FLOOD AND WATER MANAGEMENT SUPPLEMENTARY PLANNING DOCUMENT

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Severn & Avon Valley Combined Flood Group



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1: Purpose and Status

As all forms of flooding and their impact on the natural and built environment are material planning considerations, the aim in Tewkesbury Borough is to ensure that flood risk is taken into account at all stages of the planning process, we will guarantee that the EA flood maps are enhanced to reflect the true floodplain of the area, to avoid inappropriate development in areas at risk of flooding. Where new development is exceptionally necessary in such areas, the aim is to make it safe without increasing the risk elsewhere and reduce overall risk.

Tewkesbury is unique in the fact that it is situated at the junction of the Rivers Severn and Avon. The Severn is tidal which affects the Avon thus making Tewkesbury the focal point for what happens in large parts of North Gloucestershire. This means that water volumes are so high during flooding, water management (SUDS), as advocated by PPS 25, is inadequate. PPS25 water management criteria deal in minimums which does not allow for Tewkesbury's unique situation.

Tewkesbury Council is adopting an integrated approach to water cycle management that aims to manage all of the components of the water cycle (rainwater, storm water, sewage, ground water, surface water (PLUVIAL) and recycled water) to secure a range of social, economic and environmental benefits.

The purpose of this Supplementary Planning Document (SPD) is therefore to set out the Council's commitment to minimising flood risk, from the largest floodplain in the country, managing surface water and achieving sustainable drainage principles in new and existing developments whilst ensuring that the re-use and recycling of water is given priority. This approach is in addition and enhances Planning Policy Statement (PPS) 25: Development and Flood Risk (2006) that emphasizes, "All forms of flooding and their impact on the natural and built environment are material considerations".

PPS 25 differs from the previous version as it now stresses the importance of managing surface water and its effective disposal from development is now a material consideration. Tewkesbury is particularly concerned to ensure that surface water is managed to alleviate against this type of flooding episode in the future.

Adoption of this SPD will mean that its provision will become a material consideration in the determination of planning applications, adding further strength and detail to the existing adopted Local Plan policies (Env17, Env18, Env19 and Res4). Early use of this document in the design process is therefore essential.

Consultation

The SPD and associated Sustainability Appraisal (SA) will be subject to public consultation in line with the council's adopted Statement of Community Involvement (SCI). The statement of consultation for this SPD in Appendix 8 provides further details on the process.

2: Aims and Objectives

Local Planning Authorities (LPAs) have a responsibility to take account of water – in both flooding and drainage matters as material considerations in the determination of planning applications for new developments. They are also required to consult with the relevant Water Authority, Environment Agency and Highway Authority, each of whom has a responsibility for giving approval to different drainage proposals. This SPD aims to assist co-ordination between the regulatory Authorities in the resolution of Water Management, and its objectives are to:

- 1. Discourage any building in flood zone 3 and tighten up planning policy for developments in flood zone 2.
- 2. Prevent flood exacerbation to ensure that development is designed to reduce the risk of flooding either on the site or downstream by reducing the volume and frequency of water flowing directly to watercourses.
- Require the inclusion of Sustainable Drainage System (SUDS) approaches permeable paving, planted roofs, filter drains, swales, basins and ponds, etc. for all new developments (systems should be designed taking into account the impermeable nature of Gloucestershire soils) – including that adequate provision for their long-term maintenance.
- 4. Ensure that development incorporates appropriate water management techniques that maintain existing hydrological conditions and that will not have adverse effects upon the natural water cycle.
- 5. Provide on-site storage capacity for surface water attenuation for storm events up to the 1% probability event (1 in 100 years) including an appropriate allowance for climate change (currently 20%but is inadequate for this area) in order to restrict the developed rate of runoff to no more than the existing rate of runoff for the same event. With the use of hydrograph and other hydrological tools to prove proposed schemes work.
- 6. Ensure water harvesting, saving and recycling devices are included in any new built scheme without compromising effectiveness.
- 7. Address the over-use of water by ensuring that the installations of water efficient devices are given priority.
- 8. Encourage the installation of water meters to link water habits to a charging structure thus encouraging occupants to assess their individual usage.
- 9. Encourage appropriate porous material on new developments on all sites and resist planning permission for change of use where such design features are not incorporated.
- 10. Encourage areas of green public open space within developments to reduce amount of paved surfaces and associated problems.
- 11. Encourage design systems that minimise surface water pollution and discharges into watercourses and groundwater, for example, by utilising appropriate SUDS techniques.

3: Introduction

Local Problems

It is now widely considered that as a result of climate change and increasing population we will experience more occurrences of weather extremes and urban expansion. Flood risk management, future water resource needs, supply and sewerage are key issues that need to be addressed in the Borough, with regards to the location of existing and future development. These factors may lead to an increase in flooding episodes and water shortages in the Borough. Couple this with the South West Regional Spatial Strategy (SWRSS) revision growth proposals and it is imperative that the issues associated with water management are identified and subsequently tackled.

Most of Tewkesbury is at an extremely high risk of experiencing future flooding episodes that would mirror recent events that caused large scale urban and rural flooding, together with the associated negative social, environmental and economic impacts. This was largely due to the amount of surface and rainwater run-off rapidly entering rivers and drainage systems that were unable to cope with the influx of water. This coupled with FLUVIAL (out of bank) and water displacement by developments built in the floodplain exacerbated the situation at a frightening speed. For further information on flooding in Tewkesbury, please refer to Appendix 2.

4: Adaption and Alleviation

Change is required across all levels of society to adapt to and alleviate against future flooding episodes. The Government is currently piloting a number of schemes across the UK and is seeking the most appropriate way forward to tackle the issues associated with flooding. One such scheme involves the removal of householder's Permitted Development Rights to prevent them freely paving over their front gardens without planning permission, unless they use permeable paving or gravel. This legislation was introduced on October 1st 2008.

In order to overcome the future challenges posed by flooding, the UK has to work towards the following objectives:

- 1. More adaptable drainage systems delivering reduced flood risk, improved water quality, and decreasing burdens on the sewer system;
- 2. More efficient management of surface water drainage, allowing the increased capture and reuse of water; slow absorption through the ground; and more above ground storage and routing of surface water separate from the foul sewer system;
- 3. Stronger public appreciation of the causes and consequences of surface water run-off and the actions people can take to minimise the risks;
- 4. Reducing the impact of flooding by avoiding inappropriate development in areas at risk from flooding and by directing development away from areas at highest risk.

5: Flooding Context

Types of Flooding

Flooding is described by the department of Communities and Local Government (CLG) as follows:

"Flooding from rivers and coastal waters is a natural process that plays an important role in shaping the natural environment. Flooding can also occur from groundwater, sewers and other non-natural or artificial sources. Flooding from any source can threaten life and cause substantial damage to property. Although flooding cannot be wholly prevented, its impacts can be reduced through good planning and management". (PPS 25, Para 1).

Development generally reduces surface permeability by replacing permeable ground with impervious roofs and paved areas. This reduces the amount of water infiltrating (further limited by the soil structure in Gloucestershire) into the ground and increases surface run-off, this coupled with increased PLUVIAL flooding, partly due to climate change, has greatly increased the need for tighter planning policies. The traditional solution has been to install underground pipe systems designed to convey water as quickly as possible away from the development and prevent flooding locally. However, this increases the speed of run-off and can change the flooding regime of the immediate catchment area and may lead to problems in the wider river catchment, particularly flooding downstream. Further information on the different forms of flooding can be found in PPS 25 at Annex C.

Flooding and the Planning System

Measures taken through the planning system are the primary means of avoiding and reducing flood risk affecting and arising from new development. They are an important element in managing flood risk in the long term and offer opportunities to reduce flooding through changes to the urban fabric.

Planning for flood risk exists to ensure that developments on vulnerable areas of land are of a safe and sustainable nature. Regional and Local Planning bodies are responsible for assessing flood risk. LPAs are required to consult the Environment Agency on proposals in areas at risk from Main River flooding. They are required to add their own data on PLUVIAL and other sources of flooding and are responsible for ensuring that developers assess flood risk for their development proposals in this respect.

Additionally, under the 2006 Natural Environment and Rural Communities (NERC) Act, Local Authorities and Water Companies now have a legal duty to have regard to biodiversity in carrying out all of their functions. Therefore Tewkesbury Borough Council is keen to ensure that developers seek opportunities to use open space for both amenity and flood storage uses (only if they are workable), thus encouraging and promoting biodiversity.

Areas outside the Flood Plains

It must be stressed that the recent flood events in the Borough also occurred in areas outside designated flood plains, as a result of PLUVIAL (surface water caused by large amounts of rain) rather than FLUVIAL (out of bank, watercourse) flooding. Therefore managing all forms of water, not just those areas within flood plains, is a major consideration for the Borough Council. Further information and advice on flooding arising from ordinary watercourse (Non-main River) flooding may be

available by contacting the Councils Engineering Consultancy Section and Severn Trent Water Company.

Flood Risk Responsibilities

Responsibility for the management of flood risk falls within the remit of a number of Operating Authorities, with the Department for Environment, Food and Rural Affairs (DEFRA) taking an overarching position, although at the time of document publication it is likely that the Environment Agency will take over this role. The responsibilities of the key parties are:

- 1. The Borough Council currently has primary responsibility for dealing with surface water management.
- 2. Sewerage Undertakers are responsible for any sewers adopted under the requirements of the Water Industry Act 1991 including responsibility for the sewers carrying surface water from private impermeable areas such as roofs and drives.
- 3. Highway Authorities / Agency are responsible for draining the highway network.
- 4. The Environment Agency is the principal flood defence operating authority. It has permissive powers for the management of flood risk arising from designated main rivers and the sea.
- 5. The Environment Agency is also responsible for flood forecasting and flood warning dissemination and for supervising internal drainage boards.
- 6. Landowners have the responsibility for draining their land and managing the flood risk issues associated with their property (e.g. clearing out their own ditches, brooks).

Drainage Approvals

Formal approval for a drainage system is required from:

- 1. The LPA (planning permission).
- 2. Building control Authority (approval of design and implementation of the Building Regulations).
- 3. The Sewerage Undertaker Severn Trent (connection to the adopted sewers and possible adoption of drainage systems).
- 4. The Highway Authority (road construction consent and highway drainage consent).
- 5. Other Local Authority Departments (possible agreement to maintain public open space).
- 6. The Environment Agency (discharge consents may be needed in some cases).

The planning system is used to co-ordinate consultation between the approving Authorities but the license and consents have to be applied for separately – they are not granted automatically when a planning application is approved.

Developers are encouraged to discuss their proposals at the earliest opportunity with the following organisations to ensure that any flood related issues are not exacerbated by the development: **Tewkesbury LPA**, **Severn Trent Water Network Development Team**, **County Council Highways** and the **Environment Agencies** **Development Control Team**. Contact details for each can be found at the back of this document.

In order to improve this co-ordination and avoid confusion over requirements and responsibilities within Tewkesbury Borough, applicants for planning permission will be required to submit a detailed statement outlining how the water cycle is to be managed on a development site along with proof of viability of the scheme. This must be submitted along with the planning application in order that the Operating Authorities can agree principles and are aware of drainage matters at the earliest stage.

