Bland and Swift
CONSULTING STRUCTURAL & CIVIL ENGINEERS

FLOOD RISK ASSESSMENT

THIRSTIN MILL, HONLEY

FOR

NORTH PARK HOMES

Our Ref: NCB/10991

Summary

Site	Thirstin Mills, Honley
Location	To the West of Thirstin Road
Client	North Park
Grid Reference	413447 412071
Postcode	HD9 6JJ
Area	Approx 14400 Square Metres
EA Flood Zone Classification	3 and 2
SFRA	Calder Valley, Kirklees and Calderdale
Previous Site Use	Woollen Spinning Mill
Current Site Use	None – Brownfield site
Description of Proposed Development	17 No detached dwelling houses
Vulnerability Classification	More Vulnerable
History of Flooding	None found
Flood Defence Level	Varies
Summary of Risks	Surface Water Flooding Fluvial flooding from the watercourse Groundwater from the banking
Summary of Surface Water Runoff	The attenuation of surface water runoff within the new development will be provided by an underground surface water attenuation tank. This will reduce surface water discharge rates from the site relative to the previous provision and will protect the site for rainfall events up to the 1 in 100 year plus 30% for climate change events.

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Appendices

1. Introduction

1.1 *Scope of the Assessment*

1.1.1. Bland & Swift have been appointed by North Park Homes to carry out a flood risk assessment (FRA) for the proposed development at The former Thirstin Mill site, Honley, National Grid Ref 413447 412071.

1.1.2 The proposed development is for the construction of 17 No detached dwelling houses. The overall site area is approximately 14400 square metres.

1.1.3 It is proposed to submit a planning application and this assessment should provide the level of detail necessary to show that the potential effects of the proposed development with respect to flood risk have been considered by a) identifying the source and the probability of flooding of the site, also including for the effects of climate change, b) evaluating the consequences of flooding on the development and also consequences caused by the development and stating how this will be controlled and managed, c) showing that flood risk issues evaluated by this assessment comply with current guidance.

2. Policy and Guidance

2.1 *Planning Policy Statement 25 (PPS25) Remains in place but superseded by NPPF.*

2.1.1. In determining an approach for the assessment of flood risk at Thirstin Mill, Honley there is a need to review the policy context. Government Guidance requires that consideration be given to flood risk in the planning process. PPS25 was updated in March 2010 and is the national policy on development and flood risk assessment.

2.1.2 The policy states that flood risk should be considered at all stages throughout the planning and development process to ensure that new development is not exposed to unnecessary flood risk and where possible floodplains are maintained as natural flood storage areas. The essence of PPS25 is that:

- The susceptibility of land to flooding is a material planning consideration:
- The Environment Agency has the lead role in providing advice on flood issues, at a strategic level and in relation to planning applications.
- Policies in development plans should outline the consideration, which will be given to flood issues, recognising the uncertainties that are inherent in the prediction of flooding and that flood risk is expected to increase as a result of climate change.
- Planning Authorities should apply the precautionary principle to the issue of flood risk, using a risk based search sequence to avoid such risk where possible and managing it elsewhere;
- The vulnerability of a proposed land use should be considered when assessing flood risk; Development types have been classified according to their vulnerability, which establishes whether the proposed land use is ‘highly vulnerable’ (e.g. hospitals, housing for the elderly), ‘more vulnerable’ e.g. (residential, drinking establishments), ‘less vulnerable’ (e.g. shops, offices), or ‘water compatible’ (e.g. recreational areas).
- Planning Authorities should recognise the importance of functional floodplains, where water flows or is held at times of flood, and avoid inappropriate development on undeveloped and undefended floodplains;
- Developers should fund the provision and maintenance of flood defences that are required because of the development;
- Planning policies and decisions should recognise that the consideration of flood risk and its management needs to be applied on a catchment wide basis and not restricted to floodplains;

- A strategic approach should be adopted in keeping with Government's aims to ensure that new development is sustainable, including the need to apply Strategic Flood Risk Assessment to decisions taken at all levels of planning, i.e. the need for assessment at the Regional Spatial Strategy; and,

- The concept of Flood Risk Reduction, particularly in circumstances where development has been sanctioned on the basis of the "Exception Test".

2.2 *PPS25: Development and Flood Risk Practice Guide (December 2009)*

2.2.1 The Practice Guide provides advice on the practical implementation of PPS25, and provides additional guidance on what is required at regional and local level. The document provides supporting information on:

- Preparing regional spatial strategies, sustainability appraisals and local development documents and the roles and responsibilities for those managing individual planning applications and the planning process;

- Additional guidance on the contents of RFRAs, SFRAs, and FRAs;

- Surface water management and implementing sustainable drainage;

- Measures to reduce flood risk to acceptable levels; and

- How to manage residual risks.

