risk of flooding from surface water, resulting in increases in depth, extent and hazard of flooding. | | |
| ***Historical information*** | There is no evidence of the site flooding in the past. But a number of historic flood events have been recorded in adjacent roads. | | |
| ***Contextual commentary*** | Detailed flood modelling indicates that surface water flood risk across the site is minimal. The EA RoFfSW map suggests there are flow routes across the site. | | |
| ***Other sources of flooding*** | | | |
| ***Contextual commentary*** | The site is at risk of reservoir flooding from the Danson Park Reservoir, Bexleyheath. It is predicted to flood up to a potential depth of 2m. The reservoir will be regularly inspected and maintained to a high stringent standard, therefore reducing the risk of the embankment associated with the reservoir failing.<br>The area is also potentially at risk of elevated groundwater levels. | | |

## Policy and Recommendations

### *Site suitability*

| | | | |
|---|---|---|---|
| ***Highest Flood Zone*** | Flood Zone 3a | ***Development vulnerability*** | More Vulnerable |
| ***Suitability*** | Yes | ***Exception Test required?*** | Yes |

### *Policy recommendations for flood risk management*

In accordance with NPPF PPG Tables 2 & 3 (reproduced in Appendix D of the Level 1 SFRA), residential development is classed as more vulnerable and should not be permitted within FZ3a unless the exception test can be passed.
The Exception test would need to robustly demonstrate that the wider sustainability benefits outweigh flood risk, and that the development will be safe throughout its lifetime and will not increase flood risk elsewhere, including allowances for climate change.
In accordance with NPPF a site-specific FRA would be required as the site is in FZ3a, see Section 8 of the Level 1 SFRA details the requirements of an FRA.

### *Passing the exception test*

To pass the Exception test:
- it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and
-a site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

A number of factors which need to be considered when looking to pass the Exception test include:
- Design of development to manage and reduce flood risk wherever possible;
- Finished floor levels;
- Safe access and egress;
- Operation and maintenance;
- Resident awareness;
- Flood warning; and
- Evacuation procedures and funding arrangements.

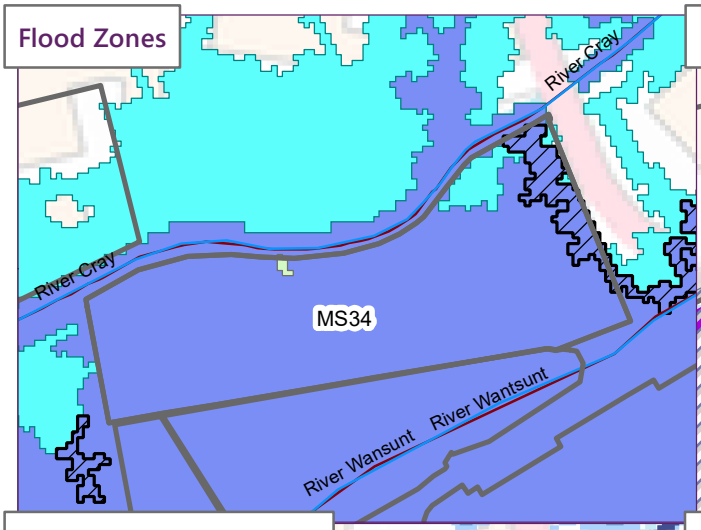
See section 6 of the Level 1 SFRA for more information.

### *Site-Specific Recommendations for NPPF Compliant Development*

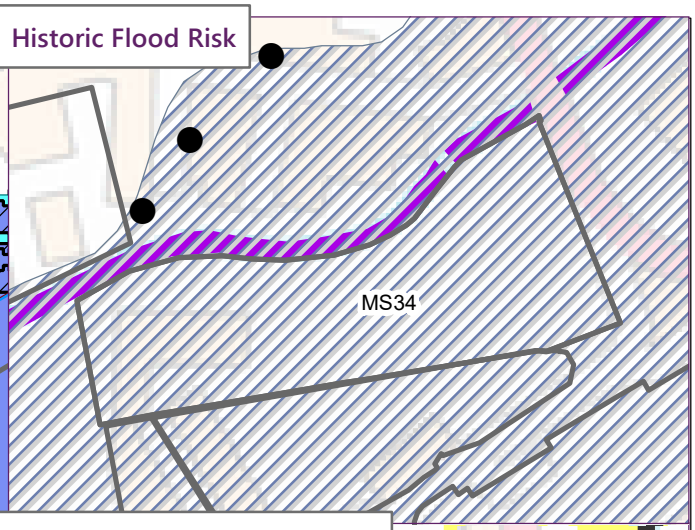
The FRA should consider:
● Siting development in accordance with the sequential approach, placing the most vulnerable uses in the areas of least risk within the site;
● Design of development to manage and reduce flood risk wherever possible, including siting all living accommodation above the maximum 1% AEP plus climate change flood level;
● As more vulnerable development is proposed the higher central (35%) and upper end (70%) climate change allowances should be used for the flood risk assessment.
● Any development within the 1% AEP plus 70% climate change flood extent not intended to flood will require floodplain storage compensation to be provided elsewhere to ensure no increase in flood risk as a consequence of development. Floodplain storage compensation should be provided as close to the development as possible and in an area hydraulically connected to the River and existing floodplain.
● The Site falls within 8m of the River Wansunt culvert and River Cray. An 8m gap should be observed between the proposed development and the main River Cray and Wansunt culvert to maintain the integrity of the river bank and access to the river for maintenance purposes. For work within this buffer zone, a Flood Risk Activity Permit will be required. Any development in and around the River Wansunt culvert will need to carry out a condition assessment and CCTV survey of the culvert to demonstrate the works will not cause the culvert to collapse/further deteriorate.
● Development would need to carry out a condition assessment and CCTV survey of the Wansunt culvert to demonstrate their works would not cause the culvert to collapse or further deteriorate.
When considering the safety of the development:
● Safe access and egress - the western edges of the site are in FZ1 and outside the area of surface water flood risk suggesting this is the safest route for access and egress;
● Resident awareness;
● Flood warning and evacuation procedures - noting Crayford is at risk of more rapid onset flooding due to the perched nature of the River Cray.
Further detail on the above points is given in the Level 1 SFRA, Section 6.3.
The construction of the development should not exacerbate surface water flood risk in the wider area. Any changes to the site configuration which will alter how surface water is stored and/or flows across the site will need to be detailed in an accompanying drainage strategy.
Sustainable drainage solutions should be implemented (see drainage management recommendations below).

| ***Drainage Management Recommendations*** |
| --- |
| Surface water runoff should be managed appropriately to ensure flood risk is not increased elsewhere. All feasible SuDS options should be assessed, whilst adhering to the SuDS hierarchy as set out in the Level 1 SFRA report (see chapter 7 and Appendix B of the Level 1 SFRA).<br>The site is currently developed, but betterment in surface water runoff should be sought ideally, and as such the greenfield runoff rate should be determined for the site using current best practice. This will allow for the appropriate sizing of attenuation and conveyance SuDS to ensure that sufficient space for drainage infrastructure is provided in developing site masterplans.<br>Infiltration would be the preferred method of partially/wholly discharging water from the site. The infiltration potential in this area is labelled as high, which alongside the underlying geology, could indicate that infiltration may be possible. However the site is in SPZ 1, therefore consultation with the EA will be required for infiltration SuDS. Site investigations would be required to fully assess the feasibly of using infiltration SuDS techniques.<br>Drainage design should include recommended allowances for climate change.<br>Any SuDS should be located outside of the 1% AEP fluvial flood extent including an allowance for climate change to ensure they remain operation in times of flood.<br>The topography of the site should be taken in to consideration to ensure that gravity drainage is possible throughout the whole site. An appropriate discharge location should be identified (if not all infiltration) and appropriate consultations should be had. |

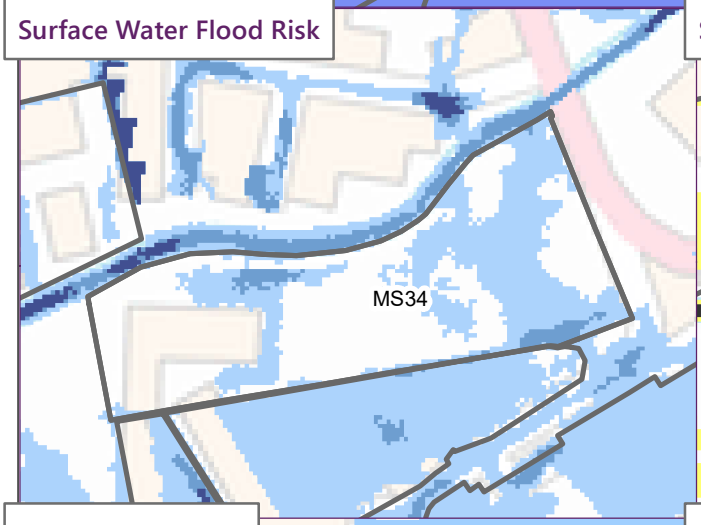
## Flood Zones



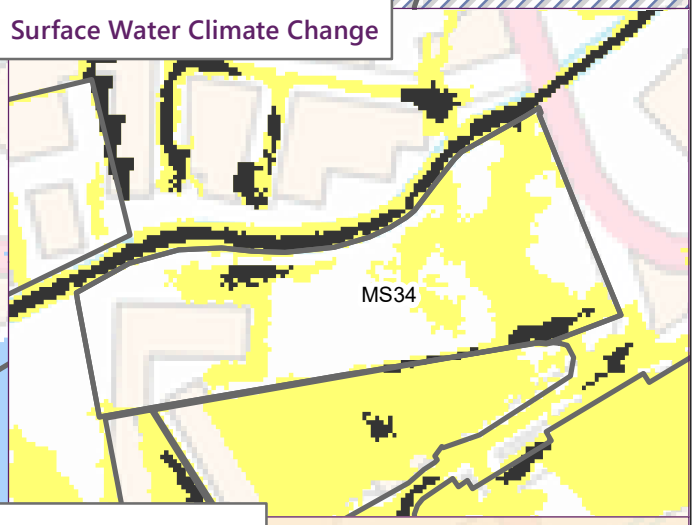

## Historic Flood Risk



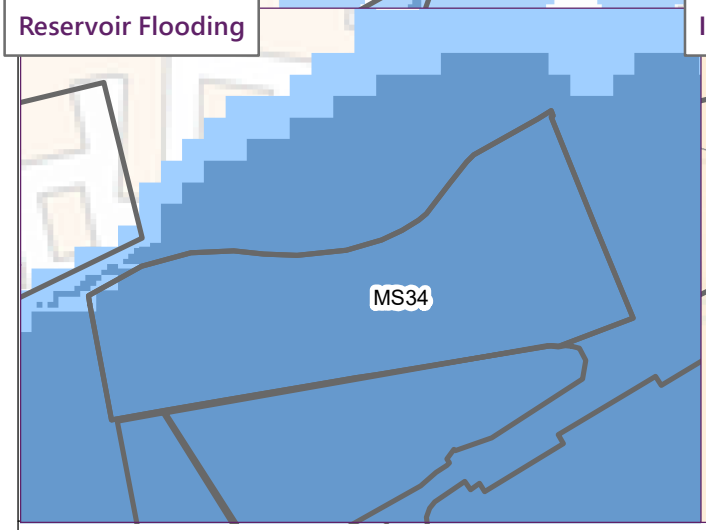

## Surface Water Flood Risk



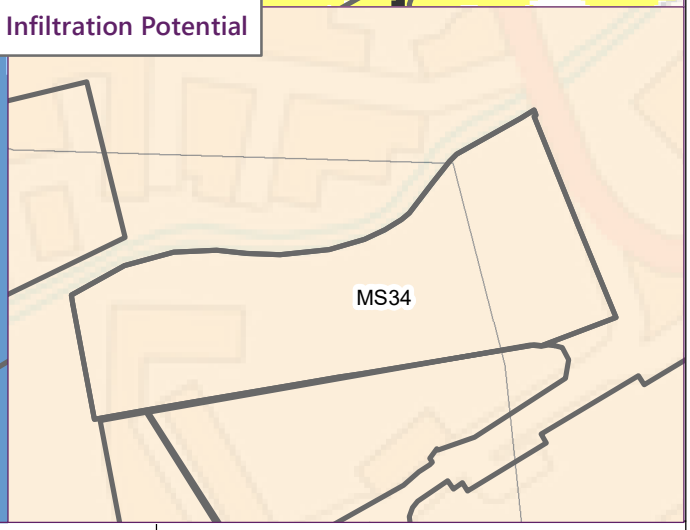

## Surface Water Climate Change




## Reservoir Flooding




## Infiltration Potential




Key

LBB Site

**Flood Zone Summary**
- Main Rivers
- Ordinary Watercourses
- Flood defences (SoP over 1 in 100 year AEP)
- Flood Storage Areas
- Functional Floodplain
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

