Survey Site Solutions Ltd

Flood Risk Assessment for Planning

May 2020

Prepared for: Mr & Mrs Creek

Our reference:
Job No-:1221-001-002

Location:

Starling House

Birks Lane

Millhouse Green

Penistone S36 9NB

Document Issue Record

Project: Starling House, Birks Lane, Millhouse Green, S36 9NB

Client: Mr & Mrs Creek

Location: Penistone

Application: Flood Risk Assessment

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1. Key Facts

Flood Risk Posed:

- Site within Flood Zone 2.
- There would appear to be a small risk of fluvial from the River Don which borders the southern boundary of the site.
- Fluvial defences to 1:30 year standard.
- Record of historical flooding at the site.
- Risk of pluvial flooding would appear to be “Medium”.
- Site located within an area where the risk of groundwater emergence is Medium to Medium High.
- Not in a groundwater source protection zone.
- Low risk to sewer surcharge flooding.
- The site is inside the maximum inundation extent on the EA Reservoir Inundation Map.

Flood Risk Management:

- Proposed buildings are set significantly above the design 1:100 year plus climate change flood level at 218.250mAOD.
- External surfaces will be constructed out of permeable material to aid the dispersion of surface water from the site.
- Levels of the site will be designed to direct the flow of any inundation into the adjacent river.
- Flood proofing will be incorporated as appropriate.
- Safe escape will be provided by a formal flood warning and evacuation plan, which will be prepared in liaison with the Council’s Emergency Planners and tied in with the emergency plans for the local area.
- The applicant will register with the Environment Agency Floodline Warnings/Alert Direct service.

2. Introduction

Survey Site Solutions Ltd have been appointed by Mr & Mrs Creek (hereinafter referred to as "the applicant") to undertake a Site Specific Flood Risk Assessment (FRA) for Planning at Starling House, Birks Lane, Millhouse Green, Penistone S36 9NB (hereinafter referred to as "the site"). The FRA has been undertaken in accordance with the National Planning Policy Framework (NPPF) March 2012 and the associated technical guidance.

The site appears to be located within Flood Zone 2 as defined by the Environment Agency (EA) on their Flood Map for Planning. Under the National Planning Policy Framework (NPPF). An FRA is required if a proposed development:

- includes building or engineering works in Flood Zone 2 or 3.
- includes building or engineering works on land classified by the Environment Agency as having critical drainage problem.
- changes the use of land or buildings in a location at risk of flooding from rivers or the sea, or with critical drainage problems.
- changes the use of land or buildings in a way that increases the flood vulnerability of the development where it may be subject to other sources of flooding.
- is larger than 1 hectare.

Given that the proposed application site is subject to other sources of flooding and includes building works, the applicant is required to submit an FRA under the NPPF. The assessment should demonstrate to the Local Planning Authority (LPA) and EA how flood risk will be managed now and over the development's lifetime, taking climate change into account, and regarding the vulnerability of its potential users.

The objectives of an FRA to support a planning application are to establish:

- whether the proposed development is likely to be affected by current or future flooding from any source.
- whether it will increase flood risk elsewhere.
- whether the measures proposed to deal with these effects and risks are appropriate.

3. Existing Situation

3.1. Site Usage:

The site is currently a maintained piece of land with several trees. It is located between the river and adjacent access road to Starling House.

Figure 1: Site frontage (Source: Google Earth)

3.2. Topography:

The site levels range from 217.400m to 218.000m AOD. These generally fall from the West to East and North to South across the site. The general level at present where the proposed buildings will be situated is 217.800m.

Figure 2: Aerial view of the site and **immediate surrounding area** (Source: Google Earth)

3.3. Geology and Soil:

The British Geological Survey (BGS) Map indicates that the bedrock underlying the site is Sandstone Group - Mudstone, Siltstone and Sandstone. Sedimentary Bedrock formed approximately 319 to 329 million years ago in the Carboniferous Period. The soil type in the area is taken from UKSO data, the site is seasonally wet acid loamy and clayey soils.

