



**Leeds**  
CITY COUNCIL

# Site Allocations Plan

## Flood Risk Exception Test – Site Specific Flood Risk Assessments Supporting Information

Leeds Local Plan  
Development Plan Document  
December 2019



## 1. INTRODUCTION

- 1.1. As part of the preparation of the Site Allocations Plan (SAP) a range of Background Papers were produced providing supporting evidence and further details. Where site requirements in the adopted SAP refer to information in any of these Background Papers, this information has been extracted and reproduced as supporting information to the adopted SAP.
- 1.2. All sites in the Site Allocations Plan were the subject of a sequential flood risk test, as set out in the Background Paper 2017. This is not reproduced here. Not all sites with flood risk required exception testing, and some sites had a flood risk exception test, but were not subsequently allocated. Some were identified sites where the flood risk footnote clearly identifies that either an exception test has already been done through the planning application process, or only a small part is in a higher flood risk zone so housing can be designed to avoid this. These are not included in this document. This Flood Risk Assessment (December 2019) details only specific flood risk exception tests (done as part of the evidence base and Flood Risk Sequential and Exceptions Test Background Paper May 2017), referred to in specific site requirements on new allocations in the adopted Plan.

## 2. BACKGROUND

- 2.1 The Leeds Strategic Flood Risk Assessment (SFRA) has underpinned the assessment but the parts of the SFRA that refer to the delineation between flood zone 3ai and 3aii have not been used. For zone 3a data this update relies on the November 2016 flood map provided by the Environment Agency.
- 2.2 **Flood zone 2** is defined as areas with a medium probability of flooding and comprises land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) in any year. In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development, and the appropriate application of sustainable drainage systems.
- 2.3 **Flood zone 3a** is defined as areas with a high probability of flooding and comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) in any year. In this zone, developers and local authorities should seek opportunities to:
  - reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage systems;
  - relocate existing development to land in zones with a lower probability of flooding; and
  - create space for flooding to occur by restoring functional floodplain and flood flow pathways and by identifying, allocating and safeguarding open space for flood storage.
- 2.4 **Sub Delineation of Zone 3a**

A number of areas of existing development within the District of Leeds are affected by flooding with a 5% (1 in 20 year) probability. Careful consideration must be given to the future sustainability of development within areas that may be subject to flooding on a relatively frequent basis. For this reason, Zone 3a High Probability has been sub delineated in the Leeds SFRA in the following manner:

  - Zone 3a(ii) High Probability - areas that fall within the 5% (1 in 20 year) flood envelope; and
  - Zone 3a(i) High Probability - areas that fall outside of the 5% (1 in 20 year) flood envelope, however are affected by river flooding in the 1% (1 in 100 year) event.

This sub-delineation of high risk zone 3a has been used to inform previous versions of the flood risk sequential test, ensuring that the Council has done its best to avoid allocating vulnerable development in flood risk areas as far as possible. However, because the EA

Flood Map changed significantly in November 2016, the final update to the sequential test does not rely on the sub-delineation of zone 3a in the SFRA as it can no longer be assumed to be accurate. An update to the SFRA will take place once the Leeds Flood Alleviation Scheme is complete.

## 2.5 **Flood zone 3b**

This is the functional floodplain and has been defined in the Council's Strategic Flood Risk Assessment in the following way:

Zone 3b Functional Floodplain is land:

- where water flows or has to be stored in times of flood;
- that is subject to flooding with a 1 in 20 year (5%) probability (or more frequently);  
and
- that is reserved by Leeds City Council for this purpose.

The functional floodplain primarily consists of the broad open spaces adjoining the waterway corridors of the River Wharfe and River Aire. It is essential that these floodplain areas are protected from future development.

**Exception Tests referred to in site requirements  
of specific allocations in the Site Allocations  
Plan**

## **Introduction**

Para 157 of the NPPF (Feb 2019) requires that for those sites that have passed the Sequential Test and are proposed for a 'more vulnerable use', including residential, the sites must also pass the Exception Test. For the Exception Test to be passed:

1. It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk; and
2. 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.

### **Aireborough**

HG2-1 New Birks Farm, Ings Lane, Guiseley – 10.84ha, capacity 160 units.

Flood Risk Appraisal; see Appendix 1

<b>Exception Test for Site: MX2-36 (2021) Water Lane Car Park, City Centre HMCA</b>	
<b>Flood Risk Zone: 3A</b>	
<b>Proposed uses subject of Exception Test: Mixed use, residential (30 units) and office</b>	
<b>A: Does the development provide wider sustainability benefits to the community that outweigh flood risk?</b>	
<b>Yes</b>	<b>Explain how: Brings a derelict brownfield site back into use. Close proximity to the city centre train and bus stations.</b>
<b>B: Has a FRA demonstrated that the development will be safe for its lifetime, without increasing flood risk elsewhere, and, where possible, reduce flood risk overall?</b>	
<ul style="list-style-type: none"> <li>• The site is located within Flood Zone 3A, however, it did not flood on Boxing Day 2015. The return period for this event is estimated to have been between 1 in 200 and 1 in 300 years. It is therefore likely that the site is actually located within Flood Zone 2. Once the Leeds Flood Alleviation Scheme is complete, the risk of flooding to the site, from the River Aire will be further reduced.</li> <li>• Although the site will be defended by the Leeds FAS, there is a residual risk of flooding, should the weirs fail to operate or else be subjected to an exceedance event. The measures below describe how the remaining flood risk will be further reduced:</li> <li>• The EA have a flood warning service which covers this area. In the event of flooding it will be possible to provide at least 2 hours advance warning, probably much longer for extreme events.</li> <li>• Occupants of the site will be encouraged to sign up to the EA’s Flood Warning Service. This will provide sufficient advance warning to enable the site to be evacuated, if necessary, for very extreme events.</li> <li>• Any flooding is likely to be of short duration, (less than 24 hours), hence it is likely that people could remain inside their apartments, if they are unable to evacuate the site.</li> <li>• The depth and velocity of flooding at the site during extreme events (&gt; 1 in 100yrs return period) is unlikely to present a risk of structural damage to buildings.</li> <li>• Flood resilient construction should be utilised, where appropriate. For example, concrete ground floors should be used in preference to timber. Electrical sockets, fuse boxes, control equipment and wiring should be located at least 1.5 metres above floor level. Electrical cables should come down the wall to raised sockets rather than be located below ground level.</li> <li>• Floor levels should be raised above predicted flood levels, as per LCC’s Minimum Development Control Standards.</li> <li>• There is also a risk of flooding from other sources, such as sewers, water mains and surface water run-off. This needs to be considered during detail design. It is expected that flood risk will be reduced by setting finished floor levels above adjacent ground levels.</li> <li>• The existing site is almost entirely impermeable, so any redevelopment which incorporates SuDS will provide betterment.</li> <li>• In terms of drainage, the site is classed as a ‘brownfield’. Any redevelopment would have to comply with Council’s surface water discharge (30% reduction) policy. This will ensure that the development helps to reduce flood risk elsewhere.</li> </ul>	
<b>Conclusion</b>	
Proposed housing use on site MX2-36 is considered to have passed the Exception Test. A detailed FRA must be submitted alongside any development proposals demonstrating that these recommended mitigation measures have been incorporated to ensure that the development will be safe and will not increase flood risk elsewhere.	

**Exception Test for Site: HG2-208, Globe Quay, Globe Road, HMCA: City Centre****Flood Risk Zone: 3A****Proposed uses subject of Exception Test: Housing (4 units)****A: Does the development provide wider sustainability benefits to the community that outweigh flood risk?****Yes****Explain how: The site is within walking distance to Leeds Train Station. It is part of a regeneration area and the proposal helps to bring a Listed Building back into use.****B: Has a FRA demonstrated that the development will be safe for its lifetime, without increasing flood risk elsewhere, and, where possible, reduce flood risk overall?**

- The EA Flood Map indicates that the site is located within Flood Zone 3A. However, the site did not flood on Boxing Day 2015. The return period for this event is estimated to have been between 1 in 200 and 1 in 300 years. It is therefore likely that the site is actually located within Flood Zone 2. Once the Leeds Flood Alleviation Scheme is complete, the risk of flooding to the site, from the river Aire will be further reduced.
- Although the site will be defended by the Leeds FAS, there is a residual risk of flooding, should the weirs fail to operate or else be subjected to an exceedance event. The measures below describe how the remaining flood risk will be further reduced.
- The EA have a flood warning service which covers this area. In the event of flooding it will be possible to provide at least 2 hours advance warning, probably much longer for extreme events.
- Occupants of the site will be encouraged to sign up to the EA's Flood Warning Service. This will provide sufficient advance warning to enable the site to be evacuated, if necessary, for very extreme events.
- Any flooding is likely to be of short duration, (less than 24 hours), hence it is likely that people could remain inside their apartments, if they are unable to evacuate the site.
- The depth and velocity of flooding at the site during extreme events (> 1 in 100yrs return period) is unlikely to present a risk of structural damage to buildings.
- Flood resilient construction should be utilised, where appropriate. For example, concrete ground floors should be used in preference to timber. Electrical sockets, fuse boxes, control equipment and wiring should be located at least 1.5 metres above floor level. Electrical cables should come down the wall to raised sockets rather than be located below ground level.
- Floor levels should be raised above predicted flood levels, as per LCC's Minimum Development Control Standards.
- There is also a risk of flooding from other sources, such as sewers, water mains and surface water run-off. This needs to be considered during detail design. It is expected that flood risk will be reduced by setting finished floor levels above adjacent ground levels.
- The existing site is almost entirely impermeable, so any redevelopment which incorporates SuDS will provide betterment.
- In terms of drainage, the site is classed as a 'brownfield'. Any redevelopment would have to comply with Council's surface water discharge (30% reduction) policy. This will ensure that the development helps to reduce flood risk elsewhere.