**Surface Water Flood Risk**
- 3.33% AEP Extent
- 1% AEP Extent
- 0.1% AEP Extent

**Risk of Flooding from Reservoirs Max Depth**
- < 0.3
- 0.3 - 2.0
- > 2.0

**Historic Flood Risk**

Recorded Flood Events Bexley Borough (1960-2019)
- Cause unrecorded
- Blocked Culvert
- Blocked Gulley
- Blocked Gully
- Burst Water Main
- Fluvial
- Groundwater
- Sewer
- Surface Water (Pluvial)
- Surface Water, Fluvial and Groundwater
- Surface and Fluvial
- Surface and Groundwater
- Surface and Sewer

Recorded flood outlines
- 1953 Event
- 1968 Event
- 1977 Event

**Surface Water Climate Change**
- 1% AEP
- Areas potentially vulnerable to climate change

**Infiltration Potential**
- High
- Med
- Low

N

0 100 200 m

Scale at A4: 1:3,513



Client

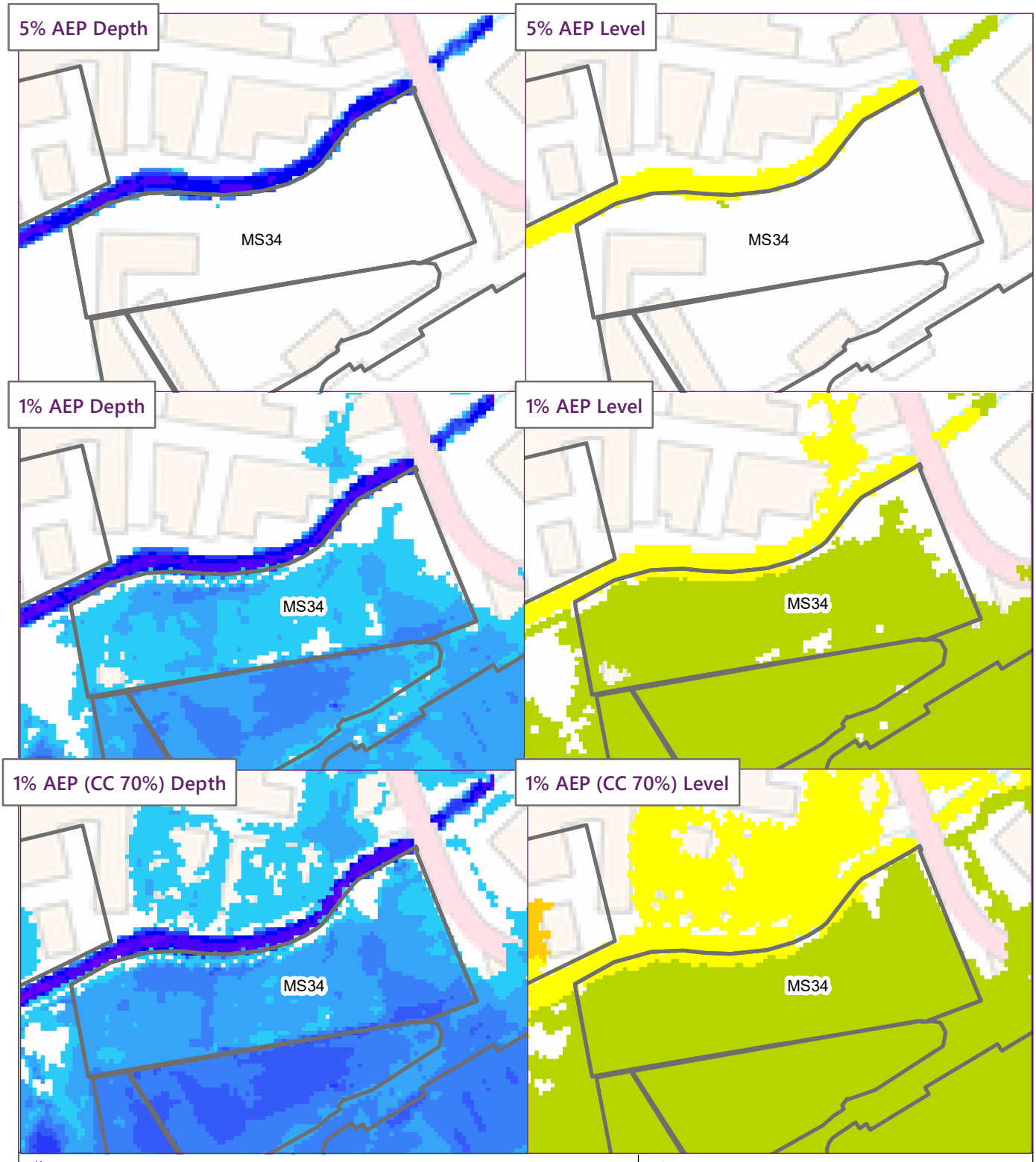
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS34**
**Flood Risk Overview Map**

June 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0 - 0.05
- 0.05 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- 3 - 3.5
- 3.5 - 4
- 4 - 5
- 5+

**Max level (mAOD)**

- 0 - 4
- 4 - 5
- 5 - 6
- 6 - 7
- 7 - 8
- 8 - 9
- 9 - 10
- 10 - 11
- 11 - 12

N

0 100 200 m

Scale at A4: 1:3,513



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS34**
**Fluvial flood risk - River Cray**
**(including the presence of defences)**

May 2020

wood.


Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 200 m

Scale at A4: 1:3,524



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS34**
**Surface Water Modelling Results: Crayford**

June 2020

wood.

# Bexley Level 2 SFRA

Flood Risk Information Sheet

| General information | | | |
|---|---|---|---|
| ***Site name / address*** | **CRA02 Tower Retail Park, Tower Park Road, Crayford** | | |
| ***Site ID*** | AS58 | **Local Plan Reg 19 Ref** | SA22 |
| **Sustainable development location** | Crayford Station and District Centre | **Area (ha)** | 3.45 |
| ***Allocation type*** | Residential-led mixed use | | |
| | Mixed use % (A1- A5) | Residential % | Design led net capacity |
| | 25 | 75 | 360 |

| Baseline Flood Risk Summary | | | |
|---|---|---|---|
| ***Fluvial/Tidal*** | | | |
| ***Overview*** | | | |
| Source of risk | Fluvial | Watercourse | River Cray and River Wansunt |
| % site in Flood Zone 1 | 0% | % site in Flood Zone 3a | 98% |
| % site in Flood Zone 2 | 2% | % site in Flood Zone 3b | 0% |
| Flood Defences | Yes | % site in ABD | 0% |
| ***Fluvial flood risk (including presence of defences)*** | | | |
| Present day max 1 in 100 AEP flood level (mAOD) | 5.83 | Future max 1 in 100 AEP flood level (mAOD) | 6.2 |
| Present day max 1 in 100 AEP flood depth (m) | 0.68 | Future day max 1 in 100 AEP flood depth (m) | 0.98 |
| ***Impact of climate change*** | Sea levels are predicted to rise with future climate change, consequently levels in the Tidal River Thames are also predicted to increase. As a result, in the event of a breach in the tidal flood defences in the future peak flood levels on site will increase. | | |
| ***Historical information*** | The site is shown to have flooded during the 1968 fluvial flood event along the River Cray. | | |
| ***Contextual commentary*** | The EA Flood Zone Map shows the site is 98% covered by Flood Zone 3a and 2% covered by Flood Zone 2. The source of risk is fluvial flooding from the River Cray and River Wansunt. There is no risk of tidal flooding. Detailed modelling results indicate that the site is at risk of flooding in the 1% AEP event, originating from the West. The extent and depth of flooding is anticipated to increase with climate change. | | |
| ***Surface Water*** | | | |
| ***Overview*** | | | |
| % site at high risk (1:30 AEP) | 2% | % site at low risk (1:1000 AEP) | 31% |
| % site at medium risk (1:100 AEP) | 6% | % site with no mapped risk | 61% |
| % site in critical drainage area | 0% | | |
| ***Impact of climate change*** | Rainfall intensity is predicted to increase with climate change. The increase in intensity will result in an increase in risk of flooding from surface water, resulting in increases in depth, extent and hazard of flooding. | | |
| ***Historical information*** | There is evidence that flooding has occurred on site in the past. Records attribute some events to surface water (pluvial) flooding and blocked gullies, with others having no specific cause reported. | | |
| ***Contextual commentary*** | Modelling indicates multiple shallow surface water flow paths across the site, with the more detailed modelling flood maps indicating pockets of shallow ponding on site in the 1% AEP event, with depths up to 0.3m and low hazard. | | |
| ***Other sources of flooding*** | | | |
| ***Contextual commentary*** | The site is at risk of reservoir flooding from the Danson Park Reservoir, Bexleyheath. It is predicted to flood up to a potential depth of 2m. The reservoir will be regularly inspected and maintained to a high stringent standard, therefore reducing the risk of the embankment associated with the reservoir failing.<br>The area is also potentially at risk of elevated groundwater levels. | | |

## Policy and Recommendations

### *Site suitability*

| | | | |
|---|---|---|---|
| ***Highest Flood Zone*** | Flood Zone 3a | ***Development vulnerability*** | More Vulnerable |
| ***Suitability*** | Yes | ***Exception Test required?*** | Yes |

### *Policy recommendations for flood risk management*

In accordance with NPPF PPG Tables 2 & 3 (reproduced in Appendix D of the Level 1 SFRA), mixed use development, where it contains residential development, is classed as more vulnerable and should not be permitted within FZ3a unless the exception test can be passed.
The Exception test would need to robustly demonstrate that the wider sustainability benefits outweigh flood risk, and that the development will be safe throughout its lifetime and will not increase flood risk elsewhere, including allowances for climate change.
In accordance with NPPF a site-specific FRA would be required as the site is in FZ3a, see Section 8 of the Level 1 SFRA details the requirements of an FRA.

### *Passing the exception test*

To pass the Exception test:
- it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and
-a site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

A number of factors which need to be considered when looking to pass the Exception test include:
- Design of development to manage and reduce flood risk wherever possible;
- Finished floor levels;
- Safe access and egress;
- Operation and maintenance;
- Resident awareness;
- Flood warning; and
- Evacuation procedures and funding arrangements.

