ABSTRACT

Purpose
Climate change will present many new challenges for professionals in the built environment. Observers have speculated that the increase in damage to property caused by more frequent and severe flood events may result in loss of property value. However a consistent link between flood risk and value has not been proven in the UK to date.

Approach
As part of an ongoing study into the impact of flooding on property value in the UK, the available international evidence has been examined and general lessons drawn. A case study is presented of an example site, flooded in 2000, using actual transaction data.

Findings
This research demonstrates that, in general, there is a tendency for people to forget about the risk of flood damage with time. However, various
manifestations of floodplain designation or regulation including mandatory insurance purchase can maintain awareness in the longer term. For the case study the impact of the flood on house prices is seen to be temporary, lasting less than three years.

**Research Limitations/Implications**
Both the case study and the previous international research indicate that studies of the price impact of flood events should consider temporal aspects. Tentative conclusions from a single case study suggest that taking the long view of likely future recovery could promote price stability for flooded communities.

**Originality/Value**
The discounting of flood-prone property is naturally of concern to property stakeholders including the valuation profession and property owners. This research is unique in using transaction data to measure flood impacts in the UK.

**Keywords**: flood, property, risk, valuation, UK. **Case Study**

**INTRODUCTION**
The maintenance of property value is a key element in the sustainability of local communities (Bramley et al, 2004). It is of importance not only to property owners and their agents but also to local and national governments. It is a widely held view that property in the floodplain will suffer loss of value due to the risk of flood damage (Hughes, 2000; Halligan, 2004). If this devaluation leads to vacant or derelict properties then local blight could result. In extreme examples the case could be made for clearing entire swathes of housing. However, abandonment of existing localities to the elements is a policy matter and the increased pressure on building land makes such an event undesirable.

Structural approaches to reducing the problem of the exposure of the built environment to flooding are a partial solution. Planning guidelines such as PPG25, restrict new development on the floodplain. Pressure from floodplain residents and insurers to build flood defences to maintain communities has
led to much increased flood defence spending in recent years. However
government, the Environment Agency and the insurance industry increasingly
recognise that flooding cannot be controlled entirely (Tunstall et al, 2004) and
so there remain hundreds of thousands of existing properties at risk of
flooding. It is vital for the maintenance of these properties at risk that
confidence in their future viability is upheld.

In the light of the anticipated increase in flood frequency (Office of Science
and Technology, 2003) the impact of flooding has assumed greater
importance in the UK than was the case before 1998. Arguably, before the
widespread flooding of 1998 and 2000, the country was in a state of
complacency with no legal disclosure regime and little information available to
prospective purchasers (Clarke et al, 2002). The unfolding of events since
that date including flood plain mapping and the revision of the insurers
commitment to provide universal insurance (Huber, 2004) has changed the
outlook for floodplain property.

In the UK there has been a dearth of research into the impact of flooding on
property value. Research to date in the UK (BFRG, 2004; Eves, 2004)
canvasses the opinion of valuation experts but does not provide sufficient
evidence to establish the prevalence or scale of property value discount
caused by flooding. Understanding of the temporal nature of such effects has
also been lacking. Research elsewhere, for example in the US by Tobin and
Montz (1994), has demonstrated the tendency for flood impact to decline with
the passage of time. However, in some instances, where regulation is in
place or flood insurance is mandatory, there can be observed a long-term
capitalisation of risk into property prices (Troy and Romm, 2004).

A study into the impacts of flooding on property value and the link with
insurance availability and cost is ongoing. This paper discusses the previous
research into the impact of flood on property value in the UK and
internationally, further developing the land utility profiles encountered in the
literature.
A case study is presented of a comparison of three recent housing developments flooded during the 2000 event. Two of the developments were in the flood area but one of these escaped the worst of the flood damage due to raised construction. The third was outside the flood area. Although no significant long-term flood effect is observed, there were temporary impacts on the property market. The lack of long-term impact may partly be explained by plans to boost the local flood defences. Alternatively it may be that optimism, a growing local property market and the lack of any restriction on purchase (insurance and therefore mortgages are available) over-ride any lingering memories of the flood.

In order to gain further understanding of the temporal nature of flood impact many more examples need to be considered. It will also be important to bring the effect of insurance explicitly into the analysis. This will be an aim of the ongoing research project.