Culverting of Ditches

Where a development requires existing ditches to be culverted, Land Drainage Consent will be produced and a suitably marked up "as built" drawing showing line, levels and size of the culvert and flow capacity together with any manhole positions and the Land Drainage Consent Number, will be provided to the Engineering Consultancy Team clearly indicating the properties with future riparian responsibilities for maintenance etc. Such responsibilities will be incorporated into the deeds of the properties concerned.

6: Water Management Statement

Water Management Statement Requirement

Tewkesbury Borough will require all outline or detailed planning applications that result in waste or surface water to be drained to be accompanied by a Water Management Statement (WMS). This will comprise a report outlining the water cycle issues relevant to a development proposal and the suitable means of providing for drainage in the long term. It will include existing drainage systems and problems, infiltration, groundwater, surface water flow, foul and storm water disposal and other drainage related flooding issues. The WMS will also include the Flood Risk Assessment (FRA) this is required for all applications.

A feasibility study evaluating the means of incorporating SUDS as part of the proposed development will also be required, as will a study of local soils and geology supported by site investigation results. This information will assist in developing an outline proposal for SUDS to be incorporated within the proposed layout of the development. The developer must be able to demonstrate that the technique is suitable for the development and provide supporting evidence (hydrographs) to back up their calculations. The WMS should also include a rainwater harvesting and grey water recycling feasibility study and the appropriate measures for collecting and reusing water should be incorporated into a development.

Developers will also be required to provide a statement detailing how both foul and storm water sewage from a development will be dealt with as part of the WMS. Appropriate details to be submitted must be agreed with the Councils Engineering Consultancy section prior to submission of the planning application.

The WMS is viewed as a crucial element in managing flood risk and therefore no application will be validated until it has been received for each site and agreed.

The WMS should be viewed as a process involving several stages:

- 1. Prior to land acquisition, the developer should undertake an assessment of the site in terms of the requirements set out in this SPD in order to assist appraisal of site development constraints and land acquisition costs.
- 2. The WMS must accompany the submission of an outline or detailed planning or change of use application. The level of detail required will depend on the scale and type of development and individual site conditions. It is suggested that early contact with qualified Land Drainage Engineers is made in order to ascertain the level of information required for an individual site.
- 3. Evaluation of the submitted WMS will be undertaken by the LPA in conjunction with the other regulatory bodies, including, the Environment Agency, Water Authority and Highways Authority. Once satisfactory to all parties, the LPA will validate the planning application based on the principles of the WMS.
- 4. The developer must notify the planning authority following approval of planning permission and any other required consent before the commencement of any land drainage and flood defence measures on site.
- 5. The WMS will be used by all the relevant Authorities as a basis for their considerations of how water is managed for a site.

A checklist and further information on types of development affected by water cycle issues can be found at Appendix 6.

The level of detail required for the WMS will vary depending on individual site conditions. It may only be necessary to provide a short sentence for a house extension, for example, outlining that a water butt will be utilised, if it is in an area at minimum risk of pluvial or fluvial flooding or where adequate surface water drainage currently exists on site. It is essential therefore that the land drainage engineers are contacted at the very initial stages of project planning to clarify the level of details required in the WMS for each individual site.

7: Surface Water Management

The surface water drainage arrangements for any development site in Tewkesbury Borough should be such that the volumes and peak flow rates of surface water leaving a developed site are no greater than the green field rates prior to the proposed development and does not add significantly to the floodplain levels while in flood, unless specific off-site arrangements are made and result in the same net effect.

The developer must also liaise with the sewerage undertaker and discuss how surface water can be removed from the site and if any on-site / off-site attenuation measures will be necessary. There may be circumstances where it is appropriate for infiltration attenuation storage to be provided outside the development site, if necessary through the use of a Section 106 agreement.

Policy Env19 of the Local Plan deals with surface water run-off and is complementary to the general flooding policies. In accordance with this policy and other local plan policies referred to in this document, the following will apply:

Surface Water Attenuation Requirement

Provision should be made for on-site storage and attenuation to restrict the developed rate of runoff to no more than the existing rate of runoff for all storm events up to the 1% probability event (1 in 100 years), including an 30% allowance for climate change (currently 20%). Attenuation should be a feature of all drainage proposals and details should be provided in the WMS as required by the LPA.

When the peak inflow rate in a storm exceeds the allowed discharge into the watercourse, the excess flow has to be 'attenuated' on the site for the duration of the storm and its effect on the floodplain. This is then released at, or less than, the allowed discharge rate after the storm to store the excess volume and allow the correct discharge rate to go to the watercourse and not increased water levels of the watercourse while it is in flood.

Justification

Surface water flooding occurs wherever high rainfall events exceed the drainage capacity in an area. Such events can lead to serious flooding of property and possessions where surface water flows and collects. The Foresight Future Flooding report estimated that currently 80,000 properties are at very significant risk from surface water flooding (10% annual probability or greater), which could cause an average £270 million of damage each year. These problems were exemplified during recent flood events when extreme rainfall over the Midlands and the north of England led to large-scale flooding, causing around £3 billion of damage, the majority of which was caused by surface water run-off. Continuing to drain built up areas into watercourses in Tewkesbury Borough without considering wider issues is therefore not a long-term sustainable option.

Surface Water Management Train

To mimic natural catchment processes as closely as possible a Surface Water Management Train is required. This is a Building Regulations requirement advocated by the Council. The WMS will require all proposals to apply this principle to drainage on a development site to establish which elements are feasible. It is the techniques at the top of the hierarchy that are preferred so that prevention and control of water at source should always be considered before site or regional controls.



Fig 1: surface water management train (Source: CIRIA, July 2005)

Further details on applying the principles of the Surface Water Management Train can be found at Appendix 4.

Management of Surface Water Drainage

Management responsibility for surface water drainage is split between the Environment Agency, Local Authorities, Water Companies, and other agencies, with no single organisation having overarching control. As a result, decisions about new drainage or development investments are often taken without a complete understanding of surface water risks and the most effective solutions.

An essential requirement for a WMS should ensure that all partners work together to ensure the most effective solutions to dealing with surface water run off to prevent flooding and pollution are found. It will also make certain that the ongoing management and maintenance of surface water drainage is dealt with from the outset.

8: Sustainable Drainage Systems (SUDS)

The basic principle with SUDS is to minimise the impacts of the development on the quantity and quality of run-off and maximise amenity and biodiversity opportunities. This three way concept is described as the SUDS triangle, discussed in further detail in 'The SUDS Manual (C697)', produced by CIRIA. The three objectives of quantity, quality and amenity / biodiversity should have equal standing and the ideal SUDS solution will achieve benefits in all three categories. This integrated approach is supported by the Council and should be demonstrated through the WMS.

SUDS highlight the benefits of providing a sustainable solution to help reduce and manage surface water run off which might otherwise cause flooding and pollution. These are physical structures built to receive surface water run off and provide drainage solution that mimic natural processes rather than piped solutions. By dealing with rain close to its source, SUDS can deal with polluted water and slow down flows across sites and into watercourses allowing settlement, filtering and infiltration, which also have ecological benefits. It should be noted that SUDS is more effective the farther away the development is from the floodplain and consideration should be given to the proximity of the development to the floodplain.

Developers are required to work with the Council and the Environment Agency to incorporate SUDS in all new development to reduce the risk of flooding, pollution to watercourses and to minimise negative impacts on biodiversity. This should be considered at the earliest stages possible and preliminary consultation with the Council is advised. The Council will make use of planning conditions or legal agreements to secure implementation and maintenance of SUDS where appropriate.

SUDS can be designed to fit into some settings where the soils and geology allow the options available should be considered at the early stages of development, and should take full account of the Surface Water Management Train, with the objective of exhausting all measures at the top of the Management Train before considering other control options. SUDS measures seek to mimic natural drainage processes and reduce the impacts of urbanisation on downstream watercourses. These can operate at the level of individual properties (green roofs, water butts, soak ways in garden areas and porous paving of driveways), within neighbourhoods (swales, detention basins and porous paving of highways); and at the strategic level (through features such as large balancing ponds).

Choice of route for SUDS development and maintenance

Where there is a requirement to implement SUDS, the local planning authority has two routes available to ensure that the SUDS are properly implemented and maintained. These are:

- Through an agreement under Section 106 of the Town and Country Planning Act
- By a condition to planning permission



Figure 2 Model agreement options with SUDS as a requirement of planning permission

Policy EVT 9 of the Local Plan deals with Surface Water run-off and encourages the use of SUDS. In accordance with this policy, the following measures will be required:

SUDS Requirements

The Council will require the provision of SUDS techniques in **all** built development proposals and change of use applications (where appropriate) that involve changes to a sites drainage characteristics in order to minimise the impact of surface water runoff and PLUVIAL flooding (PLUVIAL flooding detail can be obtained from Severn Trent Water at the developers cost) from the site on natural watercourses or existing drainage systems

Details of the proposed SUDS measures must be provided in the WMS and the measures must be proven to work using hydrological tools such as hydrographs before and after.



Pre- and Post-development runoff hydrographs following storm rainfall over a site area.

Figure 2: A typical Hydrograph showing Volume Calculation and the need to eliminate the hydrographs peaks

The measures must also identify long-term ownership and provide adequate proposals for the regular maintenance and management of such measures over the life expectancy of the development.

Where the physical layout of a development or other constraints limits drainage options, the council will expect developers to provide full justification for proposals which do not follow SUDS principles. As a minimum, the LPA will not normally permit development that will increase the rate of runoff to a watercourse. Exceptions may arise where the developers enter into a planning obligation to secure approved off-site works that will have the same effect as a Sustainable Drainage System.

Planning Obligations and Conditions

The ownership and maintenance of conventional piped drainage systems is clearly defined in Sewers for Adoption (Water Services Association, 1994). It is expected that all drainage systems will be formally adopted by the appropriate authority i.e. Severn Trent Water and Gloucestershire County Council Highways.

However, by their nature, many SUDS can be considered either drainage or landscape features, and there is no clear guidance on who is responsible for the operation and maintenance of such facilities. Due to the different legal duties, a country wide agreement of this kind will take time to evolve in England. However, there is scope for individual maintenance agreements to be negotiated on a site-bysite basis and Tewkesbury Borough will adopt this approach in the interim period.

Suggested SUDS Approaches

It is well acknowledged that there should be a SUDS approach for every situation, (Tewkesbury Borough Council will not consider development in flood zones 2 or 3 therefore SUDS does not apply), although the suitability of each will depend on the type of scheme, the catchment area, local hydrology and geology and potential contaminants present in the run-off. SUDS will not work in the floodplain itself. A list of SUDS techniques can be found below and these are detailed in the CIRIA publication 'The SUDS manual (C697)' available from their website: www.ciria.org.