**Conclusion**

Proposed housing use on site HG2-208 is considered to have passed the Exception Test. A detailed FRA must be submitted alongside any development proposals demonstrating that these recommended mitigation measures have been incorporated to ensure that the development will be safe and will not increase flood risk elsewhere.

<b>Exception Test for Sites:</b>	
<b>MX2-32</b>	<b>Water Lane – Westbank</b>
<b>HG2-194</b>	<b>Silver Street / Midland Mills North</b>
<b>HG2-195</b>	<b>Silver Street/ Midland Mills South</b>
<b>Flood Risk Zone: 3A for all sites</b>	
<b>Proposed uses subject of Exception Test: Housing</b>	
<b>A: Does the development provide wider sustainability benefits to the community that outweigh flood risk?</b>	
<b>Yes</b>	<p><b>Explain how:</b></p> <p>These brownfield development sites are located within the City Centre and close to high frequency bus routes. They are accessible by a number of sustainable transport modes to a wide range of employment, shopping and leisure opportunities. They are within Holbeck Urban Village which is designed to regenerate a range of old industrial buildings and vacant sites – including buildings of significant historical importance from the industrial revolution – into a vibrant mixed use quarter of the city centre. Some key sites have already been converted or redeveloped for housing, including the Round Foundry, and there is significant development interest for other sites, including for mixed office residential schemes.</p> <p>Sustainability appraisal site assessment: Generally positive scores for housing provision, reusing brown field land and buildings, and four significant positive scores for the sustainable location and access to the highway network, facilities and services.</p>
<b>B: Has a FRA demonstrated that the development will be safe for its lifetime, without increasing flood risk elsewhere, and, where possible, reduce flood risk overall?</b>	
<b>Site MX2-32 Water Lane Westbank</b>	
<ul style="list-style-type: none"> <li>• The EA Flood Map indicates that the site is located within Flood Zone 3A.</li> <li>• Any flooding is likely to be of short duration, (less than 12 hours), hence it is likely that people could remain inside buildings at first floor level, if they are unable to evacuate the site.</li> <li>• The depth and velocity of flooding at the site during extreme events (&gt; 1 in 100yrs return period) is unlikely to present a risk of structural damage to buildings. <ul style="list-style-type: none"> <li>• Although the site will be defended by the Leeds FAS, there is a residual risk of flooding, should the weirs fail to operate or be subjected to an exceedance event. The measures below describe how the remaining flood risk will be further reduced in order to make the site safe for its users:</li> </ul> </li> </ul>	
<ul style="list-style-type: none"> <li>• Flats at first floor level and above, with car parking at ground level, would be preferable.</li> <li>• Openings should be incorporated within the building structure, to allow water to pass through the site.</li> <li>• The EA have a flood warning service which covers this area. In the event of flooding it will be possible to provide at least 2 hours advance warning, probably much longer for extreme events.</li> <li>• Occupants of the sites will be encouraged to sign up to the EA’s Flood Warning Service. This will provide sufficient advance warning to enable the site to be evacuated, if necessary, for very extreme events. Higher ground can be found on Marshall Street, about 250m SW of Westbank .</li> <li>• Flood resilient construction should be utilised, where appropriate. For example, concrete ground floors should be used in preference to timber. Electrical sockets, fuse boxes, control equipment and wiring should be located at least 1.5 metres above floor level. Electrical cables should come down the wall to raised sockets rather than be located below ground level.</li> </ul>	

- Floor levels should be raised above the 100 year flood level as per LCC's Minimum Development Control Standards
- There is also a risk of flooding from other sources, such as sewers, water mains and surface water run-off. This needs to be considered during detail design. It is expected that flood risk from these sources will be reduced by setting finished floor levels above adjacent ground levels.
- In terms of drainage, the sites are classified as 'brown-field'. Any redevelopment would have to comply with current SuDS policy which requires run-off from brownfield sites to revert back to greenfield rates. This will help to reduce flood risk elsewhere.

### **Sites HG2-194 Silver St/Midland Mills North and HG2-195 Silver Street/Midland Mills South**

- The EA Flood Map indicates that both sites are located within Flood Zone 3A.
- Any flooding is likely to be of short duration, (less than 12 hours), hence it is likely that people could remain inside buildings at first floor level, if they are unable to evacuate the site.
- The depth and velocity of flooding at the site during extreme events (> 1 in 100yrs return period) is unlikely to present a risk of structural damage to buildings.
- Although the site will be defended by the Leeds FAS, there is a residual risk of flooding, should the weirs fail to operate or else be subjected to an exceedance event. The measures below describe how the remaining flood risk will be further reduced.
- The EA have a flood warning service which covers this area. In the event of flooding it will be possible to provide at least 2 hours advance warning, probably much longer for extreme events.
- Occupants of the sites will be encouraged to sign up to the EA's Flood Warning Service. This will provide sufficient advance warning to enable the site to be evacuated, if necessary, for very extreme events. Higher ground can be found on Water Lane, about 50 - 150m North West of the sites.
- Flood resilient construction should be utilised, where appropriate. For example, concrete ground floors should be used in preference to timber. Electrical sockets, fuse boxes, control equipment and wiring should be located at least 1.5 metres above floor level. Electrical cables should come down the wall to raised sockets rather than be located below ground level.
- Floor levels should be raised above the 100 year flood level as per LCC's Minimum Development Control Standards.
- There is also a risk of flooding from other sources, such as sewers, water mains and surface water run-off. This needs to be considered during detail design. It is expected that flood risk from these sources will be reduced by setting finished floor levels above adjacent ground levels.
- In terms of drainage, the sites are classified as 'brown-field'. Any redevelopment would have to comply with current SuDS policy which requires run-off from brownfield sites to revert back to greenfield rates. This will help to reduce flood risk elsewhere.

### **Conclusion**

Subject to an FRA being submitted alongside detailed development proposals and demonstrating that the development will be safe and will not increase flood risk elsewhere, proposed housing use on sites MX2-32, HG2-194 and HG2-195 is considered to have passed the Exception Test.

**Exception Test for Site MX2-29 The Calls (38)****Flood Risk Zone: 3A****Proposed uses subject of Exception Test: Housing (14 units)****A: Does the development provide wider sustainability benefits to the community that outweigh flood risk?****Yes****Explain how:**

The site comprises of an existing building which would be converted to flats with offices on the lower floor(s).

It is located within the city centre and close to high frequency bus routes. It is accessible by a number of sustainable transport modes to a wide range of employment, shopping and leisure opportunities.

Sustainability appraisal site assessment: Generally positive scores for housing provision, reusing brown field land and buildings, for the sustainable location and access to the highway network, facilities and services.

**B: Has a FRA demonstrated that the development will be safe for its lifetime, without increasing flood risk elsewhere, and, where possible, reduce flood risk overall?**

- The EA Flood Map indicates that the site is located within Flood Zone 3A.
- Any flooding is likely to be of short duration, (less than 12 hours), hence it is likely that people could remain inside buildings at first floor level, if they are unable to evacuate the site.
- The depth and velocity of flooding at the site during extreme events (> 1 in 100yrs return period) is unlikely to present a risk of structural damage to buildings.
- The measures described below explain how the flood risk will be reduced in order to make the site safe for its users:
- The EA have a flood warning service which covers this area. In the event of flooding it will be possible to provide at least 2 hours advance warning, probably much longer for extreme events.
- Occupants of the site will be encouraged to sign up to the EA's Flood Warning Service. This will provide sufficient advance warning to enable the site to be evacuated, if necessary, for very extreme events. Higher ground can be found on Wharf St and High Court to the north.
- Flood resilient construction should be utilised, where appropriate. For example, concrete ground floors should be used in preference to timber. Electrical sockets, fuse boxes, control equipment and wiring should be located at least 1.5 metres above floor level. Electrical cables should come down the wall to raised sockets rather than be located below ground level.
- Floor levels should be raised above the 100 year flood level as per LCC's Minimum Development Control Standards.
- There is also a risk of flooding from other sources, such as sewers, water mains and surface water run-off. This needs to be considered during detail design. It is expected that flood risk from these sources will be reduced by setting finished floor levels above adjacent ground levels
- In terms of drainage, the site is classified as 'brown-field'. Any redevelopment would have to comply with current SuDS policy which requires run-off from brownfield sites to revert back to greenfield rates. This will help to reduce flood risk elsewhere.