**INTERNATIONAL EVIDENCE FOR FLOOD DISCOUNT**

Many studies have looked for flood impacts on residential property values. In the US in particular flood effects have been examined across a wide geographical spread. The findings from these researches vary greatly, partly due to methodological differences and partly to the nature of the impact measured (Lamond et al, 2005). There are, however, some common themes which emerge.

Typically, flooded property retains most of its value once it has been reinstated. It is worth noting that the largest average impact observed was 30%. This large discount was measured by Tobin and Montz (1994) in the immediate aftermath of an event in Linda and Olivehurst, California, and on property flooded to a depth of greater than ten feet. The majority of studies found average impacts below 15% on transacted property. In some cases prices were observed to increase after flooding, perhaps due to betterment on reinstatement (Tobin and Montz, 1994).
Individual properties may suffer large discounts, particularly if reinstatement is inadequate or the risk of return of flooding is very high. In rare cases a property will become almost unsaleable due to financing issues. Examples of this were quoted in BFRG (2004), but these comprised a small minority of property transactions. However for parties with a financial interest in a property even a small discount can still be highly problematic and leave property owners with negative equity.

People can often ignore the risk of flood. There is an international body of research which examines the public awareness of natural hazards and of floods in particular, for example Slovic (1987); Brilly and Polic (2005). It seems that the perception of risk and consequent reactions are a complex matter, not necessarily predictable from experts' assessment of risk or affected by new evidence which contradicts their pre-conceptions. The ways in which awareness and preparedness can be raised among at-risk populations has been much debated in recent years in the UK (for example (Bye and Horner, 1998; BMRB, 2002) as an important part of putting into place adequate public information campaigns and warning systems. However, awareness of flood risk does not imply a disinclination to live in a flooded area or even to prepare for flooding via structural or other methods.

From the responses to their national survey BFRG(2004) quoted valuation professionals as saying about flooded or at-risk property that in some cases “people will accept inconvenience depending on the location and uniqueness of the property”, and also that “sales of property that directly front or are close to the watercourse are generally stable” and finally that “…purchasers see their idyll and want it and any barrier to their purchase is seen as destructive to their aim of ownership”. Other valuers made more negative comments about flood-prone property but the above quotes illustrate the aspect of the property market that is about fulfilling dreams. In these circumstances people can choose to ignore inconvenient realities unless the conveyancing process forces them to examine them.
The results of surveys of flooded and at-risk populations reveal that there is complacency among floodplain residents. For example in the UK as part of an evaluation of the intangible costs of flooding (Environment agency/DEFRA 2004) a survey of property in locations flooded in 1998 and 2000 was carried out. Only 24% of residents were aware of the risk of flooding before the recent events but awareness post flood had risen, just three years later 86% were aware of the risk. Strangely, among those at risk but not flooded, which could include residents that had moved into previously flooded property since the flood, only 42% were worried about future flooding. Most recently a British Market Research Bureau (BMRB) survey of property at risk of flooding (BMRB, 2005) revealed that one third of people had not taken the trouble to discover whether their insurance policy covered flood risk and only 7% had found out how to get flood warnings. A survey of Lewes residents (Puvacharoen, 2003) found that despite high awareness of flood risk and no plans to further defend the areas at risk 91% of respondents were satisfied with their area of residence. Fewer than half of flood victims would even consider moving to an area with a lower risk of flood. Vulnerability surveys of previously flooded households reported in Green et al (1994) showed that while stress was experienced by some flood victims the population is remarkably resilient. Forty-five percent reported that they hardly worry about future flooding, only 22% had spent money to stop water entering the property. Only 17% of residents said when asked that they would move if they could.

Elsewhere similar patterns of behaviour can be seen. In the US Burby (2001) noted the lack of propensity to purchase insurance, Babcock and Mitchell (1980) in Ontario, Canada studied both the actual and perceived differences in price between flood-prone and flood-free property. None of the residents mentioned flood risk as a factor when asked about influences on the selling price of their property and only one out of thirty-eight had purchased flood insurance. In New Zealand Montz (1993) showed that people were prepared to accept hazard in return for perceived lifestyle benefits.
As time elapses after a flood event the memory of the event fades. For some flood victims the trauma of flooding will remain with them indefinitely but for others the feelings will subside. For the community as a whole, turnover of property will ensure that the average experience with flood will also decline with time. The rate of forgetting will vary with the stability of the local area and can be affected by disclosure regulation or by the action of organisations such as the Environment Agency or local flood groups. The tendency of the community to forget about flood risk can be reflected in the value impact of flood as examples in the literature demonstrate.

