Flood Risk Assessment

National Planning Policy Framework
Development and Flood Risk

Flood Risk Assessment

For

Proposed Housing, Sheffield Road, Penistone

on behalf of

The Cooperative Estates

by

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Revisions

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Revision	Date	Description of Revision
/	5th December 2012	First Issue
A		
B		
C		

1.0 Introduction

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1.1 Project Background

1.1.1 Curtins Consulting was appointed by The Co-operative estates to undertake a Flood Risk Assessment for the proposed development at Sheffield Road Penistone . The FRA provides information on the nature of flood risk at the site and follows Government guidance with regards to development and flood risk.

1.1.2 The report is based on currently available information and preliminary discussions.

1.1.3 Proposals contained or forming part of this report represent the design intent and maybe subject to alteration or adjustment in completing the detailed design for this project. Where such adjustments are undertaken as part of the detailed design and are deemed a material derivation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.

1.1.4 Where the proposed works, to which this report refers, are undertaken more than twelve months following the issue of this report Curtins Consulting shall reserve the right to re-validate the findings and conclusions by undertaking appropriate further investigations at no cost to Curtins Consulting.

1.1.5 The main flood risk to the site is considered to be surface water management of proposed discharge into the existing sewer network serving the existing development site.

1.2 Scope of Flood Risk Assessment

1.2.1 The assessment is to be undertaken in accordance with the standing advice and requirements of the Environment Agency for Flood Risk Assessments as outlined in the Communities and Local Governments Technical Guidance to the National Planning Policy Framework (NPPF).

1.2.2 Environment Agency guidance dictates that In Flood Zone 1, where the risk of flooding from rivers or the sea is classified as low, a FRA is still required but it should be focused on the management of surface water run-off. Development that increases the amount of impermeable surfaces can result in an increase in surface water run-off, which in turn can result in increased flood risk both on site and elsewhere within the catchment. This is particularly important for larger scale sites, which have the potential to generate large volumes of surface water run-off. In addition, the site may also still be at risk from other sources of flooding (e.g. groundwater and overland runoff), which are not considered in the mapping of Flood Zones

1.2.3 The assessment will:

- Investigate all potential risks of flooding to the site,
- Consider the impact the development may have elsewhere with regards to flooding,
- Consider outline design proposals to mitigate any potential risk of flooding determined to be present.

1.3 Proposed Development

1.3.1 The Scheme consists of the anticipated construction of 44 new dwellings off Lairds Way, Penistone.

2.0 Existing Site Details

2.1 History and Current Use

2.1.1 The site is located approximately 750 metres to the east of Penistone centre with the M1 motorway a further 8 kilometres to the east, as shown in Figure 1 and 2. Prior to approximately 1893 the site consisted of open fields, however it has been noted that following this date a large building forming part of the Yorkshire Steel and Iron Works dominated the site. This development remained on the site in various guises until approximately 1938 where it has been identified that all buildings associated with the works have been completely demolished.

Figure 1: Aerial Photograph

2.2 Existing Watercourse

2.2.1 At its narrowest point the development site is located approximately 100 metres to the south of the River Don.

2.2.2 The Scout Dike and reservoir lies a further 2km to the north west.

2.2.3 Cubley Brook has been identified in the vicinity of the proposed site; however it is my belief that to negotiate the existing railway lines to the south of our development site the watercourse enters into a culvert before ultimately discharging into the River Don.

2.2.4 No evidence of the above culvert has been received to date, however its presence should be anticipated.

2.0 Existing Site Details

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2.3 Existing Drainage

2.3.1 Given the sites current status it is unlikely any existing drainage networks are present across the site, however it is anticipated that an existing network will be available beneath Sheffield Road.

