

## **1 SYNOPSIS**

It is widely recognised that additional land is required for residential and commercial developments. This, in turn, invariably leads to an increase in impermeable area with a subsequent increase in the volume of surface water runoff. The planning process offers the ideal opportunity to adopt an integrated urban drainage approach from the outset when preparing development proposals. These opportunities are, however, currently being missed for a number of reasons.

One of the main reasons for this is that there is often a separatist stance taken at planning stage by the various organisations responsible for land drainage, i.e. the Environment Agency, Water Companies, Local Authorities, Internal Drainage Boards and riparian owners. There is also confusion with regard to the ownership of surface water assets. Consequently the responses at the planning stage from the various organisations responsible for surface water runoff are usually made on a separatist basis resulting in a lost opportunity to provide integrated urban drainage.

The paper will demonstrate where the hindrances lie in relation to the application of integrated urban drainage principles within the planning process using experience from recent projects. It concludes by making suggestions and recommendations as to how integrated urban drainage can be better incorporated into the planning process in future.

## **2 INTRODUCTION**

Recent figures show that some 3 million new homes are required by 2020. Many of these will be built on greenfield land. In this case the additional runoff volume from the roof areas alone amounts to around 1,000,000 m<sup>3</sup> for a 5mm event.

An estimated one third of these homes are likely to be built in flood prone areas. This will, therefore, introduce around 330,000 m<sup>3</sup> of extra runoff volume to flood affected areas for a 5mm event. For more extreme events the increases in runoff volumes are

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significantly greater. This figure does not include the additional runoff from roads, other residential hardstanding areas, commercial/industrial or other development.

Basically new development, particularly on greenfield sites, equals more surface runoff whatever its means of removal from site. Notwithstanding other flood related issues, e.g. insurance, the planning process has a significant but often overlooked role to play with regard to providing integrated urban drainage and sustainable homes. More emphasis on addressing surface water within the planning process is, however, required if we are to fully provide integrated solutions. A joined up flood risk management policy with clear responsibilities is essential to achieve this aim.

### **3 SURFACE WATER DRAINAGE – LEGISLATION AND GUIDANCE DOCUMENTS**

There are a number of items of legislation and documents applicable to assessing surface water runoff at the planning stage. These comprise policies, strategies, plans, reviews, guidance and assessments.

#### **EUROPEAN LEGISLATION**

The EC Water Framework Directive established principles for the protection and improvement of all the EU's natural water bodies. It requires the completion of management plans for all river basins. Whilst highlighting ecology, water quality and the environment it is recognised that development has the potential to adversely affect the water environment. The Water Framework Directive provides the opportunity to integrate flood management within overall river basin planning to provide sustainable flood risk management. A strategic approach is promoted rather than addressing specific localised flooding problems. In addition, the EU Floods Directive came into force on 26 November 2007. This Directive now requires Member States to assess if all watercourses and coast lines are at risk from flooding, to map the flood extent, assets and humans at risk in these areas and to take adequate and coordinated measures to reduce this flood risk. This Directive also reinforces the rights of the public to access this information and to have a say in the planning

process.

### **NATIONAL PLANNING POLICY**

The relevant documents comprising the "Planning System" include circulars, Planning Policy Statements (PPSs) and Regional Spatial Strategies (RSSs). These documents set out, roles, responsibilities, relationships, duties of officers/members and lead to RSSs, Regional/Local Plans and ultimately the determination of individual planning applications.

The key document for surface water runoff and flooding in England is PPS 25: Development and Flood Risk, October 2006, particularly Annex F. PPS25 is accompanied by Development and Flood Risk: A Practice Guide Companion to PPS25 "Living Draft". These documents consider the different types of flood risk at all stages of the planning process. The key aspect for surface water runoff is Appendix F.6 which requires surface water from the post developed site to be managed in a sustainable manner to mimic surface water flows from the site prior to the proposed development. In addition, flood risk to the site and elsewhere should be reduced and climate change should be taken into account.

The Environment Agency became a Statutory Consultee from October 2006 but it is Local Planning Authorities (LPA's) who determine the majority of planning applications. The LPA's are driven by performance indicators which require a prompt turnaround for decisions on planning applications. Another key issue of the planning system is Section 106 of the Town and Country Planning Act 1990 regarding developer contributions. The LPA can charge a levy recognising that a development can cause an increase in population which leads to an increase in demand for public facilities, such as roads, libraries, schools and parks.