2.3 *Kirklees Core Strategy and Development Framework*

2.3.1 Previously the proposed core strategy document being produced by Kirklees was withdrawn. The Local Plan (previously known as the Local Development Framework) is the new development plan being produced for Kirklees. Consultation on the Local Plan started on the 9 November 2015 and finished on 1 February 2016.

2.4 *Kirklees Strategic Flood Risk Assessment (SFRA)*

2.4.1 Kirklees published a Strategic Floor Risk Assessment in 2008 in conjunction with both Wakefield and Calderdale councils. The SFRA creates a strategic framework for the consideration of flood risk when making planning decisions at Local Level. It was developed with reference to PPS25, the PPS25 Practice guide and additional guidance provided by the Environment Agency.

2.4.2 The main objectives of the Kirklees SFRA are to provide flood information:

- As the evidence base for the application of the risk based sequential approach to support planning decisions, in compliance with PPS25.
- That is strategic as it covers a wide spatial area, considering both present and future risk;
- That supports sustainability appraisals of the local development framework; and
- That identifies what further investigations may be required in flood risk assessments for specific development proposals.

2.4.3 The main risks of flooding identified within the SFRA include:

- Fluvial flooding in the Calder catchment.
- Surface water flooding from impermeable surfaces.
- Flooding from groundwater

2.5 *The SUDS Manual, CIRIA (2007)*

2.5.1 This guidance provides best practice on planning ,design, construction, operation and maintenance of Sustainable Drainage Systems (SUDS) to facilitate their effective implementation within developments.

2.5.2 The guidance supersedes previous general guidance on SUDS and addresses landscaping, biodiversity issues, public perception and community integration as well as water quality treatment and sustainable flood risk management. The output is based on results contained in the Environment Agency R&D Report SCO20114/2.

2.5.3 The SUDS Manual aims to provide comprehensive advice on the implementation of sustainable drainage techniques in the UK. It provides guidance on:

- Initial planning;
- Design through to construction;
- The management of SUDS in the context of the current regulatory framework; and
- Advice on landscaping, waste management, cost, and community engagement.

2.5.4 The SUDS Manual has been used to provide the necessary design guidance for the surface water drainage strategy incorporated into the Masterplan.

2.6 *Sewers for Adoption*

2.6.1 This document is the definitive guide for those planning, designing and constructing sewers and pumping stations for subsequent adoption by water companies in England and Wales under Section 104 of the Water Industry Act.

2.6.2 This guidance provides best practice on planning, design, construction, operation and maintenance of SUDS to facilitate their effective implementation within developments.

3. Development Site

3.1 *Development Description and Location*

3.1.1 The site is located at HD9 6JJ , National Grid Ref 413447 412071 and has Thirstin Road on two sides of the boundary, a slope on the third and fourth side. The approximate area of the overall development site is 14400 square metres. See appendix A for a site location plan.

3.1.2 A watercourse is located within the development site and flows in a South to North direction. The watercourse discharges into the Mag Brook that is around 125 Metres from the site boundary.

3.1.3 The proposed development Is for the construction of 17 No dwelling houses.

3.2 *Vulnerability Classification*

3.2.1 The site is proposed for residential development and is classed as more vulnerable.

3.3 *Sequential Test*

3.3.1 Alternative sites have been considered as part of the FRA and a sequential test report was produced in May 2011 .

3.4 *Exception Test*

3.4.1 Residential development is proposed for the site.

3.4.2 For the Exception Test to be passed, it should be demonstrated that the development provides sustainability benefits to the community that outweighs any flood risk, the development should be sited on previously developed land unless no alternative is available and the FRA should show that the proposed development will be safe without causing an increase in flood risk off site and should if possible reduce overall flood risk.

3.4.3 The results of the Exception test requirements given above are that the development will incorporate sustainability benefits as well as contributing to future employment benefits that will serve the wider community. The location of the site is on previously developed land. The previous use was as a woollen spinning mill. The FRA demonstrates that the site will remain safe without increasing flood risk off site. All three requirements comply with the tests and therefore pass.

3.4.4 It is concluded that although the site may be subject to a residual risk from flooding, the probability of this occurring is very low. The development will benefit the wider community and therefore outweigh the negligible risk of flooding to the site.

