HPK/2013/0270
HIGH PEAK
27 MAY 2013
BOROUGH COUNCIL

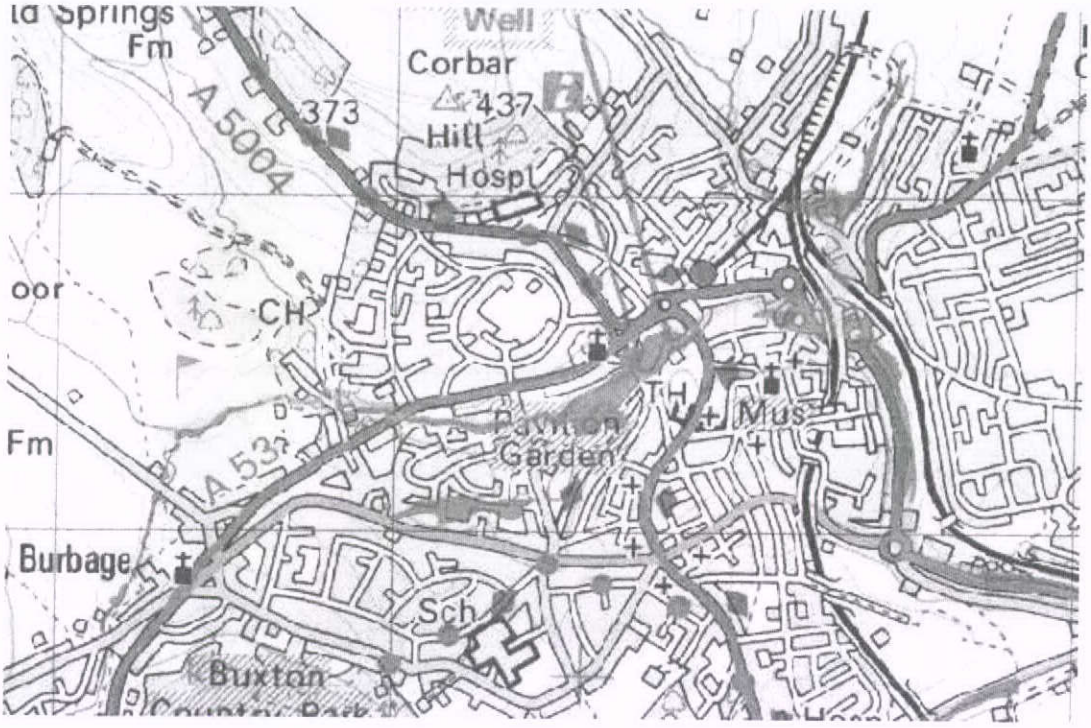
Proposed Residential Development at 20/22 Macclesfield Road, Buxton. Tributary of the River Wye. Flood Risk Assessment. PPS 25.

This Flood Risk Assessment has been prepared in accordance with the FRA Pro-forma guide contained in the Planning Policy Statement 25 Practice Guide. June 2008 and Annex E of Planning Policy Statement 25 paragraph E3.

The Planning Policy Statement 25 Practice Guide. The Assessment of Flood Risk. Paragraph 3.78 states that the content of a FRA should always be appropriate to the scale and nature of the development.

1. Development Description and Location.

1.1. The site is on the southern bank of the River Wye and the southern bank is shown on the Environment Agency's flood map as being affected by flood zone 2. See extract below.



1.2. The site is located to the north of Macclesfield Road, Buxton and to the rear of numbers 20 & 22 Macclesfield Road. The area of the site to be developed is a total of approximately 0.3 hectares in area and is generally surrounded by housing and open land.

1.3. The development comprises the provision of new residential dwellings and access drive. See current architectural layout number 02.01revC. Prepared by Heathcote Design and Development of Buxton.

1.4. As the site is shown on the Environment Agency's flood map to be partially affected by flood zone 2 a Flood Risk Assessment is required in accordance with the requirements of PPS 25.

1.5. It has been demonstrated by calculation and digital modelling that the proposed location of the new houses within the application site are shown to be within flood zone 1. Therefore there is no need to sequential test the proposed development site.

