WATER ENGINEERING

Derbyshire County Council
Brown Edge Road
Buxton

Level 1 Screening/Scoping
Flood Risk Assessment

Integrated Engineering and Environmental Consultants

environmental | water | transportation | civil | structural | highways | infrastructure

BWB CONSULTING

BWB CONSULTING

WATER ENGINEERING

Derbyshire County Council
Brown Edge Road
Buxton

Level 1 Screening/Scoping
Flood Risk Assessment

BWB Consulting Ltd
3-4 Kayes Walk
The Lace Market
Nottingham
NG1 1PY

Ref: LW/NTW404/L1FRA/A

Date: February 2010

		Signed
AUTHOR:	L. Wallis	
CHECKED:	D. Harvey	
APPROVED:	A. Goodchild	
REPORT REF:	NTW404/L1FRA	
STATUS:	Revision A (11/02/2010)	

CONTENTS PAGE

Page No.

1.0 SUMMARY INFORMATION

Introduction

1.1 This Level 1 Flood Risk Assessment (FRA) is compliant with the requirements set out in Planning Policy Statement 25 – Development and Flood Risk (PPS25) and has been prepared with reference to the associated Practice Guide (December 2009). The FRA has been produced on behalf of Derbyshire County Council in respect of a proposed planning application for a development at Brown Edge Road, Buxton.

1.2 The purpose of this report is to form a screening study to identify whether there are any flooding or surface water management issues related to a development site that may warrant further consideration. The screening study will ascertain whether a Level 2 or 3 FRA is required and the scope of works for further assessment.

Site Name	Land off Brown Edge Road
Location	Buxton, Derbyshire
NGR (approx)	SK060743
Application Site Area (Ha)	1ha approx.
Development Type	Residential care centre and assisted housing
EA Development Control Area	Lower Trent, Midland Region
Local Planning Authority	High Peak Borough Council

Table 1.1 – Site Summary

1.3 In accordance with the PPS25 practice guide, published December 2009, the report is based on the following readily available information:

(i) Strategic Flood Risk Assessment
(ii) Environment Agency Flood Map
(iii) Environment Agency Standing Advice
(iv) PPS25 table D.1
(v) Other Environment Agency and Local Authority consultation

Existing Site

1.4 The existing site shown in **Figure 1** encompasses an area of approximately 1ha, comprising a playing field on land to the west of Brown Edge Road, Buxton. The site is therefore considered to be greenfield in terms of drainage.

1.5 A small tributary watercourse runs near to the western boundary of the site, to its confluence with the Hogshaw Brook at the south of the site. The Hogshaw Brook is a tributary of the River Wye which it joins in the centre of Buxton.

Proposed Development

1.6 Development proposals are for a residential care centre and assisted housing for the elderly.

Relevant Policy and Guidance

Planning Policy Statement 25: Development and Flood Risk

1.7 PPS25[1] sets out the Government's national policies on different aspects of land use planning in England. A supporting Practice Guide is also available. It encourages development to be located in areas of lower flood risk where possible, and stresses the importance of preventing increases in flood risk off site to the wider catchment area.

1.8 PPS25 also states that alternative sources of flooding, other than fluvial (river flooding), should also be considered when preparing a Flood Risk Assessment.

1.9 This Flood Risk Assessment is written in accordance with PPS25.

Peak Sub-Region Strategic Flood Risk Assessment

1.10 The Peak Sub-Region Strategic Flood Risk Assessment[2] covers the area defined as the Peak sub-region within the East Midlands Regional Plan 2006. The report commissioned for High Peak Borough Council (September 2009) covers the town of Buxton and River Wye and is relevant to the site area.

1.11 The SFRA highlights flooding issues within the area in relation to the River Wye catchment, groundwater, pluvial runoff and sewer and infrastructure flooding. A range of maps showing this has been prepared as part of the SFRA. The SFRA's Flood Zone maps are based on a combination of the Environment Agency's Flood Zone maps and, where it is available, modelled flood data.

PPS25 Flood Zones and Vulnerability Classification

1.12 The indicative floodplain maps, which ignore the presence of flood defences, show that the site lies mostly within Flood Zone 1 (**Figure 2**).

