IPSWICH
BOROUGH COUNCIL

Ipswich Drainage And Flood Defence Policy

May 2002 with minor updates made August 2009

1 INTRODUCTION

This document sets out the Councils Policies relating to flood protection and drainage. It provides guidance on the roles of various drainage bodies and Council services and sets standards for sustainable drainage for new developments.

The document is intended to be reviewed annually and is available to the public on the Councils Web site. Major revisions may be required if the Floods and Water Management Bill is enacted - expected Summer 2010

Comments on the policies are welcomed and should be addressed to The Flood Risk Manager, Ipswich Borough Council, Civic Drive, Ipswich IP1 2EE, or E-mailed to Drainage@Ipswich.gov.uk

Appendix A of the policy is the standard format statement required by the government bodies listed below.

Parts 12 and 13 set standards and provide detailed guidance to developers regarding sustainable drainage.

Copies will be issued to:

The Environment Agency (EA)
The River Gipping Internal Drainage Board (IDB)
The Council's Heads of Service and Directors

Suffolk County Council

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2 NEED FOR POLICIES

Until 1992 most surface water runoff from paved and roof areas in new developments in Ipswich was drained to piped systems adopted and maintained by Anglian Water (AW).

With such systems, the increased runoff, which results, increases the risk of flooding downstream. Runoff contains a wide range of contaminants which give rise to poor water quality in rivers and streams. Recharge of aquifers is reduced and flows in streams become more variable. All these factors have detrimental affects on biodiversity and amenity.

Now sustainable urban drainage systems (SUDS) are being promoted by the Environment Agency the Department for Environment, Food and Rural Affairs (DEFRA) and The Department for Communities and Local Government (CLG). They are increasingly used for surface water disposal. These systems are intended to reduce adverse affects but are liable to give rise to flooding problems unless they are expertly designed, properly constructed and maintained. Anglian Water are not normally responsible or interested in ensuring these systems are suitable or adequate.

The coming together of SUDS, shared surface roads (with very low kerbs), disabled access requirements (very low thresholds), increasingly dense house building, climate change and rising sea level is leading to a need for much more drainage input in development control and the need for an Ipswich Borough Council Drainage policy. If this is not done then many properties are likely to suffer flooding for which AW or the Highway authority would have no responsibility but which the Council may have permissive powers to remedy.

An increasing number of development sites are currently served by unadopted roads and sewers. More and more green areas are being paved and graded to spill runoff onto roads, where road drainage or public sewers cannot cope. Runoff from such uncontrolled development will lead to increased flooding and pollution.

More development is taking place in the bottoms of valleys which at some time will flood. Frequently watercourses in the valley bottoms have been piped and their presence is not recorded. Buildings could easily be erected over them, pipes may be destroyed, ditches filled or simply not maintained and flooding will result.

The Local Government Association Circular 10/00 enclosed DEFRA's High Level Targets for Flood and Coastal Defence. The targets for Local Authorities include the production of a publicly available policy statement to include sections regarding planning, emergency planning and the identification and inspection of watercourses which are not maintained by the EA.

CLG's "Planning Policy Statement 25 – Development and Flood Risk" - (PPS25 , Dece 2006) and the High Level Targets require Councils to develop policies to discourage inappropriate development in areas at risk of flooding, and to encourage the provision of sustainable drainage, flood defence and flood warning measures.

Areas at risk of flooding include obvious floodplains of main rivers as well as less obvious other areas where watercourses have been piped or only flow during heavy rainfall.

The causes of flooding are frequently combinations of problems associated with a variety of public bodies, private companies, or individuals each with different responsibilities. Policies are also needed to reduce conflicts between different bodies and to help ensure that all the different services and bodies work together towards a common goal of a better environment for the people of Ipswich.

Most of Ipswich's roads and buildings are served by a combined drainage system which carries foul and surface water and is maintained by Anglian Water. During extreme weather parts of the system have flooded or overflowed into watercourses. Sometimes when flooding occurs sewage has escaped leading to concerns over health hazards. Although Anglian Water's Project Orwell has reduced the extent of these problems, several problem areas remote from the project remain. Continued uncontrolled increases in discharges into the sewerage system will increase the risk of flooding and the need for expensive and disruptive sewerage construction works. This policy should reduce this probability.

It is likely that flooding is a contributory factor to social deprivation. This work together with provision of drainage advice should therefore be viewed as part of the Councils Anti Poverty Strategy

3 CONTROL OF DEVELOPMENT IN AREAS AT RISK OF FLOODING.

The guidance of inappropriate development away from areas at risk of flooding is a key part of this policy and those of DEFRA, CLG and the EA.

There are three main areas at risk:

- Tidal flood plain – below the 4.22m (@2009) contour or 1 in 200 year frequency. It should be noted that some parts of the tidal defences will be breached as often as once every 30 years at present.
- Main River or Fluvial flood plain – variable contours but 1 in 100 year frequency Areas around ordinary watercourses.
- Other low lying areas, valley bottoms or ordinary watercourses .

The extent of tidal and main river flooding is shown on maps supplied by the Environment Agency and available on their website.