3.5 *Soil Classification*

3.5.1 The near surface soils have been classified as not suitable for disposal of surface water by means of soakaways. This is mainly as a result of contamination caused by the previous use of the site.

3.6 *Topography*

3.6.1 A topographical survey has been carried out for the site and the immediate surrounding area including Thirstin Road. The results show that the site has a slight downwards gradient from the South to the North. The level of the bottom of the open channel watercourse as it enters the site at the Southern end was 11.035M AOD.

3.6.2 The current ground levels of the site are those remaining post demolition of the former buildings..

3.7 *Geology*

3.7.1 An examination of the 1: 50 000 scale Geological Survey map of the area indicates the valley bottom is underlain by mudstones and siltstones of the Carboniferous Millstone Grit Series. However, beneath the higher ground immediately to the east, west and south of the site, Rough Rock, a named sandstone unit within the Millstone Grit Series, is shown to outcrop. On the basis of this information it is considered that Rough Rock outcrops in the valley sides, but mudstones and siltstone outcrop in the bed of the valley.

3.7.2 The Groundsure Report and groundwater vulnerability map suggests there is a secondary A aquifer within the solid geology beneath the site. This is defined as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

4. Flood Probability and Hazard

4.1 *Environment Agency Flood Zones*

4.1.1 The Flood Zones shown on the Environment Agency (EA) flood maps show the extent of flooding that would occur without flood defences. A extract of the flood zone map is given in appendix B.

4.1.2 The Environment Agency indicative flood map shows that part of the site is located in Flood Zone 3. The land within this zone is assessed as having a probability of 1% of flooding from the watercourse. The Flood zone 3 runs along the line of the watercourse. The remainder of the site is in flood zone 2 or 1.

4.2 *Sources of Flooding*

4.2.1 To comply with PPS25, all sources of flooding should be assessed. Flooding can occur from, surface rainwater from adjacent land, groundwater, surcharging pipes and sewers, other sources such as tank or dam failure as well as the more usual sources, fluvial flooding from rivers and tidal from the sea.

4.2.2 Fluvial Flood Risk. The watercourse that runs through the site is the source of risk. The SFRA flood map shows the Mag Brook to be in Flood zone 3a to the confluence with the River Holme except for a floodplain area that is shown to be in flood zone 3b. The area around the confluence of the Mag Brook and the River Holme, shows floodplains in flood zone 3. The watercourse entering the site is culverted upstream through Honley for a distance exceeding 1000M. Surcharging of the culvert or blockage will need to be considered and an appropriate flood route designed.

4.2.3 Flood risk from adjacent land, surface water pipes and sewers. The nearest public sewer is a combined sewer and is located within Thirstin Road and has a diameter of 450mm. Surcharging of the sewer will need to be considered and an appropriate flood route designed. Run off from adjacent land at a higher elevation is considered to be a low risk.

4.2.4 Flood risk from groundwater. A site investigation carried out by Rogers Geotechnical recorded groundwater strikes in the trial pits and boreholes, with the highest level recorded at 2.7M below the current ground level. The EA bedrock designation aquifer map shows the site to be underlain with a Secondary A aquifer.

4.2.5 The natural spring located on the site has been diverted via a recently constructed manhole into the culvert that passes through the site. Groundwater is also known to issue from the valley sides during periods of prolonged and heavy rainfall. The SFRA does not indicate that Honley is at risk from groundwater flooding. Possible groundwater will need to be collected and a flood route designed in case of blockage.

4.2.6 Flood risk from tidal waters. The site is not in a zone with this risk.

4.3 *Environment Agency*

4.3.1 The EA were involved with the design for the realignment of the culvert across the site, carried out post demolition. The EA have previously raised concerns regarding the potential increased flood risk on the site as a result of the demolition of the mill buildings. The primary concern was surcharging of the current open channel. The proposals to modify the channel in order to redirect surcharge flows was accepted.

4.4 *Flood Routes*

4.4.1 The proposed flood route in the event of culvert blockage or excessive water flow would be via a flow diversion arrangement that would result in the water flowing down the Thirstin Road. At the Northern end of the site, the flow on the road can flow back into the watercourse. The flood route for groundwater flow emanating from the banking in the event of land drain blockage would be via a swale type structure within the ground at the bottom of the slope. This would divert water to the Northern end of the site and discharge onto the road and thence into the watercourse.

5. Management of Residual Risks

5.1 *Residual Risks*

5.1.1 Residual risks are defined as risks that remain after risk avoidance, reduction and mitigation measures have been undertaken. For flood risk assessment, risks in this class are extreme events beyond the 1 in 1000 year plus climate change for tidal sources and 1 in 100 year plus climate change for rainfall events.