BFRG (2004) in their questioning of surveyors enquired about the length of time to recovery of a flooded property. There was very little consistency in the responses, with some suggesting under a year and others anticipating longer than an eight year impact.

In Nyngan, Australia, in 1990 the whole town was inundated at an estimated cost of $50 million (AUS) and subsequently the flood defences were raised to increase future protection. Lambley and Cordery (1997) compared the average house value in Nyngan with its flood free neighbour Gilgandra. For about 18 months following the flood there was a divergence in trends with the Nyngan property declining in absolute value. Two years after the flood property values in Nyngan had recovered and caught up with their flood-free neighbour. An interesting facet of this study was the observation that trading in property never stopped and there was evidence of entrepreneur activity with houses bought at a discount just after the flood appearing again on the market within four years at a greatly increased price. Lambley and Cordery suggest that flooded property should not be sold in the immediate aftermath, residents should be encouraged to restore their property and sit tight for the recovery. Their research also confirms the fact that residents can place false confidence in defence works. Although the banks were raised this does not ensure total safety from future inundation.

Tobin and Montz (1994) have studied multiple flood sites and observed different rates of recovery. In one example, Linda and Olivehurst California,
the most severely affected properties had not recovered completely after ten years. It is interesting to note that in this instance some houses had not been reinstated and served as a visual reminder of the flood.

Where regulated disclosure or mandatory flood insurance is present, some long-term capitalisation into value is possible. Donnelly (1989) analysed sales from an area which had not been flooded for a decade but which falls under the National Flood Insurance Program (NFIP). The NFIP is a scheme in the US which enforces development guidelines and ensures that residents requiring mortgage finance are aware of flood risk and must purchase flood insurance. Donnelly measured a 12% discount in price for those properties situated on the floodplain. Troy and Romm (2004) observed an impact amounting to an average discount of 4% when a new regulatory disclosure regime was introduced in California.

THEORETICAL PROFILES OF FLOOD IMPACT ON PROPERTY VALUE

Tobin and Montz (1994) present a theoretical framework for flood impact on property value. Integrating flood hazard research and urban economics literature they present charts of land value which vary with time and the severity and frequency of flood events. They suggest that the speed and scale of the recovery in value is dictated by various socio-economic and environmental characteristics in addition to the flood characteristics. These charts can be characterised, based on scenarios encountered in the literature into four basic profiles as discussed below. These recovery profiles, if borne out in UK examples, can form the basis of prediction of the impact of future flooding events.

Figure 1 shows a basic profile where a one-off flood event temporarily depresses prices and then over time the price level recovers (for clarity inflation has been ignored) This profile might be observed under a number of conditions: for example, if there was a flash flood in a low flood risk area. Since the risk of return is low there is no rational reason for prices to remain low. In this case, the interval before price levels recover would probably be
quite short, possibly as short as the time taken to reinstate the property. Alternatively price trends following a flood in a moderate risk area could display this profile, as was seen in Sydney (Eves, 2004). The recovery happens as people collectively forget about flood risk, and so the recovery time might be expected to be longer than for a flash flood.

Figure 1: Theoretical effect of a flood event on house prices

However if flooding is regular and already capitalised into house prices then a study of an individual flood event will reveal no effect. Regulated disclosure or mandatory insurance could also cause this zero-impact scenario because a new flood event presents no new information to the property buyer. Figure 2 shows this theoretical profile. The profile could also be observed in fully resilient housing whatever the flood risk category. Fully resilient property will experience inconvenience for the duration of the flood but require minimal clean up and costs should be reasonably low. This type of property might be regarded by a rational consumer as close to no risk.
Figure 2: Flood effect already permanently capitalised into flood.