A further guidance document which is being increasingly used is "Preliminary Rainfall Runoff Management for Developments, Revision C", September 2005 which is part of the Defra/EA Flood and Coastal Defence R&D Programme. This document is

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particularly relevant for dealing with additional runoff volumes where there is an increase in impermeable areas at sites.

Other guidance includes the Defra Making Space for Water Strategy (2004) aimed at managing the risk from flooding and coastal erosion. This strategy also considered options for adoption and maintenance of SUDs. There is also a new Government initiative on water strategy "Future Water". This was published on 7 February 2008 and sets out the Government's long-term vision for water and the framework for water management in England. One chapter concentrates on the management of surface water runoff. A key aspect of this is the sustainable management of surface water at the **surface**. It also reinforces the use of Surface Water Management Plans to improve the co-ordinated response from stakeholders. A section is devoted to integrated planning for new development.

For Northern Ireland there is PPS15 – Planning and Flood Risk issued in June 2006 following a period of consultation. PPS15 sets out the Department of the Environment's planning policy to minimise flood risk to people, property and the environment throughout the whole of the planning process. It also includes the Government's commitment to sustainable development and the conservation of biodiversity. A precautionary approach is adopted. A Drainage Impact Assessment is required for sites greater than 1 hectare, where the development comprises 10 or more dwellings or there is a change of use and increase in impermeable surfaces of greater than 1000 m<sup>2</sup>. An assessment is also needed where surface water runoff impacts on a sensitive area.

### **OTHER KEY DOCUMENTATION**

- a) Building Regulations. Part H3 deals with rainwater drainage. This also ties in with the Code for Sustainable Homes.
- b) Water Industry Legislation. The important aspects include the right to connect to public sewers covered by the Water Industry Act 1991, Section 106. Sewers for Adoption sets out the requirements for adoption of development sewerage.

c) Sustainable Drainage Documentation. They include the following:

- Interim Code of Practice for Sustainable Drainage Systems, National SUDs working Group, July 2004
- CIRIA C609 Sustainable Drainage Systems – Hydraulic, structural and water quality advice
- CIRIA C635 – Designing for Exceedance in Urban Drainage – good practice
- CIRIA C697 – The SUDs Manual
- CIRIA C698 – Site Handbook for the Construction of SUDs

#### **4 PITT REPORT RECOMMENDATIONS**

The Pitt Report included 15 recommendations and 72 interim conclusions. Some of these were directly related to the planning process.

The report identified that development control is central to managing flood risk. In particular, development should avoid known risk areas and mitigate against the risk where development needs to take place in flood risk areas. Property resistance and resilience to flooding was also addressed and recommendations are to be incorporated into future updates to the Building Regulations. For existing buildings in flood plain areas however, it was noted that insurance companies were reluctant to pay for betterment in relation to flood resilience as part of the settlement of claims resulting from the 2007 floods.

The importance of Strategic Flood Risk Assessments and Surface Water Management Plans was emphasised as the basis for managing surface water flood risk. A joined up approach was recommended with local authorities leading on the management of surface water flooding at a local level with support from other bodies. It was commented that there is a lack of knowledge of flood defence and drainage assets. Local authorities should hold a register of assets to include condition and responsible owners.

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It also noted that the cumulative impact of permitted development on the drainage of

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surface water is significant. It considered that householders and business owners should not be allowed to lay impermeable surfaces as of right. In addition, developers should make a **full** contribution to the costs of building/maintaining flood defences. The report identified good and bad design of new development.

Other key aspects include the identification of Surface Water Hot Spots as a matter of urgency. These are areas at the highest risk from surface water flooding and should be identified by the Environment Agency supported by Local Authorities and Water Companies. The remaining high risk areas subject to surface water flooding should be identified over the coming months. The output from these findings should inform Local Resilience Forums.

The report also addressed the right to connect to public sewers. Defra is currently considering whether this right to connect should be removed for surface water to more encourage use of SUDs. It was commented that there should be proposals to invest in the surface water drainage network to deal with increasing flood risk as part of the Water Industry pricing review. Furthermore, there should be an organisation responsible for ownership and maintenance of SUDs. Satisfactory maintenance of existing surface water drainage systems was also discussed.

