Executive summary

The extent of flooding problems has been a source of dispute at Menston in connection with planned development of Greenfield sites labelled Bingley Road and Derry Hill. At a late hour, an independent external opinion has been sought. This report presents that opinion.

The developers have relied on generalised methods of flood estimation that are widely but wrongly applied to such sites. There is always specific local information about drainage and flooding. An important factor neglected in this case is the prevalence of springs and responsive groundwater from the Millstone Grit aquifer underlying the hillside on which Menston sits. The areal extent of the topographic catchment draining to Derry Hill has also been underestimated.

The hillside on which Menston sits can be summarised as hummocky. It is drained by a number of small streams. Some of these are seasonal, with flows only occurring in wet weather and/or when groundwater levels are unusually high.

The progressive migration of Menston village up the hillside has led to problems previously. Because there is no dominant stream, each has in turn been culverted, diverted into sewer systems or obstructed by development. Some defiles lacking a permanent watercourse have been filled in: overlooking that these may be routes taken by floodwater in exceptional conditions.

These problems are heightened by the unique setting of Menston. The most unusual feature is the transverse drainage of Matthew Dike. This watercourse cuts off stream flow from Reva Hill, and guides it eastwards towards Mire Beck. Were Matthew Dike absent, there would be larger streams in Menston of the kind evident in Burley in Wharfedale: streams that are less easy to culvert or neglect.

It transpires that upper sections of Matthew Dike overflow into the Derry Hill catchment in major flood events such as that of 24 September 2012. Thus the effective catchment to Derry Hill (and to the culvert behind Dick's Garth Road) – which was already underestimated – is increased further in major floods.

A second unusual feature arises from the siting of the huge asylum at High Royds in 1888. My report refers to this chiefly as High Royds Hospital (HRH). HRH was designed to be as self-sufficient as possible, and the availability of a strong source of groundwater was a key asset. The groundwater abstraction at the HRH Pump House continued throughout the lifetime of HRH. The abstraction ceased on closure of the hospital in 2003.

Extension of Menston village southwards has mainly taken place in an era where spring flows were being suppressed by this major abstraction. The spring flows are no longer suppressed and groundwater levels are now typically higher. Agricultural (and other) lands on the hillslope are now typically wetter than previously. The Bingley Road development lies within the area where typical groundwater levels can be expected to be appreciably higher than during the lifetime of HRH.

The report explores these and other features. The penultimate chapter tentatively considers some actions that might make the Bingley Road and Derry Hill sites less flood-prone.