5.1.2 Flood level prediction for extreme events beyond the limits as stated above is outside the scope of this report. Nevertheless consideration of the effects of exceedence will be given.

5.1.3 The proposed development is for residential buildings. It is anticipated that the number of persons within the buildings would be less than 100 but more than 50. The site use is classed as more vulnerable.

5.1.4 Blockage of the inlet to the culvert. The inlet to the culvert is to be protected by a system of screens designed in accordance with the EA's 2009 document on Trash screen design. In the event of blockage, the floodwater surcharge will be diverted into Thirstin Road and flow down to rejoin the watercourse at the Northern end of the site.

5.1.5 Breach of the flood defence wall to the open channel watercourse at the Southern end of the site. The residential development will have finished floor levels sufficiently high so that in the event of a breach, the water will flow down the private drive and then into Thirstin Road

5.2 *Flood Levels*

5.2.1 It is recommended that the finished floor level of the proposed buildings is sited at 600mm above the predicted year 2107, 1 in 100 year flood level. This will result in variable finished floor levels from the Southern end of the site down to the Northern end of the site due to the topography.

5.3 *Evacuation Plan*

5.3.1 The proposed dwellings on the site will be in the flood zone 1. Safe means of emergency egress would be along the drive, to the rear of the buildings or along the Thirstin Road footpath. The footpath has a gradient sufficient to prevent flooding.

5.3.2 No special measures are required for this site in terms of emergency evacuation due to the high level of finished floor relative to maximum predicted flood levels. There will be a flow diversion structure between the development and the open channel designed to direct surcharge flows onto Thirstin Road. Thirstin Road has a gradient sufficient to prevent flooding.

6. Surface Water Management

6.1 Surface water drainage strategy

6.1.1 The previous site was mainly made up of roofs and hardstandings. The site of the former mill pond located at the Southern end of the site adjacent to the open channel was permeable. All the surface water drainage from the mill was directed into the culvert. The ground water from the banking was collected by land drainage and together with the spring water was all directed into the culvert.

6.1.2 Attenuation of surface water from roofs and hard paved areas for the proposed development will be provided. The attenuation system is proposed to be in the form of underground storage tanks, sized to allow containment of the 1 in 100 year plus 30% for climate change, peak rainfall event. The permitted outflow will be based on the 1 in 1 year event for the previous development. Discharge from the tanks is to be controlled by a hydraulic flow restricting device and will discharge into the existing culvert at the downstream end.

6.1.3 As system of land drainage will be required at the bottom of the banking that will direct the groundwater to a point at the Northern end of the site, where discharge into the culvert is proposed.

6.1.4 The results of the soakaway testing showed that while there is a possibility that soakaways might work, it was recommended that these are not used due to possible contaminated ground and the presence of the underlying aquifer.

6.1.5 As a result of the above drainage strategy, there will be no uncontrolled flooding on the site during events up to those designed for. This strategy will also result in a reduction in the peak discharge rate of water from the site, into the watercourse, compared with previous use. The storage of water on site in tanks will therefore contribute to a reduction in possible flooding downstream of the site. There will also be an added benefit due to the larger area of permeable ground compared to the previous use.

6.1.6 Foul drainage from the site will be directed into the existing 450mm diameter combined sewer located under Thirstin Road.

7. Conclusions

7.1.1 Based on the EA flood maps, part of the site is located in Flood Zone 3. The development will take place outside of the flood zone 3.

7.1.2 The proposed site use is considered to fall into the more vulnerable class.

7.1.3 The surface water drainage strategy will result in a reduction of peak surface water discharges off the site. The strategy will also ensure that there will not be any flooding of the site due to the 1 in 100 year plus 30% for climate change, peak rainfall event. This will also have the effect of reducing the effect of flooding downstream due to the smaller volume of water entering the watercourse.

7.1.4 A sequential test has previously been carried out for this site and this also included an Exception test due to the more vulnerable site classification.

7.1.5 The report recommends that the finished floor level for the buildings is set at 600mm above the predicted year 2107, 1 in 100 year flood level.

7.1.6 The permeable areas of the proposed development will exceed the area that existed with the previous use

7.1.7 The development proposal has considered the risk by flooding caused by the development and also the effects by possible flooding on the development. Consideration has been given to the need to manage and reduce flood risk to comply with the guidance in PPS25. This FRA shows that the proposed development is not at risk of flooding and also aims to further reduce the risk of onsite and offsite flooding by the use of SUDS in the drainage design. The proposal does not increase the risk of flooding offsite. The development of this site should not be restricted as a result of flood risk.