**Conclusion**

Subject to an FRA being submitted alongside detailed development proposals and demonstrating that the development will be safe and will not increase flood risk elsewhere, the proposed housing use on Site MX2-29 is considered to have passed the Exception Test.

**Exception Test for Site MX2-22 St Peters Square****Flood Risk Zone: 3A****Proposed uses subject of Exception Test: Housing (49 units)****A: Does the development provide wider sustainability benefits to the community that outweigh flood risk?****Yes****Explain how:**

Following the demolition of the previous building around 1995, this brown field development site comprises an infill opportunity. Development would improve the visual appearance of the frontage to York St.

Located within the city centre and close to high frequency bus routes the site is accessible by a number of sustainable transport modes to a wide range of employment, shopping and leisure opportunities.

Sustainability appraisal site assessment: Generally positive scores for housing provision, reusing brown field land and buildings, for the sustainable location and access to the highway network, facilities and services.

**B: Has a FRA demonstrated that the development will be safe for its lifetime, without increasing flood risk elsewhere, and, where possible, reduce flood risk overall?**

- The EA Flood Map indicates that the site lies within Flood Zones 2 and 3A.
- Sheepscar Beck runs in a culvert immediately to the West of the site and the site could be at risk of flooding from this source – particularly if there is a blockage within the culvert.
- The depth and velocity of flooding at the site during extreme events (> 1 in 100yrs return period) is unlikely to present a risk of structural damage to buildings.
- The measures described below, explain how the flood risk will be reduced in order to make the site safe for its users:
- Flood resilient construction should be utilised, where appropriate. For example, concrete ground floors should be used in preference to timber. Electrical sockets, fuse boxes, control equipment and wiring should be located at least 1.5 metres above floor level. Electrical cables should come down the wall to raised sockets rather than be located below ground level.
- Given the proximity to the River Aire, floor levels should be raised above the 100 year flood level as per LCC's Minimum Development Control Standards, or else raised above adjacent road level, whichever is higher.
- In terms of drainage, the site is classified as 'brownfield'. Any redevelopment would have to comply with current SuDS policy which requires run-off from brownfield sites to revert back to greenfield rates. This will help to reduce flood risk elsewhere.

**Conclusion**

Subject to an FRA being submitted alongside detailed development proposals and demonstrating that the development will be safe and will not increase flood risk elsewhere, the proposed housing use on Site MX2-22 is considered to have passed the Exception Test.

<b>Exception Test for Site HG2-99 Buslingthorpe Tannery/Hill Top Works Sheepscar</b>	
<b>Flood Risk Zone: a small part of site in zone 3a</b>	
<b>Proposed uses subject of Exception Test: Housing (189 units)</b>	
<b>A: Does the development provide wider sustainability benefits to the community that outweigh flood risk?</b>	
<b>Yes</b>	<p><b>Explain how:</b></p> <p>This is a brownfield site located between Chapeltown and Meanwood in Inner North Leeds. Development for housing would help regenerate an unattractive partly cleared old industrial site and introduce life and activity into the area. Only a small part of the site (21%) is recorded as in flood zone 3a, according to the Environment Agency latest modelling.</p> <p>Sustainability appraisal site assessment: Generally positive scores for education, health, housing provision, community participation and transport and very positive scores for CO2 emissions and meeting local needs.</p>
<b>B: Has a FRA demonstrated that the development will be safe for its lifetime, without increasing flood risk elsewhere, and, where possible, reduce flood risk overall?</b>	
<p><u>Site 210</u></p> <ul style="list-style-type: none"> <li>• Much of this site is in flood zone 1 however a significant proportion of it is in Flood zone 3a and therefore a detailed Flood Risk Assessment is required to determine the precise extent of the flood zones. <ul style="list-style-type: none"> <li>• A sequential approach should be taken to the site layout there should be no reason for any buildings to be located within FZ2 or FZ3.</li> </ul> </li> <li>• If necessary the floor levels of buildings within site 210 should be raised above the 100 year flood level + freeboard.</li> <li>• As site 210 is located on the edge of the flood plain, it will possible for people to evacuate the site onto higher land, immediately adjacent to the site, should it be necessary during exceptional flooding.</li> </ul> <p><u>Site 125</u></p> <ul style="list-style-type: none"> <li>• Site formerly 125 is located adjacent to Sheepscar Beck, which enters the site in the SW corner then runs in a culvert adjacent to the Western boundary under the site.</li> <li>• Any development of this site would need to be accompanied by a Flood Risk Assessment and should incorporate such measures as: no building over the line of the culvert, including a suitable stand-off distance, raised floor levels above the 100 yr flood level + freeboard level, as per LCC's Minimum Development Control Standards, a sequential approach to the layout of the site to avoid building within the floodplain, unless an appropriate form of building is used: for example car parking at ground floor level and accommodation at 1st floor level and above.</li> <li>• Flood resilient construction should be utilised, where appropriate. For example, concrete ground floors should be used in preference to timber. Electrical sockets, fuse boxes, control equipment and wiring should be located at least 1.5 metres above floor level. Electrical cables should come down the wall to raised sockets rather than be located below ground level.</li> <li>• There is also a risk of flooding from other sources, such as sewers, water mains and surface water run-off. This needs to be considered during detail design. It is expected that flood risk from these sources will be reduced by setting finished floor levels above adjacent ground levels.</li> <li>• Given that the flood plain does not extend into the North of the site, it will be possible to easily evacuate to a safe place of refuge within the site, should this be necessary, during exceedance events.</li> </ul>	

- In terms of drainage, the site is classified as 'brownfield'. Any redevelopment would have to comply with current SuDS policy which requires run-off from brownfield sites to revert back to greenfield rates. This will help to reduce flood risk elsewhere

**Conclusion**

Subject to an FRA being submitted alongside detailed development proposals and demonstrating that the development will be safe, will not increase flood risk elsewhere, and will apply a sequential approach to the layout of the site so that the built development is in the least risky parts, the proposed housing use on site HG2-99 is considered to have passed the Exception Test.

**Exception Test for Site MX2-9 Kirkstall Road, Leeds**

**Flood Risk Zone: Zone 3a**

**Proposed uses subject of Exception Test: Housing (553 units)**

**A: Does the development provide wider sustainability benefits to the community that outweigh flood risk?**

**Yes**

**Explain how:**

This brownfield development site is located on the edge of the city centre and close to high frequency bus routes along the Kirkstall Road quality bus corridor. It is accessible by a number of sustainable transport modes to a wide range of employment, shopping and leisure opportunities. It is an opportunity to decontaminate and regenerate a former heavy industrial site, injecting life and vitality into this part of the city.

Sustainability appraisal site assessment: Generally positive scores for education, health, housing provision, community participation, contaminated land, local distinctiveness and transport and very positive scores for CO2 emissions and meeting local needs.

**B: Has a FRA demonstrated that the development will be safe for its lifetime, without increasing flood risk elsewhere, and, where possible, reduce flood risk overall?**

- The EA Flood Map indicates that the site is located within Flood Zone 3A.
- Any flooding is likely to be of short duration, (less than 12 hours), hence it is likely that people could remain inside buildings at first floor level, if they are unable to evacuate the site.
- Given the close proximity to the river, the depth and velocity of flooding at the site during extreme events (> 1 in 100yrs return period) could potentially cause structural damage to buildings. Additional modelling work (Hazard Assessment) is required in order to fully assess the risk.
- The measures described below, explain how the flood risk will be reduced in order to make the site safe for its users:
- Building should be set back from the edge of the river by at least 8m.
- Buildings, such as flats – at first floor level and above, with car parking at ground level, would be preferable to dwelling houses. Bungalows are not acceptable.
- Openings should be incorporated within the building structure, to allow water to pass through the site.
- Buildings should be designed to withstand hydro-dynamic loading, if necessary.
- The EA have a flood warning service which covers this area. In the event of flooding it will be possible to provide at least 2 hours advance warning, probably much longer for extreme events.
- Occupants of the site will be encouraged to sign up to the EA's Flood Warning Service. This will provide sufficient advance warning to enable the site to be evacuated, if necessary, for very extreme events. Higher ground can be found approximately 200m to the North of the site.