1.13 From table D1 of PPS25, these Flood Zones are described as:

Zone 1 – Low Probability

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

Appropriate Uses – All land uses are appropriate in this zone.

1.14 However, the Flood Maps do not show floodplains from smaller watercourses, particularly those with a catchment less than 3km^2 and, as there are two watercourses in close proximity of the site this Flood Risk Assessment makes an assessment of the potential floodplain extents of these.

[1] Planning Policy Statement 25: Development and Flood Risk, *Communities and Local Government,* December 2006.

[2] Peak Sub-Region Strategic Flood Risk Assessment, *Derbyshire Dales District Council, High Peak Borough Council and the Peak District National Park Authority,* September 2008.

1.15 Other Flood Zones are defined in PPS25 as follows:

Zone 2 – Medium Probability

This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%)

Appropriate Uses – water compatible, less vulnerable and more vulnerable uses of land and essential infrastructure are appropriate in this zone. Subject to sequential test being applied, the highly vulnerable land uses are only appropriate in this zone if the Exception Test is passed.

Zone 3a – High Probability

This zone comprises land assessed as having a 1 in 100-year or greater annual probability of river flooding (>1%)

Appropriate Uses – water compatible and less vulnerable uses of land are appropriate in this zone. Highly vulnerable not permitted in this zone. More vulnerable and essential infrastructure should only be permitted in this zone if the Exception Test is passed. Essential infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in times of flood.

Zone 3b – The Functional Floodplain

This zone comprises land assessed as land where water has to flow or be stored in times of flood. SFRAs 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 to be agreed between the LPA and the Environment Agency, including water conveyance routes)

Appropriate Uses – Only water compatible uses and the essential infrastructure listed in table D.2 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 times of flood;*
- *Result in no net loss of floodplain storage;*
- *Not impede water flows; and*
- *Not increase flood risk elsewhere.*

Essential infrastructure in this zone should pass the Exception Test.

1.16 Under table D2 of PPS25 which classifies land use, the proposed development use; residential care centre and assisted housing, is considered as ‘More Vulnerable’ being ‘residential institutions such as residential care homes, children’s homes, social services homes, prisons and hostels’.

1.17 Within Flood Zone 1 ‘More Vulnerable’ development is considered appropriate.

2.0 SOURCES OF FLOOD RISK AND NEED FOR FLOOD RISK ASSESSMENT

2.1 This section identifies the *potential* sources of flood risk to the site and also to the wider catchment area following development of the site. This will be used in identifying the Scope of the Level 2/3 FRA.

Flood Source	Presence	Description
Fluvial	ü	Hogshaw Brook and tributary
Tidal	X	Not near a tidal zone
Canals	X	None in vicinity of site
Groundwater	ü	Will need consideration
Sewers	ü	Severn Trent Water
Reservoirs	ü	Lightwood and Turner Lodge Reservoir.
Pluvial runoff	ü	Possible from the surrounding area
Development Drainage	ü	Increase in impermeable area on site leading to potential increase surface water runoff
Historic Flooding	X	None known to affect the site

Table 2.1 – Potential Sources of Flood Risk

Watercourses

2.2 The closest point of the site to the Hogshaw Brook is at the south-west corner and is approximately 15m from the Brook. A tributary to the Hogshaw Brook flows from north to south approximately 20m from the western boundary of the site.

2.3 The confluence of the tributary and Hogshaw Brook is located near to the south-west corner of the site. From here the Hogshaw Brook flows in a south-easterly direction through several culverted sections in the town of Buxton to its confluence with the River Wye some 1000m downstream.

2.4 The Environment Agency Flood Zone Maps, and the flooding maps within the SFRA (Tile B11) show that the sites is within Flood Zone 1. However, catchments less than 3km^2 tend not to be shown on the Flood Zone maps. Therefore, as the watercourses identified are in close proximity to the site some further assessment will be required of these. The Hogshaw Brook and its tributary are considered Ordinary Watercourses; consequently they are not Main River and are not under the jurisdiction of the Environment Agency, rather they are considered under riparian ownership. The Hogshaw Brook becomes Main River just downstream of the site. Information taken from the FEH CD-ROM V3 shows the catchment of the Hogshaw Brook to the site to be approximately 3km^2. The tributary is not shown as a flow path within the catchment, however its drainage is included within the Hogshaw Brook catchment area to this point.