- 1. Soak ways
- 2. Permeable Surfacing
- 3. Swales and Basins
- 4. Infiltration Trenches and Filter Drains
- 5. Ponds and Wetlands
- 6. On site Stormwater Detention
- 7. Reed Bed Filtration
- 8. Green Roofs

Costs

SUDS have the potential to reduce costs to the developer by avoiding the need to construct additional surface water drainage infrastructure while achieving additional benefits, such as the provision of open space, wildlife improvements and water conservation, however any SUDS scheme should be adequate for the job intended with good safety margins (with climate change +20% is not adequate in the Borough, TBC will require +30%).

Health and Safety

It is required practice to undertake a safety audit or risk assessment of a SUDS scheme before the design is finalised to ensure that risks to workers and the public (with a particular emphasis on children) have been designed out as far as possible. Some SUDS techniques will only be feasible in large-scale developments. However, measures can be incorporated into small-scale developments through using permeable surfacing materials and soft planting, providing water butts and recycling grey water.

SUDS Maintenance

One of the biggest challenges in achieving the wider uptake of both SUDS and rainwater/Greywater use systems is the question of eventual ownership of the systems and, in particular, who will maintain and repair them. With both types of system it is important that they are maintained/repaired properly if they are to consistently perform at design levels (and to minimise health and safety risks). Developers may be unwilling to incorporate these systems into buildings if ongoing maintenance/repair responsibilities are uncertain, and lengthy (thus costly) negotiations are required to implement them. If this barrier is to be overcome successfully, standard agreements need to be developed to ensure that all involved

are aware of their responsibilities, costs are distributed equitably, and that activities are co-ordinated.

Where the LPA and relevant Operating Authority gives approval for a SUDS scheme, the developer will be responsible for meeting all necessary costs for the planning, design and installation of such systems. Approval of submitted details for SUDS proposals will normally be dealt with through the WMS and subsequently followed through by means of planning conditions or a legal agreement.

A SUDS maintenance strategy must be submitted as part of the WMS, together with details on appropriate commuted payments if necessary. Commuted sums for maintenance will generally be sought where drainage schemes incorporate open space / amenity space and / or the physical maintenance of drains, filters and other similar works. Tewkesbury Borough may also apply planning conditions that would require completion of the necessary works before the rest of the development can proceed. All maintenance schemes and cost should be for the life of the development unless commuted to the LPA.

It is essential that the ownership and responsibility for maintenance of every sustainable drainage element is clear; the scope for dispute kept to a minimum; and durable, long-term accountable arrangements made, such as by using management companies. These issues should be addressed as part of the Flood Risk Assessment (FRA) as part of the WMS. If the maintenance agreement is breached, the Authority can enter and do the work themselves. Also, if any periodic charges are not met these could be reclaimed as a civil debt. Appendix 5 gives an example of a SUDS Maintenance Framework Aggreement (ref CIREA)

Where such works would provide a wider benefit, the funding provided by developers may be proportional to the benefits to them. For instance, the development might fund the provision of the defences or other measures which would then be vested in and maintained by the Operating Authority. Where development is undertaken adjacent to a watercourse, the Borough Council will normally require the developer to carry out necessary improvements to the watercourse along the frontage of development, in addition to the required SUDS drainage measures. The developer will have to prove that any flood defence scheme or SUDS drainage measures will not affect areas or communities outside the development within a 10 kilometre radius.

Section 106 Agreements

Tewkesbury Borough will use Section 106 agreements as a mechanism by which SUDS can be required of the developer. It is usual for the developer to hire a consultant to prepare a SUDS design, and for this to be vetted by the LPA in conjunction with other statutory parties. Tewkesbury Borough LPA will insist that PLUVIAL flooding is incorporated into their calculations for the SUDs design, this information can be obtained from organisations such as Severn Trent, the cost will be borne by the developer. The adopting party will then adopt the asset and the developer will pay a commuted sum upon transfer.

When SUDS are adopted by a LPA, there is no mechanism by which payment for the ongoing maintenance and renewal of SUDS can take place other than the commuted sum. The payment is made on the basis of expected costs of maintenance over the first 30 years of the assets life. Arrangements for the maintenance of the entire SUDS should be clear. It is anticipated that responsibility should rest with one or more publicly accountable bodies. There may be opportunities where the private management of facilities is considered appropriate. However, Tewkesbury Borough and its partners will have to be assured that a management regime is in place to ensure that maintenance for the life of the facilities will ensue, evidenced by the WMS.

Where the surface water system is provided solely to serve any particular development, the construction and ongoing maintenance costs should be fully funded by the developer. Section 106 agreements may be appropriate to secure this. After assessment of the WMS and all other relevant considerations, the LPA, in consultation with their partners, including advice from the Environment Agency and any other relevant operating authority, will negotiate an appropriate contribution from the developer. If agreement cannot be reached on the provision of that contribution, the application will be refused.

Where the development results in a system of private drainage being constructed i.e. built to un-adoptable standards, the developer must provide details of how the future maintenance and replacement will be carried out and at whose cost. This will usually mean the setting up of a management body for the development.

Adoption

The Borough Council will not usually consider the adoption of SUDS devices, except under exceptional circumstances. However, other Operating Authorities may consider adopting facilities. The Council Parks team, for instance, will consider adopting areas of public open space surrounding new surface water drainage facilities in the larger towns but all such details should be incorporated into the WMS.

The adopting organisation, along with relevant partners will need to approve the design included as part of the WMS prior to construction and this is likely to influence the design just as much as technical considerations.

9: Flood Mitigation

Flood Mitigation Requirements

Land Build-up

The LPA will not allow any land infill/build-up that will displace water into other areas; water displacement exacerbates flooding in the Borough. The LPA will not allow any loss of the floodplain.

Floor levels in new residential and non-residential development

Floor levels for habitable rooms in new development must be set at 600 mm or more above the flood level predicted for the 1:100 year flood event (plus 30% to allow for climate change) in order to reduce the potential risk to life and damage to property.

Protection of flood flow routes

Development will not be permitted if it inhibits the function of flood flow routes to convey floodwater as efficiently as possible across floodplains.

Use of flood resilient construction in new development

New development will be built with flood resilient materials and construction methods, demonstrating that as a minimum, the future mandatory elements of the Code for Sustainable Homes (external / internal water use and surface water drainage elements) are met from 2011. Flood resilient construction allows buildings to recover quicker than conventional buildings after a flood has taken place.

Provision of safe access and egress routes in new development in flood zones 2

New development in flood zones 2 must provide safe escape routes for people out of buildings and safe access routes for the emergency services to rescue people stranded in a flood.

Development in flood zone 3

Flood zone 3 will be determined by the EA flood map plus PLUVIAL (rainfall flooding) and historical data. No development will take place in this zone. **Development adjacent to watercourses**

No development shall take place within 10 metres of an ordinary or culverted watercourse in order to maintain access for maintenance purposes.

10: Planning Requirements

Sequential and Exception Tests

National guidance requires LPAs to adopt the flood zoning principles in PPS25 along with the sequential and exception tests to direct development away from areas at highest risk. When allocating land in spatial plans, determining broad locations for development and infrastructure, or considering applications for development, the Council will therefore take into account the vulnerability to flood risk of certain land uses.

The basis of the sequential approach is the need to demonstrate that there are no reasonably available sites in areas with a lower probability of flooding that would be appropriate for the type of development or land use proposed. The overall aim is to steer new development to Flood Zone 1. Where this is not possible then Flood Zone 2 can (Flood zone 2 must include PLUVIAL flooding) be considered taking into account the flood risk vulnerability of different land uses and applying the exception test where required.

If there are no suitable sites in Flood Zones 1 and 2, because of the uniqueness of the of the North Gloucestershire floodplain and the confluence of two rivers at Tewkesbury to the north of Gloucester, sites in Flood Zone 3 will not be considered and the exception test will not be applied. Further information on the standard flood zone definitions can be found in Table D1, Annex D of PPS 25.

The Exception Test must demonstrate that essential development provides wider sustainability objectives that outweigh the flood risk. Highly vulnerable land uses include emergency services and caravans. The Exception Test will not be used to justify vulnerable unessential developments in flood Zones 3a and 3b. The Sequential Test will be applied and demonstrate that 'essential infrastructure' cannot be located in Zones 1 or 2.

Further details on the application of the sequential and exception tests can be found in Annex D of PPS 25 and a list of land types can be found in Table D2 of PPS 25.

11: Flood Risk Assessments (FRAs)

Tewkesbury Borough Council policies require FRAs to be submitted with planning applications in areas of flood risk or where flood risk either on or off site could be a material consideration. In areas associated with FLUVIAL flooding on main rivers, the developer is advised to contact the Environment Agency for advice. For all other areas, the developer is advised to contact the Council's Engineering Consultancy Team to ascertain if FLUVIAL flooding from ordinary watercourses or PLUVIAL flooding could affect the site. (Tewkesbury Borough Council will use an enhanced Environment Agency flood map which will incorporate PLUVIAL and historical data as well as FLUVIAL flooding additional PLUVIAL flooding information will also be requested from Severn Trent at the developers cost). The requirements of the FRA will depend on the scale, nature and location of the proposed development and should be submitted as part of the WMS. When submitting a planning application to the LPA, an appropriate FRA will be required to demonstrate how flood risk from all sources of flooding to the development itself and flood risk to others will be managed now and in the future, taking climate change into account. Further details on when FRAs are required and how they should be undertaken can be found in Annex E of PPS 25.

Flood Risk Assessment Matrix

Tewkesbury Borough Council will use the Environment Agency's Flood Risk matrix to determine when FRA's should be submitted. Further detail on this can be found at Appendix 6.

Soils and Geology

Within the Borough, the predominant soil type throughout is generally clay. However, accurate classification of soil type and permeability will need to be established by site investigation, the detail of which will be dependant on the development proposed. The results of this information will subsequently aid in assessing the effectiveness of any proposed SUDS techniques. The Borough Council will need to agree with and approve the soil and geology assessment provided in the WMS. The scale of the proposals and location will dictate whether the Environment Agency have an input also. The developer will also need to provide the necessary level of detail required by any of the organisations with an interest in drainage matters.

Water Supply

In line with policy EVT6 in the Local Plan, development proposals that increase the requirement for water will only be permitted where adequate resources exist or can be provided without detriment to the quality or quantity of existing water and the wider environment.

Section 83 of the Water Act 2003, places a responsibility on LPAs to take into account, where relevant, the desirability of conserving water in their own activities, and to require water conservation in the activities of others (e.g. new development in their area). A key policy driver for planning for water resources at the local level is provided by the Water Act 2003 and the Council will use other plans and strategies, for example, Catchment Abstraction Management Strategies (CAMS) in making decisions involving the water supply in the Borough.

12: Water Recycling

Water recycling is a key component of integrated water cycle management. The safe implementation of water recycling can help to reduce inputs of nutrients and other contaminants to surface waters, conserve drinking water and provide economic and social benefits to communities. SUDS need to take into account the possibilities of re-using and recycling surface water in as many ways as feasible.

The aim in Tewkesbury Borough is to encourage and support water recycling that is safe, environmentally sustainable and cost-effective by requiring rainwater harvesting and grey water recycling methods to be included in any new development, however these methods are only effective in non floodplain areas.