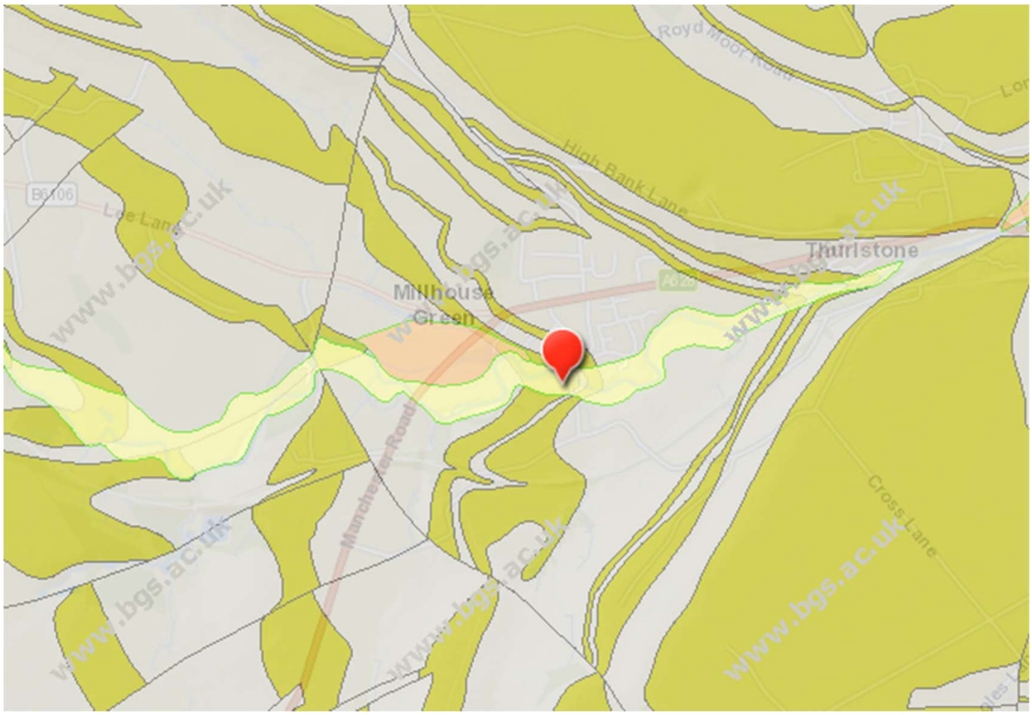

Figure 3: Local geology (Source: BGS)

Figure 4: Local soil types (Source: UKSO)

3.4 Riparian Ownership:

A riparian owner is someone who owns land or property alongside a river or other watercourses. A watercourse is any natural or artificial channel through which water flows including flow through a culvert, ditch, drain, cut, dyke, sluice or private sewer.

Riparian owners have statutory responsibilities, including:

- Maintaining riverbeds and banks.
- Allowing the flow of water to pass without obstruction.
- Controlling invasive alien species.

Further guidance for riverside property owners can be found in the Environment Agency's helpful booklet 'Living on the Edge, 5th Edition' published in June 2014.

3.5 Flood Risk Activity Permit:

Under the Environmental Permitting (England and Wales) Regulations 2010 any activity within 8m of the bank of a main river, or 16m if it is a tidal main river, or any activity within 8m of any flood defence structure or culvert on a main river, or 16m on a tidal river or any activity within 16m of a sea defence structure may require a permit. Some activities may be excluded or exempt. Further details and guidance are available on the GOV.UK website:

https://www.gov.uk/guidance/flood-risk-activities-environmental-permits.

For more information and to apply please contact the Partnerships and Strategic Overview team at:

- National Customer Contact Centre on 03708 506 506 or
- enquiries@environment-agency.gov.uk

Please be aware that Environment Agency permits, consents and licences are separate from the planning process and are not guaranteed.

The applicant has confirmed that the development is proposed within 8m of the top of bank of the Main River. Flood Defence Consent will therefore be required.

4. Proposed Development

The proposed planning application is for the redevelopment of the site with 2 number buildings proposed between the river and the access road.

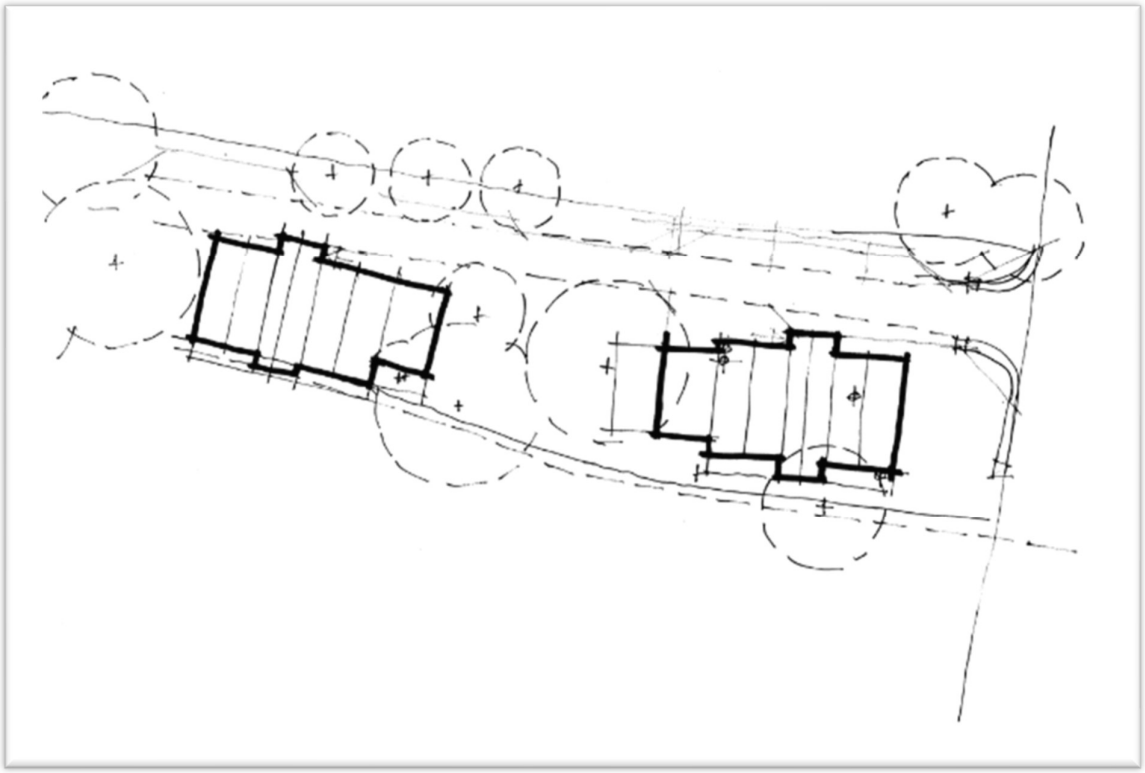

Figure 5: Proposed Site layout Plan (Source: WHP)

