

## **Professor Richard Ashley**

### **Cypress Gardens/Longlevens flooding summer 2007**

#### ***1. Summary***

- The residents of Cypress Gardens have been let down by every agency supposedly there to provide good services and ensure health, safety, security and well-being.
- Cypress gardens is by no means unique although it is clearly designated as in the 100-1 flood plain. It just happens that the rainfall and conditions were such locally that problems occurred. There are many other similar developments around the UK, awaiting similar rainfall and similar consequences.
- As the institutional arrangements for flood risk management in England and Wales are the most complex in the world, it is not really surprising that each agency (and the residents) were expecting others to assume responsibility – and that the residents did not have any idea that they also shared some part in the need to look after themselves.
- Much of this is as a result of the inadequate planning system: the understandable desire by councils for new developments in their area to house people and for economic prosperity. Flood risk and drainage at the local scale has always been very low on the priority list for developments, with roads and visual amenity being considered of far higher importance.
- The problems are also as a result of the developer, Bellway Homes, wishing to maximise profits by cutting corners on good design, construction and maintenance. Although there is evidence that suggests that the appropriate standards prevailing at the time of the development were followed. Nonetheless there was no thinking that certain features of the site made it especially vulnerable to flooding.
- Bellway Homes assert that they have followed the standards of design and auditing prevalent in 1998-2001. This may be so, but they failed to account for flood risk (which is obvious even to a layperson) due to the lower level of the site compared with that on the opposite bank of the brook and due to the constriction caused by the footbridge. They may have followed ‘the letter’ of the rules and standards, but certainly not the spirit.
- Government is also to blame, in allowing councils to operate in this way in the past they are culpable and government has neglected to provide adequate building controls (cutting local authority budgets; allowing developers to be self-certifying via

NHBC); promoting house building at all odds (this is now even worse with CLGs demands) and reducing local authorities' in-house capabilities to control these complex systems through PFI and outsourcing. In mitigation, PPS25 goes a long way to ensuring this should not happen in the future provided it is implemented properly.

- Specific failures in relation to Cypress Gardens are:
  - Poor development in relation to flood risk considerations (anecdotal evidence suggests wholesale levelling of the site leading to it being lower than the ambient ground level in adjacent areas; bridge blocking flows not dealt with) and poorly designed and maintained on-site drainage by the developer, Bellway Homes – profits before people. Bellway Homes deny lowering the site.. However, it is clear that the site was evidently below the brook level at the time as pointed out to GCC (letter from Julian Myrans to GCC dated 25/08/01).
  - Bellway Homes also maintain that the bridge was needed to maintain a right of way. Again although they followed the letter of the requirements for development, poor consideration of the blockage potential has not addressed the flood risks this brought, as it would have been straightforward (although costly) to get permission to replace the bridge with one that did not block the brook flow.
  - Anecdotal evidence suggests that stormwater drainage maintenance had not been carried out prior to the flooding in June. Bellway Homes state, however, that this was done before the flooding and again after by STW – we have no way of refuting this.
  - As regards the flap valve – Bellway Homes state that even if this had been fitted it would not have been able to influence the level of flood water. This statement cannot be made without detailed hydraulic modelling and betrays an ignorance of how the system was designed to perform. If the flap valve were in place then the brook would not have been able to flow up the pipe into the storage cistern during the flooding. Hence without the brook inflow there may have been spare volume in the tank to take some of the flood water from the road gullies once the brook had spilled over the bank. Flooding may not have been prevented entirely but it may well have not been as bad. This may be the most significant lack of care that Bellway Homes is responsible for and that is not in dispute without detailed modelling.
  - Sadly it appears that no stakeholder was responsible to ensure that the flap valve had been fitted other than Bellway Homes. Thus suspicions about inadequate planning and building control enforcement of the development on the part of the Council and lack of water course maintenance as originally believed was not correct. However, there was also some responsibility on the part of the council to undertake

a strategic flood risk assessment of the area as part of the development planning processes – this has not been done and is only now underway.