Figure 3 shows the profile which might occur if new information were imparted by the flood and permanently changed the expectations of the residents, for example a first flood on a new estate where there was no previous expectation of flooding. This is particularly likely if the flood signals a risk to the insurance community and brings with it financing issues for potential purchasers. This scenario may also be typical in high-flood-risk areas, where long gaps have occurred between events and the population have forgotten about the possibility of flooding. A renewed awareness may be generated by a new flood incident. This has been the case for many locations in the UK inundated in the 1998 and 2000 floods because they occurred after a prolonged dry period of about two decades.
The final profile is included, despite being counter-intuitive because it was observed by Montz (1992) and by Tobin and Montz (1994). Post-flood values of flooded homes were seen to improve relative to non-flooded comparatives. This could be due to reinstatement of the property resulting in betterment as might be the case after a flash flood of an old property, particularly if that requires bringing up to building standards exceeding the original specification or involves updating fixtures and decoration. Another instance where it might be observed would be where flood defences are improved immediately following a flood event. This would not be a true flood effect but might be confused with flood impact.

These theoretical profiles, stemming from the international literature demonstrate the necessity of considering the temporal dimension in any study of the UK market. They also suggest that the measured impacts in UK flood sites are likely to vary greatly depending on local circumstances. Categorisation of flood location typographies could in turn aid in prediction of the likely impact for specific flood events in the future. The following case study shows an example that most resembles profile 1.
CASE STUDY

Barlby is a village to the North East of Selby in North Yorkshire. It is bordered to the West by the river Ouse and to the East by the A19. In the past there have been two distinct areas within the village, Barlby Hilltop and Barlby Bridge. New development is now in-filling the gap between these areas. The last serious flooding occurred in Barlby during 1947 and it was severe on that occasion. Barlby is partially protected from flooding by a flood defence bank. The presence of defences, as is often the case, had reduced the expectation of flood to the extent that much new development had been or was planned to be built in the low lying areas of the village.

During the autumn 2000 floods the local defences were overtopped inundating 150 properties (NAO, 2001), many of them of recent construction (Environment Agency/DEFRA, 2004) to up to 2 feet. It was a dramatic local
event, the planned level of defence was seriously exceeded by the flood water and it was only thanks to prompt defensive action by the emergency services that the flooding was prevented from encompassing more property. From a Manchester University report on the emergency action (Wearne, 2002) there was ‘A massive deployment of sandbags (some via chinook helicopter) on the left bank of the river from above Barlby and down to Selby’. This partially succeeded but while overtopping was prevented, scour and piping through resulted in flooding. Two thousand people were evacuated from their homes and local hospitals were emptied (Pook, 2000).

After the flood in 2001, emergency strengthening activities were carried out costing about £1m (Wearne, 2002). Following this shoring up of defences permanent improvement of the defences for Barlby were planned. A scheme costing over £10m to cover Selby and Barlby was started in 2004 but in October 2005 these defences were not completed (ABI 2005).

The New Estates

Part of the bitterness felt by flood victims in Barlby was due to the feeling that the authorities should not have allowed the houses in the new developments to be built or should have insisted on flood prevention measures being incorporated. In an interview with York Evening Press a parish councillor said of a planned school development "That land is part of the village's flood plain - as is the" new housing estate "- as everyone can clearly see at the moment." The parish council had objected to the building of the new estate "We were dead against it, but we were told that the floods of 1947 could never happen again. Tragically, we have been proved correct."

In March 2001 a Panorama programme (Panorama, 2001) on the subject of the recent flooding contained many references to Barlby, it mentioned the new developments one of which flooded and the other largely escaped. Planners had insisted that the later built estate, the one which escaped, should have raised floors. The implication was that planners had been negligent in not insisting in raised floors for both estates. While it may be true that resilient
building practices may have lessened the damage suffered by the residents of Barlby, it is doubtful whether full protection would have been afforded to all considering the depth of flooding. In addition the company involved claimed that, at the time of construction, the site was “not shown as a flood risk area in any public document”. Whatever the rights and wrongs of the case, which is outside the scope of this paper, it is fair to say that the flood generated a great deal of media coverage, naming the estates and the roads involved in the flooding. Consequently, local residents can hardly have failed to be aware of the flood risk on the estate in question and the expectation of property devaluation was very reasonable.

As one resident, interviewed by Panorama (2001) and others said “We own this property. When we bought it seven weeks ago it was worth £90,000. Today it's worth [£58,000]. How can I walk away from £31,000? I can't afford to walk away from that.”