5. Assessment of Flood Risk

Within planning, Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. They are shown on the Environment Agency's Flood Map for Planning (Rivers and Sea), available on the Environment Agency's web site.

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water must flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

Table 1: Flood Zones

The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding.

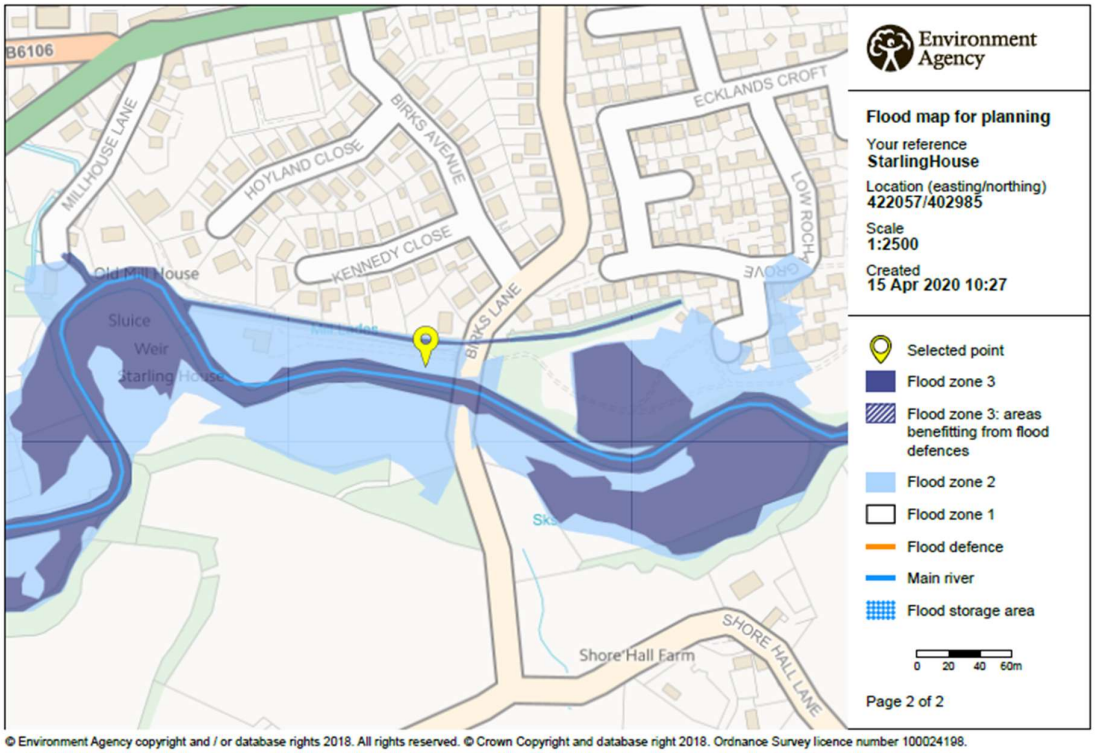

Figure 6: Environment Agency Flood Map for Planning (Rivers and Sea) (Source: EA)

The site is located within Flood Zone 2 (Medium Probability), which means it is defined as land having between 0.1% – 1% chance of flooding from rivers in any year (between 1:1000 and 1:100 chance) or between 0.1% – 0.5% chance of flooding from the sea in any year (between 1:1000 and 1:200 chance).

River Don . The River Don rises in the Pennines, west of Dunford Bridge, and flows for 70 miles (110 km) eastwards, through the Don Valley, via Penistone, Sheffield, Rotherham, Mexborough, Conisbrough, Doncaster and Stainforth.

Historical flood events:

The EA have records of historical flooding affecting areas close to the site in June 2007 & July 2012 which was caused by the main river exceeding channel capacity. This did not affect the proposed site.

5.3 Pluvial (Surface Water):

Pluvial (surface water) flooding happens when rainwater does not drain away through the normal drainage systems or soak into the ground but lies on or flows over the ground instead.

In 2013 the EA, working with Lead Local Flood Authorities (LLFAs), produced an updated Flood Map for Surface Water. It is considered to represent a significant improvement on the previous surface water flood maps available, both in terms of method and representation of the risk of flooding. The modelling techniques and data used and considerably improved and incorporated locally produced mapping where this is available to represent features best modelled at a local scale.