Maps showing the areas known to be at risk of flooding from ordinary watercourses, sewers or surface runoff are under preparation. A draft version is available on the councils intranet for use by IBC. A map identifying the approximate positions of ordinary watercourses is on the Council's web site.

PPS 25 describes what type of developments may be permitted within flood risk areas subject to satisfactory building design and emergency arrangements for warning and evacuation.

The Environment Agency are statutory consultees in the planning process and provide comments in accordance with their "flood risk standing advice" available on the EA's web site

Ipswich Borough Council's Drainage team may also comment, especially were sustainable drainage is required, or where localised flooding occurs.

DFD1 The Council's Drainage Engineering Service will check all planning applications for new or extended buildings. When these relate to areas known or suspected to be at risk of flooding from ordinary watercourses then the Drainage Engineering Service will pass recommendations on to the Development Control Service.

DFD2 When development is proposed in or close to areas where floodwater from Anglian Water's sewers collects, then the Drainage Engineering Service will normally liaise with Anglian Water with a view to ensuring that AW make recommendations to the planners/developer.

Note: Areas most commonly flooded are not the main river or tidal flood risk areas covered by the EA's flood maps.

4 ENVIRONMENT AGENCY FLOOD DEFENCES – WATERFRONT, ORWELL ESTUARY

The Council view the river and waterfront as a vital amenity critical to regenerating derelict areas. The sheet piled flood defences are not acceptable visually, the walls are deteriorating and sea levels are rising, leading to a gradual deterioration in flood protection standards.

The Environment Agency has developed the Ipswich Flood Defence Management Strategy which aims to protect Ipswich from tidal and fluvial flooding for the next 100 years. The strategy was adopted in 2006 following wide ranging consultations.

The Environment agency and Ipswich BC are now working in partnership to deliver the strategy. The most important parts are planned for construction between 2009 and 2012/3, these include a barrier across the New Cut. The barrier will be raised from the river bed when tidal flood warnings are received. During closure periods fluvial flows will be stored within the river channel.

River defence walls upstream of the barrier will need to be retained and maintained but not raised.

5 ORDINARY WATERCOURSES – AREAS AT RISK OF FLOODING.

DFD3 Ordinary watercourses and associated areas at risk of flooding will be identified and recorded by The Council's Drainage Engineering Service from their flooding data base, land drainage records and contoured plans. Records will be gradually improved as more information becomes available. Such records will be based on the Map Info Geographic Information System (GIS) for easy integration with other records. Bottoms of valleys will be regarded as areas at risk of flooding.

Many watercourses have been piped and may also be known as land drains. Some roads in valleys which carry large flood flows have been identified.

In 2008 the Environment agency issued maps showing areas most likely to be susceptible to surface water flooding. These highlight the valley bottoms however no account is taken of piped drainage systems and they are indicative. These maps will be used to assist in flood risk management and may be refined where risks appear greatest.

Note: Valleys have been formed by flowing water. Difficult to establish likely extent of such flooding in 100 year event so initially judgement will be needed. Roads are unlikely to be classed as watercourses as the majority of flow along them is likely to be from highway or buildings.

6 INSPECTION OF ORDINARY WATERCOURSES

DFD4 The Council's Drainage Engineering Service will implement an inspection programme for "critical ordinary watercourses", as required by the Environment Agency and DEFRA, and report their condition to the Environment Agency. A list of critical ordinary watercourses is to be agreed between The Council and the Environment Agency.

This policy is in need of review as it has been superceded by changes in arrangements for reporting and inspections and nationally the EA have accepted critical ordinary watercopurses as main rivers. No critical water courses were agreed in Ipswich.
Piped watercourses, ditches or valley bottoms along which water occasionally flows would be extraordinarily difficult to survey as many are in back gardens with no access manholes. So the current policy remains to exclude these from regular inspection.

7 ORDINARY WATERCOURSE MAINTENANCE.

The Environment Agency's consent is required to pipe in watercourses. Their policy is that this is not normally permitted. PPS25 suggests culverted watercourses should be restored.

Where developers fill or pipe watercourses, without approval from the Environment Agency and the Council's Flood Risk Manager, then planning enforcement action may be taken.

Note: Many piped watercourses/land drains are known to exist. Owners are usually unaware of their presence and very few access points are provided.

Routine maintenance should normally be undertaken by landowners. Where maintenance problems exist the Council's Drainage Engineering Service will ensure owners are made aware of their responsibilities. In the event of a blockage or overloading IBC may become involved, initially offering advice. In extreme circumstances such as when many owners are involved and the problem is acute, then the Council's Drainage Engineering Service may serve notice on owner(s) requiring them to undertake works. Alternatively the Council may use its permissive powers under the Land Drainage Act to implement improvement works. In such cases Executive Committee approval is needed.

Care will be needed to ensure that such works do not aggravate problems downstream.