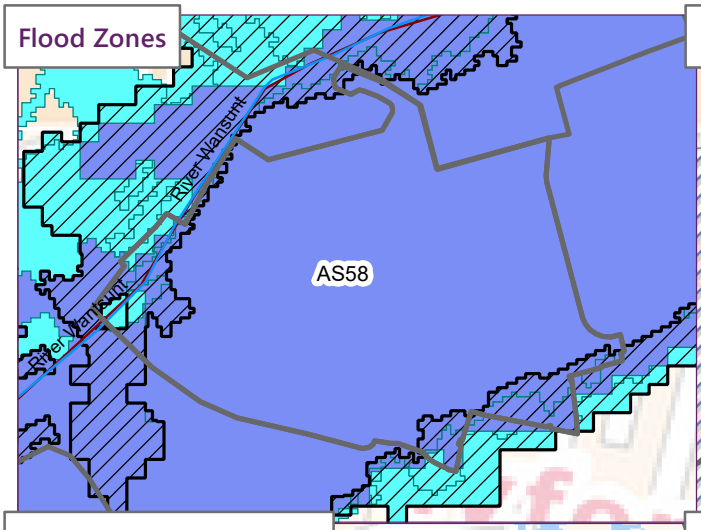
See section 6 of the Level 1 SFRA for more information.

### *Site-Specific Recommendations for NPPF Compliant Development*

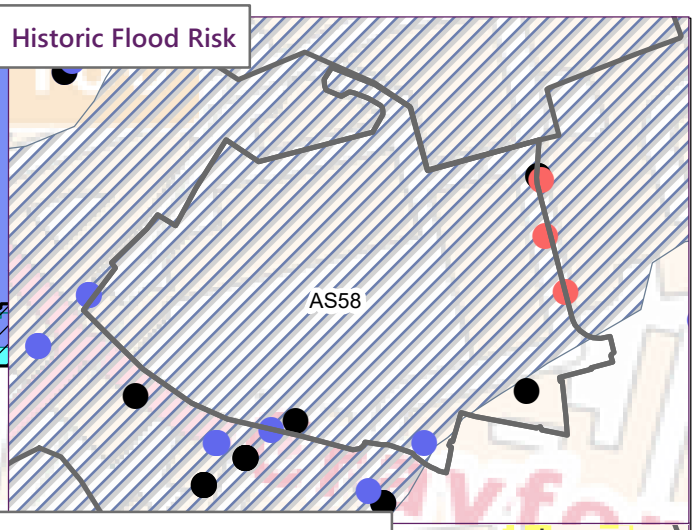
The FRA should consider:
● Siting development in accordance with the sequential approach, placing the most vulnerable uses in the areas of least risk within the site;
● Design of development to manage and reduce flood risk wherever possible, including siting all living accommodation above the maximum 1% AEP plus climate change flood level;
● As more vulnerable development is proposed the higher central (35%) and upper end (70%) climate change allowances should be used for the flood risk assessment.
● Any development within the 1% AEP plus 70% climate change flood extent not intended to flood will require floodplain storage compensation to be provided elsewhere to ensure no increase in flood risk as a consequence of development. Floodplain storage compensation should be provided as close to the development as possible and in an area hydraulically connected to the River and existing floodplain.
● The Site falls within 8m of the River Wansunt Culvert. An 8m gap should be observed between the proposed development and the River Wansunt culvert for maintenance purposes. For work within this buffer zone, a Flood Risk Activity Permit will be required. Any development in and around the River Wansunt culvert will need to carry out a condition assessment and CCTV survey of the culvert to demonstrate the works will not cause the culvert to collapse/further deteriorate.
● A condition assessment and CCTV survey of the Wansunt culvert would be required to demonstrate their works would not cause the culvert to collapse or further deteriorate.
When considering the safety of the development:
● Safe access and egress - the south west corners of the site bounds an area outside the modelled 1% AEP plus 70% climate change extent suggesting this is the safest route for access and egress, but consideration of access and egress routes across the site to this point would be required; ● Resident awareness; ● Flood warning and evacuation procedures - noting Crayford is at risk of more rapid onset flooding due to the perched nature of the River Cray.
Further detail on the above points is given in the Level 1 SFRA, Section 6.3.
Modelling indicates the site is at low surface water flood risk, but there is evidence of historic flooding on the site and in adjacent roads. Existing surface water flow routes across the site should be preserved to ensure flood risk is not increased elsewhere. The construction of the development should not exacerbate surface water flood risk in the wider area. Any changes to the site configuration which will alter how surface water flows across the site will need to be detailed in an accompanying drainage strategy to ensure flood risk is not increased elsewhere. Sustainable drainage solutions should be implemented (see drainage management recommendations below).

| ***Drainage Management Recommendations*** |
| --- |
| Surface water runoff should be managed appropriately to ensure flood risk is not increased elsewhere. All feasible SuDS options should be assessed, whilst adhering to the SuDS hierarchy as set out in the Level 1 SFRA report (see chapter 7 and Appendix B of the Level 1 SFRA).<br>The site is currently developed, but betterment in surface water runoff should be sought ideally, and as such the greenfield runoff rate should be determined for the site using current best practice. This will allow for the appropriate sizing of attenuation and conveyance SuDS to ensure that sufficient space for drainage infrastructure is provided in developing site masterplans.<br>Infiltration would be the preferred method of partially/wholly discharging water from the site. The infiltration potential in this area is labelled as high, which alongside the underlying geology, could indicate that infiltration may be possible. However the site is in SPZ 1, therefore consultation with the EA will be required for infiltration SuDS. Site investigations would be required to fully assess the feasibly of using infiltration SuDS techniques.<br>Drainage design should include recommended allowances for climate change.<br>The topography of the site should be taken in to consideration to ensure that gravity drainage is possible throughout the whole site. An appropriate discharge location should be identified (if not all infiltration) and appropriate consultations should be had. |

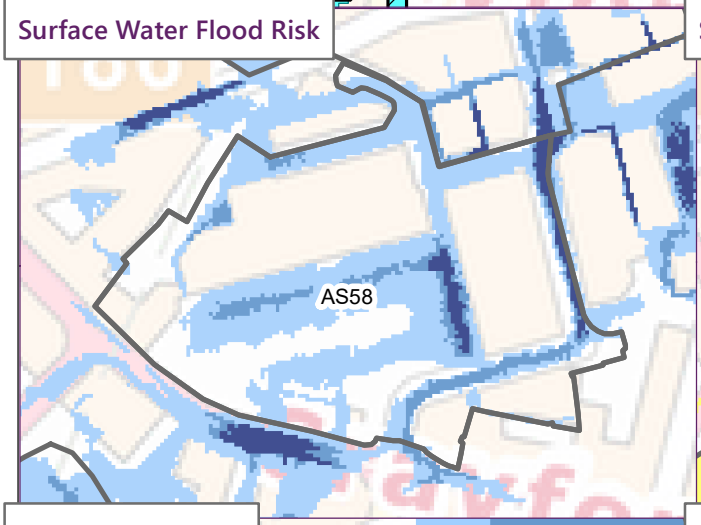
## Flood Zones



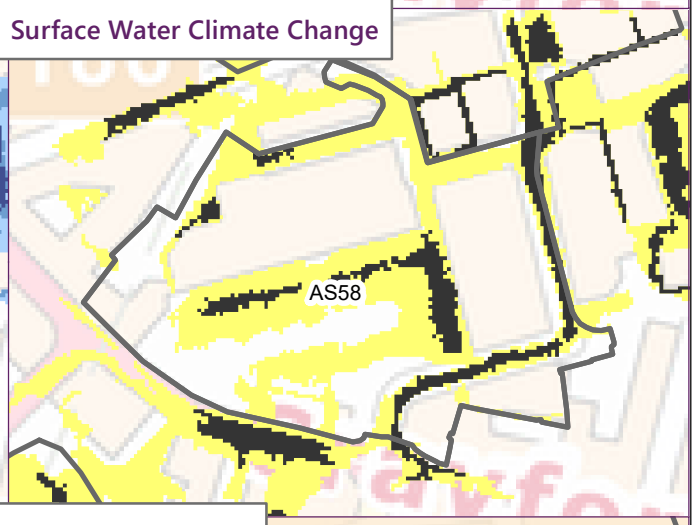

## Historic Flood Risk



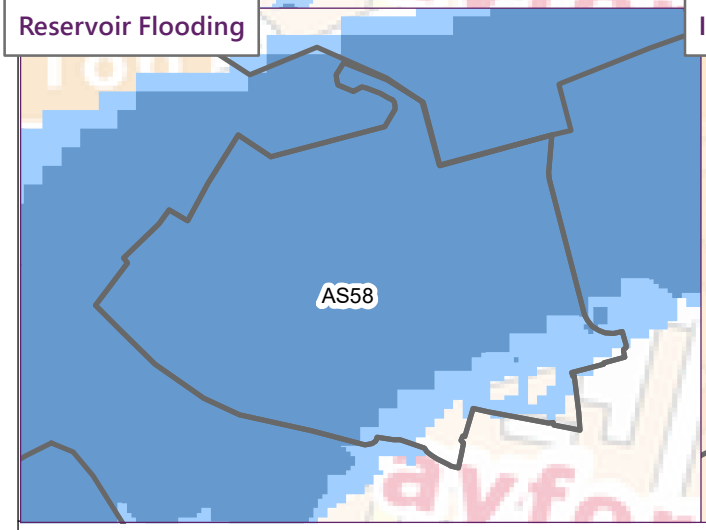

## Surface Water Flood Risk



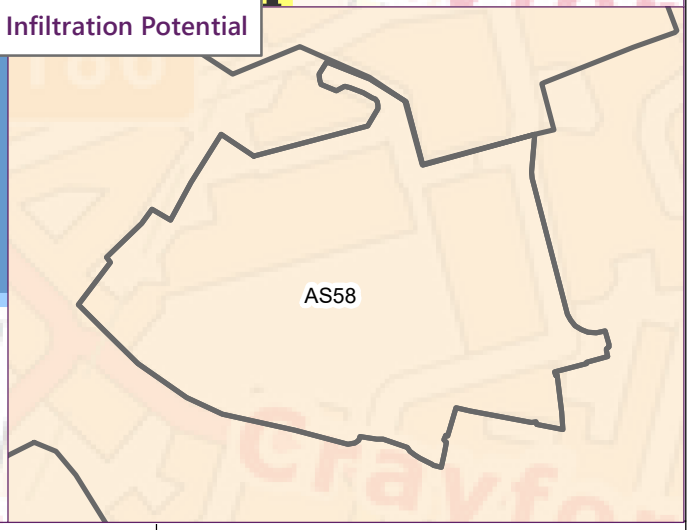

## Surface Water Climate Change




## Reservoir Flooding




## Infiltration Potential




Key

LBB Site

**Flood Zone Summary**
- Main Rivers
- Ordinary Watercourses
- Flood defences (SoP over 1 in 100 year AEP)
- Flood Storage
- Functional Floodplain
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

**Surface Water Flood Risk**
- 3.33% AEP Extent
- 1% AEP Extent
- 0.1% AEP Extent

**Risk of Flooding from Reservoirs Max Depth**
- < 0.3
- 0.3 - 2.0
- > 2.0

**Historic Flood Risk**

Recorded Flood Events Bexley Borough (1960-2019)
- Cause unrecorded
- Blocked Culvert
- Blocked Gulley
- Blocked Gully
- Burst Water Main
- Fluvial
- Groundwater
- Sewer
- Surface Water (Pluvial)
- Surface Water, Fluvial and Groundwater
- Surface and Fluvial
- Surface and Groundwater
- Surface and Sewer