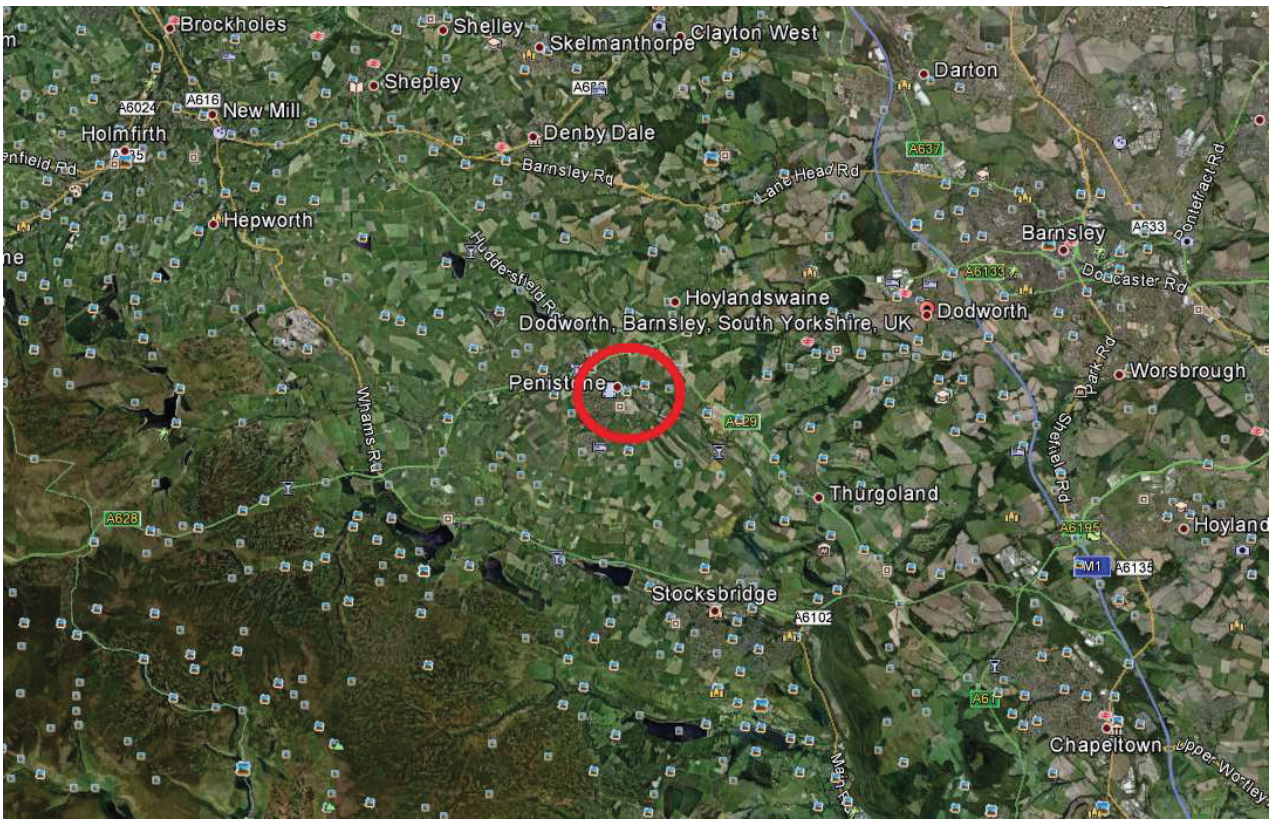
2.3.2 There is an existing housing estate which lies directly to the east of the proposed site, subject to approval it may be possible to utilise the existing drainage networks within this development.

2.4 Topography

2.4.1 The levels across the existing site vary marginally with an average fall from east to west of approximately 1 metre, however the site itself is significantly elevated from Sheffield Road with an average difference in height being noted at approximately 9m.

3.0 Development and Flood Risk

Figure 2: Site Location Plan



3.1 National Planning Policy Framework

3.1.1 In March 2012 the Department of Communities and Local Government published National Planning Policy framework document (NPPF) which provides technical guidance on how flood risk should be assessed during the planning and development process.

3.2 Table D1 (extract NFFP) Flood Zone Classifications

Zone 1 Low Probability

Definition

This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%)

Appropriate Uses

All uses of land are appropriate in this zone

Zone 2 Medium Probability

Definition

This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 01%) in any year.

