Directorate of Environment and Regeneration • Planning Services

LOCAL PLANNING GUIDANCE NOTE NO.19: SUSTAINABLE DRAINAGE SYSTEMS

Background

The provision of adequate drainage facilities to serve proposed developments has long been an important planning consideration. Where new development introduces hard, impermeable surfaces, as in roads, driveways, parking areas and the roofs of buildings, precipitation cannot soak into the ground as readily as when it falls on to soil or grass. For many years, surface water run-off drainage systems were designed to take the peak discharge excess rainwater away from the immediate locality to enter the watercourse as quickly as possible. But growing concerns about climate change in general and land liable to flooding in particular have brought the realisation that this **rapid drainage of stormwater merely runs the risk of shifting the problem downstream**. Consequently, at times of very heavy rainfall, the **current approach (known as attenuation) is to delay it at or close to the development site in controlled conditions through sustainable drainage systems (SuDS), until its release is less likely to contribute to or exacerbate flooding downstream.** Flooding is not confined to flood plains, because heavy rain falling on to waterlogged ground can cause localised flooding almost anywhere.

Put bluntly, **the UK must either invest more in sustainable approaches to flood management or learn to live with more flooding.** During autumn 2000, nearly 2,000 properties were affected by flooding in Wales, including a large number in Flintshire. Increasing difficulties in obtaining insurance cover and therefore in the costs of coping with flooding, points to the need to reduce flood risks. Continuing to drain our urban areas without considering the wider issues is not a sustainable option.

But it is also vital that SuDS measures are geared to **pollution attenuation**. In Flintshire this means particularly in relation to the River Dee and its estuary. SuDS is an important part of a sustainable approach to new development which not only looks at the wider and longer term implications of development but also has regard to creating quality development in terms of **landscaping and nature conservation**. In summary, then **the three cornerstones of SuDS are flow attenuation, pollution attenuation and amenity/conservation.**

This Note deals only with surface water drainage, not foul drainage as such, although it should be noted that small scale natural systems can assist with the latter.

Policy

"Planning Policy Wales" (PPW), published by the Welsh Assembly Government (WAG) in 2002, states that "In determining applications for development, local planning authorities should work closely with the Environment Agency, drainage bodies, sewage undertakers, prospective developers and other relevant authorities to ensure that **surface water run-off is to be controlled as near to the source as possible by the use of sustainable urban drainage systems**, and ensure that development does not:

Increase the risk of flooding elsewhere by loss of flood storage or flood flow route; or

Increase the problem of surface water run-off".

Surface water drainage is a material planning consideration. **"Technical Advice Note 15: Development and Flood Risk" (TAN 15)**, published by WAG in 2004, explains that development should not create additional run-off compared with the undeveloped situation and redevelopment schemes should aim to reduce run-off where possible. (SuDS can of course be applied to existing developments.) "Planning authorities can consider imposing a condition requiring developers to examine the SuDS option and provide the planning authority with details and options. If it is demonstrated that SuDS could work on a site, and subject to the appropriate agreements being in place with regard to adoption, then the planning authority would require SuDs to be implemented. Developers will need to give good reason why SuDS could not be implemented. **If a conventional drainage system does not improve the status quo or has a negative impact then this can be a valid reason for refusal."** In practice, it is likely that there are very few sites where SuDS will not be technically possible.

In Flintshire, the **Unitary Development Plan (UDP)** contains two policies relevant to sustainable drainage systems. **GEN1 "General Requirements for Development"** outlines the principle whereby development should not increase flooding problems, whilst **EWP17 "Flood Risk"** provides a more detailed context on SuDS. Both policies are quoted in **Appendix 1.** The supporting text to the latter explains that **the use of SuDS should be considered in developments within and adjacent to areas which have an existing flooding problem and that such measures could make a significant contribution to the sustainable management of water in the county.** Areas at risk from flooding, in the context of Policy EWP16, are shown on the UDP Proposals Maps which cover the county as a whole and individual towns and main villages.

The **Building Regulations** stem from different legislation to planning. Requirement H3 of Part H of the BR 2000 relates to the drainage of rainwater:

- Adequate provision shall be made for rainwater to be carried from the roof of the building.
- Paved areas around the building shall be so constructed as to be adequately drained.
- Rainwater from a system provided in connection with (1) or (2) above shall discharge to one of the following, listed in order of priority:

a. an adequate soakaway or some other adequate infiltration system; or where that is not reasonably practicable,
b. a watercourse; or where that is not reasonably practicable,
c. a sewer.