The Flood Map for Surface Water assesses flooding scenarios as a result of rainfall with the following chance of occurring in any given year (annual probability of flooding is shown in brackets):

- 1:30 (3.3%)
- 1:100 (1%)
- 1:1000 (0.1%)

The mapping below shows the Risk of Flooding from Surface Water centred on the site. Please note that the EA to not consider this information suitable to be used to identify the risk to individual properties or sites. It is useful to raise awareness in areas which may be at risk and may require additional investigation.

The EA Risk of Flooding from Surface Water Map suggests that the site lies within an area of “Medium” risk of flooding from surface water.

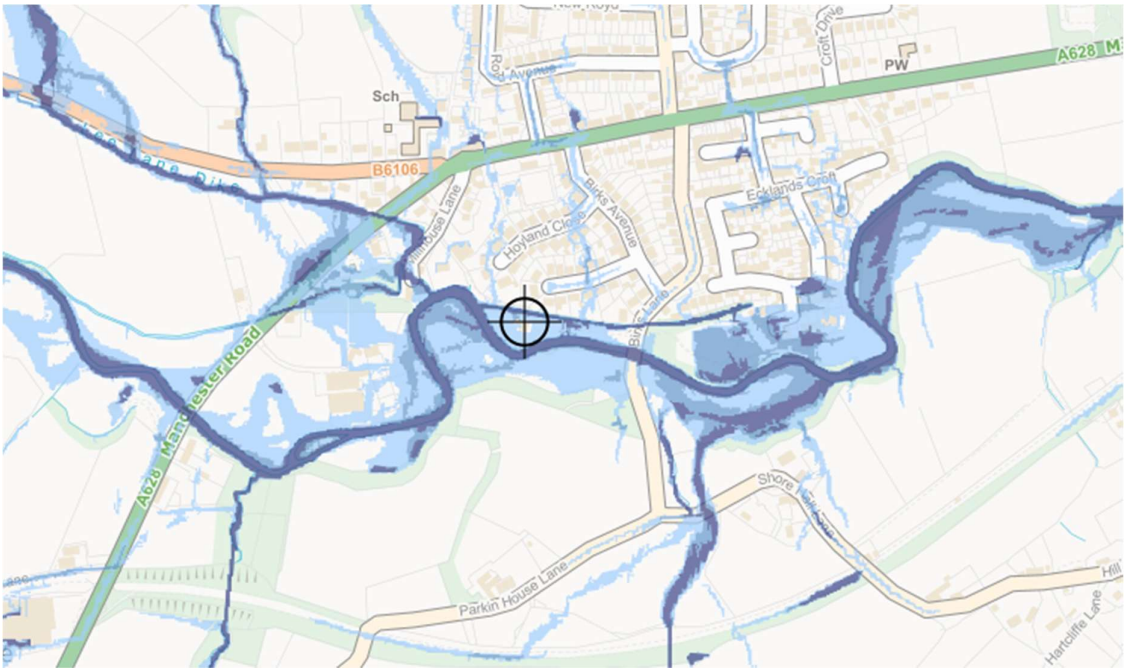

Figure 7: Extract from EA Risk of Flooding from Surface Water Map centred on postcode (Source: EA)

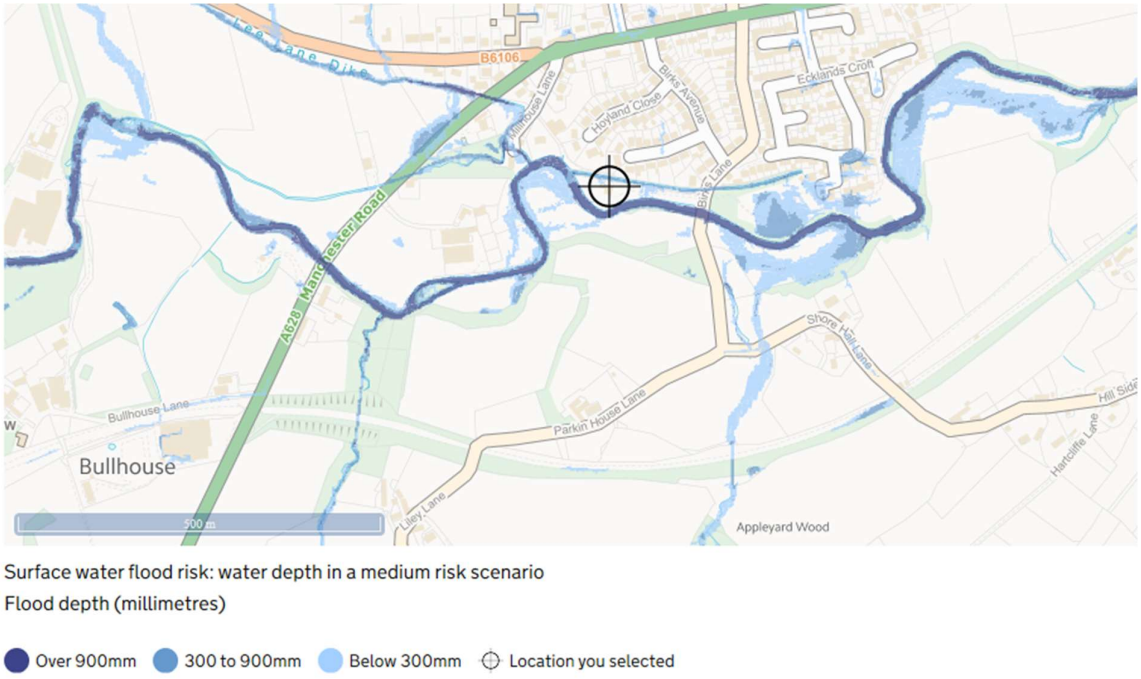

Figure 8: Extract from EA Medium Risk of Flooding from Surface Water depth centred on postcode (Source: EA)