Recorded flood outlines
- 1953 Event
- 1968 Event
- 1977 Event

**Surface Water Climate Change**
- 1% AEP
- Areas potentially vulnerable to climate change

**Infiltration Potential**
- High
- Med
- Low

0 100 200 m

Scale at A4: 1:4,055



Client

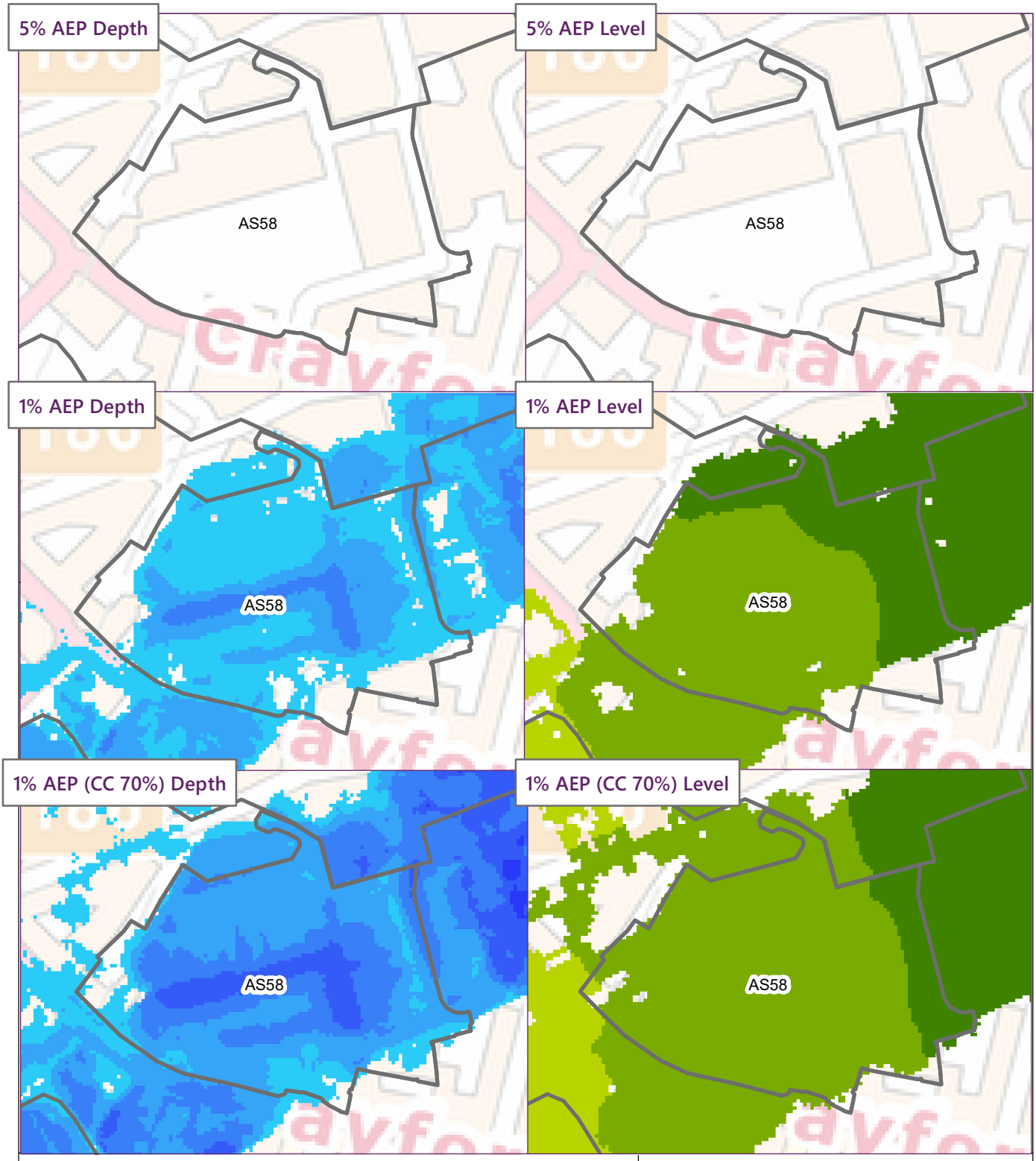
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: AS58**
**Flood Risk Overview Map**

June 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0 - 0.05
- 0.05 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- 3 - 3.5
- 3.5 - 4
- 4 - 5
- 5+

**Max level (mAOD)**

- 0 - 4
- 4 - 5
- 5 - 6
- 6 - 7
- 7 - 8
- 8 - 9
- 9 - 10
- 10 - 11
- 11 - 12

N

0 100 200 m

Scale at A4: 1:4,055



Client

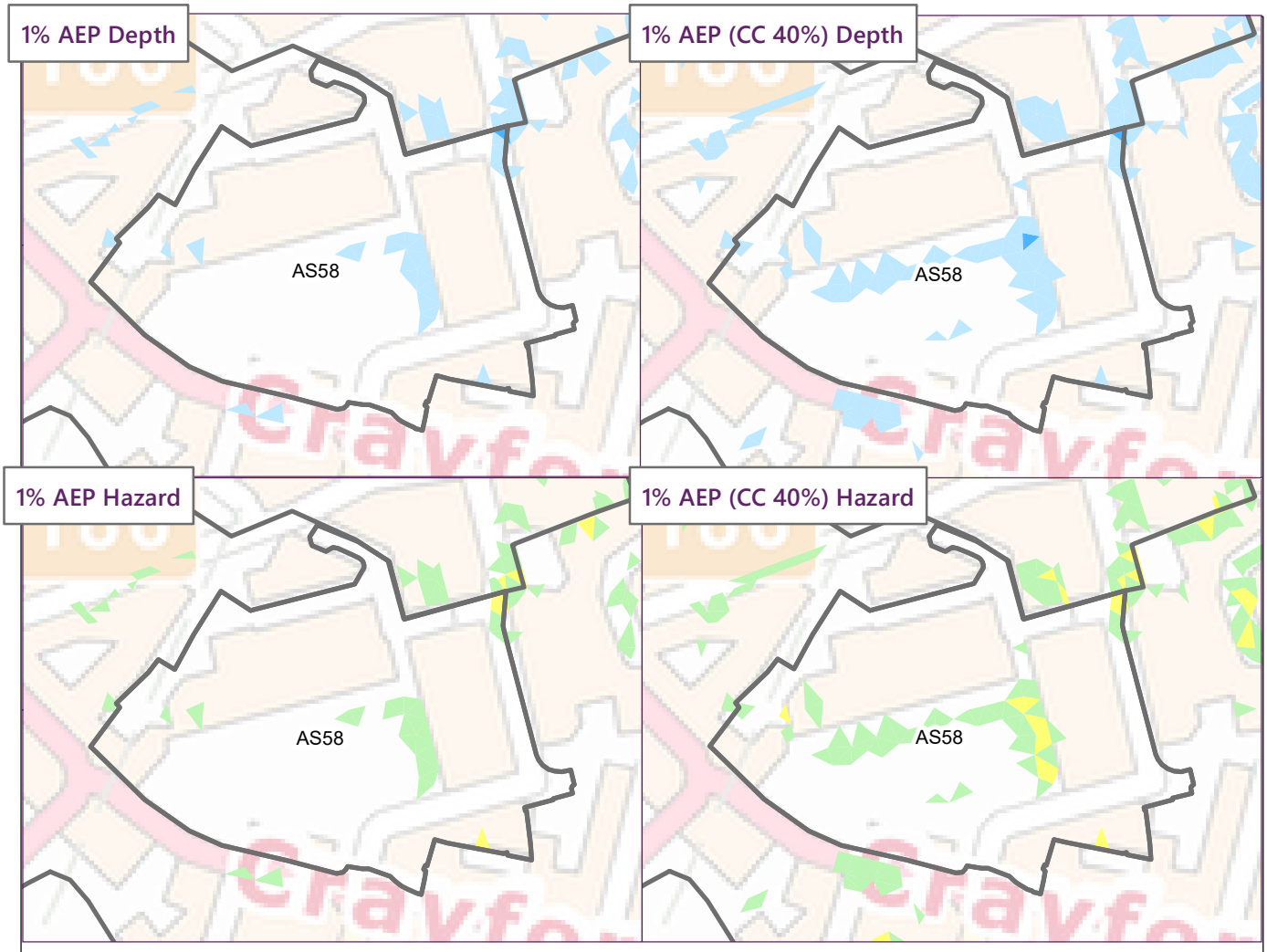
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: AS58**
**Fluvial flood risk - River Cray**
**(including the presence of defences)**

May 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 200 m

Scale at A4: 1:4,067



Client

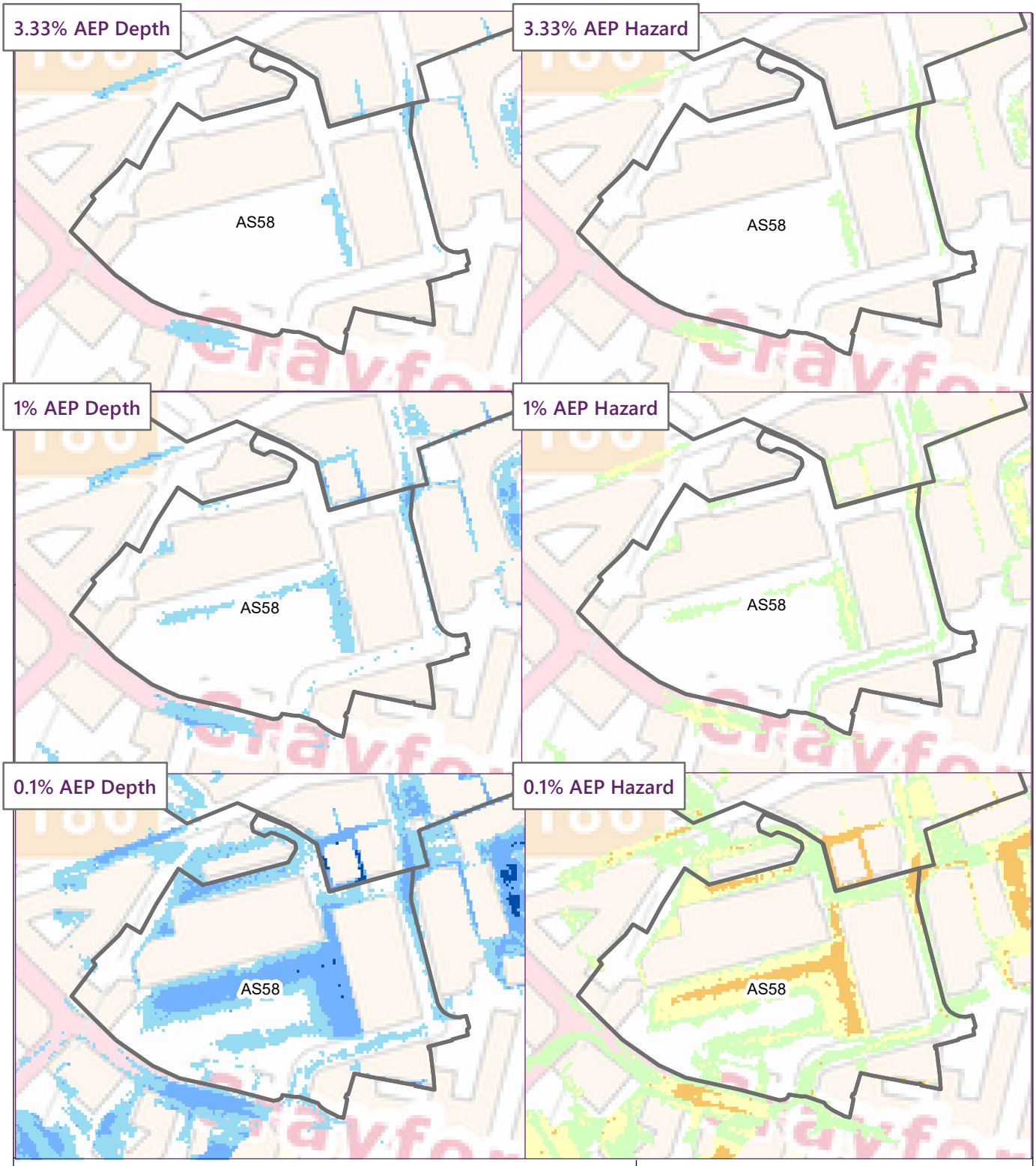
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: AS58**
**Surface Water Modelling Results: Crayford**

May 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 200 m

Scale at A4: 1:4,055



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: AS58**
**Risk of Flooding from Surface Water (EA Dataset)**

May 2020

wood.

