



Flood Zone 1 and therefore the fluvial flood risk to the site is considered low.

Pluvial Flood Risk

The EA website states:

“Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding. Because of this, we report the highest risk within 20m of a specific location, such as an individual property. This means reports for neighbouring properties may show different levels of risk.”

Table 6 identifies the risk of surface water flooding throughout England as defined by the EA online SurfaceWater Flood Maps.

| Scenario / Annotation | Description |
|--------------------------------------|--|
| High Risk – Dark blue shading | High risk means that each year this area has a chance of flooding of greater than 3.3%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding. |
| Medium Risk – Blue shading | Medium risk means that each year this area has a chance of flooding of between 1% and 3.3%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding. |
| Low Risk – Light blue shading | Low risk means that each year this area has a chance of flooding of between 0.1% and 1%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding. |
| Very Low Risk – No shading | Very low risk means that each year this area has a chance of flooding of less than 0.1%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding. |

Table 6 – Surface Water Flood Risk descriptions



The EA Flood Risk from Surface Water – Flood Maps (**Figure 2**), shows the site and surrounding catchment is considered to be at medium to low risk of pluvial flooding.



Figure 2 - EA Flood Risk from Surface Water Flood Maps

Reservoir and Artificial Water Bodies

The Environment Agency 'Risk of Flooding from Reservoirs' maps indicate areas where peoples' lives would be in danger as a result of an uncontrolled release of water from a reservoir.

Dams in England are regulated by the Reservoirs Act 1975, which sets out stringent conditions and requires the inspection and maintenance of reservoirs capable of holding over 25,000 m³ of water above natural ground level. The Environment Agency monitor compliance at such reservoirs and employ a range of enforcement options where necessary. As such the probability of a reservoir breach is deemed to be very low.

With reference to the below online Environment Agency Risk of Flooding from Reservoir Failure Flood Maps, it is evident that the site the risk of flooding from reservoirs is low.