8 RECORDING AND MONITORING FLOODING

DFD5 The Council's Drainage Engineering Service will update their flood record database whenever complaints of flooding are received. The database will be converted to Map Info to facilitate integration with other systems. Following heavy rain other Service Areas should pass reports of flooding to the Drainage Engineering Service. In extreme events the Drainage Engineering Service will also obtain further information from the fire service or by site visits.

9 FLOODING INVESTIGATION AND ADVICE

DFD6 The Council's Drainage Engineering Service will investigate flooding complaints and, where appropriate, provide advice which will often involve site visits or redirecting the customer to the appropriate body . In complicated cases the Drainage Engineering Service will endeavour to bring together the relevant bodies with a view to alleviating the problem.

Examples of some relevant bodies and some of their main areas of responsibility follow:

- The Environment Agency - Main Rivers and Estuary.
- Anglian Water - water supply & public sewers carrying foul or surface water which are usually beneath roads.
- Water Voice Eastern - The statutory OFWAT Customer Services Committee - contact them if you are not satisfied with AW's handling of complaints.
- OFWAT - Water company regulator
- Property owners - internal building drainage and pipework connecting to public sewer plus ordinary watercourses and land drains within the property.
- Ipswich Borough Drainage Engineering Service - Permissive land drainage powers relating to ordinary watercourses.
- Ipswich Borough Highways and Construction Service - road gulleys and pipework connecting to public sewer.
- Ipswich Borough Homes – Council owned residential property drainage.

- Ipswich Borrough Council Housing Options team – Where defective private drainage in neighbours property cause problems with buildings or health.

Note: It must be recognised that flooding is very rarely due to a single cause. Often the problem may appear to be a local private problem, however it may result from the trunk sewer surcharging with the first flood point being from a private drain. The drainage team are familiar with how the drainage systems operate and can often quickly diagnose the problem. AW often direct complainants on to IBC if they state that the floodwater was surface water, All too often such flooding is rainwater which is unable to enter a full sewerage system.
There will always be some flooding which cannot be easily alleviated.

10 DRAINAGE RECORDS AND PROVISION OF INFORMATION

The Council's Drainage Engineering Service retain old records of Anglian Water's public sewer network which are no longer kept up to date, as well as land drainage records. This information is often more detailed than Anglian Water can provide. When requested, the Council's Drainage Engineering Service will provide extracts of such information (A charge of £15 per copy will be made) A disclaimer not accepting liability and suggesting that critical information should be checked on site will be added.

DFD7 Consideration will be given to the idea of The Drainage Engineering Service collating and keeping relevant drainage records currently kept by various different Council services.

11 FLOOD WARNINGS AND EMERGENCY EVACUATION

Flood warnings are issued and disseminated to the public by the Environment Agency.

The Council's Emergency Plan Officer is responsible for updating the council's Emergency Plan which sets out the Council's duties and procedures.

The council's main roles are to support the emergency services with evacuation and to provide emergency accommodation.

DFD8 The Council do not normally issue filled sand bags to the public.
However a maximum of 10 empty sand bags per property may be collected from Grafton House. A small stock of filled bags and 1 tonne filled bags is kept at Grafton House for major emergencies.

DFD9 Where new developments are proposed in areas at risk of flooding then the Council's Development Control Service will consult with the Emergency Plan Officer and the Environment Agency regarding evacuation procedures, flood warnings and possible amendments to the plan.

The Drainage Engineering Service will provide assistance in updating the flood plan and also during emergencies utilising their records and local knowledge.

Consideration is to be given to improving the flood plan. This may entail including plans for flash floods which tend to cause problems with ordinary watercourses (valley bottoms) as well as planning for overtopping of the river defences. The plans will focus on identifying those at greatest risk, mitigating the effect of flooding on transport and emergency services, and recovery after serious flooding. The plan will be based on dealing with a flood which overtops flood walls and floods Ipswich as per the EA's indicative maps - a 200 year return period event.

12 SUSTAINABLE URBAN DRAINAGE SYSTEMS (SUDS)

SUDS control surface water runoff as close to its origin as possible before it enters a watercourse. This involves moving away from conventional piped systems to engineering solutions that mimic natural drainage processes and minimise bad effects on the environment.

SUDS may be infiltration systems whereby water is soaked away into the ground or may be attenuation systems which release flows gradually to watercourses or sewers. Both types of system involve storing water underground or in open landscaped basins.

Such systems are likely to take up more space, be cheaper to install, and require more maintenance and design resources. They will usually dictate the layout and appearance of development.

DFD10 Wherever reasonably practicable and appropriate, new developments should be drained to SUDS.

SUDS should be used wherever the Environment Agency, IBC or Anglian Water restrict discharges to watercourses or sewers.

SUDS are likely to be inappropriate for:

- Very small developments where ground conditions are unsuitable for soakaways and adequate sewerage facilities exist.
- Brownfield sites which are expensive to redevelop, perhaps because of contamination, or the need for tidal or fluvial flood defence measures.

For green field sites where adequate sewerage capacity exists and ground conditions are suitable for soakaways developers should consider the use of SUDS.

SUDS are promoted through topics in the Local Plan and Supplementary Guidance, based on specialist advice and guidance provided by the Environment Agency and the Council's Drainage Engineering Service.