In the example of Barlby there is an opportunity to examine three recently built housing estates, in close proximity where locational amenities and demand factors should be very similar. Two were threatened with flooding in 2000 but one largely escaped while the other was very publicly flooded, the third lies just outside the floodplain.

The Current Market for Houses in Barlby.

Figure 5 shows an Environment Agency map of the Barlby area with flood risk outlines as defined in March 2006. The estates are labelled as follows: estate A is the flooded estates without raised floors, estate B is the flooded estate with raised floors which according to media accounts meant that all but three properties escaped flooding. Estate C is outside the floodplain, is the newest of the three estates and according to local estate agents the houses there are generally of the best quality. The estates each contain a slightly different mix of houses. Estate C contains very few semi-detached houses and estate B containing mainly semi-detached. Estate A consists of a mixture of both semi-detached and detached housing. Estates B and C can most sensibly be compared individually with estate A but not with each other.
The hatched area of figure 5 shows areas at which are at risk of flood but which are also partially protected by flood defences. The risk for most of these properties is currently described as moderate. This should mean that under the Association of British Insurers statement of principles, an agreement by which properties protected to a moderate level or above should be treated as insurable under normal policies, the residents should be able to gain insurance cover. In conversation with an estate agent in Selby this was confirmed, residents can gain insurance although in some cases only by passing on existing policies.

Examining the asking prices of similar houses across the three estates should quickly reveal whether there has been a massive discounting of property value as a result of the flood. An internet search for property for sale in March 2006 revealed two, very similar, four bed roomed houses for sale in the adjacent estates A and C with the same agent. The asking prices were very similar and in fact the property on the flooded estate subsequently sold before
the non-flooded one. Table I shows the features listed on the estate agents details.

**Table I: Comparative characteristics of four bedroomed properties**

<table>
<thead>
<tr>
<th>Estate A (flooded)</th>
<th>Estate C (outside floodplain)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detached</td>
<td>Detached</td>
</tr>
<tr>
<td>4 beds</td>
<td>4 beds</td>
</tr>
<tr>
<td>Gardens</td>
<td>Gardens</td>
</tr>
<tr>
<td>Integral garage</td>
<td>Integral garage</td>
</tr>
<tr>
<td>Gas Fired Central Heating</td>
<td>Gas Fired Central Heating</td>
</tr>
<tr>
<td>En-suite shower room</td>
<td>En-suite shower room</td>
</tr>
<tr>
<td>PVC double glazing</td>
<td>Sealed unit double glazing</td>
</tr>
<tr>
<td>Ground floor cloaks</td>
<td>Ground floor cloaks</td>
</tr>
<tr>
<td>Dining room</td>
<td>Utility Room</td>
</tr>
<tr>
<td>Kitchen diner</td>
<td>Large kitchen diner</td>
</tr>
<tr>
<td>Lounge</td>
<td>Lounge</td>
</tr>
</tbody>
</table>

£195,000          £189,950

Comparing estate A and estate B is not so straightforward because the houses on each are of slightly different layout. Table II shows the particulars of two three-bedroom properties. From these examples it does not appear that the houses on estate A are at a discount relative to those on estate B.

**Table II: Comparative characteristics of three bedroomed properties**

<table>
<thead>
<tr>
<th>Estate A (flooded)</th>
<th>Estate B (raised floors)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detached</td>
<td>Detached</td>
</tr>
<tr>
<td>3 beds</td>
<td>3 beds</td>
</tr>
<tr>
<td>Gardens</td>
<td>Gardens</td>
</tr>
<tr>
<td>detached garage</td>
<td>No garage</td>
</tr>
<tr>
<td>Gas Fired Central Heating</td>
<td>Gas Fired Central Heating</td>
</tr>
<tr>
<td>En-suite shower room</td>
<td>No en-suite</td>
</tr>
<tr>
<td>PVC double glazing</td>
<td>Sealed unit double glazing</td>
</tr>
<tr>
<td>Ground floor cloaks</td>
<td>Ground floor cloaks</td>
</tr>
<tr>
<td>Dining room</td>
<td>Conservatory</td>
</tr>
<tr>
<td>Kitchen</td>
<td>kitchen diner</td>
</tr>
<tr>
<td>Lounge</td>
<td>Lounge</td>
</tr>
</tbody>
</table>

£159,950          £139,950

These two examples do not constitute proof that the value of property is not determined by the estate location but they do show that a long-term
devastating blight on property value has not materialised. However historic data might reveal a more involved picture.