- Flood resilient construction should be utilised, where appropriate. For example, concrete ground floors should be used in preference to timber. Electrical sockets, fuse boxes, control equipment and wiring should be located at least 1.5 metres above floor level. Electrical cables should come down the wall to raised sockets rather than be located below ground level.
- Floor levels should be raised above the 100 year flood level, as per LCC's Minimum Development Control Standards.
- There is also a risk of flooding from other sources, such as sewers, water mains and surface water run-off. This needs to be considered during detail design. It is expected that flood risk from these sources will be reduced by setting finished floor levels above adjacent ground levels.
- In terms of drainage, the site is classified as 'brownfield'. Any redevelopment would have to comply with current SuDS policy which requires run-off from brownfield sites to revert back to greenfield rates. This will help to reduce flood risk elsewhere.

### Conclusion

Subject to an FRA being submitted alongside detailed development proposals and demonstrating that the development will be safe and will not increase flood risk elsewhere, the proposed housing use on site MX2-9 is considered to have passed the Exception Test.

### Exception Test for HG2 – 100 Gledhow Road/Gledhow Terrace

**Flood Risk Zone: small portions in 3a and 2**

**Proposed uses subject of Exception Test: Housing (25 units)**

**A: Does the development provide wider sustainability benefits to the community that outweigh flood risk?**

**Explain how:**

This is a cleared brownfield site located between Chapeltown and Harehills in inner north Leeds. Development for housing would help regenerate an unattractive site and introduce life and activity into the area. Only a small part of the site (16.8%) is recorded as in flood zone 3a, according to the Environment Agency latest modelling.

Sustainability appraisal site assessment: Generally positive scores for education, health, housing provision, community participation and local distinctiveness and very positive scores for CO2 emissions, transport and meeting local needs.

**B: Has a FRA demonstrated that the development will be safe for its lifetime, without increasing flood risk elsewhere, and, where possible, reduce flood risk overall?**

- The EA Flood Map indicates that part of the site lies within FZ3.
- Gipton Beck runs in a culvert immediately to the West and the site could be at risk of flooding from this source – particularly if there is a blockage within the culvert.
- The depth and velocity of flooding at the site during extreme events (> 1 in 100yrs return period) is unlikely to present a risk of structural damage to buildings.
- The measures described below, explain how the flood risk will be reduced in order to make the site safe for its users:
- Flood resilient construction should be utilised, where appropriate. For example, concrete ground floors should be used in preference to timber. Electrical sockets, fuse boxes, control equipment and wiring should be located at least 1.5 metres above floor level. Electrical cables should come down the wall to raised sockets rather than be located below ground level.
- Floor levels should be raised above adjacent road level, as per LCC's Minimum Development Control Standards.

- In terms of drainage, the site is classified as 'brownfield'. Any redevelopment would have to comply with current SuDS policy which requires run-off from brownfield sites to revert back to greenfield rates. This will help to reduce flood risk elsewhere.

**Conclusion**

Subject to an FRA being submitted alongside detailed development proposals and demonstrating that the development will be safe, will not increase flood risk elsewhere, and will apply a sequential approach to the layout of the site so that the built development is in the least risky parts, the proposed housing use on site HG2-100 is considered to have passed the Exception Test.

## North

### Exception Test for Site HG2-234 Land at Kirkstall Forge, Kirkstall Road

Flood Risk Zone: 3 and 1

Proposed uses subject of Exception Test:

**A: Does the development provide wider sustainability benefits to the community that outweigh flood risk?**

**Yes** The site experienced some flooding on Boxing Day 2015. This flood event was described as a 1 in 200 event.  
This site has a planning consent and is under construction. It includes the provision of a new railway station at Kirkstall Forge which brings sustainability benefits to the site which outweigh the flood risk.  
  
Sustainability appraisal site assessment: Not assessed as the site already has a planning consent.

**B: Has a FRA demonstrated that the development will be safe for its lifetime, without increasing flood risk elsewhere, and, where possible, reduce flood risk overall?**

A planning application has been submitted for the whole of the Kirkstall Forge site, however the Council has carried out further detailed work on site HG2-234 to establish the precise extent of the developable area, the results of this work have divided the site into 2 separate parcels as follows:

#### **Site HG2-234 East: Adjacent to Rugby Football Ground Land at Kirkstall Forge, Kirkstall Road, Leeds**

Flood Risk Assessment and Exceptions Test

Existing Ground Levels (m AoD) as follows:

SW = 46.58; SE = 47.33; NW = 47.82; NE = 48.06m.

Upstream Cross Section: RIVER\_SECTION\_02671606769

Downstream Cross Section: RIVER\_SECTION\_02671606486

Base model										
Node	Description	Centreline Chainage (m)	Bed Level	Max Stage 50 year	Max Stage 75 year	Max Stage 100 year	Max Stage 200 year	Max Stage 100+CC year	Max Stage 500 year	Max Stage 200 year +CC
2671606486	Rugby ground (left bank)	2,182.0	32.840	37.358	37.449	37.505	37.634	37.805	37.835	38.012
2671606769		1,899.0	32.850	37.74	37.837	37.898	38.037	38.213	38.241	38.404

#### **Conclusion**

The majority of the site is located within FZ1, however, the linear tail of the site boundary sits within Flood Zones 2 and 3. No building should be constructed within this part of the site, which is presumably an access road?

#### **Site HG2-234 West: Opposite Newlay Wood Close Land at Kirkstall Forge, Kirkstall Road, Leeds**

Flood Risk Assessment and Exceptions Test

Existing Ground Levels (m AoD) as follows:

SW = 41.00; SE = 41.30; NW = 39.40; NE = 40.41m.

Adjacent Cross Section: RIVER\_SECTION\_02671700963

Base model										
Node	Description	Centreline Chainage (m)	Bed Level	Max Stage 50 year	Max Stage 75 year	Max Stage 100 year	Max Stage 200 year	Max Stage 100 +CC year	Max Stage 500 year	Max Stage 200 year +CC
2671700963	Rein Road	585.0	34.788	40.599	40.804	40.927	41.253	41.666	41.717	42.065

**Conclusion**

The entire parcel is located within FZ3 – particularly so when climate change is considered. The site should not be developed for anything other than water compatible uses. It will not be possible to raise the level of the site out of the flood plain without displacing water in the direction of the opposite bank and increasing flood risk there.

**Conclusion**

The majority of the site that is described as HG2 – 234 East is suitable for built development excluding those parts of the site that are in flood zone 3a. Floor levels should be raised above the level of the 1 in 200 year flood event. The part of the site that is described as HG2 – 234 West is not suitable for built development and must be kept open. It should be assumed that this part of the site will flood.

**Exception Test for Site HG2-178 Aberford Road - site of Glenoit and Minerva Mills, Oulton**

**Flood Risk Zone: 3a and 2**

**Proposed uses subject of Exception Test: Housing (70 units)**

**A: Does the development provide wider sustainability benefits to the community that outweigh flood risk?**

<b>Yes</b>	<p><b>Explain how:</b></p> <p>This is a cleared brownfield site located within Woodlesford which is part of Rothwell, defined as a major settlement in the Core Strategy. It was a former paint factory that closed in 1987 and was then used as a distribution centre. After the employment use ceased the site was cleared and has been vacant since then. Housing use on this site would help to bring the site back into use and assist in the regeneration of derelict land. The site relates well to the existing residential area and is close to the local facilities of Woodlesford and the shopping and leisure facilities of Rothwell. The Aire and Calder Navigation forms a strong boundary to the north east. The site is accessible by both bus and train from the station nearby at Woodlesford. These factors make it a sustainable location for housing development.</p> <p>Sustainability appraisal site assessment: Scores negative for flood risk. Generally positive scores for housing provision, reusing brownfield land, remediation of contaminated land and access to the highway network.</p>
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**B: Has a FRA demonstrated that the development will be safe for its lifetime, without increasing flood risk elsewhere, and, where possible, reduce flood risk overall?**

- The EA Flood Map indicates that the majority of the site is located within Flood Zones 3A and 2.
- Any flooding is likely to be of short duration, (less than 12 hours), hence it is likely that people could remain inside buildings at first floor level, if they are unable to evacuate the site.
- The depth and velocity of flooding at the site during extreme events (> 1 in 100yrs return period) is unlikely to present a risk of structural damage to buildings.
- The measures described below explain how the flood risk will be reduced in order to make the site safe for its users.
- The EA have a flood warning service which covers this area. In the event of flooding it will be possible to provide at least 2 hours advance warning, probably much longer for extreme events.
- Occupants of the site will be encouraged to sign up to the EA's Flood Warning Service. This will provide sufficient advance warning to enable the site to be evacuated, if necessary, for very extreme events. Higher ground can be found immediately adjacent to the site.
- Flood resilient construction should be utilised, where appropriate. For example, concrete ground floors should be used in preference to timber. Electrical sockets, fuse boxes, control equipment and wiring should be located at least 1.5 metres above floor level. Electrical cables should come down the wall to raised sockets rather than be located below ground level.
- Floor levels should be raised above the 100 year flood level as per LCC's Minimum Development Control Standards.
- There is also a risk of flooding from other sources, such as sewers, water mains and surface water run-off. This needs to be considered during detail design. It is expected that flood risk from these sources will be reduced by setting finished floor levels above adjacent ground levels.