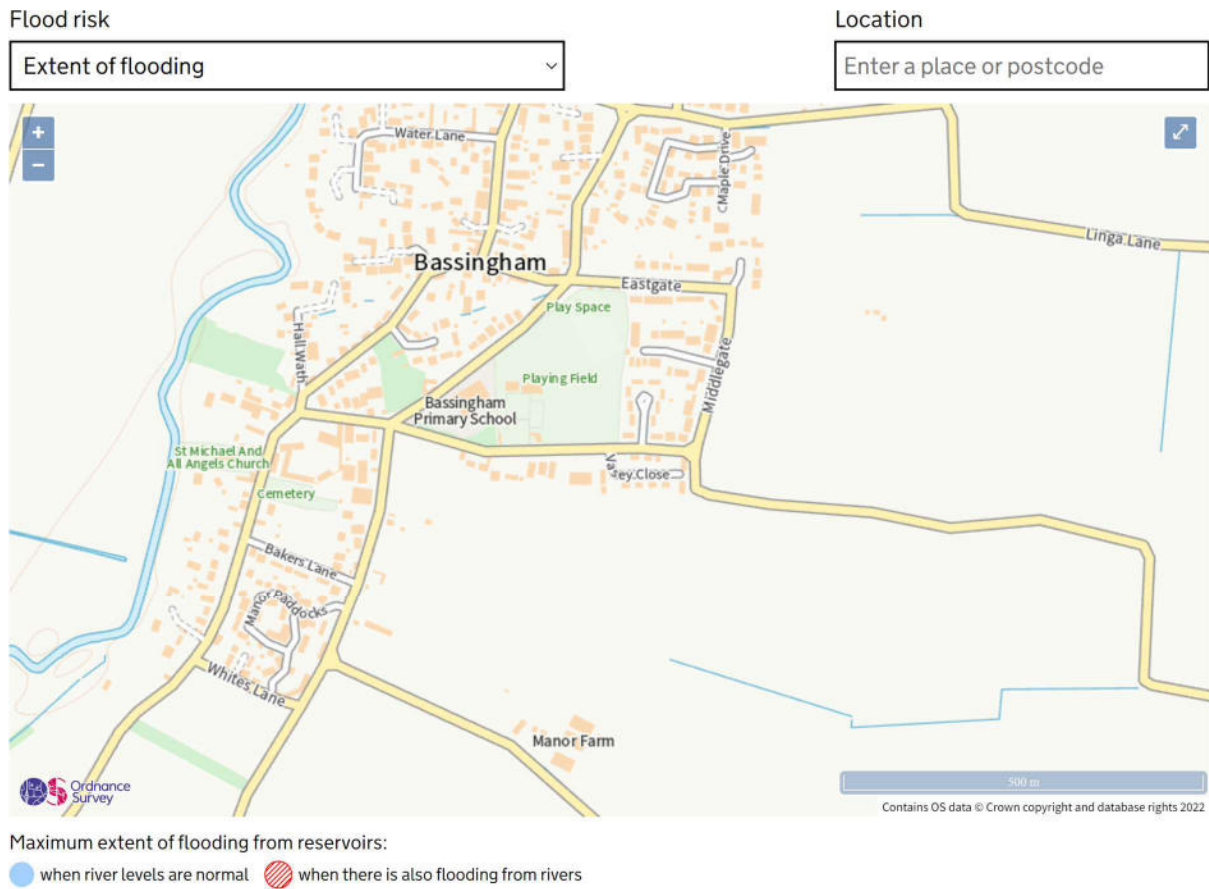


Figure 3 - EA Flood Risk from Reservoir Flood Maps

Sewer Flooding

Sewer flooding can occur when either;

- I. the capacity of the sewer system is overwhelmed by heavy rainfall and / or,
- II. the sewer network becomes blocked or is of inadequate capacity, resulting in flooding of land and/or property.

The site is not known to be susceptible to sewer flooding, however, should any sewers, drains or gullies within the site or surrounding catchment flood then the flood water would naturally flow away from the site.

Groundwater Flood Risk

Groundwater flooding generally occurs during intense and/or long-duration rainfall events which is sometimes referred to as antecedent conditions.

Groundwater flooding is most common in low-lying areas overlain by permeable soils and permeable



geology, or in areas with a naturally high-water table.

According to the Soilscales Maps produced by the National Soils Research Institute (**Figure 4**), soil conditions at the site is described as 'Loamy and clayey floodplain soils with naturally high groundwater' and within the surrounding catchment 'sandy and loamy floodplain soils with naturally high groundwater'.

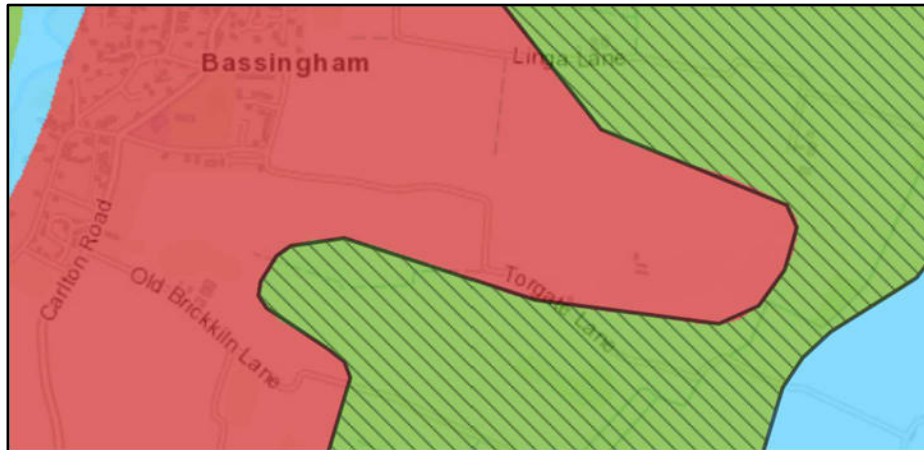


Figure 4 – Soilscales Map

Intrusive ground investigation was undertaken by Delta-Simons (reference 12-0310.01) and confirmed the description above. The ground investigation report noted sands and gravels, typical of superficial deposits. Groundwater was recorded as shallow as 600mm below ground level.

Ground conditions would suggest the site is susceptible to ground water flooding, however, the flood resilient measures recommended within this report will further reduce the likelihood and consequence of flooding and will facilitate a quicker recovery in the unlikely event of a flood through the raising of ground levels.