Appropriate uses

The water-compatible, less vulnerable and more vulnerable uses of land and essential infrastructure in Table D2

Zone 3a High Probability

Definition

This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year

Appropriate uses

The water compatible and less vulnerable uses of land in table D2. The highly vulnerable uses should not be permitted and more vulnerable and essential infrastructure should only be permitted if the Exception Test is passed. Essential infrastructure permitted should be designed and constructed to remain operation and safe for users in times of flood.

Zone 3b The Functional Flood Plain

Definition

This zone comprises land where water has to flow or be stored in times of flood. SFRA's should identify this Flood Zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability agreed between the LPA and EA, including water conveyance routes)

Appropriate uses

Only the water-compatible uses and essential infrastructure listed in table D2 that has to be there should be permitted in this zone. It should be designed and constructed to:

- remain operational and safe for users in flood

- result in no loss of flood plain storage

- not impede water flows, and

- not increase flood risk elsewhere

Essential infrastructure in this zone should not pass the Exception Test.

3.3 Table D2 (extract NPPF) Flood Risk Vulnerability Classification

Essential Infrastructure

Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk, and strategic utility infrastructure, e.g. primary substations and electricity generating power stations

Highly Vulnerable

Police, Ambulance and Fire stations and command Centres and communications required during flooding.

Emergency dispersal points.

Basement dwellings, caravans, mobile homes and park homes for permanent residence.

Installations requiring hazardous substance consent.

More Vulnerable

Hospitals

Residential institutions

Buildings used for dwelling houses, student hall, hotels etc.

Non residential for health services, nurseries and educational establishments

Landfill and sites used for waste management facilities or hazardous waste

Camping or caravans subject to specific warning and evacuation plan

Less Vulnerable

Buildings used for shops, financial, professional and other services; restaurants, cafes, hot food takeaways, offices, general industry, storage and distribution, assembly and leisure.

Land and buildings for agriculture and forestry.

Waste treatment, except landfill and hazardous waste

Mineral working and processing (except sand and gravel working)

Water treatment plants and sewage treatment plants (if adequate pollution control measures are in place)

Table 3: Flood risk vulnerability and flood zone 'compatibility'

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	×	×	×

Key: ✓ Development is appropriate.
× Development should not be permitted.

3.0 Development and Flood Risk

3.4 Site Specific NPPF Flood Risk Categorisation

3.4.1 To assess the NPPF flood risk classification for the site the first step was to inspect the Environment Agency web based flood mapping data (Extract shown Figure 3).It can be seen from this data that the site (Shown edged red) is clear of the blue and turquoise shaded sections noted on the drawing key and areas subject to either river or tidal flooding (blue), or areas of extreme flooding (turquoise).