2.5 It is understood that the Environment Agency have a 1D hydraulic model of the River Wye Brook through Buxton prepared in 2000. However, the upstream extents of this model do not incorporate the Hogshaw Brook and therefore no modelled flood level information is available for comparison with site levels. The Environment Agency have suggested that this model is being updated as a 2D model, to include the Hogshaw Brook and results are expected in May 2010.

2.6 Flood Warning is available to the River Wye through Buxton although this does not extend as far as the Hogshaw Brook and the site.

Groundwater

2.7 The SFRA identifies that 'local knowledge suggests the area is covered by pipelines and springs not identified on Ordnance Survey maps'. High Peak Borough Council were contacted but did not know of any localised flooding issues on the site.

2.8 The Environment Agency note no other known problems with flooding from groundwater, however this does not necessarily mean that flooding from ground water is not a risk.

2.9 However, within the town of Buxton there have been thermal springs recorded since records began. The SFRA suggests that there is a water protection issue within the area, due largely to the Buxton Mineral Water abstraction.

Sewers

2.10 Asset plans from Severn Trent Water have been obtained and show a surface water and a foul system running in Brown Edge Road. There is a risk to the site should these exceed capacity, become blocked or have their outfalls restricted during high water levels in the receiving watercourse. The SFRA shows no incidents of recorded flooding affecting the site (Tile B11).

2.11 The DG5 resister shows how many properties within a post code area have been flooded from artificial drainage or surface water runoff. For the postcode area SK17-7 the register lists 5 properties having being affected in the area. It is not possible to locate individual properties due to the data protection. The SFRA suggests therefore that the site lies within a medium risk area (Tile B15).

Reservoirs

2.12 Ordnance survey maps identify two waterbodies upstream of the site; Lightwood Reservoir to the north-west and Turner Lodge Reservoir to the north.

2.13 The Lightwood Reservoir is now discussed and is largely dry, save for the Hogshaw Brook running through and pooling in places.

2.14 The Turner Lodge Reservoir would appear to be used for agricultural purposes. It is not thought that the reservoir would be likely to breach or to have significant capacity to cause any flood risk to the site.

2.15 Furthermore, the SFRA states that neither of these waterbodies are on the Reservoirs Register for the High Peak Borough Council area, having capacities of less than 25,000m^3. Therefore the flood risk from breach of a reservoir is considered to be significantly low.

Pluvial Runoff

2.16 Surface water flooding is highlighted in the SFRA as still causing significant flooding problems in some areas within Flood Zone 1. However, the SFRA map showing flooding from all sources (Tile B11) does not show any recorded incidents on or near to the site.

2.17 However, much on the land to the north and to the west of the site slopes steeply towards the site and there could be risk of overland flows during extreme rainfall events.

Development Drainage

2.18 The existing site is greenfield and therefore considered permeable. Any development will cause an increase in hardstanding impermeable surfacing on the site and hence have the effect of reducing infiltration and increasing runoff.

2.19 This can increase flows in the receiving watercourses and increase flood risk to the surrounding area and areas downstream of the site.

2.20 Additionally the SFRA raises that where surface water from a developed site is discharged directly to a watercourse, locally high water levels can cause backup and prevent effective drainage.

Historic Flooding

2.21 The SFRA notes specific recorded flood events affecting the area. In January 1965 the River Wye flooded through Buxton largely on the natural floodplain area. Noteworthy flooding also occurred in 2000 on the River Wye. Historic flooding to property in the residential area adjacent to the confluence of the Hogshaw Brook and River Wye has been noted.

2.22 It is understood that neither of these events affected the site however, this does highlight some flooding issues downstream of the site.

3.0 FURTHER FLOOD RISK ASSESSMENT

3.1 A Level 2/3 FRA will be required to be submitted with the planning application for the site. The scope of the FRA will need to assess the sources of flood risk as previously discussed and incorporate the following scope of works and recommendations.