- In terms of drainage, the site is classified as 'brownfield'. Any redevelopment would have to comply with current SuDS policy which requires run-off from brownfield sites to revert back to greenfield rates. This will help to reduce flood risk elsewhere.

### Conclusion

Subject to an FRA being submitted alongside detailed development proposals and demonstrating that the development will be safe and will not increase flood risk elsewhere, the proposed housing use on site HG2-178 is considered to have passed the Exception Test.

### Exception Test for Site HG2-186 Main Street, Hunts Farm, Methley

**Flood Risk Zone: 3a and 2**

**Proposed uses subject of Exception Test: Housing ( 25 units)**

#### **A: Does the development provide wider sustainability benefits to the community that outweigh flood risk?**

##### **Explain how:**

The site is currently a mixture of used and un-used agricultural buildings in various states of repair. Development would improve the appearance of the site. The site has an outline planning consent for residential development. A significant contribution (circa £1m) from the Bank's development site at Station Road, Methley has been given to pay for flood alleviation works within the locality. This includes a scheme that will defend the Hunt's Farm site to the 1 in 100 year standard.

The site is within the settlement of Methley which is defined as a smaller settlement in the Core Strategy settlement hierarchy. This is because it meets the criteria of having a population of over 1,500, a primary school and a convenience store or pub. As a smaller settlement the village is expected to accommodate a small percentage of the growth planned for the Outer South HMCA. Hunts Farm provides an opportunity for rounding off of development within the village. It is unclear whether this site is classed as greenfield or brownfield. In the sustainability appraisal it is described as an 'existing, unattractive brownfield site', in the post Issues and Options Summary it is described as greenfield. It is an existing UDP commitment and this status has enabled an outline consent to be given despite conflicts with flood risk policy.

Sustainability appraisal site assessment: Scores double negative for loss of grade 1, 2 or 3 agricultural land. Scores negative for loss of employment use and because the site is outside the accessibility zone for primary and secondary education. Scores negative for biodiversity and flood risk. Scores positive for housing provision, close to the facilities of the city centre and re-use of land. Scores double positive for access to the highway network.

#### **B: Has a FRA demonstrated that the development will be safe for its lifetime, without increasing flood risk elsewhere, and, where possible, reduce flood risk overall?**

- The EA Flood Map indicates that the site is located within Flood Zones 3A and 2.
- LCC has a scheme in its capital programme to defend this site up to the 1 in 100 year standard.
- Any flooding could be long duration, (greater than 24 hours), because the adjacent washland relies on a pumping station to evacuate the flood water.
- The depth and velocity of flooding at the site during extreme events (> 1 in 100yrs return period) is unlikely to present a risk of structural damage to buildings.
- The measures described below, explain how the flood risk will be reduced in order to make the site safe for its users:
- The EA have a flood warning service which covers this area. In the event of flooding it will be possible to provide at least 2 hours advance warning, probably much longer for extreme events.

- Occupants of the site will be encouraged to sign up to the EA's Flood Warning Service. This will provide sufficient advance warning to enable the site to be evacuated, if necessary, for very extreme events. Higher ground can be found on Main Street, about 200m from the site.
- Flood resilient construction should be utilised, where appropriate. For example, concrete ground floors should be used in preference to timber. Electrical sockets, fuse boxes, control equipment and wiring should be located at least 1.5 metres above floor level. Electrical cables should come down the wall to raised sockets rather than be located below ground level.
- Floor levels should be raised above the 100 year flood level as per LCC's Minimum Development Control Standards.
- There is also a risk of flooding from other sources, such as sewers, water mains and surface water run-off. This needs to be considered during detail design. It is expected that flood risk from these sources will be reduced by setting finished floor levels above adjacent ground levels.
- In terms of drainage, development would have to comply with current SuDS policy which requires that surface water run-off rates should not exceed the 'greenfield' run off rate.

### **Conclusion**

Methley is a small settlement and therefore some residential use is appropriate however local facilities are limited and this site has poor access to primary and secondary schools. The sustainability of the site for housing use is tenuous however a programme of flood defence works is taking place which includes defence for this site. Given the heavy reliance on flood defence to improve the sustainability of the site, it is important that adequate maintenance arrangements are in place for the defence to ensure that flood risk can be mitigated for the lifetime of the development.

There are some sustainability benefits to the allocation of this site in terms of tidying up previously developed land.

The site specific requirements for this site should include a reference to the need for the flood defence to be completed and adequate maintenance arrangements for the defence to be in place. They should also require an FRA to be submitted alongside detailed development proposals to demonstrate that the development will be safe and will not increase flood risk elsewhere. As part of the site is in zone 2 and part in zone 3a, a sequential approach should be taken to the layout of the site – to attempt to avoid locating the built development in the most risky parts of the site.

<b>Exception Test for Site HG2-53 Calverley Cutting / Leeds Liverpool Canal, Apperley Bridge</b>	
<b>Flood Risk Zone: small areas of Zone 2 and Zone 3a</b>	
<b>Proposed uses subject of Exception Test: Housing (32 units)</b>	
<b>A: Does the development provide wider sustainability benefits to the community that outweigh flood risk?</b>	
<b>Yes</b>	<p><b>Explain how:</b></p> <p>The sustainability appraisal of this site scores well on the social objectives of providing housing and social inclusion. It scores badly on the environmental objectives of greenspace, greenfield land, biodiversity, flood risk, landscape and agricultural land, but positively on transport accessibility and natural resources. Despite the limited positives, only 18% of the site is covered by Zone 3 flood risk which runs in a north-south arc through the western flank of the site.</p>
<b>B: Has a FRA demonstrated that the development will be safe for its lifetime, without increasing flood risk elsewhere, and, where possible, reduce flood risk overall?</b>	
<ul style="list-style-type: none"> <li>• The EA Flood Map indicates that part of the site is located within Flood Zones 3A.</li> <li>• Carr Beck runs in a culvert immediately to the West and the site could be at risk of flooding from this source – particularly if there is a blockage within the culvert.</li> <li>• Additional modelling work is needed in order to determine more precisely the location of any overland flow routes.</li> <li>• The depth and velocity of flooding at the site during extreme events (&gt; 1 in 100yrs return period) is unlikely to present a risk of structural damage to buildings.</li> <li>• The measures described below, explain how the flood risk will be reduced in order to make the site safe for its users:</li> <li>• Any future development may need to incorporate a designated flood route through the site to allow overland flows to pass through the site safely, without risk of property flooding.</li> <li>• Flood resilient construction should be utilised, where appropriate. For example, concrete ground floors should be used in preference to timber. Electrical sockets, fuse boxes, control equipment and wiring should be located at least 1.5 metres above floor level. Electrical cables should come down the wall to raised sockets rather than be located below ground level.</li> <li>• Floor levels should be raised up above adjacent ground levels.</li> <li>• In terms of drainage, the site is classed as a 'green-field'. Any future development would have to incorporate SuDS measures to mimic greenfield runoff.</li> </ul>	
<b>Conclusion</b>	
<p>Subject to an FRA being submitted alongside detailed development proposals and demonstrating that the development will be safe, will not increase flood risk elsewhere, and will apply a sequential approach to the layout of the site so that the built development is in the least risky parts, the proposed housing use on site HG2-53 is considered to have passed the Exception Test. The advice in Part B of the test above should be followed.</p> <p>The site residential capacity of 32 in the Site Allocations Plan Issues and Options should have been 35 according to the standard calculation. Given that this site is adjacent to the Bradford urban area, a re-calculation allowing for 18% of the site not to have houses instead of the standard 10% means that 32 dwellings would be achievable.</p>	

# Land at, New Birks Farm, Guiseley (HG2-1)

## Potential Development Site

### Preliminary Appraisal of Flood Risk

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<b>Project ref:</b>	3412 – Mire Beck, Guiseley
<b>Date:</b>	14 June 2016
<b>Version:</b>	Final v1.0

1. This document has been prepared by Weetwood Services Ltd ('Weetwood') on behalf of Leeds City Council and presents a review of flood risk for a potential development site located at New Birks Farm, Guiseley.
2. The document has been prepared solely for and is confidential to Leeds City Council. Weetwood accepts no responsibility or liability for any use that is made of this document other than by Leeds City Council for the purposes for which it was originally commissioned and prepared.