Rainwater Harvesting and Greywater Recycling

Rainwater harvesting is described as being water collected from roofs via traditional guttering, through down pipes to an underground tank(s). This water is then delivered on demand by an in-tank submersible pump direct to toilets, washing machine and outside tap use. More than 50% of mains water can be substituted by rainwater in this way.

Greywater recycling is typically defined as being water from the bath, shower and wash hand basin. The ideal situation for grey water is in living accommodation where sufficient amounts are generated daily for reuse in toilets, the washing machine and any outside tap.

The Council will seek to achieve further reductions in mains water use by promoting the inclusion of rainwater collection and grey water recycling measures in all developments where feasible. Developers must give consideration to the following measures:

Requirements for Rainwater Harvesting and Greywater Recycling

Rainwater harvesting should be incorporated on development sites for uses such as car washing, watering gardens and topping up ponds or wetland habitats.

Greywater recycling systems should be incorporated on development sites for nonpotable uses such as for flushing toilets Consideration should be given to the use of more efficient domestic and nondomestic appliances, such as low flush or compost toilets, waterless urinals, reduced flow rates for showers, low-flow or spray taps and water meters with pulsed output (levels of water use should be consistent with 'very good' standards for BREEAM and Eco-Homes on new build wherever possible).

Other water recycling measures should be considered when designing any landscaping scheme for residential or non-residential development. Such measures could include working with existing natural vegetation, selecting drought-resistant plants or low water use landscaping / gardens and using automatic drip irrigation systems.

Developers will also be required to consider the installation of water meters to link water habits to a charging structure – thus encouraging occupants to consider their individual wastage.

(Further information and illustrations on water conservation methods and techniques can be found at Appendix 7).

The WMS should include a rainwater harvesting and grey water recycling feasibility study. This will show how the appropriate measures for collecting and reusing water will be incorporated into the development.

Maintenance

The facilities for both rainwater harvesting and grey water re-use require maintenance to ensure their effectiveness and to prevent deterioration of water quality. The Council will use conditions and/or legal agreements for the long-term maintenance of rainwater harvesting and grey water recycling systems based on the models available from CIRIA (see appendix . Future maintenance arrangements should be addressed in the earliest project planning stages and agreed as part of the WMS.

13: Minimising Pollution

Causes of Water Pollution

Some traditional methods of building can cause poor water quality as run-off can contain a variety of pollutants. The poor water quality associated with new developments may also have direct negative impacts on biodiversity.

Large areas of hard landscaping also result in surplus run-off, exacerbating flooding, pollution and erosion problems and reducing natural infiltration. This can directly cause water quality problems. As water runs over land, it picks up pollutants and transports them into watercourses.

Run-off from roads will contain heavy metals and hydrocarbons and run-off from farmland is more likely to contain nitrates and sediment. These can have serious implications for water quality and amenity.

Possible Solutions

Although some pollution arising from runoff may be unavoidable, and water treatment at every outfall may be impractical, by moderating flows and filtering runoff, SUDS can deliver significant reductions in impact on the water resource by means of ground infiltration, sub base storage and filtration or bio-filtration. Development sites in Tewkesbury Borough will be required to use mitigation measures to minimise any resultant pollution and the following will apply:

Requirements for Minimising Pollution

Developers must minimise surface water pollution to prevent discharge into watercourses and groundwater by incorporating mitigation measures into new development. An example could be by storage and safe removal from site.

As part of the WMS, the Council will require a method report detailing how contaminated water arising during construction will be dealt with and the measures for mitigation of pollution will be incorporated into a development proposal.

Pollution Reduction Methods

Methods that can help to reduce pollution include infiltration trenches, basins ponds, and wetlands and filter drains. Infiltration trenches comprise stone filled reservoirs to which storm water runoff is diverted, and from which the water gradually infiltrates the ground, again infiltration will not work in the clay soils of Gloucestershire, an in depth soil analysis will be required. Ponds and wetlands remove pollution by a range of chemical, physical and biological processes. Pollutant removal is by absorption, filtering and microbial decomposition in the surrounding soil. Systems can be designed which successfully incorporate both infiltration and filter systems. Details of such systems and their long-term maintenance are to be included within the WMS.

Under the 2006 Natural Environment and Rural Communities Act (NERC) Local Authorities and Water Companies now have a legal duty to have regard to Biodiversity in carrying out all of their functions.

Those proposing development should seek opportunities to use multi-purpose open space for amenity; wildlife habitat and flood storage uses and need to consider how flooding and biodiversity can be jointly managed. Further information on Biodiversity can be found in the Councils Local Plan to 2011 NCN1 through to NCN7.

14: Appendix 1:

Abbreviations

- BREEAM Building Research Establishment Environmental Assessment Method
- CIRIA Construction Industry Research and Information Association
- Defra Department for Environment, Food and Rural Affairs
- DPD Development Plan Document
- FRA Flood Risk Assessment
- LDD Local Development Document
- LDF Local Development Framework
- LPA Local Planning Authority
- PPS Planning Policy Statement
- RFRA—Regional Flood Risk Appraisal
- SA Sustainability Appraisal
- SCI Statement of Community Involvement
- SFRA 1 & 2 -- Strategic Flood Risk Assessment level 1 and 2
- SPD Supplementary Planning Document
- SUDS Sustainable Drainage Systems
- SWJCS South Gloucestershire Joint Core Strategy
- WMS Water Management Statement
- SWRSS South West Regional Spatial Strategy

15: Appendix 2

Glossary of Terms

Attenuation - Reduction of peak flow and increased duration of a flow event.

Balancing pond - A pond designed to attenuate flows by storing runoff during the peak flow and releasing it at a controlled rate during and after the peak flow has passed. The pond always contains water. Also known as wet detention pond.

Basin - Flow control or water treatment structure that is normally dry.

Bio retention area - A depressed landscaping area that is allowed to collect runoff so it percolates through the soil below the area into an under drain, thereby promoting pollutant removal.

BRE Environmental Assessment Method (BREEAM) - the most widely used environmental assessment method for buildings. It sets the standard for best practice in sustainable development and demonstrates a level of achievement.

Catchment - The area contributing surface water flow to a point on a drainage or river system. Can be divided into sub-catchments.

Construction Industry Research and Information Association (CIRIA) - CIRIA is a member-based research and information organisation dedicated to improvement in the construction industry.

Climate Change – is any long-term significant change in the "average weather" that a given region experiences. Average weather may include average temperature, precipitation and wind patterns.

Code for Sustainable Homes - The Code measures the sustainability of a new home against categories of sustainable design, rating the 'whole home' as a complete package. The Government confirmed a mandatory rating against the Code will be implemented for new homes from 1 May 2008.

Combined sewer - A sewer designed to carry foul sewage and surface runoff in the same pipe.

Detention basin - A vegetated depression, normally dry except after storm events constructed to store water temporarily to attenuate flows. May allow infiltration of water to the ground.

Department for Environment, Food and Rural Affairs (Defra) - is a UK Government Department with that champions Sustainable Development, helping Government as a whole to deliver economic, social and environmental sustainability.

Development Plan Document (DPD) – Under the new system of local planning brought in under the Planning & Compulsory Purchase Act 2004, the term 'development plan document' covers any Local Development Document that is part of the development plan. A development plan document has to be independently tested by a Government inspector and carries full weight in relation to planning applications, which distinguishes it from a supplementary planning document.

Eco-homes – Eco-homes is a version of BREEAM for homes. It provides an authoritative rating for new, converted or renovated homes, and covers houses, flats and apartments.

Environment Agency - Are a UK non-departmental public body of Defra with the principle aim of protecting and enhancing the environment to make a contribution towards the objective of achieving sustainable development. The Agency has principle responsibility for river (fluvial) flooding.

Evapotranspiration - The process by which the Earth's surface or soil loses moisture by evaporation of water and by uptake and then transpiration from plants.

Exception Test – If, following application of the Sequential Test (see below), it is not possible for proposed development to be located in zones of lower probability of flooding, the Exception Test can be applied as detailed in Annex D of PPS25. For

the Exception Test to be passed the proposed development must provide wider sustainability benefits to the community that outweigh the estimated flood risk.

Filter drain - A linear drain consisting of a trench filled with a permeable material, often with a perforated pipe in the base of the trench to assist drainage, to store and conduct water, but may also be designed to permit infiltration.

Filter strip - A vegetated area of gently sloping ground designed to drain water evenly off impermeable areas and filter out silt and other particulates.

Flood frequency - The probability of a flow rate being equalled or exceeded in any year.

Floodplain - Land adjacent to a watercourse that would be subject to repeated flooding under natural conditions.

Flood Mitigation - Methods of reducing the effects of floods. These methods may be structural solutions (e.g. reservoirs) or non-structural (e.g. land- use planning, early warning systems).

Flood Risk Assessment (FRA) - An assessment of the risk of flooding, particularly in relation to residential, commercial and industrial land use. FRAs are required to be completed according to PPS25 alongside planning applications in areas that are known to be at risk of flooding.

Flood routing - Design and consideration of above-ground areas that act as pathways permitting water to run safely over land to minimise the adverse effect of flooding. This is required when the design capacity of the drainage system has been exceeded.

Flow control device -A device used to manage the movement of surface water into and out of an attenuation facility, e.g. a weir.

Fluvial flooding – Flooding from a main watercourse (brooks, streams, rivers and lakes etc) that occurs when the water features cannot cope with the amount of water draining into them, from the land. When rainfall is heavy and / or prolonged, a large amount of run-off reaches the rivers and eventually causes them to overtop their banks.

Greenfield runoff - This is the surface water runoff regime from a site before development, or the existing site conditions for brown field redevelopment sites.

Green roof - A roof with plants growing on its surface, which contributes to local biodiversity. The vegetated surface provides a degree of retention, attenuation and treatment of rainwater, and promotes Evapotranspiration.

Greywater - Wastewater from sinks, baths, showers and domestic appliances. A Greywater system captures this water before it reaches the sewer (or septic tank system).

Groundwater - Water that is below the surface of ground in the saturation zone.

Highways Agency - The government agency responsible for strategic highways, i.e. motorways and trunk roads.

Highway authority - A local authority with responsibility for the maintenance and drainage of highways maintainable at public expense.

Hydrological - the occurrence, circulation, distribution, and properties of the waters of the earth and its atmosphere.

Impermeable surface - An artificial non- porous surface that generates a surface water runoff after rainfall.

Infiltration (to the ground) - The passage of surface water though the surface of the ground.

Infiltration (to a sewer) - The entry of groundwater to a sewer.

Infiltration device - A device specifically designed to aid infiltration of surface water into the ground.

Infiltration trench - A trench, usually filled with stone, designed to promote infiltration of surface water to the ground.

Material Consideration – A legal term describing a matter or subject which is relevant (material) for a local authority to consider when using its powers under planning law in dealing with a planning application.

Microbial decomposition - The breaking down of complex molecules into constituent parts or elements by microorganisms.

Model agreement - A legal document that can be completed to form the basis of an agreement between two or more parties regarding the maintenance and operation of sustainable water management systems.