Geology

The (online) 1:50,000 scale bedrock geology BGS Maps suggests the sites geology is likely to comprise of Scunthorpe Mudstone Formation - Mudstone And Limestone, Interbedded and Balderton Sand and Gravel Member - Sand And Gravel Superficial Deposits as shown in **Figure 5**). Ground investigation by Delta-Simons (reference 12-0310.01) confirms the BGS Maps description and notes sandy/gravelly deposits approximately 2m – 2 ½m below ground level, underlain by mudstone. It is therefore highly unlikely that an infiltration type drainage strategy would be a viable means of managing the surface water run off from the site.



Figure 5 - BGS 1:50,000 Scale Online Mapping Site Geology

Flood Warning and Emergency Evacuation Plan

This Flood Warning and Emergency Evacuation Plan (FWaEEP) seeks to ensure that the occupants of the site are satisfactorily prepared for a potential flood and can safely evacuate from the site in the event of a flood.

The purpose of this plan is to:

- I. raise the occupants awareness of the risk of flooding to the site,
- II. detail the type of flood warnings and estimated lead time,
- III. explain:
 - a. the details of the emergency evacuation plan and the need for safe refuge,
 - b. when, how and who triggers the evacuation plan,
 - c. what actions are required by the occupants of the site,

This FWaEEP has been prepared with reference to the EA's website which contains up to date guidance on flooding issues. The information presented and conclusions drawn are based on statistical data and are for guidance purposes only. Subsequently, the conclusions drawn could differ if the information is found to be inaccurate, misleading or if additional information exists or becomes available.

Whilst every effort has been made to ensure the advice provided within this plan is accurate at the date of production, it is the responsibility of the manager/owner of the site to ensure that any additional risk specific to the site are fully considered and that the FWaEEP is kept up to date.



This FWaEEP should be read in conjunction with the site-specific Flood Risk Assessment for the site.

This FWaEEP has been prepared using our best engineering judgement, however, there are levels of uncertainty implicit in the historical data and methods of analysis. Subsequently, this FWaEEP provides no guarantee against flooding of the site or surrounding catchment, nor does it provide guarantees as to the absolute accuracy of water levels, flow rates and associated probabilities quoted. The author of this report therefore accepts no liability should this be the case.

Source of Flooding

The proposed development site is located within Flood Zone 1.

The Environment Agency (EA) Pluvial Flood Maps suggests the site is at medium to low risk of pluvial flooding. The potential flood risks posed by sewers, reservoirs and groundwater sources are also considered to be low.

Flood Warning Information

There are a variety of methods of flood warnings available throughout the UK, however, by far the best FWaEEP comes in the form of awareness, vigilance, and preparedness.

The EA operates a 5-day flood risk for England and Wales and can be viewed via [5-day flood risk for England and Wales - GOV.UK \(flood-warning-information.service.gov.uk\)](https://www.gov.uk/government/organisations/environment-agency/services/5-day-flood-risk-for-england-and-wales)

The EA operate Flood Alerts and Flood Warnings for England and Wales which can be viewed via [Flood warnings for England - GOV.UK \(flood-warning-information.service.gov.uk\)](https://www.gov.uk/government/organisations/environment-agency/services/flood-alerts) where:

Flood Alerts



Flood Alerts are to warn people of the possibility of flooding and encourage them to be alert, stay vigilant and to make early preparations for flooding.

The Environment Agency will issue this warning two hours to two days in advance of flooding via their website and the Flood Warnings Direct service. When a Flood Alert warning is issued guests/visitors should:

- Be prepared to act on the flood plan
- Prepare a flood kit of essential items
- Monitor local water levels and the flood forecasts



Figure 6 – EA Flood Alert – Flood Warning Information

EA – Flood Warning



FLOOD WARNING

Flood Warnings are to warn people flooding is expected and encourage them to take immediate action to protect themselves and their property.

This warning is given half an hour to one day in advance of flooding. At this stage guests/visitors should:

- Act now to protect property
- Block doors with flood boards or sandbags and cover airbricks and other ventilation holes
- Move family, pets and valuables to a safe place
- Turn off gas/electric/water supplies if safe to do so
- Keep a flood kit ready
- Move cars, pets, food, valuables and important documents to safety

Guests should call Floodline on 0345 988 1188 periodically and listen to and watch for weather and flood warnings on local radio and television stations. If water levels begin to fall without reaching the Park, guests should continue to monitor the situation. They should stay alert and be ready to evacuate until the Environment Agency issues the 'Warnings no longer in force' status.