#### Introduction

3. Leeds City Council is currently in the process of allocating sites for development in its Sites Allocation Plan.
4. The Council has endeavoured to avoid allocating sites at significant risk of fluvial flooding, especially those indicated by the EA Flood Map for Planning to be located in Flood Zone 3. However, to meet targets for housing growth, it may be necessary to allocate some sites that are known to be at high risk of fluvial flooding and/or risk of flooding from other sources such as surface water or groundwater.
5. A 10.84 hectare Greenfield site at New Birks Farm, Ings Lane, Guiseley (site ref: HG2-1) has been submitted for potential residential development for an estimated 285 dwellings.
6. To help inform the allocation decision making process, Weetwood has investigated flood risk to the site from fluvial, surface water and groundwater sources.

#### Site Description

7. The site is to the north of the settlement of Guiseley; lying at the foot of the hills that form the South Pennine Moors. It is currently in agricultural use and is bounded to the east by a railway line and Ings Lane, to the north by playing pitches and open farmland and to the west and south by existing residential development.
8. Mire Beck runs along the western boundary of the site. Beyond the boundary of Mire Beck there is existing housing with back gardens leading down to the Beck. The site is fairly level adjacent to Ings Lane but then slopes down towards the west.

9. According to Cranfield University's Soilscape soil mapping, soils at the site are slowly permeable and seasonally wet loams and clays with impeded drainage, prone to overland flow where fields are compacted or poached.
10. According to British Geological Survey mapping, superficial geology consists of Tills and Alluvial deposits (any of clays, silts, sands and gravels) overlying Grits and Sandstones.
11. The site will naturally drain to Mire Beck through the process of overland flow and shallow interflow.

## **Flood Risk Appraisal**

### Fluvial Flood Risk

12. A relatively small watercourse, Mire Beck, flows in a northerly direction adjacent to the western boundary of the site. To the west of the site the beck crosses under the A65 Bradford Road in a culvert; the beck then flows in an open channel to the northern point of the site where it crosses under a railway line in another culvert.
13. The Environment Agency (EA) Flood Map for Planning (Rivers & Sea) indicates that almost the entire site is located in Flood Zone 1, defined as land having a less than 1 in 1,000 annual probability of river flooding (low probability) with only the northernmost part of the site located in Flood Zone 3, defined as land having a 1 in 100 or greater annual probability of river flooding (high Probability); and Flood Zone 2, defined as land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (medium probability).
14. However, anecdotal evidence suggests that some of the land floods at least once or twice a year. As such, the Council's Flood Management Team believes that the Environment Agency and Leeds SFRA flood mapping significantly underestimates flood risk at the site and that it is likely that up to 75% of the site may actually be located within Flood Zone 3b, defined as land where water has to flow or be stored in times of flood (functional floodplain) with the remaining 25% in Flood Zone 1.
15. It is evident that the flood outline on the EA Flood Map for Planning is incomplete. This suggests that part of the watercourse has not been modelled (the EA Flood Map only maps river flooding where the river catchment area exceeds a predefined threshold). As such, the EA Flood Map is considered likely to be incomplete for the potential development site.
16. To more accurately assess fluvial flood risk, a 1D hydraulic model of Mire Beck has been constructed. The upstream extent of the modelled reach is the culvert under the A65 and the downstream extent is the culvert under the railway line. The modelled reach is based on twelve channel cross sections. Both culverts and the channel cross sections have been surveyed by Survey Operations specifically for the purpose of the modelling study.
17. Design inflows to the model have been estimated using the accepted industry standard ReFH2 approach. This approach estimates peak design flows and design hydrographs using physical catchment descriptors. The flood extents have been derived using the 1D Flood Map tool provided as part of the Flood Modeller software package with in-channel flood levels projected across ground levels derived from 1.0 m LiDAR data.

18. Modelled flood extents for the 1 in 2, 1 in 10, 1 in 20, 1 in 50, 1 in 100 and 1 in 1000 annual probability (AEP) flood events are presented on **Figure 2** and the 1 in 20, 1 in 100 and 1 in 1000 plus a 20% increase in peak flows to allow for climate change are presented in **Figure 3**.
19. The modelling illustrates that significant flooding of the site occurs in the 1 in 2 AEP event and that approximately 5.9 hectares of the site floods in the 1 in 20 AEP event, i.e. is in the functional floodplain. The findings are not particularly sensitive to climate change, in that the flood extents do not increase significantly when peak design flows are increased by 20%.
20. It is evident from **Figure 2** and **Figure 3** that the extent of flooding for the more extreme flood events (i.e. 1 in 100 and 1 in 1000 AEP events) is not significantly greater than for the lower magnitude events (i.e. the 1 in 50 AEP event and less).
21. The sensitivity of the site to flooding from Mire Beck is due to the low lying topography of much of the site and the relatively low conveyance capacity of the channel. Although not modelled, based on these model outputs it is likely that flooding from the beck could occur several times a year, which would accord with anecdotal reports from local residents.
22. It should be noted that as with any form of hydraulic modelling there are a number of limitations associated with the flood modelling which may result in overestimation of flood extents:
  - The catchment has been output directly from the FEH Web Service for the coordinates at the railway bridge. On closer inspection the catchment used may slightly overestimate the area of land which drains to the site.
  - The channel survey does not extend upstream of the A65 Bradford Road. Consequently, the model does not take into account storage upstream of the road.
  - The flood extents have been derived using the 1D Flood Map tool provided as part of the Flood Modeller software package. In-channel flood levels have been projected across 1.0 m LiDAR data which has not been validated against topographic survey.
  - 'Glass walling' occurs for all modelled events due to the flat topography across the floodplain.
  - The modelling approach includes a limited representation of conveyance across the floodplain and storage in the floodplain.
  - Dry islands < 200 sq m have been removed in accordance with the EA's approach to flood mapping.

#### Other Sources of Flood Risk

23. The Risk of Flooding from Surface Water map (**Figure 4**) indicates that a significant part of the site is at risk of flooding from this source, with two west to east overland flow pathways indicated.
24. BGS mapping (**Figure 5**) shows that the site is at 'Moderate' to 'Significant' risk of groundwater flooding.
25. According to EA mapping, the site is not at risk of flooding from reservoirs, canals or other artificial water impoundments.
26. However, based on the findings presented above, fluvial flood risk is considered to be the most significant source of flood risk to the site.