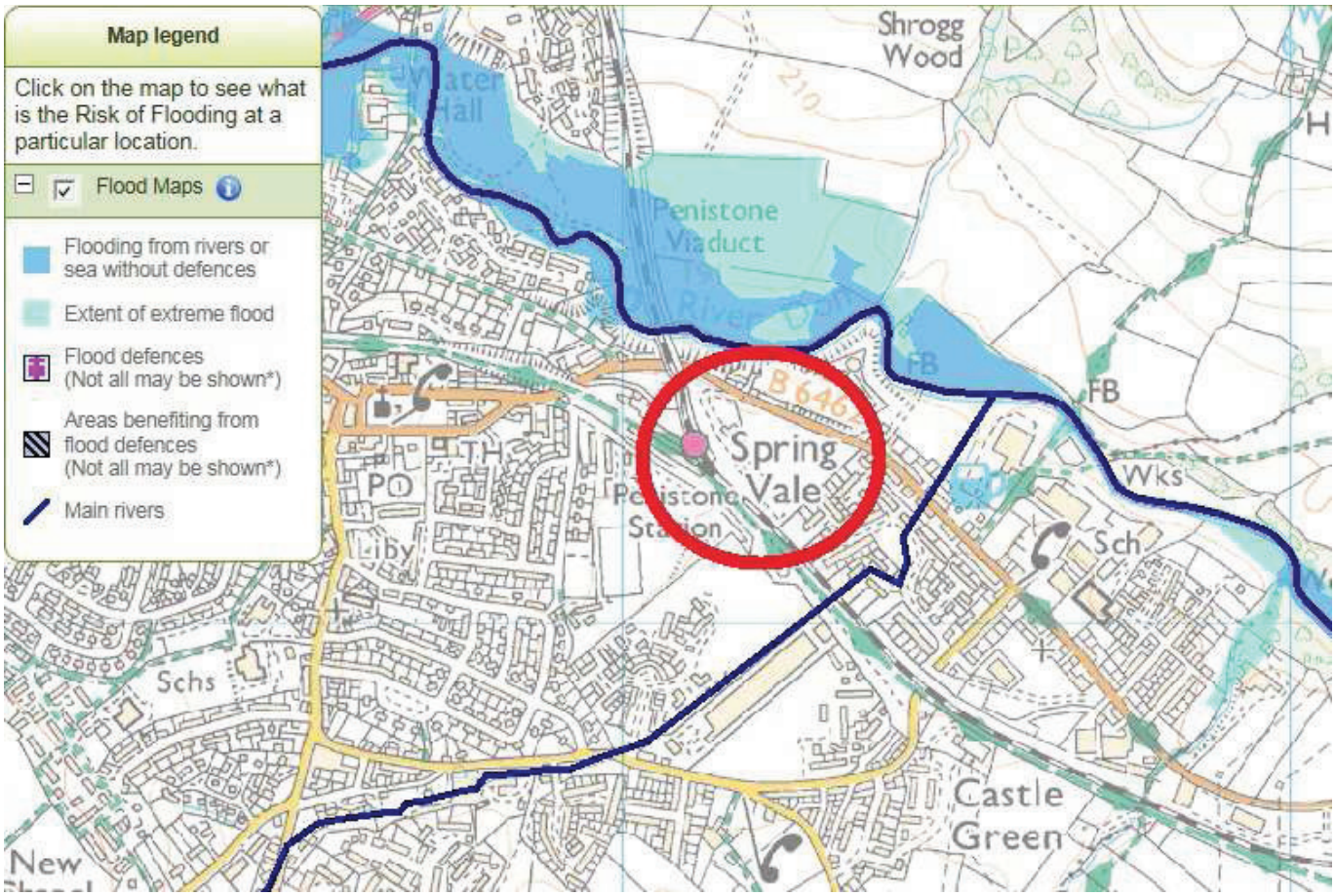
3.4.2 Where a site is located in the white (unshaded) areas shown on the Environment Agency web based flood mapping, it is generally deemed to be classified as Zone 1.

3.4.3 Referring to table D1, Flood Zone Classifications from NPPF, this site comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%) and therefore all uses of land are appropriate in this zone.

3.5 Sequential and Exception Tests

3.5.1 Figure 3 shows the site is located within a flood zone 1 area the sequential and exception tests are not required to be undertaken.

Figure 3: Environment Agency Flood Map



4.0 Hydrological Assessment

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4.1 Assessment approach

4.1.1 This study assesses the risk from different types of flooding to the development and the risk of flooding from the development as the site lies within flood zone 1 and has a development area of approximately 1.4 hectares an assessment on the surface water run off management is necessary as stated in the environment agency flood risk assessment guidance.

4.1.2 Although a check of the Environment Agencies web based flood map indicates the site lies within a flood zone 1 area, a web based flood map can only be used as a broad indicator of the actual flood risk to a particular site.

4.1.3 A Strategic flood risk assessment was produced by JBA Consulting on behalf of Barnsley Metropolitan Borough Council in September 2010 (shown in appendix A) this shows the site still lies within an area categorised as having a very low risk of flooding.

4.2 Surface Water Management

4.2.1 The development site is currently identified as being approximately 100% permeable; the proposed new housing development will increase the surface water run-off with the introduction of added areas of impermeable surfaces.