# Bexley Level 2 SFRA

Flood Risk Information Sheet

| General information | | | |
|---|---|---|---|
| ***Site name / address*** | **CRA03 Sainsbury's Crayford, Stadium Way** | | |
| ***Site ID*** | MS32 | **Local Plan Reg19 Ref** | SA23 |
| **Sustainable development location** | Crayford Station and District Centre | **Area (ha)** | 3.69 |
| ***Allocation type*** | Residential led mixed use | | |
| | Mixed use % (A1- A5) | Residential % | Design led net capacity |
| | 25 | 75 | 448 |

| Baseline Flood Risk Summary | | | |
|---|---|---|---|
| ***Fluvial/Tidal*** | | | |
| ***Overview*** | | | |
| Source of risk | Fluvial | Watercourse | River Cray |
| % site in Flood Zone 1 | 1% | % site in Flood Zone 3a | 98% |
| % site in Flood Zone 2 | 1% | % site in Flood Zone 3b | 0% |
| Flood Defences | No | % site in ABD | 0% |
| ***Fluvial flood risk (including presence of defences)*** | | | |
| Present day max 1 in 100 AEP flood level (mAOD) | 6.48 | Future max 1 in 100 AEP flood level (mAOD) | 6.74 |
| Present day max 1 in 100 AEP flood depth (m) | 0.83 | Future day max 1 in 100 AEP flood depth (m) | 1.15 |
| ***Impact of climate change*** | In the future climate change is predicted to increase river flows, consequently peak flood levels will increase. This will result in an increase in flood levels and depths across the site. | | |
| ***Historical information*** | The site is shown to have flooded during the 1968 fluvial flood event along the River Cray. | | |
| ***Contextual commentary*** | The EA Flood Zone Map shows the site is 1% covered by Flood Zone 2 and 98% covered by Flood Zone 3a. The source of risk is fluvial flooding from the River Cray. There is no risk of tidal flooding. Detailed modelling results indicate that the site is at risk of flooding in the 1% AEP event, originating from the West. The extent and depth of flooding is anticipated to increase with climate change. | | |
| ***Surface Water*** | | | |
| ***Overview*** | | | |
| % site at high risk (1:30 AEP) | 0% | % site at low risk (1:1000 AEP) | 36% |
| % site at medium risk (1:100 AEP) | 3% | % site with no mapped risk | 62% |
| % site in critical drainage area | 0% | | |
| ***Impact of climate change*** | Rainfall intensity is predicted to increase with climate change. The increase in intensity will result in an increase in risk of flooding from surface water, resulting in increases in depth, extent and hazard of flooding. | | |
| ***Historical information*** | There is no evidence of the site flooding in the past. But a number of historic surface water flood events have been recorded in adjacent roads. | | |
| ***Contextual commentary*** | Detailed modelling only predicts isolated areas of surface water ponding across the site in the future 1% AEP event. The areas they cover are small and shallow up to 0.3m in depth and low hazard. The EA RoFfSW predicts a broader extent across the north east boundary of the site. | | |
| ***Other sources of flooding*** | | | |
| ***Contextual commentary*** | The site is at risk of reservoir flooding from the Danson Park Reservoir, Bexleyheath. It is predicted to flood up to a potential depth of 2m. The reservoir will be regularly inspected and maintained to a high stringent standard, therefore reducing the risk of the embankment associated with the reservoir failing.<br>The area is also potentially at risk of elevated groundwater levels. | | |

## Policy and Recommendations

### Site suitability

| | | | |
|---|---|---|---|
| ***Highest Flood Zone*** | Flood Zone 3a | ***Development vulnerability*** | More Vulnerable |
| ***Suitability*** | Yes | ***Exception Test required?*** | Yes |

### Policy recommendations for flood risk management

In accordance with NPPF PPG Tables 2 & 3 (reproduced in Appendix D of the Level 1 SFRA), mixed use development, where it contains residential development, is classed as more vulnerable and should not be permitted within FZ3a unless the exception test can be passed.
The Exception test would need to robustly demonstrate that the wider sustainability benefits outweigh flood risk, and that the development will be safe throughout its lifetime and will not increase flood risk elsewhere, including allowances for climate change.
In accordance with NPPF a site-specific FRA would be required as the site is in FZ3a, see Section 8 of the Level 1 SFRA details the requirements of an FRA.

### Passing the exception test

To pass the Exception test:
- it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and
-a site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

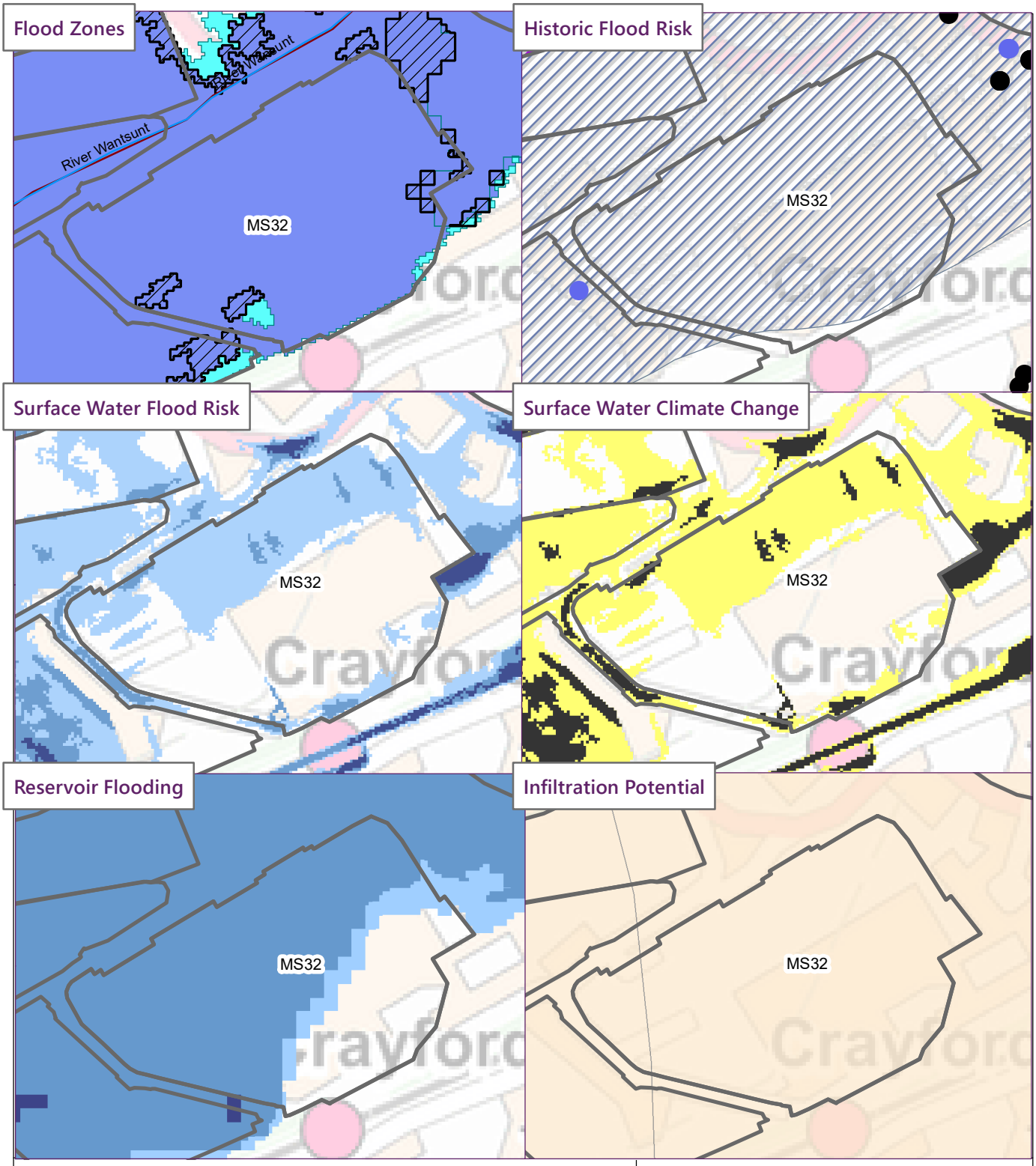
A number of factors which need to be considered when looking to pass the Exception test include:
- Design of development to manage and reduce flood risk wherever possible;
- Finished floor levels;
- Safe access and egress;
- Operation and maintenance;
- Resident awareness;
- Flood warning; and
- Evacuation procedures and funding arrangements.

See section 6 of the Level 1 SFRA for more information.

### Site-Specific Recommendations for NPPF Compliant Development

The FRA should consider:
● Siting development in accordance with the sequential approach, placing the most vulnerable uses in the areas of least risk within the site;
● Design of development to manage and reduce flood risk wherever possible, including siting all living accommodation above the maximum 1% AEP plus climate change flood level;
● As more vulnerable development is proposed the higher central (35%) and upper end (70%) climate change allowances should be used for the flood risk assessment.
● Any development within the 1% AEP plus 70% climate change flood extent not intended to flood will require floodplain storage compensation to be provided elsewhere to ensure no increase in flood risk as a consequence of development. Floodplain storage compensation should be provided as close to the development as possible and in an area hydraulically connected to the River and existing floodplain. Consultation with the EA is suggested to determine if any area covered by existing buildings on site can be excluded from the compensation storage calculations.
● An 8m gap should be observed between the proposed development and the main River Wansunt which is culverted through Crayford town centre. For work within this buffer zone, a Flood Risk Activity Permit will be required. Any development in and around the River Wansunt culvert will need to carry out a condition assessment and CCTV survey of the culvert to demonstrate the works will not cause the culvert to collapse/further deteriorate.
When considering the safety of the development:
● Safe access and egress - the south east corner of the site bounds an area of FZ1 and is outside the area of surface water flood risk suggesting this is the safest route for access and egress, but consideration of access and egress routes across the site to this point would be required;
● Resident awareness;
● Flood warning and evacuation procedures - noting Crayford is at risk of more rapid onset flooding due to the perched nature of the River Cray.
Further detail on the above points is given in the Level 1 SFRA, Section 6.3.
The site is at high risk of surface water flooding. The extent of surface water flooding coincides with the extent of fluvial flooding. The construction of the development should not exacerbate surface water flood risk in the wider critical drainage area. Any changes to the site configuration which will alter how surface water is stored and/or flows across the site will need to be detailed in an accompanying drainage strategy. Where feasible sustainable drainage solutions should be implemented (see drainage management recommendations below).

| ***Drainage Management Recommendations*** |
| --- |
| Surface water runoff should be managed appropriately to ensure flood risk is not increased elsewhere. All feasible SuDS options should be assessed, whilst adhering to the SuDS hierarchy as set out in the Level 1 SFRA report (see chapter 7 and Appendix B of the Level 1 SFRA).<br>The site is currently developed, but betterment in surface water runoff should be sought ideally, and as such the greenfield runoff rate should be determined for the site using current best practice. This will allow for the appropriate sizing of attenuation and conveyance SuDS to ensure that sufficient space for drainage infrastructure is provided in developing site masterplans.<br>Infiltration would be the preferred method of partially/wholly discharging water from the site. The infiltration potential in this area is labelled as high, which alongside the underlying geology, could indicate that infiltration may be possible. However the site is in SPZ 1, therefore consultation with the EA will be required for infiltration SuDS. Site investigations would be required to fully assess the feasibly of using infiltration SuDS techniques.<br>Drainage design should include recommended allowances for climate change.<br>Any SuDS should be located outside of the 1% AEP fluvial flood extent including an allowance for climate change to ensure they remain operation in times of flood.<br>The topography of the site should be taken in to consideration to ensure that gravity drainage is possible throughout the whole site. An appropriate discharge location should be identified (if not all infiltration) and appropriate consultations should be had. |