Natural Environment and Rural Communities Act (NERC) - designed to help achieve a rich and diverse natural environment and thriving rural communities through modernised and simplified arrangements for delivering Government policy.

Operating Authorities – Any body, including the Environment Agency, Internal Drainage Board, County Council and Local Authority, who have powers to make or maintain works for the drainage of land.

Ordinary Watercourses - Any watercourse that does not form part of a main river.

Permeability - A measure of the ease with which a fluid can flow through a porous medium. It depends on the physical properties of the medium, for example grain size, porosity and poor shape.

Permeable pavement - A paved surface that allows the passage of water through voids between the paving blocks / slabs.

Permeable surface - A surface formed of material that is itself impervious to water but, by virtue of voids formed through the surface, allows infiltration of water to the sub-base through the pattern of voids, e.g. concrete block paving.

Pervious surface - A surface that allows inflow of rainwater into the underlying construction or soil.

Piped system - Conduits generally located below ground to conduct water to a suitable location for treatment and/or disposal.

Pluvial Flooding – Flooding that result from rainfall generated overland flow before the runoff enters any watercourse or sewer. It is usually associated with high intensity rainfall events. Also referred to as surface water flooding.

Pollution - A change in the physical, chemical, radiological or biological quality of a resource (air, water or land) caused by man or man's activities that is injurious to existing, intended or potential uses of the resource.

Pond - Permanently wet basin designed to retain storm water and permit settlement of suspended solids and biological removal of pollutants.

Porous paving - A permeable surface allowing the passage of water through voids within, rather than between, the paving blocks / slabs.

Porous surface - A surface that infiltrates water to the sub-base across the entire surface of the material forming the surface, for example grass and gravel surfaces, porous concrete and porous asphalt.

Prevention - Site design and management to stop or reduce the occurrence of pollution and to reduce the volume of runoff by reducing impermeable areas.

Probability Event - the statistical probability of a flooding episode (event) occurring. **Public sewer** - A sewer that is vested in and maintained by a sewerage undertaker.

Rainwater harvesting or rainwater use system - A system that collects rainwater from where it falls rather than allowing it to drain away. It includes water that is collected within the boundaries of a property, from roofs and surrounding surfaces.

Residual Risk - The Risk that remains after risk management and mitigation measures have been implemented.

Retention pond - A pond where runoff is detained (e.g. for several days) to allow settlement and biological treatment of some pollutants.

Run-off - Water flow over the ground surface to the drainage system. This occurs if the ground is impermeable, is saturated or if rainfall is particularly intense.

Section 38 - An agreement entered into pursuant to Section 38 Highways Act 1980 whereby a way that has been constructed or that is to be constructed becomes a highway maintainable at the public expense. A publicly maintainable highway may include provision for drainage of the highway. (Drainage of highways is defined in Section 100 (9) of the Highways Act 1980).

Section 106 (Town and Country Planning Act 1990) - A section within the Town and Country Planning Act 1990 that allows a planning obligation to a local planning authority to be legally binding.

Section 106 (Water Industry Act 1991) - A key section of the Water Industry Act 1991, relating to the right of connection to a public sewer.

Separate sewer - A sewer for surface water or foul sewage, but not a combination of both.

Sewer - A pipe or channel taking domestic foul and/or surface water from buildings and associated paths and hard standings from two or more curtilages and having a proper outfall.

Sewerage undertaker - This is a collective term relating to the statutory undertaking of water companies that are responsible for sewerage and sewage disposal including surface water from roofs and yards of premises.

Sewers for Adoption - A guide agreed between sewerage undertakers and developers (through the House Builders Federation) specifying the standards to which private sewers need to be constructed to facilitate adoption.

Sequential Test – The Sequential test (Annex D of PPS25) advocates that planners use a sequential test when considering land allocations for development to avoid flood risk where possible.

Site and regional controls - Manage runoff drained fro several sub-catchments. The controls deal with runoff on a catchment scale rather than at source.

Soakaway - A subsurface structure into which surface water is conveyed to allow infiltration into the ground.

Source control - The control of runoff or pollution at or near its source.

South Gloucestershire Joint Core Strategy (SWJCS) – Joint working on the main document required as part of the LDF between Gloucester, Malvern and Tewkesbury Borough. It considers the long term vision and objectives for South Gloucestershire and will contain the policies for delivering these objectives in a planned and cohesive manner

Stormwater - Rainwater that runs off impervious surfaces and into storm drains rather than being absorbed into the soil.

Sub-catchment - A division of a catchment, allowing runoff management as near to the source as is reasonable.

Subsidiarity - The principle that an issue should be managed as close as is reasonable to its source.

SUDS (Sustainable Drainage Systems) - A sequence of management practices and control structures designed to drain surface water in a more sustainable fashion than some conventional techniques. Surface water management - The management of runoff in stages as it drains from a site.

Swale - A shallow vegetated channel designed to conduct and retain water, but may also permit infiltration; the vegetation filters particulate matter.

Treatment - Improving the quality of water by physical, chemical and/or biological means.

Water Act 2003 - Introduced some changes to the regulation of the water industry in England and Wales under the Water Industry Act 1991, by transferring responsibility for economic regulation from an individual Director General to an Authority (Ofwat).

Water Authority – Public, private or combined entity responsible for the provision of drinking water and sewerage service.

Water Butt – A container designed to capture rainwater for its reuse.

Watercourse - A term including all rivers, streams ditches drains cuts culverts dykes sluices and passages through which water flows.

Water Management Statement – A report outlining the water cycle issues relevant to a development proposal and the suitable means of providing for drainage in the long term.

Wetland - A pond that has a high proportion of emergent vegetation in relation to open water.

16: Appendix 3:

Water Conservation Methods

Water saving tap devices

Tap Aerators - with integrated flow regulators reduce the flow rate by 50 % and more.

Tap Restrictor Valves – reduce flow rates and pressure.

Water saving shower devices

Shower timer devices - restrict the amount of time the shower is left running.

Low flow showers - low flow shower-heads help reduce water waste by restricting the flow of water leaving your shower head.

Shower Start converter - connects to existing showerheads and automatically pauses a running shower once it gets warm.

Aerating Showers – to reduce flow rates.

Water saving WC's and Urinals

Urinal Controls - minimise water consumption within the washroom, whilst maintaining desirable levels of hygiene required for everyday public use.

Waterless Toilets - waterless composting toilets treat the waste without needing water and are ideal where water supply is limited or where waste-water disposal is difficult.

Dual Flush Toilets and Water Saving Siphons - the water saving dual flush valve can replace an old fashioned siphon. Water saving siphon are also effective in reducing water wastage.

Reduced Flush tools - displacement devices, e.g. save-a-flush bags, toilet float booster, toilet tank-bank and water 'hippo'

Low flush Toilets - use at least 20 percent less water than a standard WC.

Rain Catchment

Rain Catchment Systems - collects rainwater from either a roof, paved area or runoff. The water is then filtered and stored in an above or below ground tank and can be used for either residential, commercial or landscape use.



Fig: Residential Rain Catchment System

Greywater Recycling Systems

Greywater recycling - the first step in installing a grey water recycling system is to separate the grey water (shower/bath/basin and laundry) from black water (toilet and kitchen). Various types are available including:

The **standard system** allows Greywater dispersal and reuse from the complete household. This system uses trench systems and subsurface irrigation. A typical trench for this system is about 400 mm deep and 300 mm wide filled with stone and capped with a layer of sand. The Greywater is initially passed into a settling (sedimentation) tank. This enables larger particles to settle at the bottom of the tank, thus preventing blockages.

The **Water save Trench System** is used for partial Greywater reuse situations and permits wastewater from limited sources, such as from the washing machine and / or bathroom to be re-diverted into a settling tank (or through a filter) and then into a subsurface drain system, to be re-directed onto garden areas. This system also uses trench systems and subsurface irrigation

The **Water save Dripper system** comprises four parts. Initially, Greywater is diverted from the normal waste stream, then it passes through either a sedimentation tank or filter, into a pump chamber, and finally the wastewater is dispersed throughout an interconnecting subsurface dripper system

Advanced greywater treatment

Fig: Advanced Greywater Treatment System

There is a certain amount of published information on water conservation / saving techniques on the web. Some of the more popular sites include;

www.rainharvesting.co.uk www.eartheasy.com www.freewateruk.co.uk www.ecoplay-system.com www.underground-tanks.co.uk www.h20-recycling.co.uk www.aqualogic-wc.com www.catchrainwater.com www.thegreendirectory.com www.bracsystems.com www.harvesth2o.com www.greywater.com

17: Appendix 4:

Principals of the Surface Water Management Train

The surface water management train (sometimes called the treatment train) is fundamental to designing a successful SUDs scheme and provides a hierarchy of drainage techniques for improving quality and quantity. If water cannot be dealt with at one level in the management train, it should be taken; preferably using SUDs techniques, down the hierarchy and techniques closer to source are preferable to those lower down the hierarchy. Therefore prevention and source control should always be considered before site or regional control and discharging runoff to surface water sewers should only be a last resort, when no other option is available.

Prevention

Prevention seeks to prevent or minimise runoff and pollution; effectively to stop water entering the drainage system. It is applied on individual sites and involves good design. Prevention also involves good site housekeeping measures that will prevent pollutants entering the drainage system:

- 1. Keeping impervious areas to a minimum would maximise the amount of water that soaks into the ground.
- 2. Collecting rainwater for re-use.
- 3. A tidy yard with bunds around chemical storage areas will reduce spillage and leakage into the drainage system.
- 4. Minimising use of fertilisers, herbicides and fungicides on landscaped areas will reduce runoff of chemicals

Any excess surface runoff that can't be prevented from entering the drainage system is dealt with by the next level down so is subject to source control.

Source Control (control of runoff at or near its source)

Source control forms the start of the surface water management train and should be considered at the outset of development proposals. Source control (best management practice) is the preferred choice in any surface water drainage scheme. Controlling water at or near its source will usually be achieved by relatively smallscale techniques with each technique serving a small catchment area. Source control techniques can include the following:

- 1. Minimising paved areas allowing surface water run off to drain naturally, through areas such as gardens, and public open space.
- 2. Use of porous surfaces where possible.
- 3. Rainwater recycling/harvesting capturing rainwater from the roofs of buildings. The capture of rainwater can be used for indoor needs such as flushing toilets, filtered and purified for use within the main water system, stored via water butts for use as grey water for activities such as car washing and general irrigation of gardens.

Good housekeeping and education is essential in minimising pollution associated with surface water run off. Simple measures include, keeping paved areas clean and free of litter and animal waste, and informing and educating occupants about how the site is drained.