To be truly sustainable, SUDS must be maintainable, adaptable and provide an acceptable standard of performance taking into account level thresholds and shared surface roads.

Detailed standards and guidance for SUDS are laid out in section 13 of this document and will be enforced through the planning system.

DFD11 Normally before planning permission is given the developer must satisfy the Flood Risk Manager and Head of Development Control that:

- **Ground conditions are suitable for the type of SUDS proposed.**
- **Sufficient space is available on the site for SUDS and their future maintenance.**
- **Acceptable future maintenance arrangements will be put in place.**
- **Environment Agency approval is given relating to ground water protection.**

Normally before full planning permission is given, details of the proposed system will need to be approved by the Flood Risk Manager and Head of Development Control. Approval will be withheld until satisfactory arrangements for adoption are in place eg: S104 agreement signed.

No work shall begin on site until full planning permission is granted.

Reason to ensure the construction is supervised and adoption occurs.

Planning applications showing drainage to soakaways may be refused unless the developer has undertaken soakage tests to the Flood Risk Manager's approval and demonstrated that the ground conditions are suitable and that satisfactory arrangements are in place for future maintenance.

Reasons: to ensure adequate standards of flood protection within the development and also adjoining sites. Ground conditions in Ipswich are very variable and soakage rates into soils may vary by a magnitude of 1,000,000. In some areas high ground water, steep slopes or impermeable soils may preclude their use.
Once installed soakaway performance will deteriorate over a period of time and allowances for maintenance and renewal need to be made.

13 STANDARDS FOR SUSTAINABLE URBAN DRAINAGE SYSTEMS

13.1 Standards Common to Surface Water Infiltration and Attenuation Systems

DFD12 For storms of up to a 100 year return period, SUDS should normally be designed to prevent:

- **Internal flooding of buildings**
- **Uncontrolled runoff from entering watercourses or sewers.**
- **Surface runoff from crossing the site boundary**
- **Surface runoff from gardens driveways and roof areas from reaching the highway**

13.1.1 Siting of SUDS

DFD13 Infiltration or attenuation systems should normally be sited in low lying open parts of the site.

Reason to reduce installation costs, minimise waste & pollution & reduce risks of property flooding in the event of overloading, or deterioration of SUDS performance.

13.1.2 Levels Of Roads, Gardens and Floors.

DFD14 Adopted roads are to fall down towards SUDS with provision made to enable floodwater to escape from the lowest point of the road along an over land "flood path" to the attenuation or infiltration systems. No other low spots on roads will normally be permitted. Great care needs to be taken where shared surface roads and /or speed tables /humps are to be used to ensure that runoff from the highway cannot flood into gardens/houses if gullies are blocked. Building floor levels therefore need to be carefully specified.

Reasons: to avoid creating flood points, and enable roads to drain even if gulley grates are blocked.

Where sites are very flat, minor roads with a single cross fall down towards a linear infiltration or attenuation system might be possible. Longitudinal falls along the road need to be carefully considered. Channels may be used to convey road runoff away from the road thus avoiding the need for gullies, deep highway carrier drains and reducing the depth of the infiltration or attenuation system.

House floor levels and garden levels need to be very carefully planned jointly with the design of SUDS particularly where level thresholds are used. There must always be a fall down away from level thresholds.

Reasons: Runoff, from apparently very permeable, unpaved surfaces will occur with ponding in low areas, particularly if the subsoil becomes compacted by construction activities and when bare soil is exposed, and needs to be taken account of when considering garden levels where such runoff could enter buildings or the drainage system.

13.1.3 Gardens

DFD15 Sub soil in garden areas that has been compacted by construction activities or contaminated with cementitious materials should be broken up to improve permeability just before placing top soil.

Topsoil should be stored carefully in low un-compacted heaps and ideally placed in gardens only during the growing season. Bare surfaces should be turfed or seeded.

Reason: Vegetation and soil organisms will improve soil permeability thus reducing potential for muddy runoff from gardens entering and overloading highway drainage or causing flooding of gardens or buildings

13.1.4 Rain Water Storage

DFD16 The provision of rain water storage and reuse facilities (eg water butts) should be considered wherever possible. Water should enter the storage tank via a "diverter". When the tank is full water should bypass the storage tank and discharge to the surface water drainage system.

Rainwater collected in this way is liable to be contaminated and is not suitable for human consumption or washing purposes.

Reasons: Reduces mains water usage. Reduces amount of sediment entering downstream drainage systems. Reduces rate of deterioration of soakaways.

13.1.5 Car Parks

DFD17 Car parks should ideally be sited in low-lying areas and provided with adequate falls and drainage systems. They may be used as temporary flood storage areas but runoff from car parks must not be shed onto adjoining sites, highways or properties in at least a 100 year return period event.

13.1.6 Unadopted Roads And Drainage Systems

DFD18 New developments of more than 6 properties should normally be served by adopted road and drainage systems. (Additional phased add ons not permitted). No more than six properties will normally be allowed to drain to an unadopted drain.