Key

LBB Site

**Flood Zone Summary**
- Main Rivers
- Ordinary Watercourses
- Flood defences (SoP over 1 in 100 year AEP)
- Flood Storage Areas
- Functional Floodplain
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

**Surface Water Flood Risk**
- 3.33% AEP Extent
- 1% AEP Extent
- 0.1% AEP Extent

**Risk of Flooding from Reservoirs Max Depth**
- < 0.3
- 0.3 - 2.0
- > 2.0

**Historic Flood Risk**

Recorded Flood Events Bexley Borough (1960-2019)
- Cause unrecorded
- Blocked Culvert
- Blocked Gulley
- Blocked Gully
- Burst Water Main
- Fluvial
- Groundwater
- Sewer
- Surface Water (Pluvial)
- Surface Water, Fluvial and Groundwater
- Surface and Fluvial
- Surface and Groundwater
- Surface and Sewer

Recorded flood outlines
- 1953 Event
- 1968 Event
- 1977 Event

**Surface Water Climate Change**
- 1% AEP
- Areas potentially vulnerable to climate change

**Infiltration Potential**
- High
- Med
- Low

0 100 200 m

Scale at A4: 1:4,103



Client

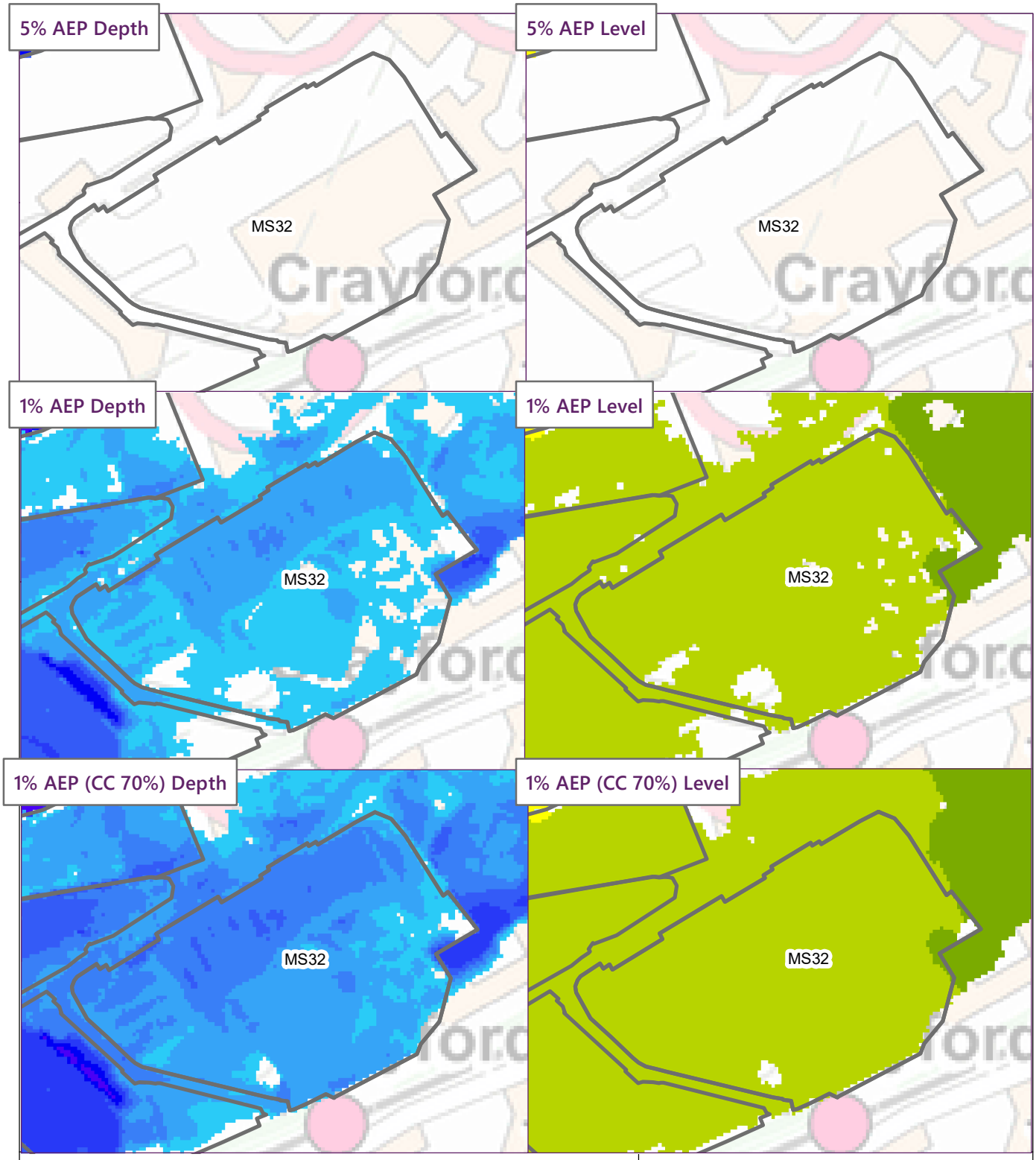
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS32**
**Flood Risk Overview Map**

June 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0 - 0.05
- 0.05 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- 3 - 3.5
- 3.5 - 4
- 4 - 5
- 5+

**Max level (mAOD)**

- 0 - 4
- 4 - 5
- 5 - 6
- 6 - 7
- 7 - 8
- 8 - 9
- 9 - 10
- 10 - 11
- 11 - 12

N

0 100 200 m

Scale at A4: 1:4,103



Client

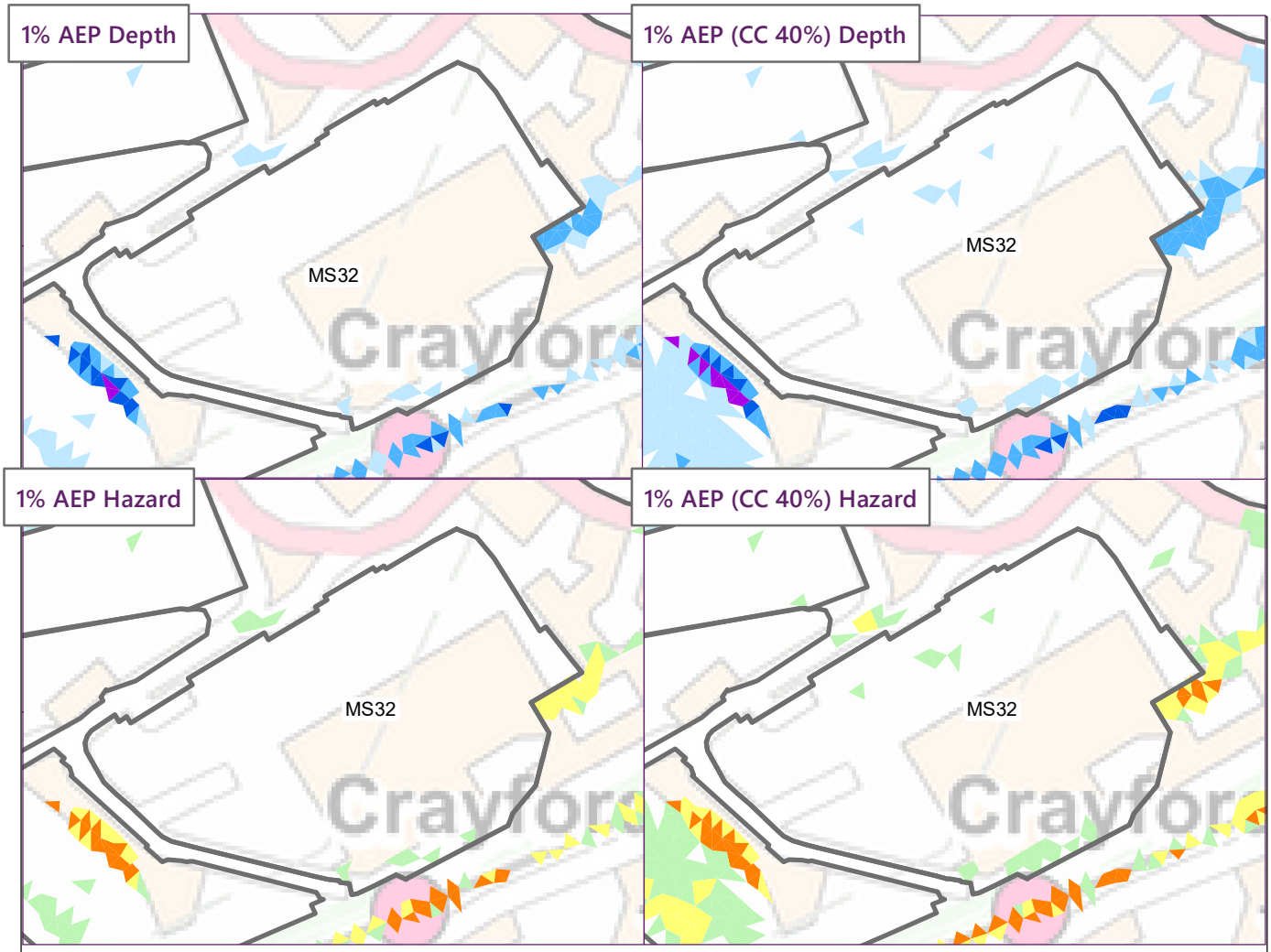
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS32**
**Fluvial flood risk - River Cray**
**(including the presence of defences)**

May 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 200 m

Scale at A4: 1:4,115



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS32**
**Surface Water Modelling Results: Crayford**

May 2020

wood.