## **5 DEVELOPER RESPONSIBILITIES**

In England the developer is required to produce the site specific Flood Risk Assessment (FRA). This must address the different sources of flooding. A FRA is required for all sites in Flood Zones 2 (medium probability) and 3 (high probability). Sites in Flood Zone 1 (low probability) which are greater than 1 hectare in area must also be accompanied by a FRA. Currently sites less than 1 hectare in Flood Zone 1 do not require a FRA but the Pitt Report identified the impact of the cumulative effect of increasing impermeable areas on small sites.

In certain cases he may also have to gather the evidence to satisfy the Sequential and Exception Tests as set out in PPS25. These are required where a development cannot be located in a low probability flood zone.

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Developers are governed by commercial and time pressure issues. In many cases they cause their own problems by not addressing surface water early enough in the development process. Typically they will not make enough provision for surface water management. This results in little room being available within the development itself to provide SUDs components. Furthermore, sometimes a developer only becomes aware that a FRA is required when he submits his planning application and is advised by the planner. Some LPA's are now refusing to register planning applications in cases where an appropriate FRA is not submitted.

Some developers are demonstrating increasing awareness of the requirements for appropriate FRAs. They refer to the Environment Agency's Flood Maps via the website and ask about the requirement for the site specific FRA in cases of doubt. Most developers have a commitment to implement SUDs although some still see the provision of storage in oversize pipes as the preferred approach.

Often a major issue with the production of the FRA is lack of asset records for the existing site. This means that it is unclear where the outfall of the existing surface water runoff is located. This can involve a detailed asset survey to determine whether surface water runoff is directed towards a watercourse, culverted watercourse, private drains or public sewer. If the location of the existing surface water runoff is uncertain it will not be possible for the future surface water runoff to mimic existing conditions as required by PPS25.

## **6 TYPICAL PLANNING CONDITIONS AND REGULATOR RESPONSES**

The principle planning consultees for surface water management in England are the LPA and the Environment Agency. The water company can greatly influence surface water runoff issues but are not a statutory consultee. Given the legal responsibilities there is a need for LPA's to have flood risk management experience either in house or available externally. Ideally this experience should be independent of the Environment Agency so that the LPA can make the final informed decision on planning

applications.

Often variations in responses are received from the consultees. Some typical responses are highlighted here along with some general (unspecific) examples. The responses vary depending upon whether the application is detailed or outline. Typically more information is required for a detailed application although the level of detail requested varies. It should be noted that it is not required to carry out detailed drainage design at planning stage. It is only necessary to prepare a strategy for the implementation of surface water management and to demonstrate that an acceptable solution can be implemented given the size and other constraints at the site.

One particular example relates to a 25 hectare school site promoted by the LPA itself. Part of the existing campus is to be refurbished whilst a separate (disused) part along with an area of existing playing fields is proposed to be sold to a developer for residential/commercial development. Initial consultations were as follows:

- a) The Environment Agency confirmed that there were no suitable watercourses in the area. Surface water runoff from the proposed development should be directed to surface water sewers.
- b) The Water Company stated that there were no suitable surface water sewers in the area and that runoff should be directed to local watercourses.

This illustrates to some extent the lack of joined up thinking in relation to implementing the most appropriate solution in dealing with runoff from the post developed site. Fortunately in this case the LPA had detailed asset records. Dye testing and CCTV survey were undertaken at the site to show that there were two separate outfalls for surface water runoff from the site. One outfall discharged to a public surface water sewer whilst the other discharged to a culverted watercourse and ultimately a main river. In addition, a substantial part of the site was subsequently found to overlie sandy soils. Percolation tests confirmed that infiltration techniques would work.

The solution put forward within the FRA mainly comprised infiltration devices, i.e.

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soakaways for roof drainage, infiltration swales for road runoff and permeable car parking spaces. In addition, there are substantial open spaces at the site to allow for surface storage of runoff. The developer was able to offer significant betterment with regard to reducing runoff rates and runoff volumes discharged both to watercourse and the public sewer network. The solution more than satisfied the requirements of PPS25.

Whilst the above example illustrates the need to have existing asset records, a second example illustrates a less than sustainable solution which was eventually accepted. The site was a brownfield site adjacent to an urban watercourse. Surface water from the existing site discharged into a public surface water sewer with an outfall into the watercourse approx 1 km downstream from the site. The watercourse itself was in open channel adjacent to the site although there were a number of culverted sections present both upstream and downstream of the site.