Reasons: to ensure adequate standards of flood protection and public health are achieved and maintained, to reduce IBC costs in dealing with private drainage causing nuisances, ensure runoff from undrained unadopted roads does not cause flooding elsewhere.

13.1.7 Privately Maintained SUDS

DFD19 Where SUDS serve only private properties and the property owners are expected to maintain the system owners must be made aware of their maintenance requirements by the developer

13.1.8 Pipework And Manholes

DFD20 Design and construction of pipework and manholes should comply with Sewers for Adoption 6th Edition or SCC design guide (for highway drainage) or Building Regulations as appropriate. Catchpits will be required at each surface water manhole.

Reason: To increase life expectancy of SUDS by ensuring that pipelines can be easily maintained without passing debris down to soakaways or storage systems.

13.1.9 Hydraulic Design for Sustainable Surface Water Systems

DFD21 The impermeable area for road drainage designs should include verges, footpaths, cycle ways, carriageway, and where appropriate, allowances for runoff from gardens or parks etc. Rainfall intensity/duration data shall be Wallingford or Met Office data for Wattisham.

DFD22 SUDS should be designed to perform to the following minimum standards:

- **30 year return period storm - no flooding of highways.**
- **Sufficient flood storage capacity must be provided at the attenuation or infiltration systems in the low spots so that the:**
- **100 year return period storm - max depth of water in publicly accessible sites<500mm.**
- **10 Year return period storm - max depth of water in publicly accessible sites<300mm.**
- **The storage may be provided in the form of public open space, excavated landscaped attenuation pond, infiltration basin or underground, possibly in combinations subject to agreement.**
- **Where the design involves surface storage of flood water then the slope to such features should be no steeper than 1 vertical in 4 horizontal.**

Where the depth of a flood storage area is less than 500 mm then steeper side slopes may be acceptable subject to maintenance considerations. A 1 in 2 slope may be possible where the depth of a basin is <0.5m and vertical sides if the depth is <0.2m (eg when utilisting car park areas.)

House floor levels should be at least 300 mm above the 100 year design water level in the flood storage area.

13.2 Infiltration Systems for Surface Water Drainage

In certain areas of Ipswich “ground water protection zones” exist. In these areas the use of infiltration systems may be restricted by the Environment Agency. Pollution interceptors may be required.
In other areas high ground water levels, impermeable soils or steep slopes may preclude their use.

13.2.1 Infiltration Systems for Highway Drainage

DFD23 The council may consider adoption of infiltration systems to serve adopted highway but not usually private roof or paved areas.

Alternatively the Highway Authority may under certain circumstances adopt conventional soakaways serving only highway.

Infiltration or soakage systems serving highways are to be designed to BRE365 or CIRIA 156 or using Micro Drainage Software.
Suffolk CC Design standards for adoptable road require a min of 4m between soakaways and the kerb. To facilitate access/maintenance the cover should be set as close to the carriageway as possible,

Normally the 10 year return period maximum water level in infiltration systems is to be below the soffit level of the lowest incoming pipe. (This may be reduced to 2 years if an approved computer simulation package is used to demonstrate adequate flood protection can be achieved. (30 year return period storm no highway flooding)

DFD24 Factors of safety (FoS) must be applied to infiltration rates used for designing infiltration systems.

Reason: sediment, leaves, plastic rubbish etc will be washed into the system and will gradually reduce the soil permeability around soakaways, reducing the storage capacity.

Factors of safety are variable and depend on the area being drained as well as the consequences of failure:

Size of area to be drained	Consequences of failure		
	No damage or inconvenience	Minor Inconvenience eg car park flooding	Damage to buildings structures or major inconvenience such as road flooding
<100 sq m	1.5	2	10
100 to 1000 sq m	1.5	3	10
>1000 sq m	1.5	5	10

(Table from page 53 of CIRIA Report 156).

Where open infiltration basins or surface storage areas are used with side slopes gentler than 1 vertical in 4 horizontal and the level difference between the 100 year water level and floor levels is >0.3m, then a FoS =2 is generally acceptable with no further consideration of extreme events

Note A FoS =10, with no freeboard seems to equate to a FoS of 2 with 300mm freeboard.

A reduced freeboard of 150 mm is acceptable with a FoS of 2 when a flood path is provided.

Flood paths need to be designed to convey a 100 year design flow, (calculated using Lloyd Davies or rational method or approved computer simulation/design tools), without flooding properties (allowing a 150 mm minimum freeboard), to an adequate discharge point. This maybe another infiltration basin where adequate storage is available.

Such flood paths must be in public open space and there may be circumstances when it is necessary to consider runoff from open spaces in design calculations.

Where infiltration basins or soakaways are linked by pipes or flood paths, then longitudinal sections will be required to demonstrate the design maximum water levels are low enough to provide the required freeboard to avoid flooding of roads or properties.