# Bexley Level 2 SFRA

Flood Risk Information Sheet

| General information | | | |
|---|---|---|---|
| ***Site name / address*** | **CRA04 Crayford Greyhound Stadium, Stadium Way, Crayford** | | |
| ***Site ID*** | MS33 | **Local Plan Reg19 Ref** | |
| **Sustainable development location** | Crayford Station and District Centre | **Area (ha)** | 1.66 |
| ***Allocation type*** | Residential | | |
| | Mixed use % (A1- A5) | Residential % | Design led net capacity |
| | 0 | 100 | 230 |

| Baseline Flood Risk Summary | | | |
|---|---|---|---|
| ***Fluvial/Tidal*** | | | |
| ***Overview*** | | | |
| Source of risk | Fluvial | Watercourse | River Cray |
| % site in Flood Zone 1 | 8% | % site in Flood Zone 3a | 87% |
| % site in Flood Zone 2 | 5% | % site in Flood Zone 3b | 0% |
| Flood Defences | No | % site in ABD | 0% |
| ***Fluvial flood risk (including presence of defences)*** | | | |
| Present day max 1 in 100 AEP flood level (mAOD) | 6.49 | Future max 1 in 100 AEP flood level (mAOD) | 6.76 |
| Present day max 1 in 100 AEP flood depth (m) | 1.98 | Future day max 1 in 100 AEP flood depth (m) | 2.25 |
| ***Impact of climate change*** | In the future climate change is predicted to increase river flows, consequently peak flood levels will increase. This will result in an increase in flood levels and depths across the site. | | |
| ***Historical information*** | The site is shown to have flooded during the 1968 fluvial flood event along the River Cray. | | |
| ***Contextual commentary*** | The EA Flood Zone Map shows the site is 5% covered by Flood Zone 2 and 87% covered by Flood Zone 3a. The source of risk is fluvial flooding from the River Cray. There is no risk of tidal flooding. Detailed modelling results indicate that the site is at risk of flooding in the 1% AEP event, originating from the West. The extent and depth of flooding is anticipated to increase with climate change. | | |
| ***Surface Water*** | | | |
| ***Overview*** | | | |
| % site at high risk (1:30 AEP) | 3% | % site at low risk (1:1000 AEP) | 35% |
| % site at medium risk (1:100 AEP) | 23% | % site with no mapped risk | 39% |
| % site in critical drainage area | 0% | | |
| ***Impact of climate change*** | Rainfall intensity is predicted to increase with climate change. The increase in intensity will result in an increase in risk of flooding from surface water, resulting in increases in depth, extent and hazard of flooding. | | |
| ***Historical information*** | There is evidence of the site being flooded in the past as a result of surface water (pluvial) flooding. | | |
| ***Contextual commentary*** | Detailed modelling indicates that for the 1% AEP event now and into the future the centre of the site is at risk of surface water flooding, with hazard predicted to be moderate to high and depths predicted to reach up to 1.2m potentially. | | |
| ***Other sources of flooding*** | | | |
| ***Contextual commentary*** | The site is at risk of reservoir flooding from the Danson Park Reservoir, Bexleyheath. It is predicted to flood up to a potential depth of 2m, with it potentially reaching over 2m deep in some isolated locations on site. The reservoir will be regularly inspected and maintained to a high stringent standard, therefore reducing the risk of the embankment associated with the reservoir failing. | | |

## Policy and Recommendations

### *Site suitability*

| | | | |
|---|---|---|---|
| ***Highest Flood Zone*** | Flood Zone 3a | ***Development vulnerability*** | More Vulnerable |
| ***Suitability*** | Yes | ***Exception Test required?*** | Yes |

### *Policy recommendations for flood risk management*

In accordance with NPPF PPG Tables 2 & 3 (reproduced in Appendix D of the Level 1 SFRA), residential development is classed as more vulnerable and should not be permitted within FZ3a unless the exception test can be passed.
The Exception test would need to robustly demonstrate that the wider sustainability benefits outweigh flood risk, and that the development will be safe throughout its lifetime and will not increase flood risk elsewhere, including allowances for climate change.
In accordance with NPPF a site-specific FRA would be required as the site is in FZ3a, see Section 8 of the Level 1 SFRA details the requirements of an FRA.

### *Passing the exception test*

To pass the Exception test:
- it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and
-a site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

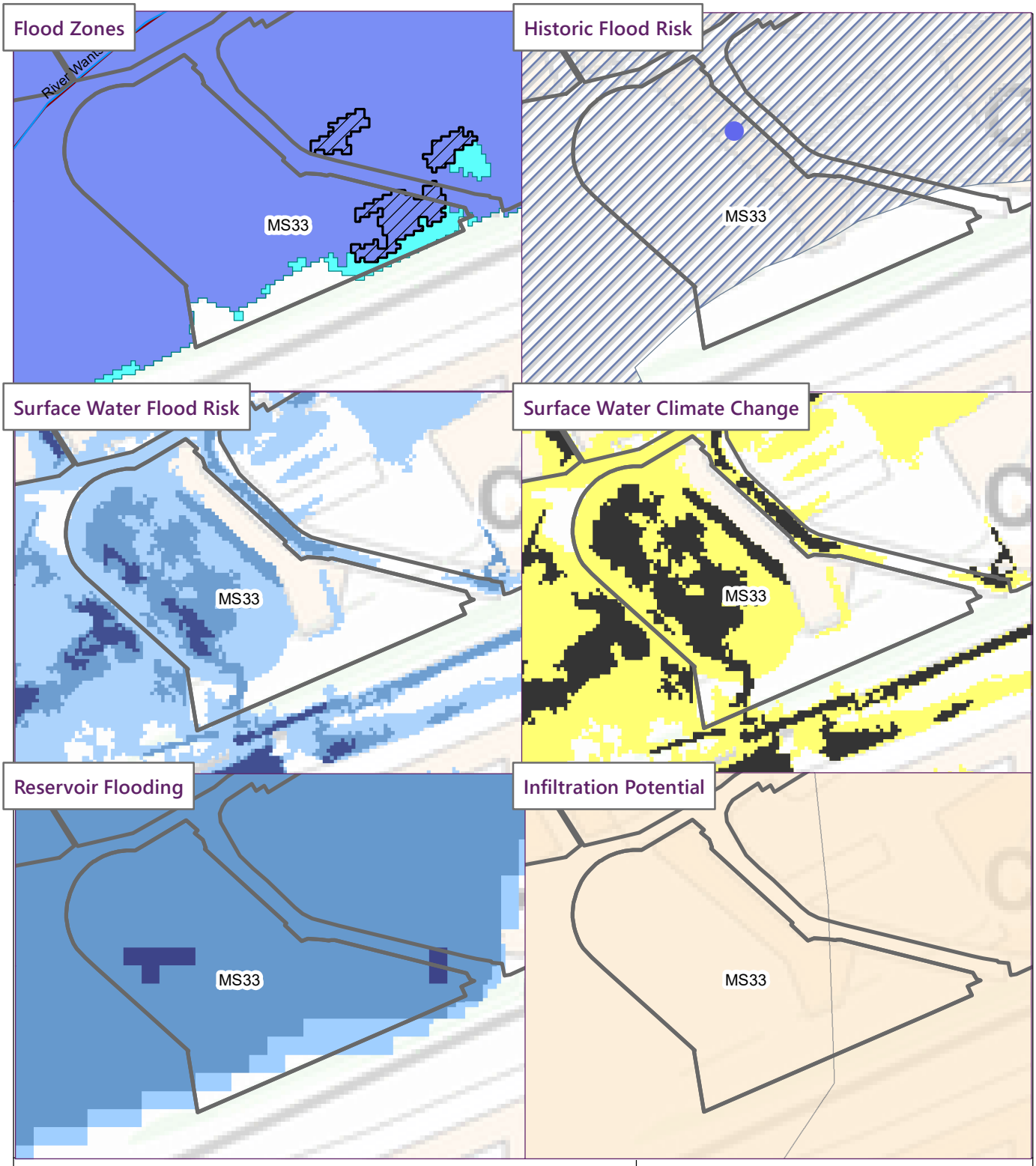
A number of factors which need to be considered when looking to pass the Exception test include:
- Design of development to manage and reduce flood risk wherever possible;
- Finished floor levels;
- Safe access and egress;
- Operation and maintenance;
- Resident awareness;
- Flood warning; and
- Evacuation procedures and funding arrangements.

See section 6 of the Level 1 SFRA for more information.

### *Site-Specific Recommendations for NPPF Compliant Development*

The FRA should consider:
● Siting development in accordance with the sequential approach, placing the most vulnerable uses in the areas of least risk within the site;
● Design of development to manage and reduce flood risk wherever possible, including siting all living accommodation above the maximum 1% AEP plus climate change flood level;
● As more vulnerable development is proposed the higher central (35%) and upper end (70%) climate change allowances should be used for the flood risk assessment.
● Any development within the 1% AEP plus 70% climate change flood extent not intended to flood will require floodplain storage compensation to be provided elsewhere to ensure no increase in flood risk as a consequence of development. Floodplain storage compensation should be provided as close to the development as possible and in an area hydraulically connected to the River and existing floodplain.
● An 8m gap should be observed between the proposed development and the main River Wansunt which is culverted through Crayford town centre. For work within this buffer zone, a Flood Risk Activity Permit will be required. Any development in and around the River Wansunt culvert will need to carry out a condition assessment and CCTV survey of the culvert to demonstrate the works will not cause the culvert to collapse/further deteriorate.
When considering the safety of the development:
● Safe access and egress - noting that the current access road is predicted to flood up to 0.75m in the future 1% AEP event an alternative safe access and egress route would need to be identified. The FRA may need to consider if safe shelter where residents would reside in situ until the flood water has receded within the building could be an option;
● Resident awareness;
● Flood warning and evacuation procedures - noting Crayford is at risk of more rapid onset flooding due to the perched nature of the River Cray.
Further detail on the above points is given in the Level 1 SFRA, Section 6.3.
The construction of the development should not exacerbate surface water flood risk in the wider area. Any changes to the site configuration which will alter how surface water is stored and/or flows across the site will need to be detailed in an accompanying drainage strategy. Sustainable drainage solutions should be implemented (see drainage management recommendations below).

| ***Drainage Management Recommendations*** |
| --- |
| Surface water runoff should be managed appropriately to ensure flood risk is not increased elsewhere. All feasible SuDS options should be assessed, whilst adhering to the SuDS hierarchy as set out in the Level 1 SFRA report (see chapter 7 and Appendix B of the Level 1 SFRA).<br>The site is currently developed, but betterment in surface water runoff should be sought ideally, and as such the greenfield runoff rate should be determined for the site using current best practice. This will allow for the appropriate sizing of attenuation and conveyance SuDS to ensure that sufficient space for drainage infrastructure is provided in developing site masterplans.<br>Infiltration would be the preferred method of partially/wholly discharging water from the site. The infiltration potential in this area is labelled as high, which alongside the underlying geology, could indicate that infiltration may be possible. However the site is in SPZ 1, therefore consultation with the EA will be required for infiltration SuDS. Site investigations would be required to fully assess the feasibly of using infiltration SuDS techniques.<br>Drainage design should include recommended allowances for climate change.<br>Any SuDS should be located outside of the 1% AEP fluvial flood extent including an allowance for climate change to ensure they remain operation in times of flood.<br>The topography of the site should be taken in to consideration to ensure that gravity drainage is possible throughout the whole site. An appropriate discharge location should be identified (if not all infiltration) and appropriate consultations should be had. |




Key

LBB Site

**Flood Zone Summary**
- Main Rivers
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- Flood defences (SoP over 1 in 100 year AEP)
- Flood Storage Areas
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- Areas benefiting from flood defences
- Flood Zone 3
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**Surface Water Flood Risk**
- 3.33% AEP Extent
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**Risk of Flooding from Reservoirs Max Depth**
- < 0.3
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Recorded Flood Events Bexley Borough (1960-2019)
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Recorded flood outlines
- 1953 Event
- 1968 Event
- 1977 Event