5.4 Groundwater:

Groundwater flooding occurs as a result of water rising from the underlying rocks or from water flowing from abnormal springs. This tends to occur after much longer periods of sustained high rainfall. Higher rainfall means more water will infiltrate into the ground and cause the water table to rise above normal levels. Groundwater tends to flow from areas where the ground level is high, to areas where the ground level is low. In low-lying areas

the water table is usually at shallower depths anyway, but during very wet periods, with all the additional groundwater flowing towards these areas, the water table can rise to the surface causing groundwater flooding.

Groundwater flooding is most likely to occur in low-lying areas underlain by permeable rocks (aquifers). These may be extensive, regional aquifers, such as chalk or sandstone, or may be localised sands or river gravels in valley bottoms underlain by less permeable rocks. Groundwater flooding takes longer to dissipate because groundwater moves much more slowly than surface water and will take time to flow away underground.

According to Groundwater Vulnerability Map by E.A the site is at Medium to Medium-High risk of groundwater flooding. This is taken over 1km squares and subject to certain interpolation.

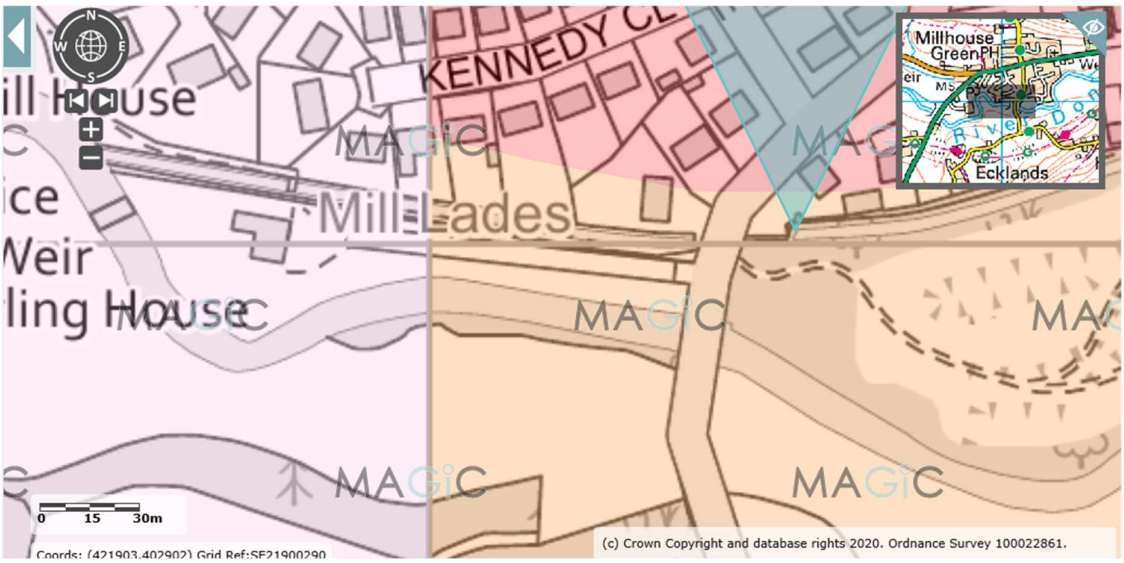

Figure 9: Extract from Areas Susceptible to Groundwater Flooding (Source: E.A/Defra)

No further information has been provided to suggest that the site is susceptible to groundwater flooding.

The Environment Agency has defined Source Protection Zones for groundwater sources such as wells, boreholes and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area. The zones are used in conjunction with the EA Groundwater Protection Policy to set up pollution prevention measures in areas that are at a higher risk, and to monitor the activities of potential polluters nearby. The published Environment Agency Groundwater Vulnerability map shows the site to be located outside any area classified as a Groundwater source protection zone.

5.5 Sewer Surcharge:

Sewer flooding occurs when the sewer network cannot cope with the volume of water that is entering it. It is often experienced during times of heavy rainfall when large amounts of surface water overwhelm the sewer network causing flooding. Temporary problems such as blockages, siltation, collapses and equipment or operational failures can also result in sewer flooding.

All Water Companies have a statutory obligation to maintain a register of properties/areas which have reported records of flooding from the public sewerage system, and this is shown on the DG5 Flood Register. This includes records of flooding from foul sewers, combined sewers and surface water sewers which are deemed to be public and therefore maintained by the Water Company. The DG5 register records of flood incidents resulting in both internal property flooding and external flooding incidents. Once a property is identified on the DG5 register, water companies can typically put funding in place to address the issues and hence enable the property to be removed from the register. It should be noted that flooding from land drainage, highway drainage, rivers/watercourses and private sewers is not recorded within the register.