- The EA now admit that they (not GCC) were actually responsible for watercourse maintenance for the last 15 years, despite what was previously asserted. Some cutting of growth has taken place each year but that has been all (why did they not remove the scaffolding bridge upstream?). Hence although flooding would have occurred anyway, the EA did not in fact do their job properly. Bellway Homes also state that ‘inspection by EA/GCC/themselves before the flooding occurred (presumably of the brook?) resulted in the EA being appointed ‘to carry out further works because some erosion had occurred... we paid EA to carry out ..planting..’. The EA have no record of this nor is it normal for them to enter into such transactions.
- Hand-washing by the environment agency –who have failed to undertake or promote any agency maintenance of the brook or to expeditiously carry out a Catchment Flood Management Plan study, which is also now underway.
- Severn-Trent water who, typically as elsewhere around the country, failed to consider properly the local flood risk potential failure of the downstream sewage pumping station [sited on the 100 year flood plain]; putting customers at severe risk of danger to health, life and limb.
- GCC claim that because Gloucester has developed over 2000 years – flooding has been high on their priorities; this is a red herring and applies only to main river interests. Not these ‘forgotten streams’, despite GCC claims they are *not forgotten*.
- GCC claim that had the EA objected to the development ‘they would have refused planning permission or required whatever measures were necessary to mitigate flood risk’. This is disingenuous as the EA were not even statutory consultees at the time and many developments went ahead despite their objections – this is GCC being wise after the event and it was common practice at the time to develop against the wishes of the EA.
- Building inspections – GCC are at great pains to point out they were not responsible and that Bellway subcontracted to an NHBC approved contractor. Bellway Homes support this view and it is standard. Whether these inspections are adequate is arguable, not only here – a catalogue of new home faults in general illustrates that these inspections may not be what they should be. The flap valve is not included in these and no-one is responsible other than the developer for fitting it or checking it has been done.

- Bellway state that construction is to sewers for adoption (now 6<sup>th</sup> ed.). It was a much earlier edition then. Sewers for adoption 4 (superseded in 2001) indicates that stormwater sewers should be designed to flow full once in 2 years in flat areas. The 1 in 30 year standard was applicable to property flood risk. From July 2001, sewers for adoption 5 introduced the need to 'protect against flooding' and specified for no flooding on any part of the site in a 1 in 30 year return period. It also specifies the need to ensure that 'under extreme wet weather' checks should be made to protect against the internal flooding of properties and the 'deign adjusted' to achieve this. Developers should also demonstrate flow paths and the potential effects of flooding from excessive storm events. It is not clear when Bellway Homes designed this site and whether or not it fell under these requirements, which align with PPG25 on flood risk.
- If the roads and drains were to adoptable standards – why has it taken 5.5 years before there have been any meaningful discussions about adoption?
- Bellway Homes deny any direct responsibility for the gas main and initial flow blockage that caused and that the main had been attached to the bridge long before the development. Surely as adjacent riparian landowner and bridge owners they should have realised it was an obstruction to the flow?
- Various amendments to the planning permission to ensure an 8m corridor (and no raising of the land adjacent to the brook) as added by the EA and stated by Bellway Homes are 'standard' pertaining both then and nowadays to such developments (see GCC policy and communications unit email of 21/08/07).

*Post-script*

- PPS25 *should* ensure this does not happen again in the future
- But..government pressure for 100s of thousands of new homes may make building on the flood plain inevitable and compromise PPS25
- The sewerage undertakers are going to take over shared sewers in the future (possibly by 2010). This is both good and bad. They will be given personal assets currently owned by customers for free (the sewers in my back garden for example) and will then be able to charge the customers to maintain these. However, it will mean that these should be better maintained and also that those so far considered 'unadoptable' will be transferred. It is not yet clear when this will happen and which sewers it will involve – it may not include stormwater sewers draining to rivers for example.

## ***2. Background***

The summer of 2007 was particularly wet and had prolonged periods of rainfall that saturated the ground. On top of this were periods of more intense rainfall. As yet the likelihood of occurrence of such events (wet period plus at least two significant intense periods) is not clear and has not been defined even in the GCC inquiry (scrutiny) report. Across the UK estimates range from odds of 30-1 to more than 400-1.