The Regulations stipulate that infiltration measures should not be sited within 5 metres of any building to protect the integrity of the foundations. Where the use of infiltration devices are not suitable the Council will expect other SuDS techniques to be considered in accordance with the hierarchical approach contained in the Regulations.

Problems which may be caused by conventional drainage systems

Traditionally rainwater run-off from developed areas is routed directly into underground pipes and drains, to be released as quickly as possible to the nearest watercourse, usually a brook or stream. This may have the following harmful effects:

- Surface water run off, especially after a prolonged dry period, carries a wide range of **pollutants** such as oil, silt and organic matter, which have harmful effects on water quality, biodiversity and amenity. It is important to ensure that the first flush of flow, which contains the most pollutants, is suitably controlled.
- Rapid drainage of large quantities of water exacerbates **flood risk downstream**.
- Artificially high flows can result in the **erosion of riverbeds and banks**, which can be harmful to property and cause the loss of riparian and aquatic habitats.
- The overload of combined foul and surface water sewer systems may cause **overflows of foul effluent** to watercourses, which is likely to be a health hazard and can impact adversely on flora and fauna and public amenity.
- Impervious surfaces around developments, together with the rapid removal of water via pipes, reduce the amount of water stored in the ground, **lowering the natural water table** and thus adversely affecting trees and other plants in the vicinity. Flows to rivers and streams at times of low rainfall would be lowered, also affecting water resources at a time when drought conditions are being experienced frequently.
- The structure of conventional road drainage systems, incorporating the use of gully pots, is **likely to harm animals** (where they occur) protected under EU legislation. In Flintshire, amphibians, especially great crested newts, are of particular concern. (However, the Highway Authority remains to be convinced of the acceptability of some SuDS measures and would prefer developers to devise their own solutions.)

Sustainable Drainage Systems

SuDS is an approach which seeks to manage the water as close as possible to its origin by various engineering solutions which replicate natural drainage processes, before it enters the watercourse.

In summary, the **benefits of SuDS** are:

- **Reducing flood risk** from development (i.e. water quantity control)
- **Minimising pollution** from surface water run-off, both dispersed and to groundwater (i.e. water quality control)
- **Minimising environmental damage**, e.g. bank erosion
- **Maintaining groundwater levels**
- Often producing **cost savings** as compared with traditional drainage systems
- Enhancing the **nature conservation and amenity** (and therefore economic) value of developments

A variety of **engineering techniques, both soft and hard,** can be employed:

Preventative measures at the source

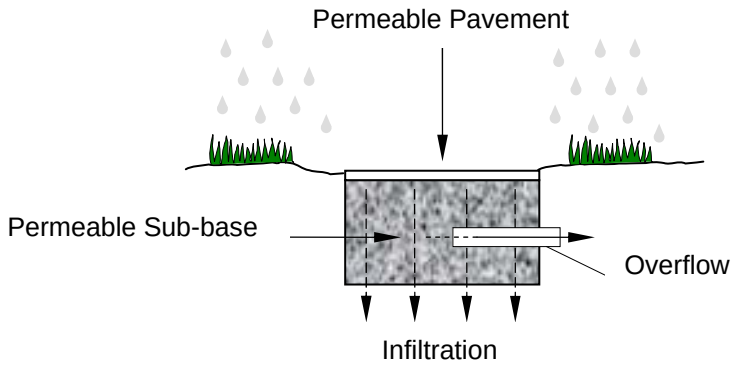
Source control forms the start of the surface water management process, and can make a significant contribution to the minimisation of surface water run-off. It includes;

- **Minimising paved areas**, allowing surface water to drain off naturally to gardens and open space
- The use of **porous surfaces** where possible
- **Rainwater recycling**, by capturing it from the roofs and using it for flushing toilets, stored in butts for car washing and garden watering, and - filtered and purified - for use within the main water system, known as “grey water”.
- **Education** is an important element in minimising pollution from surface water run-off. Simple measures such as keeping paved areas clean from litter and animal waste are helpful in this respect.