1. Any water not controlled at source should be subject to the next level down, i.e. site control.

Site Control (the management of water from several sources)

Site controls are used where adequate control of quantity or quality cannot be achieved with source controls alone after exhausting potential to manage surface water run off through preventative measures. This next level of the management train should be designed with the objective of minimising the quantity of water discharged directly to a river and can include the following:

- 1. Rainwater recycling.
- 2. Permeable surfaces & filter drains permeable surfaces offer alternatives to conventional hard surfaces. Use of materials such as porous paving, gravel, and grass allows water to permeate through the surface, rather than draining off it.
- 3. Infiltration devices work by enhancing the natural capacity of the ground to store and drain water. Devices may be in the form of surface features such as swales and filter strips. Generally these are small-scale systems, which are designed to fit into landscaped areas, consisting of vegetated sections of land and grassed depressions, which mimic natural drainage patterns, controlling discharge to a pond or wetland, or other discharge system. These systems assist in removing excess solids and pollutants before final discharge.
- 4. Devices may also be in the form of below ground features, such as soak ways and trenches. These features create underground reservoirs, which allow surface water to infiltrate gradually into the subsoil, or discharge to another structure at a controlled rate.
- 5. Grass swales. grassed areas adjacent to roads and pavements with a very shallow depression, allowing water to infiltrate.

Where adequate control of quantity or quality cannot be achieved at site level, flows should be conveyed to regional controls.

Regional Control (the management of runoff from several sites)

Where surface water cannot be accommodated on site, techniques should be considered which drain water away to a point where it can be returned to the natural water cycle. Regional control of surface water run off from a site lies at the bottom of the surface water management train and is similar to site control, except the overall catchment area will be greater. It deals with water from several sites and involves the same control techniques although they should not be used on their own without source control provided at the level of individual developments. These systems can contribute to the flow and quality of run off and should be considered as water amenity features that provide habitat and encourage biodiversity. Regional control systems can include:

- 1. filter drains
- 2. swales, and
- 3. infiltration devices

18: Appendix 5

Reference: ICoP SUDS MA2

SUDS Maintenance Framework Agreement

This A	GREEMENT is made the	day of	200	Date of the agreement.
BETW	'EEN			
(1)	Developer		[as necessary]	Details of relevant parties to be
(2)	Owner			
(3)	Council			
(4)	Highway Authority		[as necessary]	
(5)	Sewerage Undertaker			
(6)	Surety		[as necessary]	
IT IS A	AGREED as follows:			
1.	Definitions and Interpret	ation		
1.1	"the 1972 Act" means the amended).	Local G	overnment Act 1972 (as	
1.2	"the 1990 Act" means the 1990 (as amended).	Town an	d Country Planning Act	
1.3	"the 1991 Act" means the amended).	Water In	dustry Act 1991 (as	
1.4	"the 1980 Act" means the	Highway	s Act 1980 (as amended).	Include this clause if the Highways Authority is party to the
1.5	"Above Ground Drainage" means that part of the SUDS on or above ground level such as grass swales, retention ponds and ancillary structures shown coloured or edged blue on the Plan.			Deed.
1.6	"Below Ground Drainage" situated below ground leve perforated pipes and surro catchpits, filter drains and or edged green on the Pla	means tl el such a bunding r ancillary n.	hat part of the SUDS s piped systems (including naterial), soakaways, structures shown coloured	
1.7	"Completion" means the d	ate of iss	sue of the final certificate.	
1.8	"the Defects Correction Pe after the date of issue of th under Clause [].	eriod" me ne Provis	ans the period of [] months ional Certificate issued	Duration of defects correction period to be inserted.
1.9	"the Drawings" means all design or working docume	plans, dra ents listeo	awings, sections and the d in schedule [] [and	All relevant drawings should be listed or attached to the Agreement.

	attached to this Agreement].	
1.10		Details of clause number to be inserted.
1.11	"Engineer" means such officer as may be designated by the Council.	
1.12	"the Final Certificate" means the certificate defined in clause [].	Details of the level to be incented
1.13	"Highways Agreement" means any agreement made pursuant to section 38 or 278 of the 1980 Act.	Details of the land to be inserted.
1.14	"the Land" means land at [] shown [] on the Plan.	
1.15	"the Plan" means the attached plan [(reference number)].	
1.16	"Planning Agreement" means any agreement made pursuant to section 106 of the 1990 Act in respect of the Land.	
1.17	"Planning Authority means the relevant local authority or statutory body responsible for planning in respect of the area in which the Land is situated.	
1.18	"Planning Permission" means the relevant planning permission in respect of development of the Land granted by the Planning Authority with any variation thereof or supplementary permission issued in respect thereof and or any Planning Agreement.	
1.19	"the Sewerage Undertakers Works" means those part of the SUDS that will be vested in the Sewerage Undertaker under the Undertakers Agreement.	The Specification may be updated given new design guidance.
	"the Specification" means any guidance notes on design and construction of SUDS from time to time published by CIRIA or others including:	
	Book 14 Design of flood storage reservoirs	
	Report I56 Infiltration drainage	
	C522 Sustainable urban drainage systems – design manual for England and Wales	
	C523 Sustainable urban drainage systems – best practice manual	
	C582 Source control using constructed pervious surfaces	
	C609 Sustainable drainage systems – hydraulic, structural and water quality advice	
1.20	or revisions or updates to the above.	
	"the SUDS" means the sustainable drainage system comprising all treatment and drainage systems including any pipework, swales, reed beds, ponds, filter trenches, attenuation	

tanks and detention basins. 1.21 Note that the Works may be vested in the Council or the Highways Authority or the "the Works" means the construction of those parts of the Above Sewerage Undertaker and Ground Drainage or the Below Ground Drainage shown on the subsequent clauses should be Drawings that will vest in the Council. amended as required. 1.22 "Undertakers Agreement" means any agreement made 1.23 pursuant to section 104 of the 1991 Act. Words imparting one gender shall be construed as imparting any other gender. 1.24 Words imparting the singular shall be construed as imparting 1.25 the plural and vice versa. Words imparting persons shall be construed as imparting a corporate body and/or a partnership and vice versa. 1.26 Where any party comprises more than one person the obligations and liabilities of that party under this Agreement shall be joint and several obligations and liabilities of those persons. The clause headings shall not form part of this Agreement and shall not be taken into account in its construction or interpretation. 2. **Ownership and Responsibility for SUDS** 2.1A The Developer is [details of title] If the "Developer" is the "Owner" of the land at the time of entering into this Agreement alternative 2.1B The Owner is [details of title] clause 2.1B should be used and subsequent clauses amended as 2.2 The Developer/the Owner proposes to construct the SUDS in necessary. connection with the development of the Land and has agreed to carry out such construction on the terms set out in this Agreement. 2.3 Vesting of below-ground SUDS. The Developer/the Owner desires that on completion [or at the end of the Maintenance Period] the Council the Highway Authority or the Undertaker (as the case may be) shall be Amend as necessary given the responsible for agreed parts of the Below Ground Drainage parties entering into the Deed. and that in the case of the Undertaker they become public works vested in either the Highway Authority or Undertaker pursuant to a Highway Agreement or Undertakers Agreement which agreements the Owner (if different from the Developer) and/or the Developer hereby covenants to enter into as soon as reasonably practicable following the completion of this Agreement. Vesting of above-ground SUDS. The Developer/the Owner desires that on completion (or at the 2.4 end of the Maintenance Period) the Council or the Highway Authority (as the case may be) shall be responsible for agreed Amend as necessary given the parts of the Above Ground Drainage and that in the case of the parties entering into the Deed. Highway Authority they become public works vested in the Highway Authority pursuant to a Highway Agreement (or in the case of the Council by the provisions contained in this Agreement) which agreement the Owner (if different from the

Developer) and/or the Developer hereby covenants to enter

	into as soon as reasonably practicable following the completion of this Agreement.	
2.5	If any part of the Sewerage Undertakers Works discharges into or receives drainage from any other part of the SUDS which is not to be vested in the Sewerage Undertaker then the Owner (if different from the Developer) and/or the Developer hereby covenants with the Sewerage Undertaker to enter into a Deed of Grant of Easement and Rights to Discharge in Perpetuity as soon as reasonably practicable following the completion of this Agreement.	Easement and rights of discharge may be necessary where drainage is received or discharged into land with different ownership.
2.6	[The Surety has agreed at the request of the Developer/the Owner to be a party to this Agreement].	Surety if applicable.
3.	Construction of the Works	
	The Developer/the Owner shall construct the Works at its own expense and complete the Works in accordance with the Drawings and Specification and any Planning Permission (as may be varied in accordance with clause [4]) to the reasonable satisfaction of the Engineer in the position and to the extent shown in the Drawings.	Construction in accordance with drawings and specification.
4.	Minor Variations	
	Without prejudice to clause [3] the Engineer may on the written request of the Developer/the Owner give consent (such consent not to be unreasonably withheld) to the Developer to construct the Works or any part of them otherwise than in strict conformity with the Drawings and the Specification subject to:	Provision for minor variations.
4.1	The written request by the Developer/the Owner being accompanied with such information and Drawings that the Engineer will require and the consent of the Engineer shall be in writing.	
4.2	The Developer/the Owner shall not allow any variation without such written consent being first obtained.	
4.3	Nothing within this clause shall permit or authorise the breach of the Specification.	
4.4	The grant of consent by the Engineer under this Clause shall not in any way prejudice any rights of the Council, the Highway Authority and the Sewerage Undertaker against the Developer/ the Owner [or the Surety] in respect of any breach or non- observance of any part of this Agreement [and the duties and obligations of the Surety shall apply in respect of the Works as varied as they apply to the Works shown on the Drawings.]	
4.5	The Developer/the Owner shall pay on demand the Engineers reasonable costs incurred in connection with the operation of this clause.	

5.	Notification of intended Commencement of the Works	Notification of the start of construction.
	The Developer/the Owner shall:	
5.1	Give to the Engineer 4 weeks written notice of the date on which it proposes to commence the Works or any part of them and;	
5.2	At the same time submit to the Engineer for inspection such additional plans, drawings and other design or working documents not previously submitted to him which relate to the carrying out of the Works as the Engineer may require and;	
5.3	Notwithstanding the notice previously given give the Engineer 48 hours notice in writing of its intention to start the Works or any part of them.	
6.	Period of Construction	
	The Developer/the Owner shall:	
6.1	Construct and complete the Works within a period of [] from this Agreement (unless the Engineer shall in writing agree to an extension of that period) and in any event;	Period to be agreed bearing in mind the provision that planning permission is granted for
6.2	Ensure that before any building or property forming part of the development on the land which has the benefit of Planning Permission is brought into occupation such part of the Works as are necessary to drain those buildings or property shall be completed and in working order.	the development. SUDS to be ready before occupation of the dwellings on the site.
7. 7.1	Easements from third parties having interests in land through and on which the Above Ground Drainage and Below Ground Drainage are to be located for the Developer, [the Owner], the Council, the Highway Authority and the Sewerage Undertaker their servants and agents to enter upon such land after the vesting in the Council, the Highway Authority and the Sewerage Undertaker for the purpose of inspection, repair, maintenance, reconstruction, replacement or cleansing the form of and easements to be approved by the Council, the	Easements between parties as necessary to be provided before commencement of work.
	Highway Authority and the Sewerage Undertaker.	
7.2	Easements and consents in favour of the Developer, [the Owner], the Council, the Highway Authority and the Sewerage Undertaker their servants and agents for the Works and the free flow and passage of water with or without other matter through them.	
7.3	Easements and consents in favour of the Developer, [the Owner], the Council, the Highway Authority and the Sewerage Undertaker for the discharge of water with or without such other matter to any part of the SUDS, canal, pond or watercourse (as defined by section 219 (1) of the 1991 Act), to increase or decrease such discharge, to retain such discharge within any part of the SUDS and to take samples of such discharge.	