### ***2.1 Cypress gardens***

The Gardens were flooded on Monday 25<sup>th</sup> June and again on 20<sup>th</sup> July (although Bellway Homes claim they were flooded in August and largely ignore the June event). In the first June event water appeared to come from Horesbere brook on to the roads and also from the main sewer backing up into properties. In the latter event there were additional upstream flows from Greyhound Gardens that inundated a larger area and also flowed into Cypress gardens.

## **2.2 There are several reasons for the flooding and continuing flood risk**

### **2.2.1 The location and planning issues**

The development is bounded by the Horsebere brook which runs SSE – NNE along the western boundary and this is responsible for the 100-1 flood risk to the area shown on the EA's on-line flood risk map.

The development is low lying compared with the other housing estates in the surrounding area. There is anecdotal evidence that the developer was advised that the site was prone to flooding and that any properties should be set at a level higher than normal in relation to the ground level. This was not done when the estate was constructed in 2001/2, in fact the site was sloping with high and low points and again, anecdotal evidence suggested it was levelled by the developer to the lowest ground level, so placing the properties well below any others in the surrounding areas.

At the time (before 2000/1), developments did not have to comply with any particular planning policy guidance, just the Unitary Development Plan and normal building regulation standards. These are applied and enforced by the local council. Builders such as Bellway homes also have delegated authority (via subcontractors) to verify their own building standards in order to qualify for NHBC accreditation. Hence Council checks for construction standard compliance under such conditions are usually cursory (often non-existent). Evidence from adjacent property owners suggests that there were a number of problems related to the planning permission compliance and standards of construction. Since the estate was planned, tighter controls on new building have been introduced via, initially, PPG25 and subsequently, PPS25. Construction in such high risk locations as Cypress Gardens

could now only take place if there were strong grounds to make an exception to the requirements of the latter – this includes: if the development was of high economic value; if it was flood proof; if there were no alternative sites.

### **2.2.2 The brook and bridge**

The brook is a typical ‘forgotten’ urban watercourse. These are ubiquitous around the UK and in terms of maintenance and management of flood risks are often the responsibility of the riparian landowner through whose property the watercourse flows. Councils are the land drainage authorities and the EA is responsible for main rivers and the ecological quality of all water bodies. Only where the watercourse is considered a ‘main river’ or, since 2003/4, a ‘critical ordinary watercourse’ does the EA take responsibility for flood risk management. Currently the EA are preparing Catchment Flood Management Plans (CFMPs) to cover all flooding risks for every catchment in England and Wales, but their completion is still some way off and for the catchment of the Severn, not expected until summer 2008. It appears that the EA were responsible for maintenance for the past 15 years and that very little if any maintenance was carried out prior to the flooding events in 2007 especially as upstream of Cypress Gardens there was a scaffolding ‘fence’ across the brook left there from the original development. This was ultimately removed by the residents only after the first flood.

Currently the EA are leading the development of a Catchment Flood Management Plan for the wider catchment, which includes the brook. This is not expected for some time (summer 2008), but the EA have commissioned a modelling study of the brook catchment in order to identify the risks and potential solutions as soon as possible. In the meantime the EA are now engaged in providing a 300mm high embankment along the same line as the emergency sandbags used unsuccessfully in the second summer flood event. They are also undertaking some minor brook realignments downstream and bed dredging to enhance to flow capacity to get the water away more effectively.

The brook is spanned by an old bridge that existed prior to the construction of the estate that is owned by Bellway Homes. This is only suitable for pedestrians and provides a severe constriction to the cross section of the flow as it narrows the channel. At high flows the open cross section is of the order of less than one half of the upstream section of the brook. This section was further constrained by an old gas pipe attached to the downstream side of the bridge with a protective sleeve. Together, the bridge and gas main reduced the available flow cross section to about one third of the brook ‘natural’ section. The concrete plinth housing this main provided a further constriction, but this fractured during the June flood and deposited in the bed of the channel, causing further obstruction. This has since been removed but the gas main remains attached to the bridge. At no time did the developer acknowledge that this constriction to the flow may pose a flood risk.

The bridge is still the property and responsibility of Bellway homes although reportedly they are in discussions with GCC to get them to adopt it. As the bridge is an existing structure the EA, who are responsible for the brook flood risk management, cannot compel the builder to rectify it.