13.2.2 Infiltration Systems for Private Roofs, Driveways and Car Parks

DFD25 Private drives and roofs may drain, where appropriate and subject to satisfactory soakage test results, to privately owned soakaways, designed and installed, ideally to similar standards as described in 13.2.1 or to BRE Digest 365. Each soakaway should ideally drain one but not more than 2 properties. Normally a 5 m minimum clearance between soakaways and buildings is required and sufficient space must be provided to allow soakaways to be replaced and maintained. All soakaways should be provided with means of access sufficient to enable them to be located, inspected, tested and maintained or replaced.

Reasons; to avoid overloading road drainage and soakaways, to reduce impact on watercourses and adjoining land, and assist long term performance.

13.2.3 Gardens in Sites served by Infiltration Systems

For sites served by infiltration systems, gardens should ideally slope gently down from the road frontage to the rear garden. On sites where rear gardens abut each other then, ideally, the lowest spots would be at the rear boundary. Sufficient storage capacity needs to be provided in the

gardens and SUDS to prevent runoff escaping from the gardens and prevent flooding of buildings in a 100 year event (with an appropriate factor of safety applied to the soakage rate).

13.2.4 Construction Issues – Infiltration Systems

DFD26 Infiltration basins or blankets must be excavated without compacting the base of the basin. Normally turf and topsoil must be added within 3 days of excavation to avoid drying of formation. No runoff shall be allowed in basin until turf is established.

Note CIRIA report 156 gives recommendations for storing top soil so as to avoid destroying soil organisms which assist in promoting permeability.

Muddy runoff or runoff contaminated by cementitious materials is not permitted in basins or soakaways as it will reduce permeability.

It may therefore be necessary to use temporary basins or wetland areas for temporary discharge of runoff during the construction period.

The bottom 300 mm of conventional soakaway chambers should be water tight.

Reason: To assist in cleaning -wet sludge is easier to remove. To prevent settled sediments passing through rings into surround.

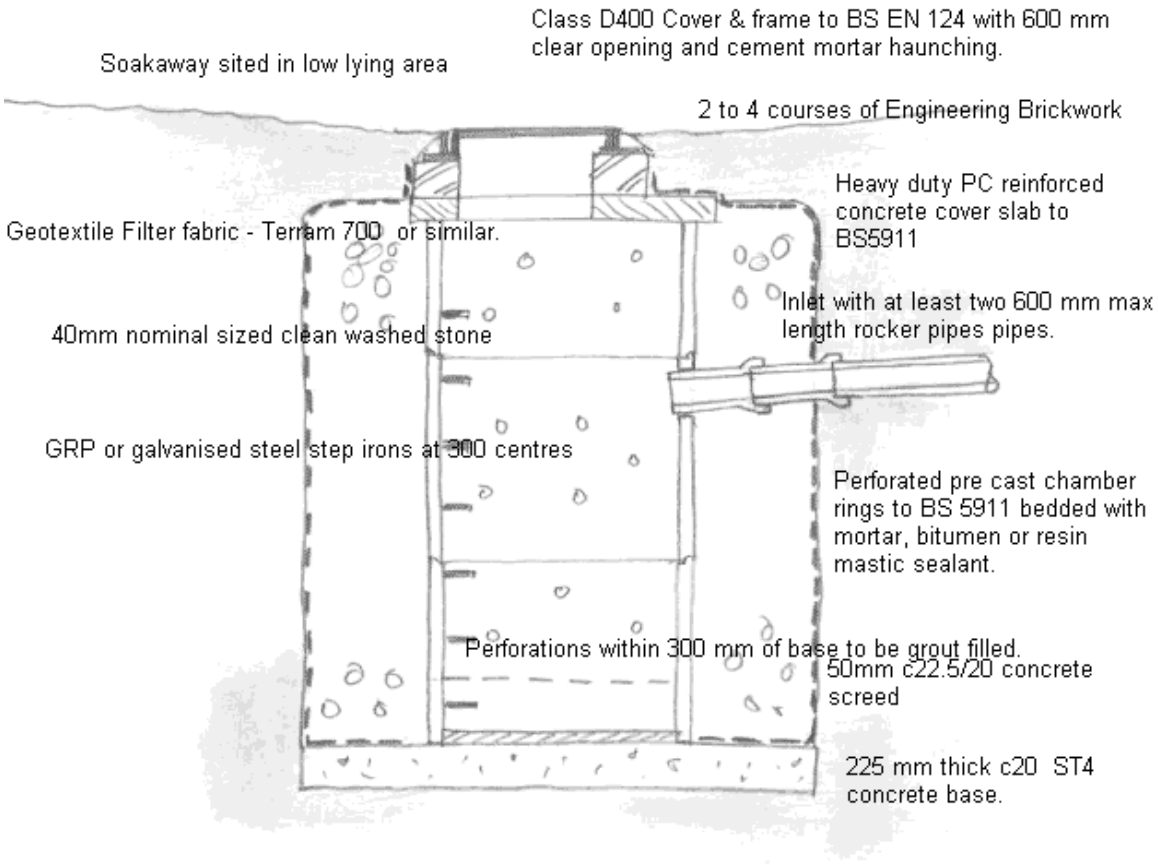
Additional silt traps for basins might be formed by constructing a wetland area which overflows several times per year into the infiltration basin.