2. Definition of Flood Hazard.

2.1. The site is adjacent to a tributary of the River Wye, a main river, and is also called the River Wye, an ordinary watercourse, and the lower parts of the site that is in the river valley is shown on the Environment Agency's flood map to be at risk from flooding during a 1 in 100 year (climate change) flood and during a 1 in 1,000 year flood event.

2.2. There is no flood risk from the public sewerage systems, the highway drainage system and no flood risk from any other natural watercourses. There are no other bodies of water within the area that constitute an additional risk.

2.3. There are springs on the site that may lead to the seepage of ground water on the site these will be picked up and drained through the proposed site surface water drainage to the stream.

2.4. The site is not shown to be at risk from coastal inundation flooding.

3. Probability of Flooding.

3.1. A detailed topographical survey of the site and the channel of the Tributary of the River Wye has been carried out and the survey levels have been related to Ordnance Datum.

3.2. The 1 in 100 year flood flows have been estimated by making use of the catchment parameters contained within the FEH CD-ROM 2. See appended flood flow calculation sheet. It is not clear what effect the springs at the head of the watercourse may have on the flood flow regime of the river.

3.3. They may lead to a reduction in the rate of run off during a design storm by extending the critical duration of the storm by slowing down its run off by the action of the water having to percolate down through the rock to the source of the springs.

3.4. It could be that the catchment area is greater than that shown on the FEH CD ROM 2 but any error may be balanced by the longer time that rain falling on the extended catchment may take to influence the main flood flow in the river.

3.5. Therefore I have estimated the flood flows using the Revitalised FSR/FEH rainfall runoff method to estimate the 1 in 100 year flood flow. This has been increased by 20% to allow for the effects of global warming until 2115. This figure has been used for the Hec Ras river modelling software to estimate flood levels at the site.

3.6. A digital model of the stream channel has been constructed within the Hec Ras river modelling software, this software is approved by the Environment Agency as being acceptable for the estimation of flood levels. See composite drawing number PM/2941/01G.

3.7. The 1 in 100 year peak flood levels at the upstream site boundary are 296.15m for the 1 in 100 climate change flood and 297.22m for the flood with the culvert obstructed. See appended summary of the Hec Ras results.

3.8. The survey has been extended downstream to include the culvert, road levels and wall profiles at Burlington Road.

3.9. The Environment Agency has also asked for the river to be modelled with the downstream culvert under Burlington Road blocked. This raises the upstream flood levels by over 1.0m.

3.10. The proposed finished residential floor level of the proposed houses will be set at a level of 297.82m AOD that is 600mm above the pessimistic1 in 100 (cc) flood level when the downstream culvert is obstructed but with the garden walls collapsed.

3.11. The planning application site is partially affected by the flood along that part of the river valley adjacent to the river bank. However this is restricted to garden areas and the footprints of the proposed houses lie outside the pessimistic1 in 100 year (climate change) flood plain boundary and will not therefore impede the flood flow.

4.0. Climate Change.

4.1. The estimated 1 in 100 year flood flow in the stream has been increased by 20% to allow for the effects of global warming to the year 2115.

4.2. The detailed design of the on site surface water drainage system will be in accordance with the requirements for no surface flooding to occur during a site critical 1 in 30 year storm event.

4.3. Any necessary on site attenuation to limit the rate of surface water discharge to protect the natural watercourse will be designed using rainfall intensities that have been increased by 30% to allow for the effects of global warming to the year 2115.

4.4. The Environment Agency requires that the surface water discharge is limited to the green field rate of run off as calculated using IOH 124. The minimum flow control that complies with building regulations is 5.0 l/s.