Figure 7 – EA Flood Warning – Flood Warning Information



EA – Severe Flood Warning

Severe Flood Warnings are to warn people of a significant risk to life or significant disruption to communities caused by widespread or prolonged flooding and encourage them to take immediate action to protect themselves and follow the advice of the emergency services.

This warning is given when flooding poses a significant threat to life. If this warning is issued guests should:



- Stay in a safe place with a means of escape
- Be ready should you need to evacuate
- Co-operate with the emergency services
- Call 999 if you are in immediate danger

The Environment Agency aim to provide enough notice between the warning alert being issued and the commencement of flooding. If possible, it is recommended that guests evacuate when a Flood Warning or Severe Flood Warning status is issued. If flood levels continue to rise, guests are advised to evacuate before safe access is lost; driving through flood water is hazardous.

Before evacuating, guests must ensure that all windows are securely closed and locked; this will provide protection against thefts and water pressure caused by flood waters. On leaving any buildings guests must ensure that doors, including internal doors, are securely locked and closed.

Figure 8 – EA Severe Flood Warning – Flood Warning Information



EA – Flood Warnings no longer in force

This means that no further flooding is currently expected in the area. This is issued when river or sea conditions begin to return to normal. During this stage it is advised that the guests remain careful as flood water may still be around for several days.

Guests should be aware that if floodwaters have entered any buildings, they will need to be cleaned, disinfected and repaired and fully dried out prior to reoccupation. Guests must check that buildings are safe before entering and if there are any doubts professional opinion should be sought. If there is any doubt that appliances may be water damaged, they must be checked before switching the power or gas back on.

Figure 9 – EA Flood Warnings no longer in force – Flood Warning Information

Given the anticipated flood risks to the site, it is recommended that:

- I. The occupants and site and the operatives of the site should sign up to the Environment Agency Flood Line Warnings Direct via <https://fwd.environment-agency.gov.uk/app/olr/register> or by calling the Flood line on 0845 988 1188 to facilitate evacuation the event of an extreme flood event.
- II. The occupants of the site should be made fully aware of all the potential flood risk to the site and surrounding catchment.
- III. If the occupants of the site are asked to evacuate the site by a risk management authority such as the EA, LLFA, Police or Fire Services etc., they must do as soon as safe and practicable.

Flood Risk Mitigation

Given the anticipated flood risks to the site, it is recommended that:

- The occupants and site and the operatives of the site should sign up to the Environment Agency Flood Line Warnings Direct via <https://fwd.environment-agency.gov.uk/app/olr/register> or by calling the Flood line on 0845 988 1188 to facilitate evacuation the event of an extreme flood event.
- The occupants of the site should be made fully aware of all the potential flood risk to the site and surrounding catchment.
- Land levels throughout the development should be profiled to encourage the runoff and overlandflows to drain away from buildings and vulnerable infrastructure, and towards the nearest drainage point(s).



- The occupants of the site should be made fully aware of the flood risks to the site and should acknowledge, understand and adhere the emergency evacuation procedures if it is safe and practicable.
- To further reduce the consequences of flooding and to facilitate a quicker recovery in the event of an extreme flood, it is recommended that the developer should consider implementing all appropriate flood resistant and resilient measures and should give due consideration to the reconditions of the Environment Agency and DEFRA report 'Improving the flood performance of New Buildings – Flood Resilient Construction' (ISBN 9781859462874) including and not limited to:

Flood Risk Mitigation – External Works

The building(s) should:

- Be constructed with finished floor levels no less than 150mm above proposed ground level,
- Raising of external levels to direct flows towards the attenuation basin,
- Proposed levels to not increase the risk of flooding elsewhere,

Consider incorporating property level resilience and / or temporary demountable flood gates / barriers and removable airbrick covers if considered necessary

Conclusion

This FRA is fully compliant with the requirements set out in both the National Planning Policy Framework (NPPF) and the Planning Practice Guidance (PPG) to the NPPF.

This FRA has considered all source of flood risk and has demonstrated that:

- The proposed development will not increase the risk of flooding to others and will not adversely affect the local management of flood risk within the vicinity of the site.
- All measures so far as reasonably practicable to reduce flood risk to the occupants of the site have been considered and recommended within this FRA.