### 2.2.3 Site drainage

Most developers seek 'adoption' of on-site drainage and construct drainage systems in accordance with 'sewers for adoption' (now 6<sup>th</sup> edition, but at the time either 4<sup>th</sup> or 5<sup>th</sup> would have been applicable). In the 5.5 years since construction there is only recent evidence that Bellway homes have sought adoption by Severn Trent Water (the sewerage undertaker) and of the roads by GCC (this includes gully cleaning). As far as can be ascertained, there is a separate sewerage system, with the foul sewage connected to a sewer passing downstream less than a mile to a pump station at Innsworth Lane (known as 'Big Normans' pumping station). Surface water drainage is collected in a separate system that drains to a holding tank, from which it is constrained to discharge into the brook downstream of the bridge at a minimum rate to avoid ecological damage and any consequential downstream flooding set by the EA. A non-return flap valve set at this outlet was designed to ensure there was no backing up from the brook into the holding tank during high brook flows. There was no evidence that this flap had been installed in the 5.5 years since the system was constructed and Bellway subsequently fitted it in late summer of 2007. The lack of this flap valve could have exacerbated the flooding that occurred on both occasions – however, the potential for this can only be determined by detailed hydraulic modelling.

Anecdotal evidence based on (Bellway homes or GCC?) hurried maintenance after the first flood in June, suggests that the surface water drainage system was partly full of building rubble (including the holding tank) from the original construction. This is refuted by Bellway Homes who claim that STW CCTV surveyed the system before the flooding and that any debris arising from the June flood was subsequently removed by a maintenance visit.

The drainage system is still the responsibility of Bellway homes as it is unadopted.

Severn-Trent Water are responsible for the foul sewage once it enters the main drainage system. During the June flood, the 'big normans' PS failed at an early stage due to inundation of the control gear from the brook. This led to a shutting down of the pumps and backing up of foul sewage into the properties in Cypress Gardens. It is not clear which was the first to occur, this flooding from the toilets and showers, or the brook overtopping as the event occurred in the early hours of the Monday morning. There is a long history of sewage flooding from this PS in the vicinity, however, this seems to be confined to areas outside properties and as such does not have a high priority a recent case (Marcic vs Thames water) established that flooding external to properties did not infringe human

rights. Ofwat (the water industry regulator) requires returns as to external sewage flooding but does not set mandatory targets for its' elimination. The PS was renovated in or around 2004 and believed to have provided a better service, however, the adjacent sewage flooding of roads and gardens has continued since then. Plans to connect up to an additional 3000 new homes to the sewer and PS has prompted STW to review the PS effectiveness and there are supposedly plans to move it to another site.

Severn-Trent have replaced the damaged pumps and claim they have resited the control panels and incoming power supplies at a higher level (although this was not given in evidence to the Council inquiry in October).

### ***3. What has happened since the flooding - summary***

- Bellway Homes may have made a number of interventions – as outlined above – in the stormwater drainage system – although it is not clear whether or not it was them that cleared out the drainage system. They have fitted the flap valve.
- The EA has commissioned studies and is raising the brook banks, deepening the channel and realigning the downstream channel
- STW has replaced the pumps and resited the control gear above flood risk level
- GCC has commissioned and carried out an 'independent' scrutiny inquiry (across Gloucestershire) that highlighted additional information and issues

### ***4. What else needs to happen - summary***

- The EA as responsible agency needs to complete the CFMP and propose remediation options and get these funded
- GCC need to carry out a Strategic flood risk assessment (SFRA) and link this to the Local development Framework (to ensure future upstream developments do not make things worse at Cypress Gardens).
- STW needs to reorganise the very convoluted sewerage network to reduce system failure risk.
- Bellway Homes needs to either reconstruct or demolish the bridge and/or achieve adoption of the roads and drains so that other agencies take over and do the job properly.
- British Gas, or whoever is the supplier, need to re-route the gas main as part of the above.

- A round table meeting and discussion between all of the main players is required. This is because this investigation has revealed differences in the recollections of events amongst the main stakeholders and also contradictory information provided by the main stakeholders, especially in regard to the views of (impartial) independent witnesses.