A key issue at this site became agreeing the existing flows in the watercourse compared to its capacity. The sewer network in the upstream urban catchment was part combined and part separate, the latter areas being mainly the newer developments. There were also a number of combined sewer overflows discharging to the watercourse. It was not possible to agree the flow rates in the existing watercourse with the Environment Agency. Using a FEH hydrology approach indicated that the watercourse would flood at the calculated flow rates. This was an overly conservative (precautionary) approach given that the diameters of the upstream culverts would significantly attenuate the flow rates. In addition, there was no overall hydraulic model of the watercourse which took into account the natural catchment area, the combined sewer network and the areas of separate drainage.

The solution reached, following much discussion, was that runoff would continue to be discharged into the public surface water sewer network. This example illustrates a common issue in that there is a lack of available hydraulic models for urban watercourses. The water company hold models of the combined networks but often

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models for surface water sewers in separate areas are not available. An opportunity was missed in terms of removing flow from a surface water sewer and discharging directly to watercourses at controlled flow rates.

One of the other key issues emerging from the regulator responses relates to betterment. On some sites the responses have been to provide storage for up to the 1 in 200 year event. Whilst this aim may be catchment specific to protect flood prone rivers, it does go beyond national planning policy. In these circumstances is it fair that the developer stands the cost for the additional infrastructure costs? Presumably, if it can be justified, then some funding for part of the asset requirements should be met from elsewhere. There are also varied responses for the reduction in runoff rates post development. Reductions in flow rate of 10%, 20% and 30% have been suggested. This leads to the question of what is betterment. This probably depends on what the issues are for the particular catchment. In some flood prone areas there would clearly be advantages in providing attenuation and storage which go beyond national planning policy. In these cases the issue is who funds the additional asset requirements.

Regulators are also asking for a maintenance and dilapidation allowance to be made for storage facilities. At planning stage, however, a drainage strategy is provided but detailed design is not carried out. It is only usually possible to specify maintenance once the type and form of the storage facility is known. This raises the question of whether adoption and maintenance issues should be addressed at the planning stage.

On some sites, particularly urban watercourses, it would clearly be an advantage to open up previously culverted watercourses. This would lead to the creation of a more natural environment and at the same time potentially reduce flood risk. Watercourses on industrial sites have often been straightened with man made banks being introduced. Some developments have actively sought to restore the natural habitats of watercourses by channel re-alignment to tie into the development proposals and this is to be encouraged. This will ensure a more sustainable development and

improved biodiversity.

The current range of different policies, strategies, plans, reviews, guidance documents, assessments and data availability can often lead to much confusion. Yet, despite this, sites still do get planning permissions approved, so what is the real problem? We need to consider, however, whether there are sufficient drivers for LPA's to ensure that we are not missing out on the opportunities to introduce integrated urban drainage solutions for new developments. More joined up thinking and action has been identified in response to the 2007 floods. This approach is also vital at the planning stage.

## **7 CONCLUSIONS AND SUGGESTED FUTURE IMPROVEMENTS**

There are a large number of policies, strategies, plans, reviews, guidance, assessments and data needed for consultation in preparing Flood Risk Assessment. This can create confusion in terms of applicability as well as interpretation. It also has the tendency to reinforce a separate approach to planning matters by the various bodies involved in surface water management. Clearly a joined up approach with clear responsibilities is required if we are to ensure we get the best solution for any particular development. Yet despite the separatist approach sites still receive planning permission but are the most appropriate surface water solutions implemented?

Improved awareness of surface water runoff within the planning process is also required by developers. A sustainable drainage solution is most likely to be achieved if surface water runoff is considered at the outset in planning a development. At present too many developers only consider surface water runoff once the development layout is finalised. This is normally too late and space restrictions can hinder the implementation of a satisfactory sustainable drainage solution.

The benefits of a joined up approach are recognised but an unanswered question is who pays, particularly when betterment over the existing situation is required. How

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can betterment be quantified and agreed to remove confusion and ambiguity. Are additional incentives required in order to promote the integrated approach? LPA's have a key role to play in this area and, given their legal position with regard to determining planning applications, they ideally require their own expertise.

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