Watercourses

3.2 At present, no hydraulic model is available for the Hogshaw Brook or its tributary adjacent to the site. Therefore some hydraulic assessment will be required to assess the potential flood risk from these watercourses should flows exceed channel capacity. A Level 2/3 FRA will recommend the necessary mitigation measures to reduce flood risk to the proposed development from the watercourses.

3.3 Two options are available to assess the flood risk depending on Client timescales and preference.

Option 1:

3.4 The Environment Agency model should be available in May 2010 and will include the Hogshaw Brook. From this an assessment of flood risk can be made for the site. Planning timescales will be reliant on Environment Agency modelling. From past experience the Environment Agency have not always delivered modelling within the timescales suggested.

3.5 However, at this stage it is not known whether the tributary to this brook which runs near to the western boundary of the site will be included. Some capacity calculations may be required on this watercourse to assess flood risk. A topographic survey will be needed to include this watercourse.

3.6 With this option, although costs for the Client are likely to be less, a Flood Risk Assessment will not be available for the site until at least May 2010 and this may have implication on planning timescales.

Option 2:

3.7 As part of a Level 2/3 FRA, a channel capacity assessment will need to be undertaken of both the Hogshaw Brook and its tributary. A watercourse/topographic survey is required to investigate the dimension of the channels.

3.8 Likely flows for each watercourse will be calculated for a range of return periods including the 20-year and 100-year (to delineate Flood Zones 3b and 3a receptively). A 20% increase should be applied to peak flows in this assessment to take into account the potential effects of climate change. Flows are to be requested from the downstream Environment Agency model, as these are can be used as a comparison for the calculated flows.

3.9 Flows will be compared with channel capacity using Manning's calculations. This channel capacity assessment will indicate where flows exceed the capacity of the watercourse and therefore if the site could be at flood risk.

3.10 It is assumed that as the site is some 15m from the watercourse at its closest point that channel capacity calculations should be sufficient in assessing the flood risk. However, should the capacity assessment show that flows exceed channel capacity and therefore could affect the development site, a hydraulic model would need to be prepared for the watercourses adjacent to the site.

3.11 With this option, although timescales to planning application may be quicker, there are costs associated with modelling (budget fee £2500 - £4000). Discussions with the Environment Agency would have been undertaken to ensure that this approach was suitable and that they will consider this over waiting for their own data to be released. However there is the risk that the Environment Agency may object on prematurity of application and make a recommendation to the Local Authority to wait for the revised modelling to be issued.

Groundwater

3.12 It is recommended that a ground investigation is undertaken on the site to further assess the risk from groundwater flooding and potential for soakaway drainage.

Sewers

3.13 A Level 2/3 FRA will consider potential flow routes should the sewers in Brown Edge Road surcharge and recommend any required mitigation measures.

Reservoirs

3.14 Reservoirs are not considered to pose a significant risk to the site and no further assessment is deemed necessary.

Pluvial Runoff

3.15 An assessment of the catchment topography surrounding the site will identify the risk from pluvial runoff. Mitigation measures will need to be recommended within a Level 2/3 FRA as necessary.

Development Drainage

3.16 An outline surface water drainage strategy will be required within a Level 2/3 FRA to prevent an increase in runoff from the developed site and hence increase flood risk downstream.

3.17 Existing surface water runoff rates from the site will need to be calculated. The SFRA recommend that these are then reduced by 20% before being discharged from a developed site. Restricting flows will require attenuation on the site and the outline surface water drainage strategy will consider the allowable runoff rates, potential connection locations, attenuation requirements and the use of sustainable drainage systems (SuDS).

Further Information Requirements for Level 2/3 FRA

3.18 A topographical survey of the site and watercourse, taken to ordnance datum will be required.

3.19 Information from the Environment Agency on their Hogshaw Brook model has been requested for the Level 2/3 assessment. This information is due to be available in May 2010.

3.20 An indicative masterplan will be required to assess the increase in impermeable surface area and to develop an outline surface water drainage strategy.

W bwbconsulting.com

Birmingham | Derby | Leeds | Leicester | Nottingham