Site control

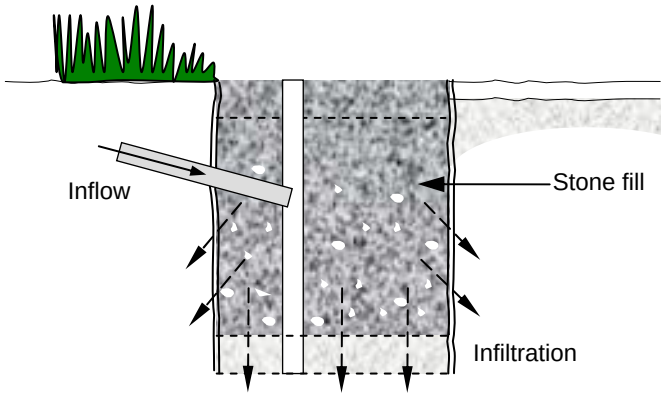
Techniques should minimise the quantity of water discharged directly to a river, through the use of:

- **Permeable surfaces** such as pervious paving, porous asphalt, gravel, crushed stone, grass-crete and grass allow water to permeate into the ground rather than draining away from it. Then, depending on the ground conditions, water can either infiltrate directly into subsoil or be retained in an underground reservoir (of crushed stone or similar) for delayed discharge into another structure. Pollutants are held below the surface to degrade slowly or be removed by filtering down through the sub soil.

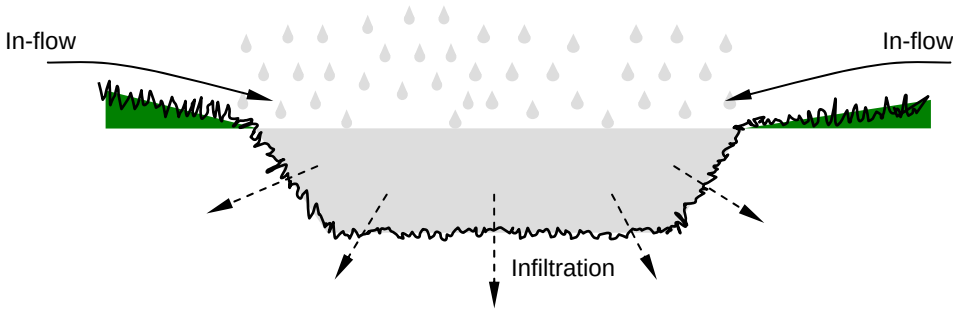


- **Infiltration trenches, filter drains and basins** work by enhancing the capacity of the ground to store and drain water. The trenches are shallow and backfilled with stone to create an underground reservoir, from where the water either infiltrates gradually into the subsoil or discharges to another structure at a controlled rate. The incorporation of a filter strip, gully or sump pit at the inflow will remove excessive solids, and enhance their longevity. Filter drains (or French drains) are similar structures through which a perforated pipe runs, facilitating the storage, filtering and infiltration of water from the source to the discharge point. A basin is normally free of water in dry weather conditions but available to store surface water run-off. Again, by slowing down the movement of the water, filtering and decomposition assist in the

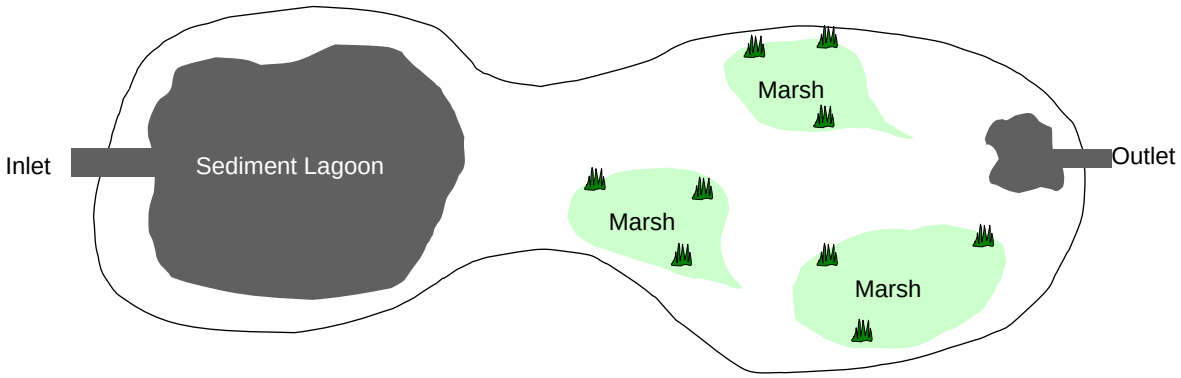
break down of pollutants. Generally these will be small scale systems, designed to fit into landscaped areas and mimicking natural drainage patterns.