In exceptional circumstances the permanent infiltration system might be used to drain surfaced roads during the construction phase. Adequate silt traps must be installed. The developer will be required to undertake regular inspections of catchpits and gulleys or other traps as well as regular road sweeping and where necessary gulley or catchpit cleaning.

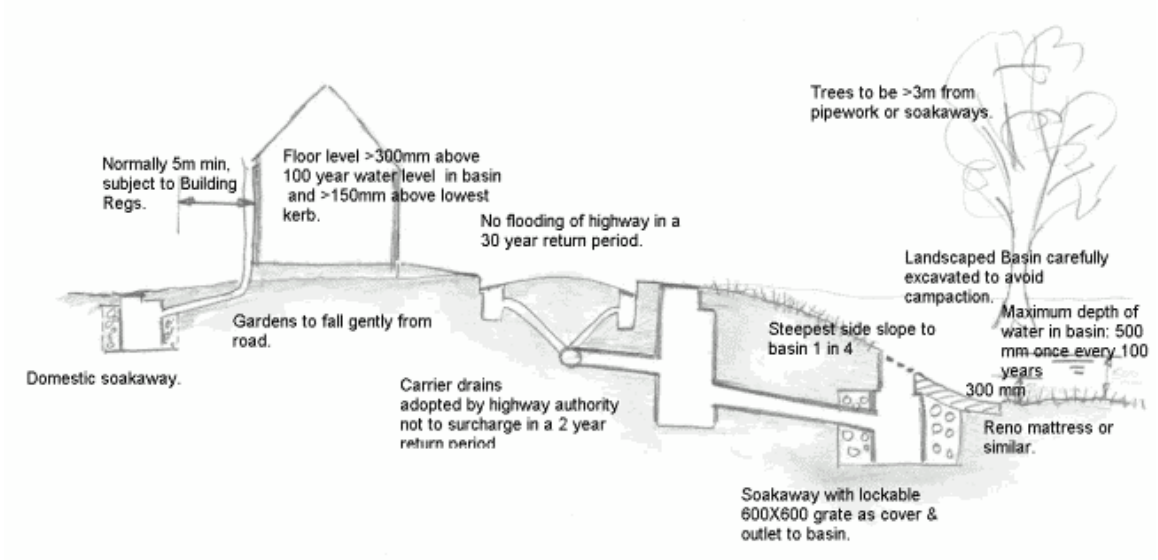
Depending on the weather, the results of inspections and the location/type of construction works being undertaken, the regime will be varied. Inspections and cleaning operations will be witnessed by a Drainage Engineering Service representative. All costs including the Councils supervisory costs will be borne by the developer.

No surface runoff should be allowed to enter infiltration basins from immediate surrounding public open spaces. This will cause erosion of topsoil and reduce permeability.
This may be achieved by slightly raising the ground level around the basins care being taken to avoid affecting any flood paths from roads to the basin.

13.2.5 Ring Soakaway Detail where IBC adopt.



13.2.6 Typical Basin Detail where IBC adopt.



13.2.7 Infiltration systems - Adoption

The council may consider adoption of infiltration systems to serve adopted highway but not usually private roof or paved areas. Alternatively the Highway Authority may under certain circumstances adopt conventional soakaways serving highway.

Currently the sewerage undertaker, AW is usually unwilling to adopt soakaways

Where IBC decide to adopt SUDS to drain public highways an adoption agreement will be tied in with the agreement under s38 of the Highways Act 1980 and final adoption will be subject to in situ site tests proving the design infiltration rate is achieved with no reduction in the original safety factor. Highways will not be adopted where SUDS fail to operate. A commuted sum will be required as determined by the Flood Risk Manager. A surety to guarantee completion to the appropriate standard may also be required.

The onus is on the developer to ensure adequate site investigations are undertaken, that designs are competent, and that construction and maintenance is correctly undertaken before adoption.

The importance of keeping muddy or contaminated runoff out of infiltration systems and turfing or protecting basins quickly must not be underestimated.

13.3 Attenuation Systems for Surface Water Drainage.

Attenuation systems may be used where ground conditions are unsuitable for the use of infiltration systems providing there is a suitable watercourse or sewerage system to receive the attenuated discharge and satisfactory arrangements are put in place for maintenance.

With relatively impermeable sites, runoff from unpaved areas is likely to be significant and will need to be included in designs.

Attenuation systems store runoff on the surface in shallow landscaped depressions (possibly including ponds), or underground in oversized pipes, box culverts, or porous media such as gravel rejects or plastic cellular material. Or in combinations.

Flows leaving the storage system are controlled using a small diameter throttle pipe, orifice, penstock or vortex flow control. These restrictions may be liable to blockages, and sediments including leaves etc, may settle in the storage system unless the system is carefully designed.

DFD27 Flow control devices with apertures of less than 100mm will not normally be acceptable.

Allowable discharges from attenuation systems need to be agreed by the Sewerage Undertaker, the Environment Agency, or possibly by IBC depending on the circumstance. For undeveloped sites draining to watercourses this will usually be the natural rate of discharge into the watercourse in a 100 year return period event.