## ***5. Notes from the inquiry in October-November 2007***

1. Bellway homes declined to attend the inquiry
2. Lack of maintenance of highway gullies (by Bellway) noted
3. Applauded the residents plans for future emergency responses
4. Chapter 11 is an example case study using Longlevens
  - a. Shows a very clear plan of the Horesbere brook catchment
  - b. Residents under severe stress and have had no local authority or health authority counselling (NB this is typical – in the Bradford inquiry the HA did not see it had any role to play in flood risk management and resisted engaging with the inquiry).
  - c. Variable insurance responses – with one resident waiting 27 days for contact.
  - d. Roads as well as drainage system are currently unadoptable
  - e. Horesbere brook maintenance has not been done and responsibility is unclear in terms of riparian owners (interesting that the council do not acknowledge that they were responsible until the EA took over) [EA: brook is a main watercourse; GCC had permissive powers and were contracted to do maintenance by EA until in June 2007; GCC said they were no longer able to be responsible]
  - f. The estate site may have been lowered and the specified variety in foundations in the planning permission were never used.
  - g. Flap valve from surface water drainage system was on original PP but only installed after the flooding this year
  - h. Gas pipe attached to the bridge has no permission to cross the brook (EA stated)
  - i. Clear failure by GCC to enforce the PP requirements
  - j. Why was the pump station control room located at ground level when it is clearly in the designated flood plain?

- k. Community resilience planning – residents recognise the need to be more self-supporting (how many of them?) – applauded by GCC, but no offer of support to help build capacity from any of the agencies!
- l. Road drain inlets are higher than the adjacent road surfaces
- m. There seems to be confusion even within the local authorities as to how highway adoption comes about
- n. Regulation of the flow in Horsebere brook originates at the Witcombe reservoir, from which the overflow weir is uncontrolled. This seems to be the responsibility of STW. It is unlikely that any changes will be made to control the outflows.
- o. Cypress gardens is at the lowest elevation along the brook catchment. The brook is also constrained in width at this point.
- p. Groundwater is very near the surface of the site – preventing owners growing grass even. Evidence suggests the site level was actually lowered by the developer.
- q. OS maps show a 20 x 12m 'water pit' and an oil tanker under the site.
- r. Houses on other side of brook were built (by Bellway) on the original higher ground and have not flooded.
- s. Residents believe they should be given compensation for the loss in property value (one estimate was <£44000) [what proportion of total is this?]
- t. GCC clearly wishes not to bear any responsibility for failures as the report portrays them in an unrealistically good light

#### Other – EA discussion with Anthony Perry

- Severn CFMP – pilot a few years ago not to current defra standard. Now under review. Expect a revised/enhanced version by summer 2008.
- No evidence of any SFRAs being undertaken by local authorities.
- Severn-Trent claimed at inquiry they were not given warning by EA as flood developed – this is untrue. Only contacted gold command once the big Normans PS was inundated.
- Bellway have been in discussion with GCC to get the roads (and bridge) adopted

- Defra scoring system for deciding on flood defence investments currently discriminates against smaller communities

## ***6. Recommendations***

The residents should sustain their high profile and try to embarrass each of the culpable agencies. Key action is going to be through the local MP who needs to ensure that pressure is brought to bear on Defra to agree that the EA proposals (once they emerge) should be funded.

A close watch needs to be kept on STW' plans to update the sewerage system for this part of Gloucester, to make sure this is done in a timely fashion and is effective.

- Strong lobbying should be undertaken to ensure that:  
GCC adopt the roads, drainage and gully maintenance, especially the bridge, which should as a minimum be demolished or replaced
- STW adopt the on-site foul sewerage as soon as possible and also where practicable, the stormwater drainage. For this to happen, they may require confirmation that the system is fit for purpose.
- A round table meeting and discussion between all of the main players is required. This is because this investigation has revealed differences in the recollections of events amongst the main stakeholders and also contradictory information provided by the main stakeholders, especially in regard to the views of (impartial) independent witnesses. This should ensure that appropriate responsibilities are in future made clear and attributable.