APPENDIX A

SITE LOCATION PLAN

SITE

www.ordnancesurvey.co.uk/**getamap**

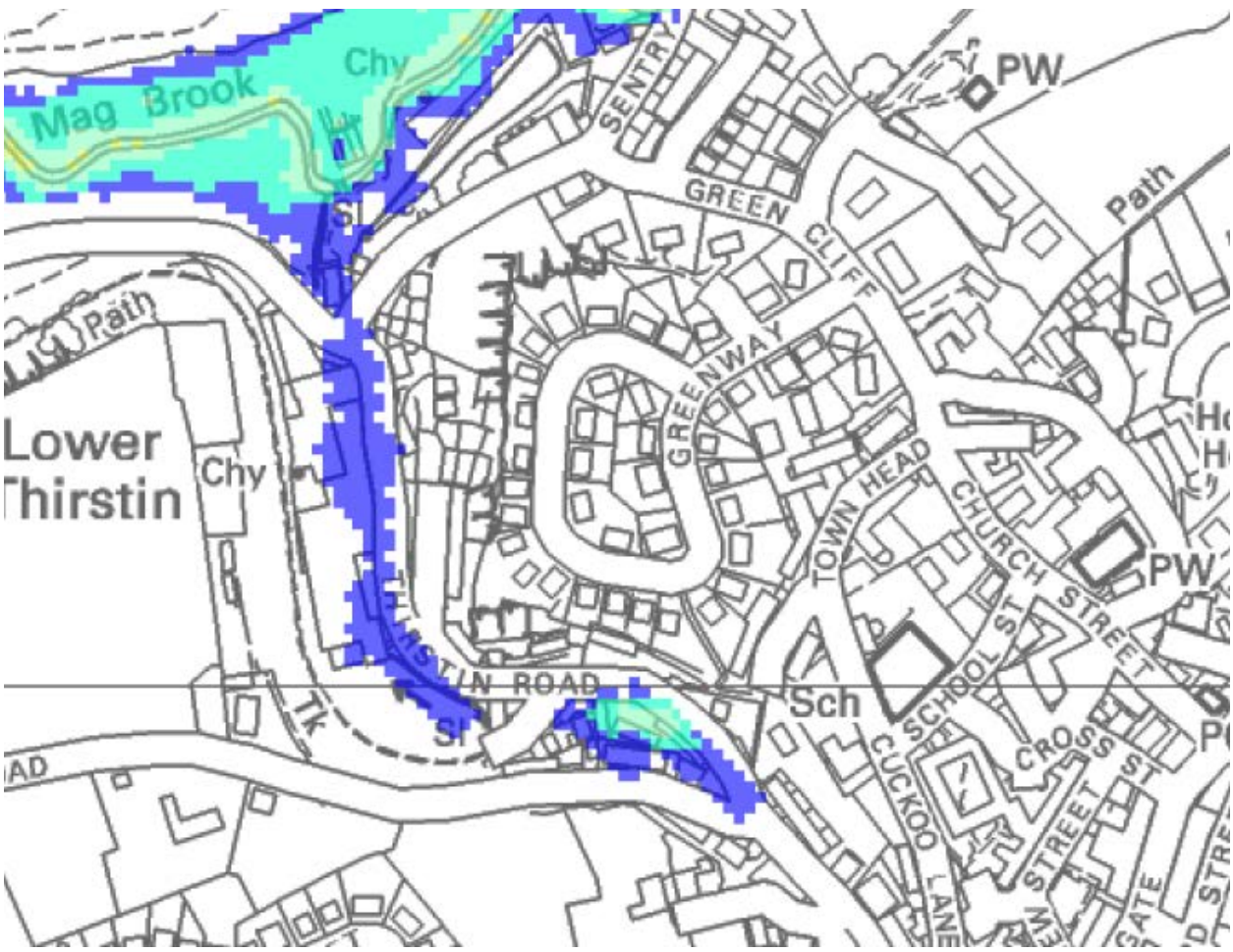
Image produced from Ordnance Survey's Get-a-map service.
Image reproduced with permission of Ordnance Survey and
Ordnance Survey of Northern Ireland.

Site boundary shown in red

APPENDIX B

EA FLOOD MAP EXTRACT

S2Q 100 + CLIMATE CHANGE. DK BLUE 0 TO 0.5 M FLOOD DEPTH FROM SFRA REPORT



APPENDIX C

TOPOGRAPHIC SURVEY EXTRACT