**Surface Water Climate Change**
- 1% AEP
- Areas potentially vulnerable to climate change

**Infiltration Potential**
- High
- Med
- Low

0 100 m

Scale at A4: 1:3,153



Client

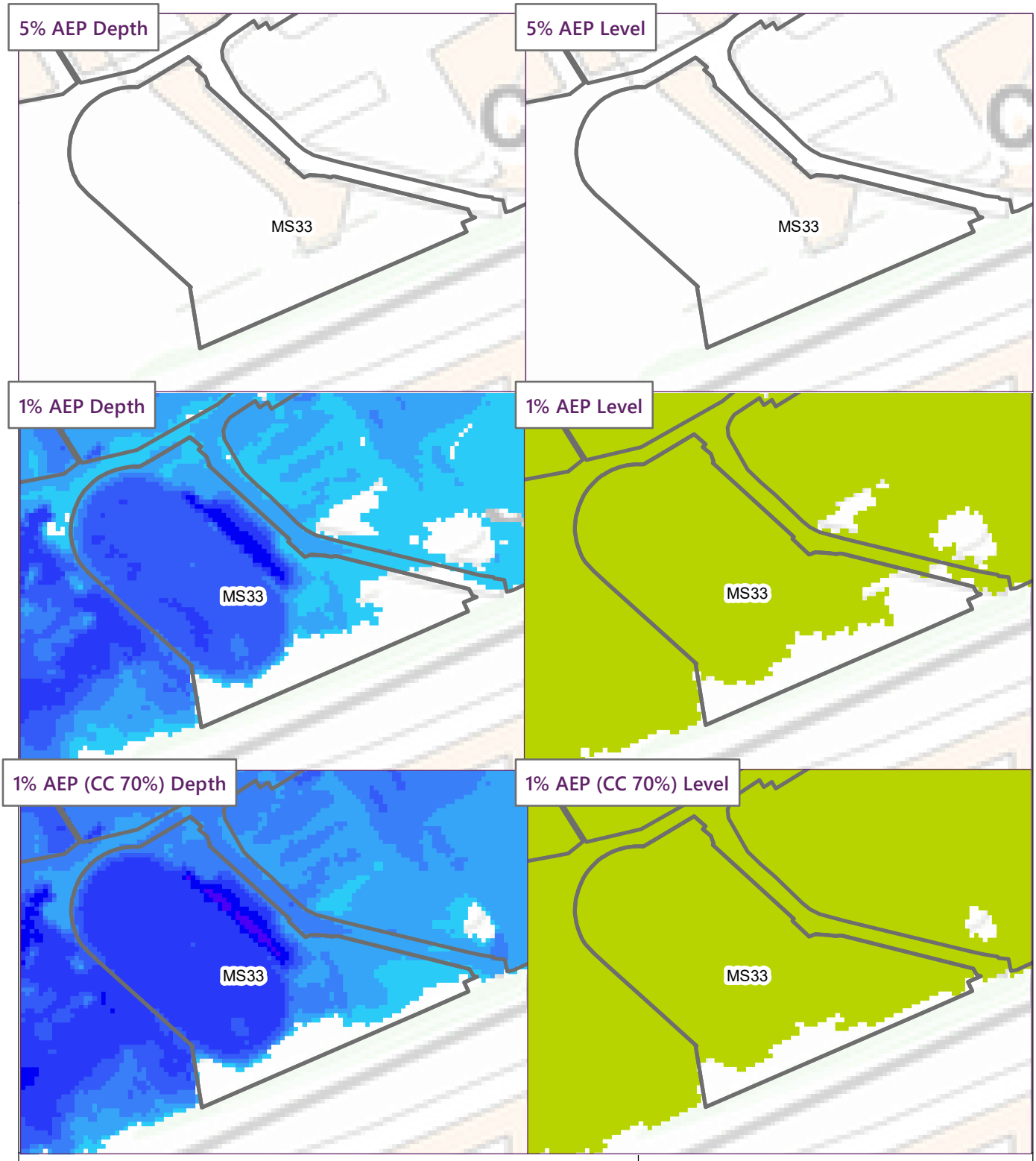
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS33**
**Flood Risk Overview Map**

June 2020

wood.




Key

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**Max depth (m)**

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- 2.5 - 3
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- 3.5 - 4
- 4 - 5
- 5+

**Max level (mAOD)**

- 0 - 4
- 4 - 5
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- 7 - 8
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- 9 - 10
- 10 - 11
- 11 - 12

N

0 100 m

Scale at A4: 1:3,153



Client

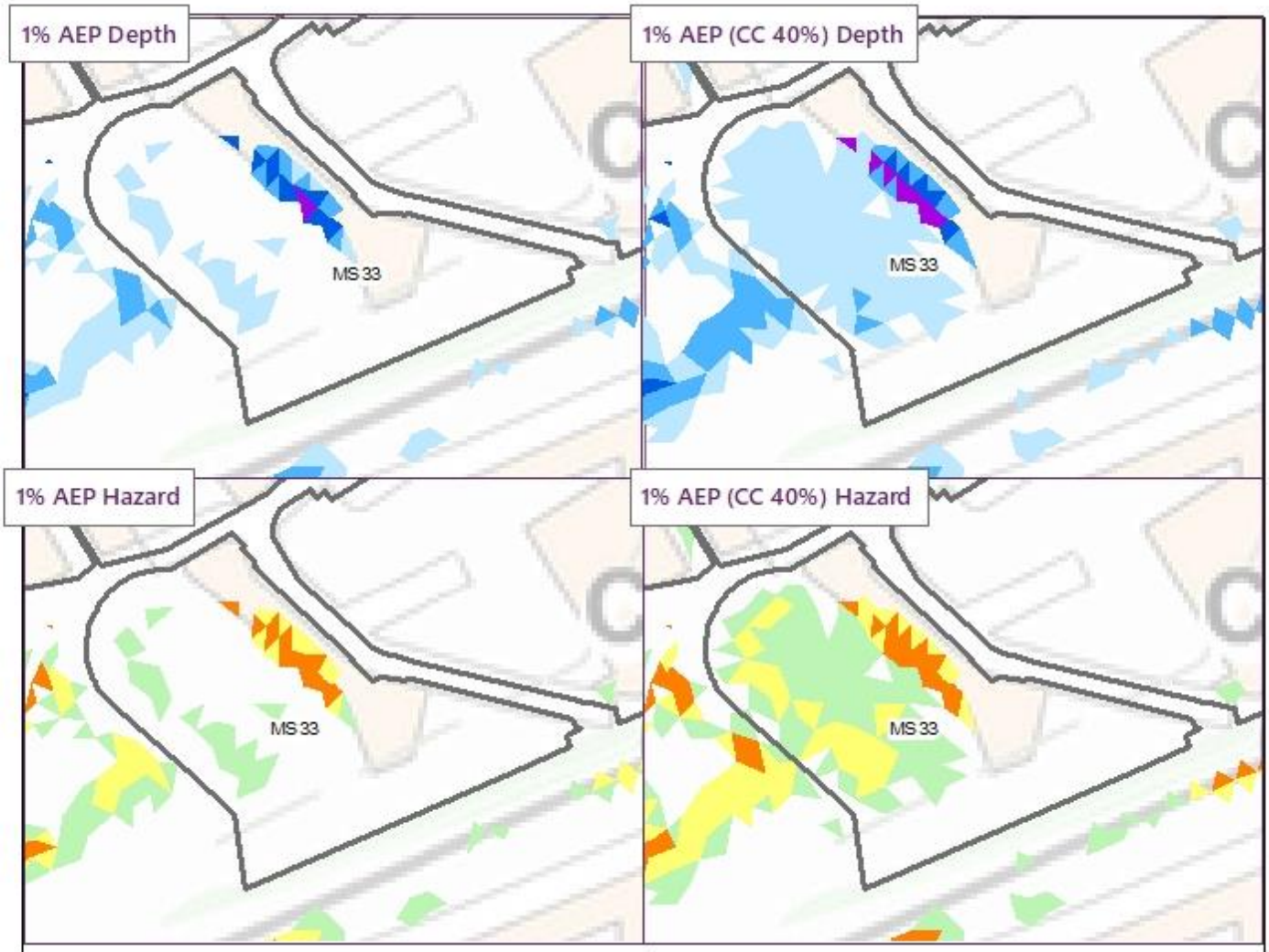
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS33**
**Fluvial flood risk - River Cray**
**(including the presence of defences)**

May 2020

wood.




Key

LBB Site

**Max depth (m)**

- 0.00 - 0.15
- 0.15 - 0.30
- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 m

Scale at A4: 1:3,162



Client

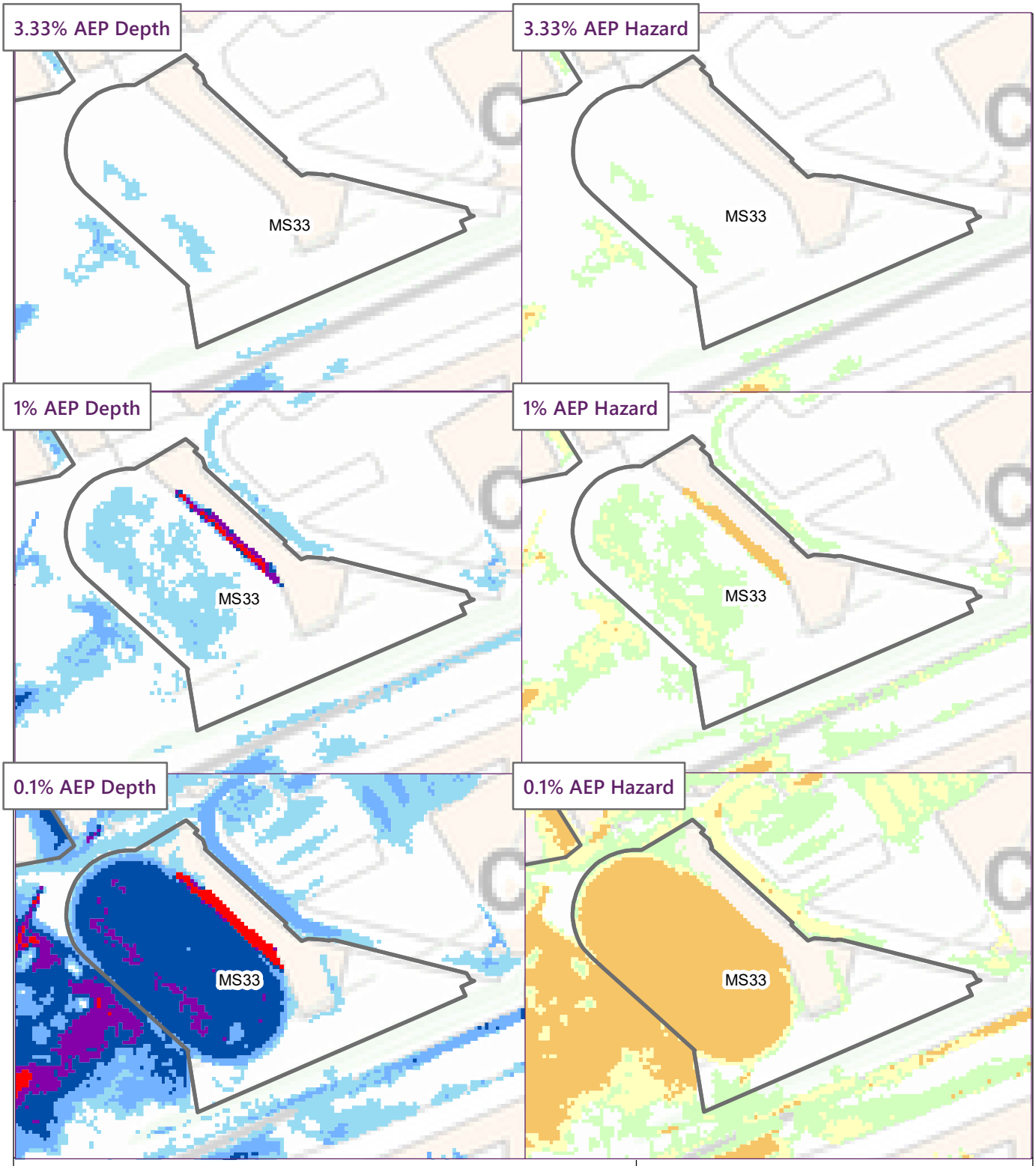
LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS33**
**Surface Water Modelling Results: Crayford**

June 2020

wood.

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- 0.30 - 0.60
- 0.60 - 0.90
- 0.90 - 1.20
- > 1.20

**Max hazard**

- Caution
- Danger for Some
- Danger for Most
- Danger for All

N

0 100 m

Scale at A4: 1:3,153



Client

LONDON BOROUGH OF BEXLEY

London Borough of Bexley
Strategic Flood Risk Assessment
Level 2

**Detailed Site Assessment: MS33**
**Risk of Flooding from Surface Water (EA Dataset)**

May 2020

wood.