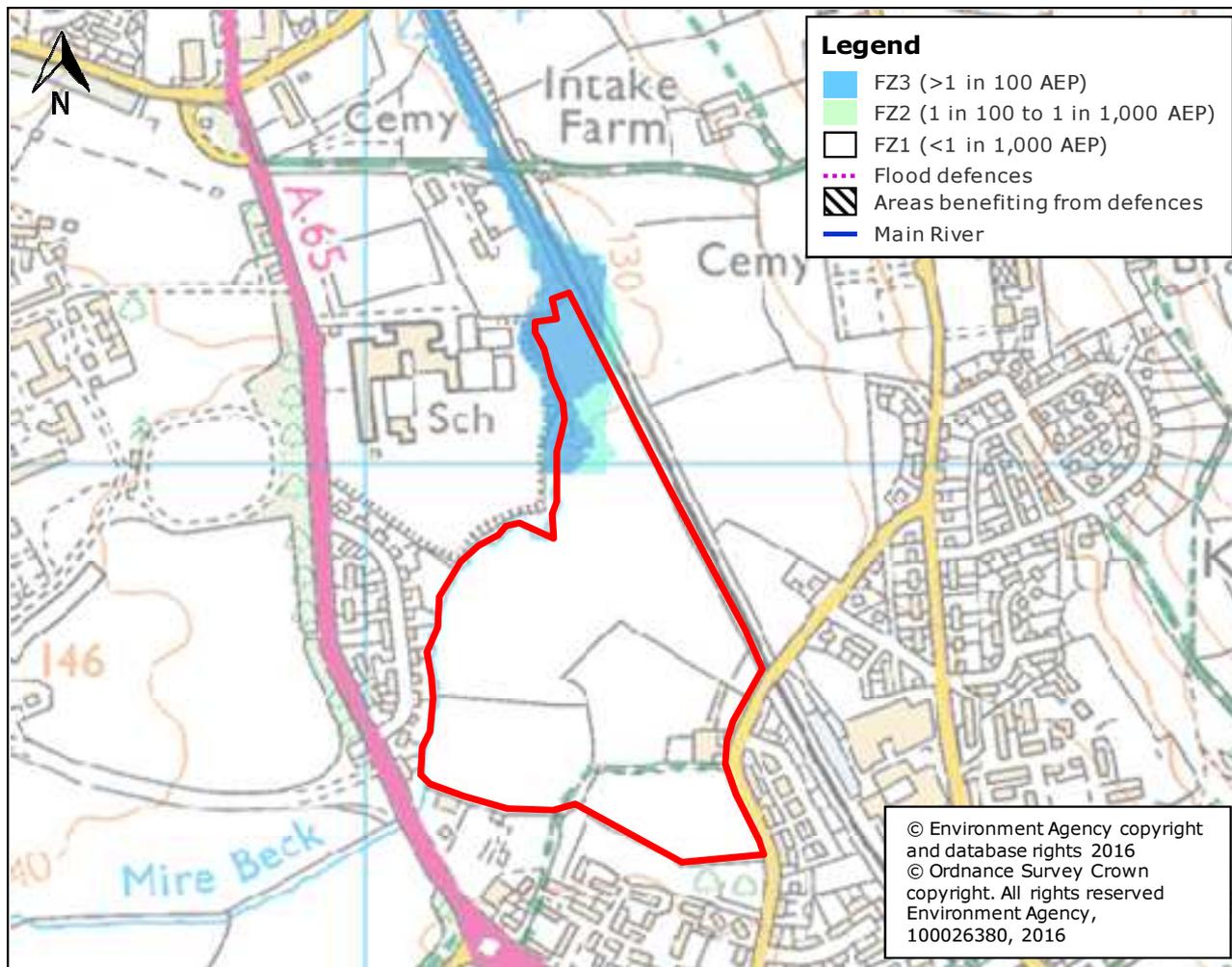
### Implications on Site Developability

27. According to the National Planning Policy Framework, Less Vulnerable (e.g. retail, commercial), More Vulnerable (e.g. residential use) and Highly Vulnerable (e.g. caravans, mobile homes, park homes) land uses are not compatible with land located in Flood Zone 3b functional floodplain.
28. The land shown to be at risk of flooding in the 1 in 20 AEP event (functional floodplain) is not developable, according to national planning policy, regardless of whether the risk could be mitigated.
29. Based on the model outputs outlined above, the developable area of the site is restricted to the eastern half of the site which is shown to be in Flood Zone 1 (with a small area in Flood Zone 2), an area of approximately 5.0 hectares. As such the potential yield of the site is almost certainly less than the potential allocation quantum of 285 dwellings, and more likely to be 150 dwellings (not withstanding other potential constraints to development).
30. In flood risk terms, the eastern part of the site is considered to be developable subject to the potential implementation of the following flood risk mitigation measures:
  - Implementation of a surface water drainage system which restricts peak runoff rates and volumes from the development to existing Greenfield rates and volumes (and ideally less to provide betterment and reduce flood risk elsewhere).
  - Raise finished floor levels above ground levels to mitigate the risk of flooding from surface water and groundwater flooding.
  - Provide flood pathways through the site to mitigate the risk of surface water flooding and the risk of flooding in the event that the capacity of the drainage system is exceeded.

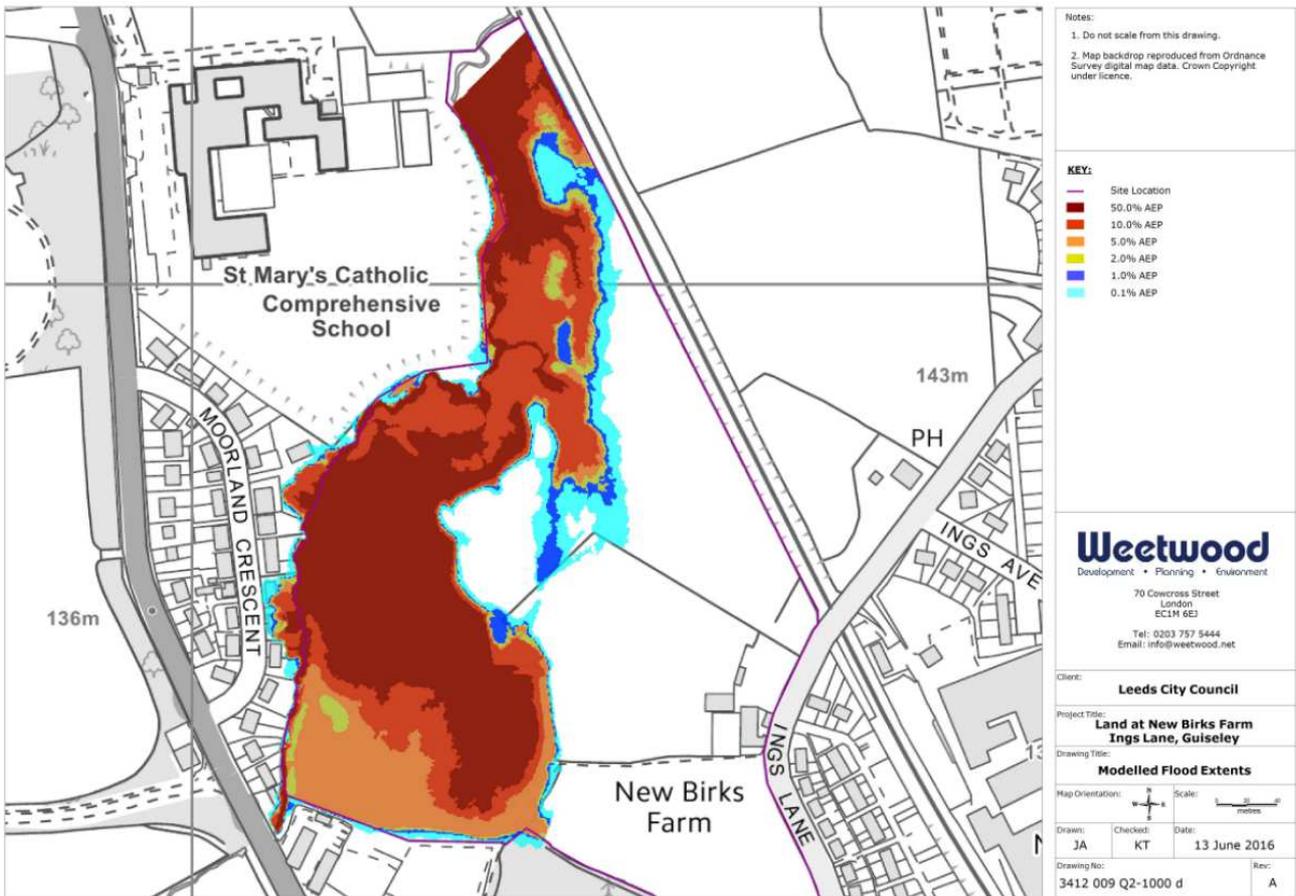
### Summary

31. Hydraulic modelling of Mire Beck indicates that approximately 50% (5.9 ha) of potential development site (HS2-1) is located within the functional floodplain and, according to national planning policy should not be developed.
32. The remaining part of the site is indicated to be located in Flood Zone 1 and Flood Zone 2. This part of the site is considered, from a flood risk and drainage perspective, to be developable, subject to the implementation of measures to mitigate flood risk from all sources of flooding.