Historic Data Analysis

Over the period 2000-2006 159 properties have been sold on the three estates, with prices ranging from £38,000 to £197,000. There have been slightly more properties sold on the flooded estates (96) than on the non-flooded one (63). The raw averages by property type are shown in table III.

Table III: Average property prices by estate and type £000 (number of sales)

<table>
<thead>
<tr>
<th></th>
<th>Estate A</th>
<th>Estate B</th>
<th>Estate C</th>
</tr>
</thead>
<tbody>
<tr>
<td>All property</td>
<td>101 (76)</td>
<td>89 (20)</td>
<td>95 (63)</td>
</tr>
<tr>
<td>Detached</td>
<td>123 (33)</td>
<td>105 (2)</td>
<td>102 (46)</td>
</tr>
<tr>
<td>Semi</td>
<td>85 (42)</td>
<td>87 (18)</td>
<td>76 (4)</td>
</tr>
<tr>
<td>Terraced</td>
<td>Na (0)</td>
<td>Na (0)</td>
<td>76 (13)</td>
</tr>
<tr>
<td>Flat</td>
<td>48 (1)</td>
<td>Na (0)</td>
<td>Na (0)</td>
</tr>
</tbody>
</table>

The first thing that may be observed is that no clear pattern emerges. There are very few sales in the estate with the raised floors but they do not appear to be consistently higher or lower than the other two estates. However this was a period of great house price inflation so timing of sale is important. Figure 6 shows the detached property average prices by year. From these tables it would appear that estate A detached houses enjoyed lower growth in value than those in estate C (which is outside the floodplain) in the early years. After 2002 however the houses in estate A appear to catch up in value with estate C. Comparisons of estates A and B does not demonstrate a similar pattern, the two lines cross one another frequently.
It is noteworthy that no property sold in the flooded estate or the estate with raised floors between November 2000 and May 2001 a period of 6 months immediately following the flood. Six months is about the average reinstatement period for seriously flooded property. In the non-flooded estate sales were uninterrupted, 17 properties were sold during the same six months. A crude analysis which does not allow for differences between houses, there are of course several designs available on these modern estates, would indicate that the properties on the flooded estates lagged behind their non-flooded neighbours in value for a couple of years. There are no differences between the estate with raised floors and the one without. It would appear that flood designation is in this instance more important than flood history. For the remainder of the analysis the two estates A and C will be considered as one. Table IV shows the average house prices separated by flood designation, type and year.
Table IV. Average price of property sold in flooded (F) and non-flooded estates (NF)

<table>
<thead>
<tr>
<th>TYPE</th>
<th>FLOOD</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>DET</td>
<td>F</td>
<td>74.2</td>
<td>83.7</td>
<td>101.9</td>
<td>122.6</td>
<td>156.5</td>
<td>158.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(4)</td>
<td>(3)</td>
<td>(8)</td>
<td>(7)</td>
<td>(9)</td>
<td>(4)</td>
</tr>
<tr>
<td></td>
<td>NF</td>
<td>82.1</td>
<td>97.1</td>
<td>124.0</td>
<td>125.5</td>
<td>160.3</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(20)</td>
<td>(13)</td>
<td>(5)</td>
<td>(3)</td>
<td>(5)</td>
<td></td>
</tr>
<tr>
<td>SEMI</td>
<td>F</td>
<td>47.9</td>
<td>61.2</td>
<td>76.5</td>
<td>96.9</td>
<td>114.8</td>
<td>105.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3)</td>
<td>(11)</td>
<td>(18)</td>
<td>(10)</td>
<td>(10)</td>
<td>(8)</td>
</tr>
<tr>
<td></td>
<td>NF</td>
<td>60.7</td>
<td>63.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>120.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2)</td>
<td>(1)</td>
<td></td>
<td></td>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>TERR</td>
<td>F</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>NF</td>
<td>57.8</td>
<td>-</td>
<td>93.5</td>
<td>99.5</td>
<td>-</td>
<td>119.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(8)</td>
<td></td>
<td>(6)</td>
<td>(2)</td>
<td></td>
<td>(3)</td>
</tr>
</tbody>
</table>

The results of a semi-logarithmic regression performed on the data including those variables significant at 5% and above is seen in table V. The majority of the variability in the data can be explained by the general house price inflation, represented by the year dummies (Y2001 – Y2005) and the house type detached dummy (Detach).