4.2.2 The existing Greenfield run off rate for the site has been estimated at 6.97 litres per second using WINDES drainage modelling software for a 1 in 100 year storm excluding climate change.

4.2.3 The proposed area of new impermeable surfaces has been identified at approximately 0.741 hectares just over 50% of the existing total site area, achieving an estimated discharge rate of 183.7 litres a second For a 1 in 100 year storm, 15 minute peak plus 20% climate change.

4.2.4 Following assessment of the Geo-Environmental report produced in November 2012 by Opus, it is noted that due to a high concentration of made ground beneath the site soakaway drainage will not be a viable option.

4.2.5 In order to restrict the anticipated flow from the site to the previously identified Greenfield run off rates, a volume of storage in the region of 327 to 472 m3 will be necessary.

5.0 Mitigation

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5.1 Surface Water Flooding Mitigation

5.1.1 Any new development site drainage should be designed in accordance with current best practice to provide adequate capacity to convey flows and deal with the 100 year with climate change storm effectively on the site. Peak flows should be restricted to pre-refurbishment run-off rates and adequate attenuation should be provided to keep the stored volume of surface water safely on the site.

5.1.2 Assuming the existing sewers will be maintained by their adopted authority, it can be assumed risk of flood from blockage or overloading is minimal.

5.1.3 To minimise localised flooding within the site the drainage design should ensure that gullies, drainage channels and drains are all suitably sized to accommodate peak storm flows. Also, all inlet features should have suitably sized sumps to catch silts and should be subject to a documented routine maintenance and cleansing regime.

5.1.4 It shall be assumed that when the site is developed the existing foul drainage network will be utilised, under these circumstances the existing network should be thoroughly checked for line blockages and collapse with any defects to be corrected accordingly under the instruction of the drainage design engineer.

5.1.5 Windes drainage modelling software has been used to identify the potential volume of storage required to achieve a similar flow rate to the existing greenfield run off rate. It is anticipated that a potential storage volume in the region of 327m3 to 472m3 will be required for a 1 in 100 year storm plus 20% climate change.

5.1.6 Flooding risk from the development site to the surrounding areas is therefore considered low.

6.0 Drainage Strategy

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6.1 Drainage Strategy

6.1.1 Surface water discharge will be made up of run off from the increased areas of impermeable material in relation to the new development. Roof water and clean run off from paved areas around the site will be collected by a series of yard gullies or channel drains before passing through a proposed retention feature before ultimately being discharged into the existing surface water drainage network.

6.1.2 The proposed foul water network to tie into existing system at a convenient location off site.

6.1.3 Any new surface drainage network for the development shall be designed to not surcharge for a 1 in 30 year storm event plus climate change and flood water generated from a 1 in 100 year plus climate change rainfall event shall be constrained within areas on site so not to cause damage to buildings, essential services or adjoining developments and services.

7.0 Conclusions and Recommendations

7.1 Conclusion and Recommendations

- A Flood Risk Assessment has been conducted for the proposed development on Sheffield Road, Penistone. The FRA has been conducted in accordance with the requirements of NPPF.
- The EA flood map shows the development site in flood zone 1.
- The proposed surface water drainage network should accommodate for all flood events up to the 1 in 30 year plus climate change.
- SUDS should be incorporated into the design wherever possible.
- Building Levels should be set no lower than the existing site levels to ensure the site remains as a flood zone 1 area.
- Close monitoring of ground water levels around the site should be undertaken to ensure the finished levels are sufficiently raised above the water table.
- Any existing drainage to be utilised within the existing development should be thoroughly checked for line blockages and collapses and any defects are to be corrected accordingly.
- The final design of the drainage networks shall be in accordance with the legislation set by the Environment Agency, Local Authority and Untied Utilities.
- A suitable maintenance strategy should be provided to ensure the drainage network is cleaned regularly.

Therefore, if the principles set out within the previous sections of this report are followed and developed at detailed design stage by the design engineer, the site can be considered:

- To have a low probability of suffering from any form of flooding
- To be proved as not increasing the probability of flood risk to other properties within the local catchment area.