4.5. 20/22 Macclesfield Road, Buxton.Rainfall M5-60 = 21.0mm, Ratio 28%.
1 in 100 year Storage Attenuation Calculations.
For an impermeable area 0.120ha

Duration	Intensity 100yr + 30%	Peak Flow Q	Allowable disch q	Q - q	$(Q - q)^2/Q$	Storage Volume
20	85.73	29.25	5.0	24.25	20.10	24.12
25	75.99	25.92	5.0	20.92	16.88	25.33
30	69.32	23.65	5.0	18.65	14.70	26.46***
40	57.88	19.75	5.0	14.75	11.02	26.44
50	50.06	17.08	5.0	12.08	8.54	25.63
60	44.64	15.23	5.0	10.23	6.87	24.74

Estimated peak storage requirement = 26.46m^3
Potential storage underground in 1.0m culvert sections or open detention lagoons or a combination of both making use of SUDs methodology wherever possible.

5. Detailed Development Proposals.

5.1. The development comprises the provision of 4 new detached houses. See current architectural layout number 02.01 rev C. Prepared by Heathcote Design and Development of Buxton.

5.2. Internal floor levels and vulnerable areas will be raised 150mm above the on site access drive levels to ensure that they will not be susceptible to flooding from local on site blockages within the surface water drainage system.

5.3. The residential floor levels will also be raised 600mm above the pessimistic estimated flood level with the downstream culvert blocked.

5.4. The possibility of the culvert blocking at the same time as a 1 in 100 year flood is remote. Also the simple garden boundary walls that may obstruct the flood flow and raise the flood levels have not been constructed to act as

flood defences. It is likely that they will collapse during a situation where the culvert is blocked and a less than 1 in 100 year flood occurs.

5.5. There will be no loss of the natural zone 2 or zone 3 flood plain volume due to the proposed development.

5.6. The proposed foul drainage system will be connected by a private foul sewage pumping station to the existing public sewerage system in Macclesfield Road.

5.7. It is anticipated that the foul sewage flow generated by the pumping station will be 5.0l/s for about 12 minutes in any 24 hour period.

5.8. Site levels will always ensure that the residents from the proposed new houses will always have a dry access to Macclesfield Road to use at all times during any flood event.

5.9. The site access road will rise from the proposed houses to Macclesfield Road so that it will always remain dry for the access of emergency vehicles and to evacuate the site during an emergency.

5.10. Any boundary fencing will be open post and rail and will not create any obstruction to the free flow of flood water along the river valley.

6. Flood Risk Management Measures.

6.1. The occupiers of the new houses will become responsible, through an on site management company, for the management of the common elements of the development that includes cleansing and maintenance of the on site drainage facilities.

6.2. They will also become riparian owners of a part of the river with responsibility for keeping it free of debris.

6.3. Internal floor levels and vulnerable areas will be raised 150mm above the on site access drive levels to ensure that they will not be susceptible to flooding from local on site blockages within the surface water drainage system.

6.4. The residential floor levels together with the on site roads and footpaths will be constructed above the flood levels therefore there will always be dry pedestrian access to Macclesfield Road the public highway that is at a level of 302.50m well above the level of any flooding.

7. Off Site Impacts.

7.1. The proposed site drainage infrastructure will be designed and constructed in accordance with the requirements of the Building Regulation.

7.2. All roofed and paved areas are to be formally drained into the on site surface water drainage system that will include a flow control and attenuation volume, this will ensure that there are no off site flood flows generated by the proposed development.

7.3. It will also ensure that the impact of the flood regime of the ordinary river known as the River Wye is kept to an absolute minimum.

7.4. Any on site springs and issues of water will be picked up by the separate system of surface water drains and routed through the development to discharge directly to the river.

7.5. There is no evidence to indicate that there will be any impact on the flora and fauna that depends on any downstream watercourse for its survival.

8. Residual Risk.

8.1. With careful design of the site levels and the drainage elements as described above there will be no residual flood-related risks that will remain after the development has been completed.

8.2. The on site drainage systems will become the householders responsibility for all future maintenance of the on site drainage services. This will ensure that the drainage systems will always operate at maximum efficiency.

8.3. There will be no residual risks to any of the neighbouring properties by any uncontrolled flood flows escaping from the proposed redevelopment.

8.4. The site can be safely developed without risk to the proposed new houses or their residents and without risk to the flood regime of the River Wye.

Peter Mason 30th November 2009