The water company that serves the site and surrounding area is Yorkshire Water. No information has been provided to suggest that the site is susceptible to sewer surcharge flooding.

5.6 Other Sources:

Reservoirs with an impounded volume in excess of 25,000 cubic metres (measured above natural ground level) are governed by the Reservoirs Act and are listed on a register held by the Environment Agency. The site is inside the maximum inundation extent on the EA Reservoir Inundation Map. The EA also advise on their website that reservoir flooding is extremely unlikely. There has been no loss of life in the UK from reservoir flooding since 1925.

All major reservoirs must be inspected by specialist dam and reservoir Engineers. In accordance with the Reservoirs Act 1975 in England, these inspections are monitored and enforced by the EA themselves. The risk to the site from reservoir flooding is therefore minimal and is far lower than that relating to the potential for fluvial / tidal flooding to occur. The Environment Agency Reservoir Flood Map illustrated below, illustrates the largest area that might be flooded if the storage area were to fail and release the water it is designed to hold during a flood event.

Records of flooding from reservoirs and canals are erratic as there is no requirement for the Environment Agency to provide information on historic flooding from canals and raised reservoirs on plans. In particular, the NPPF does not require flood risk from canals and raised reservoirs to be shown on the Environment Agency flood zones.

Overflows from canals can be common as they are often fed by land drainage, and often do not have controlled overflow spillways. Occasionally, major bank breaches also occur, leading to rapid and deep flooding of adjacent land.

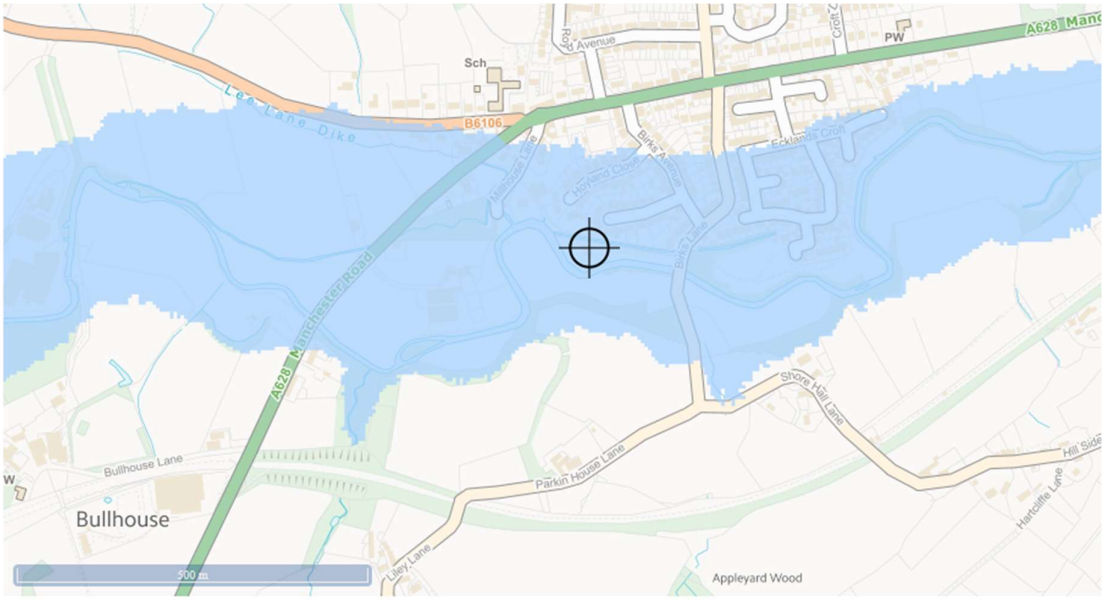

Figure 10: Maximum extent of flooding from reservoirs (Source: EA)

6 Flood Risk Management Measures

6.2 Vulnerability to flooding:

The NPPF classifies property usage by vulnerability to flooding.

The existing site usage is classified as “less vulnerable” as the site is currently un-occupied.

Post development, the site will become “more vulnerable”, as the proposed application is for redevelopment of the site into 2 new buildings and associated parking.

Accordingly, it is considered that the vulnerability of the site will increase post development.

6.3 EA Standing Advice:

The EA Standing Advice guidance is for domestic extensions and non-domestic extensions where the additional footprint created by the development does not exceed 250m^2. It should not be applied if an additional dwelling is being created, e.g. a self-contained annex or additional commercial unit.

6.4 Physical Design Measures:

The proposed application is for the redevelopment of the site with 2 new building & associated parking.

The proposed ground floor levels will be set significantly above the design 1:100 year plus climate change flood level at 218.250m AOD.

External surfaces will be constructed out of permeable material to aid the dispersion of surface water from the site.

The proposed external levels to be designed to fall from the north east to the south west boundary of the site. This will channel any inundation of surface water into the River Don.

Further attenuation will be installed to cater for roof run off generated by the new buildings and controlled by a flow control unit at a rate to be agreed with Local Authority and its drainage team. This will then be discharged into the river Don.