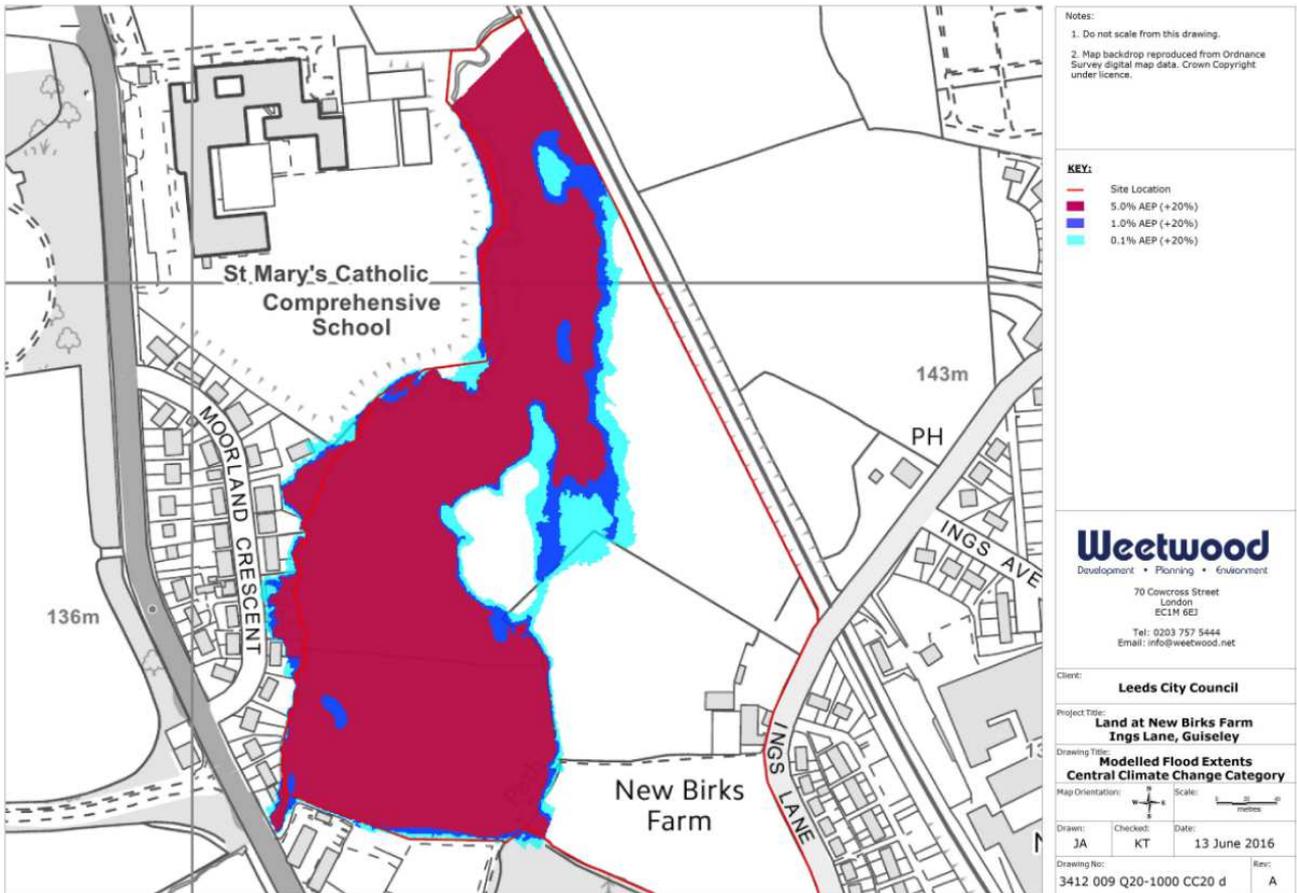
**Figures**



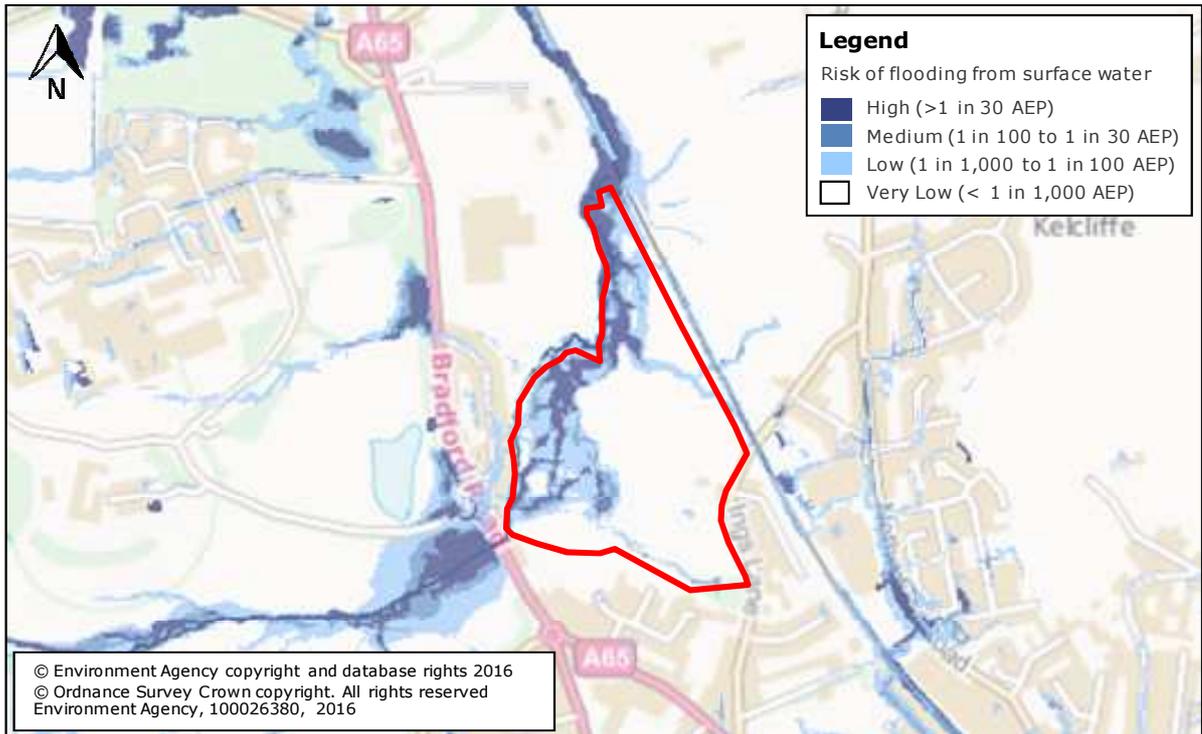
**Figure 1: EA Flood Map for Planning**



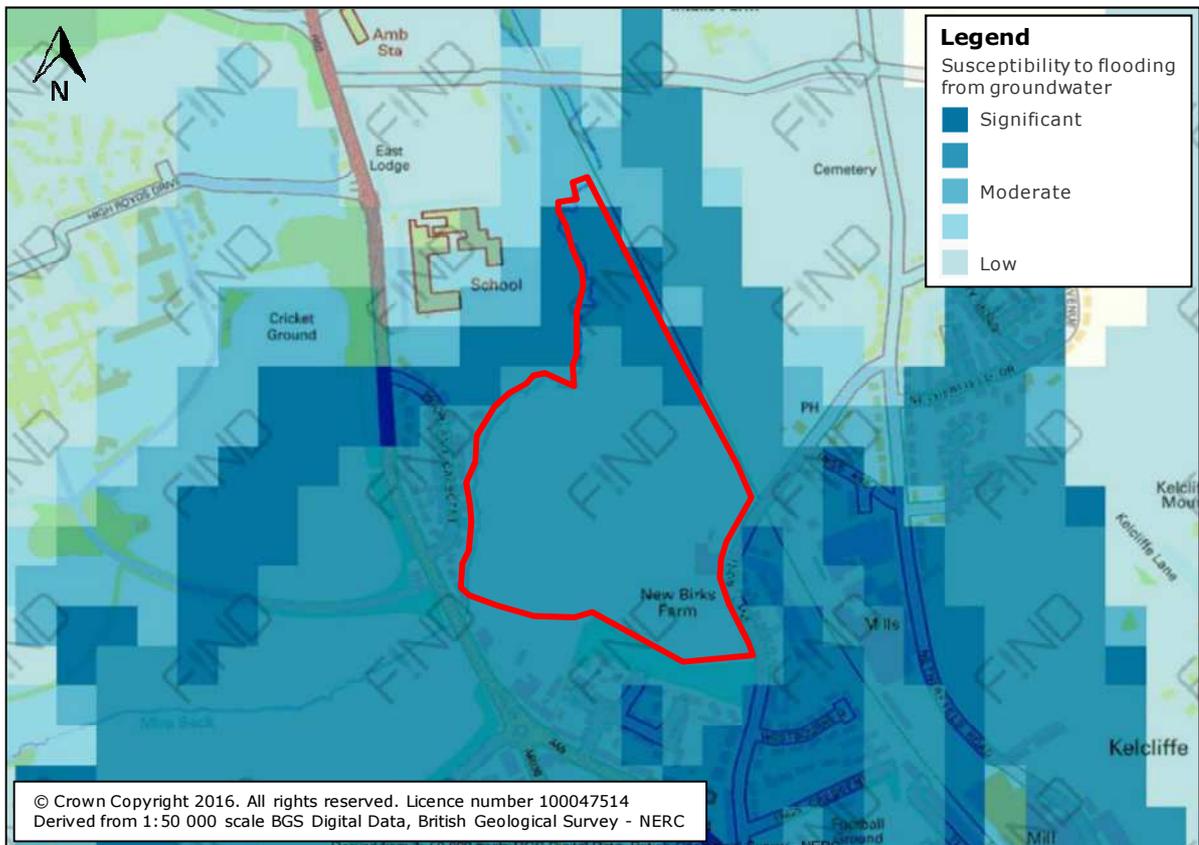
**Figure 2: Modelled Flood Outlines for 1 in 2 to 1 in 1000 annual probability**



**Figure 3: Modelled Flood Outlines for 1 in 2 to 1 in 1000 annual probability plus 20% climate change allowance**



**Figure 4: Risk of Flooding from Surface Water**



**Figure 5: Groundwater Flooding Hazard (Source: BGS)**

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**Site Allocations Plan**

**Flood Risk Exception Test –  
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Supporting Information**

Leeds Local Plan  
Development Plan Document

December 2019