

Briefing: Flood risk sites should be no barrier to development

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Flood risk areas should not be ruled out for development, they can be managed if the right foundations are chosen. Over the next 15 years there will be a greater demand for affordable homes in the UK; therefore areas prone to flooding cannot always be overlooked.

1. INTRODUCTION

The risk of flooding should not necessarily rule out the development of otherwise attractive potential building sites. Flood risk can be managed for new dwellings in particular by choosing the right foundations.

2. BUILDING FOUNDATIONS

Widespread flooding across much of central and western Britain last summer led to calls for greater care to be taken when locating future housing estates. At the same time pressure to build hundreds of thousands of new homes over the next 15 years to relieve the shortage of affordable property means that areas prone to flooding cannot always be overlooked.

House builders who carefully select the foundations they specify for such sites can help to better manage flood risk. Director of piling specialist Roger Bullivant Ltd (RBL), John Patch says, 'There is absolutely no insurmountable problem in building on flood prone sites, as long as we deal with the risk accordingly. Procedures are in place to accommodate development in low-lying areas and it is now up to everyone involved in the building of houses to recognise that. It seems to me that some planners are anxious as far as flooding is concerned. It is incumbent on us as foundation engineers to alleviate their concerns.'

Houses built in flood risk areas can, he explains, be supported on foundations raised clear of the ground, which are made of either precast concrete or lightweight steel. These foundations are suspended on a series of precast concrete or displacement piles that firm the ground without bringing material to the surface that would otherwise have to be carted away. The presence of water on a site can also present a good opportunity for a developer to use house foundations to incorporate geothermal heating technology.

3. LIGHTWEIGHT STEEL BEAMS

House foundations suited to flood risk areas include lightweight galvanised steel supports, such as RBL's product SystemFirst Homes. Perimeter and floor beams are manufactured in a factory and installed on site by hand. Pre-cut insulation panels

can then be dropped horizontally into place between the floor beams, before a screed of concrete is laid in situ.

Each beam spans a pair of precast concrete pile caps, with each cap supported by a foundation pile. A property developer who recently built an ecologically friendly bungalow in Chatham, Kent on a site that is at risk from flooding, specified galvanised steel foundations suspended off the ground to protect the building in times of heavy weather. Use of the lightweight beams also ensured that foundations were installed quickly, to allow follow-on trades to start work soon after (Fig. 1).

The introduction of galvanised steel foundations to the market follow the development of stainless steel beams, which have been used beneath a series of conventional family homes at the Buckshaw Village estate near Leyland in Lancashire. A terrace of five houses made use of four combinations of shaped beam developed to spread load; external and internal support beams were complemented by a third detail to support a separating wall, a stepped beam provided support for garage thresholds.

Lightweight stainless steel foundations have also been specified to support exclusive waterfront properties at Somerford Keynes, Gloucestershire.

4. PRECAST CONCRETE FOUNDATIONS

A second method of providing a house foundation on flood susceptible sites involves the use of precast beams spanning between concrete piles. This modular support system provides



Fig. 1. Beams about to be placed by hand on the Chatham site

an equally suitable platform for houses as steel foundations, but there is one slight drawback. Precast concrete sections are far heavier than their lightweight steel counterparts and can take longer to assemble on site.

Mr Patch adds that precast concrete components can be installed on flood risk sites using lightweight equipment that does not exert undue stress on the ground. A rig weighing less than 25 t and sat on tracked footings can be manoeuvred easily and operate safely on all manner of soft, variable ground (Fig. 2).



Fig. 2. Use of precast concrete beams at a housing development near Newport in south Wales



Fig. 3. A heat transfer tube being inserted into a foundation pile

5. MAKING USE OF GROUNDWATER

Building houses in flood risk areas not only represents a risk that needs to be carefully managed, but offers an opportunity for harnessing a natural source of heat. 'One of the advantages of constructing houses in areas prone to flooding is that sites can present a good source of underground, and possibly flowing water', says John Patch. 'If this is the case, then the site may have the potential to provide geothermal heating.'

Heat transfer pipes can be fed into the foundations and be descended to a depth of around 10 m to tap into a warm water source. Making use of naturally heated water means that less energy is required to deliver homeowners with hot water. The geothermal technique has successfully been installed beneath the ecologically friendly bungalow at Chatham (Fig. 3).

Foundations raised clear off the ground are set to become a common sight beneath new houses built on flood susceptible areas in Kingston upon Hull.

Floor levels for new properties are to be raised by between 300 mm and 600 mm, following Hull city council's approval of a strategic flood risk assessment of the area in November 2007. The council's strategic planning manager, Alex Codd, said: The whole city has been mapped out into six flood risk zones and foundation levels will vary, depending on where new houses will be built. Around 95% of the city is built in the flood plain and there is huge demand for new houses in the area. It is therefore unrealistic to insist that all new development in Hull is built on higher ground, he explained (See Fig. 4).



Fig. 4. Completed housing development in Hull, featuring raised floor levels

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