To help protect against flooding during extreme events, the applicant has agreed to implement flood resistant design measures into the buildings, in consultation with the Local Authority building control department. These measures could include the following where possible:

- Solid (concrete) ground floor.
- Closed-cell foam used in wall cavities.
- Waterproof ground floor internal render.
- External walls rendered resistant to flooding to first floor level.
- Exterior ventilation outlets, utility points and air bricks fitted with removable waterproof covers.
- Ground floor electrical main ring run from first floor level; and on separately switched circuit from first floor.
- Electrical incomer and meter situated at first floor level or above.
- Boilers, control and water storage / immersion installed at first floor level or above.
- Gas meter installed at first floor level or above.
- Plumbing insulation of closed cell design.
- Non-return valves fitted to all drain and sewer outlets.
- Manhole covers secured.
- Anti-syphon fitted to all toilets.

- Kitchen units of solid, water resistant material.

Use of MDF carpentry (i.e. skirting, architrave, built-in storage) avoided at ground floor level.
Stairs of solid hardwood construction with wood faces treated to resist water penetration.
The applicant should also consider the use of demountable flood defence barriers to defend ground level doorways and low windows.

6.5 Safe Escape:

The NPPF requires a route of safe escape for all residents and users to be provided from new residential properties in Flood Zone 2. Safe escape is usually defined as being through slow moving flood water no deeper than 25cm during the 1:100 year fluvial / 1:200 year tidal plus allowance for climate change flood event.

As such, safe escape will be provided by a formal flood warning and evacuation plan, which will be prepared in liaison with the Council's Emergency Planners and tied in with the emergency plans for the local area.

Owners, occupants and tenants of the units should follow the warning and evacuation procedure detailed in the following section.

6.6 Flood Warning:

The EA is responsible for issuing flood warnings. Flood warnings are issued to the emergency services and local authorities. Both private individuals and organisations can sign-up to receive warnings via phone, text or email. This system of receiving warnings is currently voluntary.

Advice regarding severe flood warnings will generally be given during weather forecasts on local radio and TV. In the case of extreme events, warnings can also be disseminated via door to door visits by the police or locally appointed flood wardens.

The site lies within Flood Zones 2. The EA issue flood warnings/alerts to specific areas when flooding is expected. It is recommended that the applicant registers online with the free Environment Agency Flood line Warnings/Alert Direct service at https://www.gov.uk/sign-up-for-flood-warnings to receive flood warnings by phone, text or email.

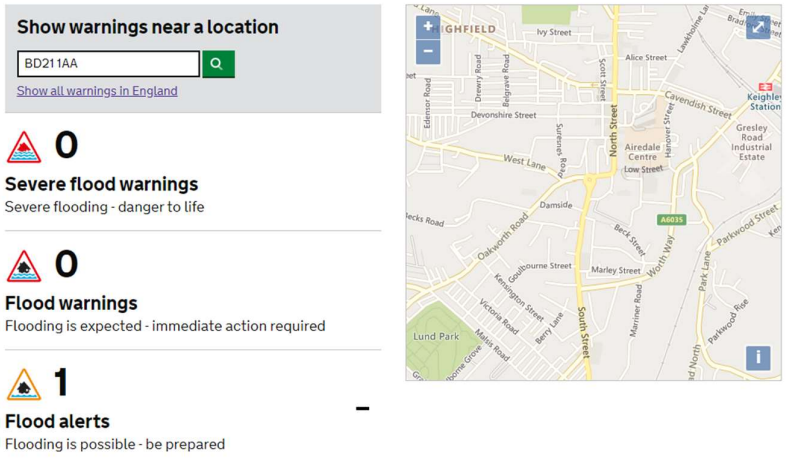

Figure 11: Extract from Environment Agency Flood Warning Area Map (Source: EA)

Flood warning service has three types of warnings that will help you prepare for flooding and act:

Flood Warning	Flood Alert	Flood Warning	Severe Flood Warning
			
What it means?	Flooding is possible. Be prepared.	Flooding is expected. Immediate action required.	Severe flooding. Danger to life.
When it's used?	Two hours to two days in advance of flooding.	Half an hour to one day in advance of flooding.	When flooding poses a significant threat to life.
What to do?	Be prepared to act on your flood plan. Prepare a flood kit of essential items. Monitor local water levels and the flood forecast on our website.	Move family, pets and valuables to a safe place. Turn off gas, electricity and water supplies if safe to do so. Put flood protection equipment in place.	Stay in a safe place with a means of escape. Be ready should you need to evacuate from your home. Co-operate with the emergency services. Call 999 if you are in immediate danger.

6.7 Flood Plan:

It is recommended that the applicant and future owners, occupiers and Landlords of the property prepare a flood plan to protect life and property during a flood event:

Before a flood:

- Find out if you are at risk of flooding.
- Find out if you can receive flood warnings.
- Prepare and keep a list of all your important contacts to hand or save them on your mobile phone.
- Think about what items you can move now and what you would want to move to safety during a flood such as pets, cars, furniture, and electrical equipment.
- Know how to turn off gas, electricity and water supplies .
- Prepare a flood kit of essential items and keep it handy. It can include copies of important documents, a torch, a battery-powered or wind-up radio, blankets and warm clothing, waterproofs, rubber gloves and a first aid kit including all essential medication.
- Consider buying flood protection products such as flood boards and airbrick covers to help reduce flood water getting into your property.