- **Swales** are very shallow, wide linear, usually grassed depressions, often alongside roads, which are normally dry but take water during rainfall and allow it to infiltrate as it slowly travels to a pond or wetland prior to its discharge to a watercourse. The rate of discharge is slowed by providing a gentle gradient or a series of low dams or pounds on the channel bottom to hold back the water. Thus, pollutants are filtered naturally by filtering or microbial decomposition. On side roads swales can replace traditional kerbs, saving on construction and maintenance costs, and assisting the ecology by providing green corridors.



- **Ponds and wetlands** are likely to be well down the system, and be fed by swales, filter drains or piped systems. They can be designed as normally dry, known as detention basins, existing to accommodate temporary flooding for a few hours, and may be used for other purposes (e.g. open space) when not required for drainage. However, they will probably contribute more to amenity and biodiversity if established as a wet pond or wetland. They can be designed to accommodate considerable variations in water levels, that is considerable spare capacity, thereby enhancing flood storage capacity during storms and reducing flood levels in streams. By allowing adequate detention time they can trap sediment and hold back pollution where it can be broken down or - after a flood or pollution event - removed later. The algae and plants of wetlands can provide a particularly good level of filtering and nutrient removal, and reeds at inlets and outlets will cleanse water on its way through the pond. Where ponds are located close to residential areas, for example, safety measures should be incorporated into the design, such as very gently sloping floors and avoiding sudden changes in depth, and perhaps fencing or barrier planting. Ponds and wetlands can provide valuable wildlife habitats, recreational opportunities and contribute to open space requirements.



An effectively functioning SuDS system will involve a range of the above approaches, from management at the source via detention ponds along the way, in order to provide effective cyclic and emergency flood and pollution control.

Site considerations

Not all SuDS techniques are suitable for every site, their effectiveness being dependent on ground conditions and ground water levels in the area. Developers should establish and take into account the soil, geological and hydrological conditions.

Where permeability is low, as on clays, swales and ponds are more likely to be effective than infiltration devices, but the solution will depend on the space available. Other subterranean solutions will always be possible. Infiltration rates can be measured and related to different types of technique. In the vicinity of old mine workings, which occur in parts of the county, SuDS must be designed to avoid feeding into such features.

Similarly, assessments should consider the topography of the site, whether it has been previously developed or contaminated, its relationship to watercourses on or adjacent to the site (be they natural, culverted or channelled), existing marshy or wet areas on or near the site, ecology in the locality, and groundwater levels and protection zones.. The choice of SuDS technique must also take account of pollutants present in the run-off.

The Council and Environment Agency Wales will provide basic guidance on the appropriateness of SuDS techniques for development sites.

Environment Agency Wales

Environment Agency Wales (EAW) has two roles in respect of development and flooding. It has to consider how development would affect rivers, and existing and new flood defence operations, taking account of conservation interests. Secondly, EAW can advise on how proposed development would itself affect flood risk by providing a broad assessment of the potential flooding effects, and of the scope for engineering works to alleviate it. As part of pre-application discussions, EAW will provide information to assist developers in complying with TAN15. When consulted EAW will indicate what further information is needed to enable consideration of the application, provide detailed advice on the flood consequences assessment accompanying an application, suggest alleviation works and conditions, and object to the proposed development where the consequences of a flood event cannot be acceptably managed in terms of the risk to people and property, and natural heritage.

Planning applications

Surface water drainage is a material consideration when determining planning applications. The Council, as local planning authority, must have regard to the degree of flood risk in determining the planning application, and make clear that approval does not imply the absence of flood risk. **The Council will seek to ensure applicants incorporate sustainable drainage systems for significant developments and will encourage them for all other developments**. It is essential to consider sustainable drainage early in the development process because there may be implications for land purchase or design and layout; furthermore, retro-fitting SuDS to a pre-existing design layout will be difficult.

Pre-application discussions

Therefore developers are advised to discuss drainage issues with the Council (initial contact with the Planning Support Officers in the Development Control Section of Planning Services in County Hall, Mold on 01352 703234) before submitting a planning application. It is advisable for developers to provide an initial assessment of drainage options at this time, having considered soils and geology, or having consulted those with experience in the field, to facilitate the Council in giving relevant advice.

Information to accompany planning applications

An Indicative Drainage Strategy should be submitted with outline planning applications, whilst for larger developments a Drainage Impact Assessment will also be required at this stage. For full applications and reserved matters a Detailed Drainage Design will be necessary.

Planning obligations and conditions, adoption and maintenance

In Flintshire, according to the UDP within 'problem areas' or areas likely to pose a flooding risk to existing built up areas, all developments which involve the installation of impermeable surfaces should be required to incorporate appropriate sustainable designs.