7.4	Easements and consents in favour of the Developer, [the Owner], the Council, the Highway Authority and the Sewerage Undertaker for the right to have in the water entering the SUDS soil and litter detritus or other matter or thing such that the same shall (as conditions from time to time may require) pass through and discharge from the SUDS or to be held in suspension in the water deposited in the SUDS and settle out upon the surface sides or walks of or elsewhere within the SUDS. Easements and consents in favour of the Developer, [the Owner], the Council, the Highway Authority and the Sewerage Undertaker for the right of support for the SUDS from the subjacent and adjacent land and soil including minerals.	
7.6	A Highways Agreement.	
7.7	An Undertakers Agreement.	
7.8	Such Statutory consents as may be required for the discharge of flood drainage works.	Definition (clause 1.12).
		Definition (clause 1.22).
		Parties are advised to contact the Environment Agency at an early stage of any project to obtain the necessary consents which will be required in addition to any planning permission granted.
8.	Restriction of Other Works and Structures	
8.	Restriction of Other Works and StructuresA. The Developer shall ensure that:	Amend as necessary.
8.	Restriction of Other Works and StructuresA. The Developer shall ensure that:B. The Owner shall ensure that:	Amend as necessary.
8. 8.1	 Restriction of Other Works and Structures A. The Developer shall ensure that: B. The Owner shall ensure that: No building or structure is erected or acts or operation carried out so as to impair the proper operation of the Works. 	Amend as necessary.
8. 8.1 8.2	Restriction of Other Works and StructuresA. The Developer shall ensure that:B. The Owner shall ensure that:No building or structure is erected or acts or operation carried out so as to impair the proper operation of the Works.No access to the Works is in any way obstructed.	Amend as necessary.
8. 8.1 8.2 8.3	Restriction of Other Works and StructuresA. The Developer shall ensure that:B. The Owner shall ensure that:No building or structure is erected or acts or operation carried out so as to impair the proper operation of the Works.No access to the Works is in any way obstructed.Support for the SUDS is not withdrawn	Amend as necessary.
8.8.18.28.38.4	 Restriction of Other Works and Structures A. The Developer shall ensure that: B. The Owner shall ensure that: No building or structure is erected or acts or operation carried out so as to impair the proper operation of the Works. No access to the Works is in any way obstructed. Support for the SUDS is not withdrawn Ground levels within the Land are not altered such that the SUDS may function less well or less adequately for the storage or dispersal of water (as the case may be) than at the date hereof and in this regard the opinion of the Council, the Highway Authority and the Sewerage Undertaker shall be final and binding. 	Amend as necessary.
 8. 8.1 8.2 8.3 8.4 	 Restriction of Other Works and Structures A. The Developer shall ensure that: B. The Owner shall ensure that: No building or structure is erected or acts or operation carried out so as to impair the proper operation of the Works. No access to the Works is in any way obstructed. Support for the SUDS is not withdrawn Ground levels within the Land are not altered such that the SUDS may function less well or less adequately for the storage or dispersal of water (as the case may be) than at the date hereof and in this regard the opinion of the Council, the Highway Authority and the Sewerage Undertaker shall be final and binding. In any transfer, conveyance or other disposition of the Land or any part thereof appropriate covenant as approved by the Council, the Highway Authority and the Sewerage Undertaker are contained therein in that respect binding upon the Land. 	Amend as necessary.

9.	Compensation	
	The Council, the Highway Authority and the Sewerage Undertaker shall not be liable to make any payment in respect of:	Restriction of liability.
9.1	Any diminution in value of the interest of the Owner, tenant or occupier of the Land by reason of the exercise of any rights in relation to the SUDS.	
9.2	Any claim, demands, losses, costs, charges and expenses in respect of or arising out of the exercise of any rights in relation to the SUDS, otherwise than arising in part or in whole from any act or default of the Council, the Highway Authority and/or the Sewerage Undertaker.	
10.	Certificates	Approval of the SUDS through Provisional and
10.1	When the Developer/the Owner is of the Opinion that the Works have been completed it shall serve written notice on the Engineer to that effect.	Final Certificates.
10.2	After receiving such a notice the Engineer shall satisfy himself as to whether or not the Works have been completed and if he is so satisfied shall issue a certificate on behalf of the Council, Highways Authority or the Sewerage Undertaker to that effect ("the Provisional Certificate") in respect of the whole or substantial part of the Works as considered appropriate.	
10.3	For the purposes of this clause the Works shall be deemed to have been completed when they have been substantially constructed in accordance with the preceding clauses of this Agreement.	
10.4	If during the Defects Correction Period or until the Works vest in the Council, Highways Authority or the Sewerage Undertaker as appropriate (whichever is the longer) any defect, damage or blockage shall appear, arise or occur in the Works the Developer shall at its own expense and within [] months after such defect, damage or blockage has appeared, arisen or occurred (or immediately if required in writing by the Engineer) make good to the reasonable satisfaction of the Engineer and;	Period for remediation of defects to be inserted.
10.5	Without prejudice to clause [] the Developer shall during the period prior to the works being vested in the Council as appropriate in accordance with clause [] maintain the Works to the satisfaction of the Engineer.	Relevant periods to be inserted.
11.	Access	
11.1	The Developer shall allow and arrange for the Engineer to have access to the works and the Land at all reasonable times for the purpose of ensuring compliance with this Agreement.	Access to be provided to the Engineer.
12.	Inspections	

- 12.1 At any time before vesting of the Works in accordance with clause 14 the Developer/the Owner shall on being so requested in writing by the Engineer open up for inspection any part of the Works which may have been covered up.
- 12.2 Should the Developer/the Owner fail to comply with any such request under 12.1 (and without prejudice to any other rights accruing on a breach of any part of this Agreement by the Developer/the Owner) the Engineer may arrange to open up the Works or any part of them.
- 12.3 In the event that any part of the Works is found to be defective, obstructed or otherwise failing to conform with the requirements of this Agreement the cost of such opening up rectification and reinstatement shall (subject to clause 12.4 below) be borne by the Developer/the Owner.
- 12.4 In any case other than mentioned in clause 12.3 above such costs shall be borne by the Council except that in any case where the Engineer has not been given reasonable notice and facilities by the Developer/the Owner in accordance with this Agreement to inspect any part of the Works and did not inspect them the cost of the opening reinstatement and rectification (if any) in relation to any part of the Works which shall have been opened up shall be borne by the Developer/the Owner whether or not such opening up reveals any defect, obstruction or other failure to comply with the requirements of this Agreement.

13. Right to Repair

If at any time before the Works shall become vested in the Council in accordance with clause 14 the Developer/the Owner shall fail to construct, complete, make good and maintain the Works or any part of them in accordance with this Agreement:

- 13.1 The Council shall be entitled at its discretion to construct, complete, make good and maintain such parts of the Works as may be necessary in the opinion of the Engineer for the proper operation of the Works and may do so either by their own employees or by contract or in such other matter as they think fit after first giving reasonable notice in writing to the Developer/the Owner and the Surety of such intention and;
- 13.2 The Developer/the Owner shall upon demand pay to the Council the cost as certified by the Engineer of undertaking such part of the Works referred to in clause 13.1 including the cost of preparation and service of notices of administration.

14. Vesting

14.1 The Council shall (subject to the Developer/the Owner complying with the terms of this Agreement and in particular the terms of clause 7) by declaration vest the Above Ground Drainage Works in the Council in accordance with the provisions contained in the 1972 Act.

Inspection of the works before covering up.

Powers of the Council to complete or maintain the SUDS before vesting.

Requirements for vesting of the works in the Council

14.2	The Council shall not be required to vest or to take over responsibility for the Works or any part of them until the following have occurred:			Maintenance of SUDS
	14.2.1	The Engineer shall have issued a certificate in writing certifying that:		and correction of defects during the Defects Correction Period.
	14.2.1.1 The Works have been constructed and completed in accordance with the Drawing and the Specification to the reasonable satisfaction of the Engineer and have been maintained by the Developer/the Owner during the Defects Correction Period and any defects arising or work required in connection with the Works during that period and prior to the date of the Final Certificate have been made good or carried out by the Developer/the Owner to the reasonable satisfaction of the Engineer.			
		14.2.1.2	No building structure or act has been erected or carried out so as to impair the proper operation of the Works.	
		14.2.1.3	All requisite consents have been obtained and provided to the Engineer.	
14.2.2 All payments required by clause (19) ha			ents required by clause (19) have been paid.	
	14.2.3 All requirements of clause [7] have been complied with.			Provision of easements.
	14.2.4	The Engir Certificate Develope right of the works or a manner in	neer shall not be obliged to issue the Final e whilst any dispute exists between the r/the Owner and a third party concerning the e Developer/the Owner to construct the any part of them in the position and the o which they have been constructed.	Disputes.
	14.2.5	To ensure after the I Certificate	e that the Works shall so soon as practicable Defects Correction Period receive the Final e:	
	14.2.5.1 The Developer/the Owner shall give [] months notice before the end of the Defects Correction Period.		Notice before end of Defects Correction Period.	
14.2.5.2 Whether or not the Engineer shall have received notice as required under clause 14.2.5.1 above any inspection which the Engineer may require to make shall be made prior to the expiry of the Defects Correction Period and shall within []] days after such inspection advise the Developer/the Owner in writing of any defects arising or work required in connection with the Works and which require to be rectified or done before the issue of the Final Certificate.		Notification of defects arising from inspections. Insert relevant periods.		

15. Duty to Developer

15.	Duty to	o Developer		
15.1	Nothing part of the Sev any oth are pro	g in this Agreement shall imply any obligation on the the Engineer or the Council, the Highway Authority or werage Undertaker to the Developer/the Owner or to her person to ensure that the Works or any part them perly constructed.	Developer responsible for proper construction of the SUDS.	
16.	Indemnity			
16.1	The De Undert may be and co	eveloper/the Owner shall indemnify the Council and the aker against all claims, costs, losses or expenses which a made against them in connection with the construction mpletion of the Works and any defect in title.		
17.	Termir	nation		
17.1	A.	If the Developer shall:	Amend as necessary.	
	В.	If the Owner shall:		
	17.1.1	Fail to perform any of its obligations under this Agreement.	Termination provision on breach of Agreement or bankruptcy.	
	17.1.2	(be adjudicated bankrupt or) shall go into liquidation voluntarily or otherwise or shall execute a deed of assignment for the benefit of or otherwise compound with its creditors (except for the purpose of reconstruction or amalgamation)		
17.2		The Council and/or the Highway Authority and/or the Sewerage Undertaker may without prejudice to their other rights, remedies and powers against the Developer/the Owner for such breach of notice in writing to the Developer/the Owner (and the Surety) determine this Agreement and upon such notice being served this Agreement shall immediately determine but without prejudice to the obligations of [the Surety to the Council, the Highway Authority and the Sewerage Undertaker under clause 17 and of] the Developer/the Owner to the Council, the Highway Authority and the Sewerage Undertaker under this Agreement.		
18.	Surety	's Obligation		
18.1	If the D obligati this cla Sewera and/or may in- failure this Ag	eveloper/the Owner fails to perform any of its ons under this Agreement the Surety shall (subject to use) pay to the Council and/or the Highway Authority age Undertaker any expenditure which the Council the Highway Authority and/or the Sewerage Undertaker cur in accordance with this Agreement by reason of the of the Developer/the Owner to perform whether or not reement has been determined.	Surety's obligation.	