During a flood:

- Tune into your local radio station on a battery or wind-up radio.
- Fill jugs and saucepans with water.
- Grab your flood kit - if you have prepared one.
- Collect blankets, torch, first aid kit, medication and food.
- Move important documents, personal items, valuables, and lightweight belongings upstairs or to high shelves.
- Raise large items of furniture or put them in large bags if you have them.
- Move people, outdoor belongings, cars and pets to higher ground.
- Switch off water, gas and electricity at mains when water is about to enter your home. Do not touch sources of electricity when standing in water.
- Fit flood protection products, if you have them, for example flood boards, airbrick covers, sandbags.
- Put plugs in sinks and baths. Weigh them down with a pillowcase or plastic bag filled with soil.
- If you do not have non-return valves fitted, plug water inlet pipes with towels or cloths.
- Move your family and pets upstairs or to a high place with a means of escape.
- Listen to the advice of the emergency service and evacuate if told to do so.
- Avoid walking or driving through flood water. Six inches of fast-flowing water can knock over an adult and two feet of water can move a car.

After a flood:

- If you have flooded, contact your insurance company as soon as possible.
- Take photographs and videos of your damaged property as a record for your insurance company.
- If you don't have insurance, contact your local authority for information on grants and charities that may help you.
- Flood water can contain sewage, chemicals and animal waste. Always wear waterproof outerwear, including gloves, wellington boots and a face mask.
- Have your electrics, central heating and water checked by qualified engineers before switching them back on.

6.7.0 Surface Water Drainage Strategy:

The development will utilise Sustainable Urban Drainage (SuDs) design in accordance with the NPPF for Planning Applications hierarchy as follows:

1. Store rainwater for later use.
2. Infiltration techniques.
3. Attenuate rainwater by storing in tanks for gradual release.
4. Discharge rainwater direct into watercourse.
5. Discharge rainwater into surface water sewer.
6. Discharge rainwater into a combined sewer.
7. Attenuation of rainwater in ponds or open water features with controlled discharge into the local watercourse.

Rainwater from the buildings will be stored in an attenuation tank and released at an agreed rate into the River Don.

All surface water runoff generated by the proposed development up to 1:100-year rainfall event (plus climate change) will be managed by Infiltration methods & techniques.

7 Conclusion

Survey Site Solutions Ltd have been appointed by Mr & Mrs Creek to undertake a Site-Specific Flood Risk Assessment (FRA) for Planning at Land at Starling House, Birks Lane, Millhouse Green, Penistone S36 9NB . The FRA has been undertaken in accordance with the National Planning Policy Framework (NPPF) March 2012 and the associated technical guidance.

The existing site usage is classified as "less vulnerable" as the site is currently unoccupied. Post development, the site will become "more vulnerable", as the proposed application is for redevelopment of the site with 2 new buildings & parking. Accordingly, it is considered that the vulnerability of the site will increase post development.

The site is located within Flood Zone 2 (Medium Probability), which means it is defined as land having between a 1 in 100 and 1 in 1,000 annual probability of river and sea flooding.

The EA have records of historical flooding having affected the site and surrounding area in 2007 & 2012.

The EA Risk of Flooding from Surface Water Map suggests that the site lies within an area at risk of flooding from surface water.

The site is located within an area where the risk of groundwater emergence is Medium to Medium high and located outside any area classified as a Groundwater source protection zone.

Site located outside any area classified as a Groundwater source protection zone.

To help protect against flooding during extreme events, the applicant has agreed to implement flood resistant design measures into the property, in consultation with the Local Authority building control department.

Safe escape will be provided by a formal flood warning and evacuation plan, which will be prepared in liaison with the Council's Emergency Planners and tied in with the emergency plans for the local area.

Owners, occupants and tenants of the units should follow the warning and evacuation procedure.

In summary:

- Site within Flood Zone 2.
- The risk would appear to be a small risk of fluvial from the River Don which borders the southern boundary of the site.
- Fluvial defences to 1:30 year standard.
- Record of historical flooding at the site.
- Risk of pluvial flooding.
- Site located within an area where the risk of groundwater emergence is Medium to Medium High.
- Not in a groundwater source protection zone.
- Low risk to sewer surcharge flooding.
- The site is inside the maximum inundation extent on the EA Reservoir Inundation Map.
- External surfaces will be constructed out of permeable material to aid the dispersion of surface water and groundwater from the site.
- Flood proofing will be incorporated as appropriate.
- Safe escape will be provided by a formal flood warning and evacuation plan, which will be prepared in liaison with the Council's Emergency Planners and tied in with the emergency plans for the local area.
- The applicant will register with the Environment Agency Flood Line Warnings/Alert Direct service.

Assuming accordance with these flood risk management measures, Survey Site Solutions Ltd consider the proposed application to be suitable in flood risk terms.