At present **adoption** is an issue at the national level, which the Environment Agency and others are seeking to resolve in the form of an agreed code of practice providing a clear and consistent responsibility procedure. (Thus far, there is an Interim Code of Practice, produced by the National Working Group in July 2004.) There are currently no legally binding obligations relating to the provision and maintenance of SuDS as opposed to conventional foul and surface water drainage systems. Until these matters are resolved nationally, arrangements for sites will be made on a site by site basis. It has to be pointed out that highway authorities generally are reluctant to accept off-highway works. An alternative might be for the Council in its land drainage capacity to have a policy for the adoption of SuDS measures.

The most appropriate method of achieving implementation and long-term maintenance of SuDS is under **Section 106** of the Town and Country Planning Act. **LPG 22 Planning Obligations** in this series explains the process in greater detail.

The Construction Industry Research and Information Association (CIRIA) have produced three Model Agreements which (1) provide a tool for planning authorities to encourage the use of SuDS and ensure effective management, (2) should be useful to developers and householders who wish to ensure effective management of their drainage systems, and (3) help to promote increased take up of SuDS. They are designed to be flexible and are available from CIRIA's website at www.ciria.org/suds. They do not stipulate which organisations should maintain particular drainage elements as this will vary according to the type of SuDS, the maintenance required, and the experience of the organisation involved.

The Council, before granting planning permission, may require that a **Section 106 planning obligation** be entered into to ensure that any SuDS schemes can be properly implemented and thereafter maintained for the lifetime of the development. An example of such an agreement can be found on CIRIA's SuDS website. This allows the Council to ensure that:

- The SuDS is properly designed and the maintenance issues have been considered
- Long term maintenance is planned for
- Revenue can be raised to support the long term maintenance

Within the Section 106 Agreement, the options for SuDS maintenance are:

- SuDS maintained in the local authority
- SuDS vested in the local authority
- SuDS maintained by a third party
- SuDS maintained by a management trust

In connection with the above list, it is relevant to emphasise that **a properly-functioning SuDS system should be low-tech, involving minimum maintenance.**

CIRIA have also prepared a **Maintenance Framework Agreement**. It allows the local authority or a sewerage undertaker to undertake ownership of the system, and allows maintenance to be carried out by a private contractor.

CIRIA's model **Private SuDS Agreement** allows any property owner or facilities manager to contract out the maintenance of SuDS., independently of the planning process.

In relatively simple and straightforward cases the Council may instead choose to impose **planning conditions** to ensure that the work is carried out properly. A maintenance strategy will be required as a condition. Commuted sums for maintenance will usually be sought where drainage schemes incorporate open space or amenity space and/or the physical maintenance of drains, filters and other similar works. Permanent utility vehicle and maintenance access must be incorporated into the landscaping or works.

All proposals for SuDS should respect amenity and ecology, particularly where a watercourse is affected. Full details of any alterations to watercourses must be submitted to the drainage authority for approval, before any works commence on site.

It is important that the SuDS network, and its interface with highways drainage, may be effectively maintained in perpetuity. Therefore a developer will be expected to liaise with the water/drainage authorities in order to provide appropriate solutions and conform adequately with national guidance.

Appendix 1: UDP Policies

GEN 1 General Requirements for Development (extract only)

Development that requires planning permission and is in accordance with the Plan's other policies, should be located on land, or within suitable buildings, which satisfies the following requirements:

i. the development should not result in/be susceptible to problems related to drainage, land stability, contamination, or flooding, either on or off site;

EWP 17 Flood Risk

Development which would seek to reduce the impact and frequency of flood risk to highly vulnerable localities will be generally supported, provided:

a. the design and character of the works is appropriate to the locality;
b. the works do not adversely impact on interests of acknowledged nature conservation and recreation importance; and
c. the works to not significantly increase floodrisk to other vulnerable areas.

In all other instances development within floodrisk areas will only be permitted where the Council is satisfied that:

a. It would not be are unacceptable risk from flooding (including tidal inundation);
b. It would not increase the risk of flooding elsewhere to an unacceptable level;
c. That appropriate alleviation or mitigation measures have been incorporated in the proposal; and
d. It would not have any adverse affect on the integrity of tidal and fluvial flood defences

The plan seeks to guide development to the most appropriate locations and to this end the Council will seek the advice of the Environment Agency in assessing flood consequences of new development proposals.