18.2	The Surety shall in no circumstance be liable to pay a sum greater than [] for which such the Surety binds itself and its successors and assigns to the Council, the Highway Authority and the Sewerage Undertaker.	Sum to be inserted.
18.3	The amount of any expenditure referred to in clause 18.1 shall be that certified by the Engineer, the Highways Authority or the Sewerage Undertaker whose certificate shall be final.	
18.4	The Surety shall be discharged or released from the covenant in clause 18.1 when the Works become vested in the Council, the Highways Authority and the Sewerage Undertaker (as the case may be), but it shall not be discharged or released from this covenant by any arrangement between the Developer and the Council, the Highways Authority and the Sewerage Undertaker (as the case may be) or by the execution of any amended extra or substituted works authorised by clause [] or by any other whether as to payments, performance, time or otherwise whether made with or without the assent of the Surety.	
19.	Bond in relation to Works that remain in the ownership of the Owner or the Developer	Bond provision
19.1	If any part of the SUDS are to remain in the ownership of the Owner or the Developer then a bond in the sum of $[\pounds$] shall be made in favour of the Council.	Value of bond to be agreed and inserted.
20.	Disputes	
20.1	All questions, disputes or differences which may arise at any time between the parties hereto in relation to the construction of the SUDS shall be referred in the first instance to a senior manager of each party who will attempt in good faith to resolve any issue arising out of this Agreement but failing resolution within 14 days may be referred with the agreement of all affected parties to mediation in accordance with the Centre for Dispute Resolution (CEDR) Model Mediation Procedure. If such parties do not agree upon mediation within 7 days thereafter or have not settled a dispute by mediation within 42 days from the initiation of the mediation the dispute shall be referred to the decision of a single arbitrator mutually agreed upon or failing such agreement within 14 days to be appointed by the President for the time being of the Chartered Institute of Arbitrators on the application of any of the affected parties and such arbitration shall be carried out in accordance with and subject to the application provisions of the Arbitration Act 1996.	Provision for arbitration in the case of a dispute.
21.	Notices	
21.1	Any notice to be served or document to be supplied or submitted under this Agreement shall be delivered or posted in respect of the Council to [details to be inserted], to the Highway Authority [details to be inserted] to the Sewerage Undertaker [details to be inserted] and any notices to be served on the Developer/the Owner may be delivered or	It is important that any change of address is notified to the other parties.

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	posted to	o its/his last known address or its registered office.	Insert details of parties.	
22.	Fees an	d Charges		
	A. The	Developer shall:	Amend as required.	
	B. The	Owner shall:		
22.1	On the e preparat	execution of this Agreement pay the costs incurred in ion and completion of the same.	han ant ala ta ila af tha	
22.2	(Enginee	er's costs).	Engineer's costs and the Commuted Sum as	
	(Commu	ted Sum).	required. All costs should be shown exclusive of VAT.	
23.	Transfe	r of Rights		
23.1	The Dev vested ir	eloper/the Owner shall prior to the Works becoming the Council in accordance with clause 14:	Transfer of rights.	
	23.1.1	At the request of the Council execute or secure the execution of a conveyance or transfer to the Council and/or the Undertaker (and at no cost to them) vesting in them the freehold estate free from encumbrances of any land comprising the SUDS and upon which structures are erected for the proper operation of the Works and or amenity areas and to pay the costs of the preparation, completion and any stamp duty in respect of the same.		
	23.1.2	At the request of the Council secure at no cost to them the transfer or grant to them of the rights referred to in clause [] as they may require so such rights will vest in them.	Insert details of clause.	
24.	Assignn	nent		
24.1	The Developer/the Owner shall not assign any interest or responsibility under this Agreement without the express written consent of the Council, the Highway Authority and the Sewerage Undertaker and upon such conditions and terms as they may impose.		Assignment of interest.	
25.	Statutory Rights			
25.1	Nothing in this Agreement shall in anyway prejudice the exercise by the Council, the Highway Authority or the Sewerage Undertaker of any of their statutory rights and powers arising otherwise than by virtue of this Agreement.			
26.	Third Pa	arty Rights		

26.1 A person who is not a party to this Deed has no rights under the Contract (Rights of Third Parties) Act 1999 to enforce or have the benefit of any term of this Deed save where this Deed expressly provides otherwise but none of the foregoing provisions of this clause affect any right or remedy of a third party which exists or is available apart from the Act.

27. Application

27.1 This Agreement shall be governed by the laws of England and Wales.

IN WITNESS WHEROF

19: Appendix 6

Water Management Checklist - Question for applicants

How do you propose to minimise the use of potable water supplies, for example through grey water collection or the use of water efficient appliances?

Does the design incorporate facilities to collect, store and use rainwater and / or grey water?

Has the integration of rain / grey water collection for flushing toilets and irrigating landscape features been integrated?

Do your landscaping schemes and planting design plans for the site minimise the need for watering?

Has the potential for treating wastewater on site and potential to integrate reedbed treatment into the landscape design of the site been considered?

Have you specified water efficient taps, toilets, showers and urinals?

Has the effect of the development on the quality and quantity of run-off from the site been considered?

Has a SuDS feasibility study been conducted?

Have you discussed water storage and retention requirements with the Environment Agency and Land Drainage Engineers?

How do you propose to mitigate surface water pollution arising during construction? Is a FRA required for your proposal?

Types of development affected by Water cycle issues

Water cycle management affects every form of development to some extent but particular attention should be given to the following types of development that may require further details in the form of a Water Management Statement :

- 1. laying of hard standings / driveways / patios;
- 2. ndividual new residential dwellings;
- 3. applications for minor and major residential development;
- 4. commercial and industrial new build or changes of use;
- 5. development or change of use of community buildings, e.g. schools / hospitals / villagehalls;
- 6. agricultural / horticultural development;
- 7. leisure uses, such as sports centres, tennis courts and swimming pools, or, any extension or physical alterations to individual business, industrial, leisure or residential properties

In addition to the types of development above, planning applications likely to require particular consideration of water management issues in Tewkesbury Borough include those for development:

1) Within a river flood plain or flood zone shown on the indicative flood plain map prepared by the Environment Agency;

2) Within or adjacent to any watercourse, particularly where there might be potential for flash flooding;

3) Adjacent to or including any flood bank or other flood control structure; situated in an area where the Environment Agency or Tewkesbury Borough Land Drainage Engineers have indicated that there may be drainage problems;

4) Likely to involve the culverting or diverting of any watercourse; of such a size or nature relative to the receiving watercourse/drainage system that there could be a significant increase in surface water run-off, or, of a significant size or nature that may put pressure on the existing water supply or sewer/drainage systems.

20: Appendix 7 This matrix should be used incorporating any changes laid out in this document.

Environment Agency Flood Risk Assessment Matrix					
A1 Development category	B1 Development (including boundary walls etc.) Within 20 metres of the top of a bank of a main river	C1 Includes culverting of control of flow of any river stream	D1 Within Flood Zone 3	E1 Within Flood Zone 2	F1 Within Flood Zone 1
A2 Householder development and alterations	B2 Consult EA	C2 Consult EA with FRA showing design details of any culvert or flow control structure proposed	D2 No consultation – see standard comment	E2 No consultati on – see standard comment	F2 No consultation No Ea Advice
A3 Non- residential extentions with a footprint of less than 250m ²	B3 Consult EA	C3 Consult EA FRA showing design details of any culvert or flow control structure proposed	D3 No consultation - see standard comment	E3 No consultati on – see standard comment	F3 No comment – No Ea Advice
A4 Change of use FROM water compatible TO "less vunerable" development	B4 Only consult EA if site falls within flood zone 3 FRA required	C4 No consultation no EA advice	Consult EA with FRA	E4 No consultati on no EA advice	F4 No consultation no EA advice
A5 Change of use RESULTING in "highly vulnerable" or "more vulnerable" development	B5 Only consult EA if site also fall within flood zone 3 or 2 FRA required	C5 No consultation no EA advice	D5 Consult EA with FRA	E5 Consult EA with FRA	F5 No consultatio – No EA advice

A6	B6 Consult	C6 Consult	D6 Consult	F6 Consult	F6 No
Operation	FA	FA with	FA	FA and	consultation
development		FRA	withFRA	FRA and	see
less than 1		showing	and	Sequenti	standard
hectare		design	Sequential	al Test	comment
		details of	Test	Evidence	
		anv culvert	Evidence	(and	
		or flow	(and where	where	
		control	required	required	
		structure	confirm	confirm	
			Exception	Exceptio	
			test has	n test	
			been	has been	
			applied).	applied).	
A7	B7 Consult	C7 Consult	D7 Consult	E7 Consult	F7 Consult
Operational	EA	EA with	EA with	EA with	EA with
development		FRA	FRA and	FRA and	FRA
of 1 hectare		showing	Sequential	Sequential	
or greater		design	Test	Test	
		details of	Evidence	Evidence	
		any culvert	(and where	(and where	
		or flow	required	required	
		control	confirm	confirm	
		structure	Exception	Exception	
		proposed	Test has	Test has	
			been	been	
			applied).	applied).	

21: Appendix 8

Statement of Consultation

This appendix to be completed when process starts.

22: Appendix 9

Useful contacts

TBC contacts plus other Local Authority contacts.

In addition

Sources of Further Information

Construction Industry Research and Information Service (CIRIA): www.ciria.org.uk/flooding

www.ciria.org.uk/SuDS

www.ciria.org.uk/SuDS

'The SUDS Manual', CIRIA available at: http://www.ciria.org/downloads.htm 'Interim Code of Practice of Practice for Sustainable Drainage Systems', National SUDS Working Group, information available at:

http://www.ciria.org.uk/SuDS/icop.htm

CIRIA'FloodResilienceAdviceSheets', available at: http://www.ciria.org/flooding/advice sheets.html

Building Research Establishment (BRE): www.bre.com

Highways Agency - http://www.highways.gov.uk

Government Publications

PPS25 – 'Development and Flood Risk' and 'A Practice Guide to PPS25 - Living Draft' (DCLG), available at: http://www.communities.gov.uk/index.asp?id=1506265 'Interim guidance for improving the flood resistance of domestic and small business properties' (ODPM), available at:

http://www.pipernetworking.com/floodrisk/preparingforfloods.pdf

'Flood resilient and resistant construction – guidance for new build' (DCLG), available at:

http://www.planningportal.gov.uk/uploads/br/flood_performance.pdf