Within any year, selling in the first quarter will tend to realise a lower price, This may reflect the fact that housing markets traditionally take off in the Spring or that as they are completed prices they may reflect offers made months earlier. The flood effect is measured by F2001 and F2002, these are interaction dummies which take the value 1 if a property sold in 2001 or 2002 and is in the designated flood-zone. F2000, F2003, F2004 and F2005 were not significant at 5%

If this pattern of quick recovery, perhaps due to planned defence improvement or to the anticipation that the event will not be repeated in the near future is
common, property owners can take the long view and reinstate their homes with confidence. There will be some residents who will be forced to sell during the recovery period, but to avoid selling at a discount they might consider strategies such as short tenancy letting if they felt that recovery was certain.

**Table V: Regression results**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std Error</th>
<th>T</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>10.985</td>
<td>0.026</td>
<td>422.42</td>
<td>0.000</td>
</tr>
<tr>
<td>Y2001</td>
<td>0.206</td>
<td>0.042</td>
<td>4.93</td>
<td>0.001</td>
</tr>
<tr>
<td>Y2002</td>
<td>0.454</td>
<td>0.056</td>
<td>8.11</td>
<td>0.000</td>
</tr>
<tr>
<td>Y2003</td>
<td>0.499</td>
<td>0.036</td>
<td>14.00</td>
<td>0.000</td>
</tr>
<tr>
<td>Y2004</td>
<td>0.684</td>
<td>0.034</td>
<td>20.19</td>
<td>0.000</td>
</tr>
<tr>
<td>Y2005</td>
<td>0.679</td>
<td>0.041</td>
<td>16.67</td>
<td>0.000</td>
</tr>
<tr>
<td>Detach</td>
<td>0.308</td>
<td>0.023</td>
<td>13.49</td>
<td>0.000</td>
</tr>
<tr>
<td>Qtr1</td>
<td>-0.090</td>
<td>0.029</td>
<td>3.07</td>
<td>0.003</td>
</tr>
<tr>
<td>F2001</td>
<td>-0.171</td>
<td>0.026</td>
<td>3.30</td>
<td>0.001</td>
</tr>
<tr>
<td>F2002</td>
<td>-0.178</td>
<td>0.059</td>
<td>3.05</td>
<td>0.003</td>
</tr>
<tr>
<td>Adj R2</td>
<td>0.846</td>
<td>F-stat</td>
<td>93.59</td>
<td></td>
</tr>
</tbody>
</table>

**CONCLUSIONS**

The value of property situated in the floodplain is of concern to many property stakeholders and is crucial to the sustainability of communities. Although the subject of much speculation, there is no proven link between flood events and house prices in the UK.

International studies have shown great variation in measured flood responses but there are some common threads. Although individual properties may suffer large discounts, on average property retains the majority of its value in flooded and flood risk areas. This may be related to the fact that people have a tendency to ignore the risk of flood or have a lower perception of risk than the experts.
Studies have demonstrated that the impact of flood events on property values tend to reduce with time elapsed from the event. Without regulated disclosure or mandatory insurance there is very little evidence of the tendency to capitalise flood risk into house price permanently.

A case study of properties in the UK, which flooded in the autumn 2000 event, shows no significant long-term impact on prices of property in the floodplain. In the short term, prices did not fall but failed to keep up with the growth in value of the rest of the market. After two years this shortfall dissipated and the previously flooded property caught up with the market.

For this case study the likelihood of return flooding is only moderate. More examples should be studied but a tentative conclusion is that in similar circumstances recovery is likely to be swift. This can give confidence to the community, lenders and insurer to invest in the reinstatement of the property.

The variability of outcomes revealed by the international research implies that many examples must be studied and that categorisation of flood locations will be helpful in attempting to project future flood impacts.

REFERENCES