DFD28 The Council will not permit surface water discharges from developments into land drains or piped watercourses unless they have been constructed to an acceptable standard and have adequate capacity.

When an attenuation system discharges to a public sewer then the statutory undertaker's approval to the design and maintenance arrangements may also be needed

The Council will normally require the general flood protection standards defined in section 13.1. In addition The Council expect designs to:

- ensure that property floor levels are at least 300 mm above the maximum possible water level in the storage system assuming a 100 year event occurs whilst the system is full (ie if the outlet is blocked.) – this will therefore mean that a high level overflow must be designed – this may take the form of an overland flood path.
- ensure that storage systems are accessible for easy maintenance.
- avoid the need for man entry into confined spaces.
- reduce risks of blockage of the flow control – by carefully designing inlets/outlets to exclude items, which could cause blockages.
- permit emptying of the storage system in the event of blockage – this is usually achieved by including a bypass valve controlled from ground level.
- reduce sedimentation in the storage system - storage pipes and tanks to be laid at gradients as recommended by CIRIA or WRc guides to detention tank design. Catchpits to be included on incoming drainage system.
- include ventilation in underground storage systems, which is sufficient to prevent a build up of explosive or toxic gases and allows trapped air to escape as the tank fills.
- ensure underground storage systems are structurally sound, of life expectancy of at least 100 years and capable of supporting all likely loads.
- ensure underground storage systems resist floatation.

Construction details will also need to comply with the relevant adopting body's requirements.

13.3.1 Attenuation systems for Highway Drainage

The highway authority may consider adoption of attenuation systems to serve adopted highway but not usually private roof or paved areas.

The sewerage undertaker may consider adoption of attenuation systems serving public highway and private roof or paved areas but not highways only. At present it is understood they normally require storage areas which contain more than 500 mm depth of water in a 100 year storm to be surrounded with security fencing and they would undertake very little maintenance.

DFD29 Where appearance is important and fencing is undesirable IBC may consider the adoption of open attenuation ponds /flood storage areas as public open space for surface water systems serving highways and or private property. In such cases a great deal of care may need to be taken with landscaping and planting to ensure the satisfactory long term appearance and operation. A commuted sum will be required to cover maintenance costs. Where the Council are to adopt then construction details will need to be agreed with the Flood Risk Manager.

Adoption would be under an agreement between the Sewerage Undertaker and The Council in parallel with a S104 agreement.

A surety may also be required to guarantee completion to the appropriate standards

13.3.2 Attenuation systems for Private Driveways, Roofs and Carparks

DFD30 Where attenuation systems serve small developments (6 or less properties) or where the sewerage undertaker is not prepared to adopt the attenuation system then

the developer must satisfy IBC that adequate arrangements are in place for future maintenance.

13.3.3 Gardens in sites served by Attenuation systems

DFD31 On sites served by attenuation systems, gardens are unlikely to be very permeable and low spots are likely to easily flood and should be avoided. Runoff from gardens will therefore need to be allowed in SUDS designs.

13.3.4 Attenuation systems - Construction Issues

Open storage areas – excavate without compacting soil, add topsoil within 3 days to avoid drying of formation, and turf or seed. No runoff is to be allowed in the basin until turf is established. Top soil for such systems is to be stored following CIRIA 156 so as to avoid destroying soil organisms which assist in promoting permeability.

Reasons to avoid unnecessary loss of additional capacity which may result from some soakage, to ensure satisfactory appearance and ensure soft base is not a safety hazard. .

13.4 Foul Drainage

DFD32 In normal circumstances foul sewage should be drained from each property via private drains serving no more than 6 properties to a sewer which is either the subject of an adoption agreement (S104 Water Industry Act) or is already a public sewer.

DFD33 Septic tanks and cesspools or private sewage treatment works will not be permitted in the urban area or within areas likely to be developed.

Reasons: to prevent nuisance, groundwater pollution etc.

13.5 Grey water.

Subject to development and evaluation.

14 DESIGN & CHECKING SERVICE FOR SUDS.

The Council's Drainage Engineering Service has set up systems to rapidly design SUDS or check calculations produced by developers.

DFD34 Within the Council all SUDS should be designed or checked by Drainage Engineering Services.

Reason: To ensure satisfactory standards and enable the DE team to monitor the development of SUDS, calculate performance indicators and eventually monitor or plan maintenance.

15 RECORDS OF SUDS

DFD35 The design calculations, catchment plans and sites of all new soakaways, infiltration basins, and attenuation systems which are not adopted by Anglian Water will be recorded by the Drainage Engineering Service.

A GIS system will be used – Mapinfo – for flexibility and economy and to rapidly provide environment performance indicators. Such information may be shared with the EA or Anglian Water and will be an invaluable aid to flood investigations, planning and possibly, in the future, ensuring that these are maintained.

16 ROAD GULLEY CLEANING

The Council, acting as highway agent for Suffolk County Council, maintains road gulleys.

When regularly cleaned, road gulleys will intercept a large fraction of pollutants that would otherwise reach watercourses or ground water via soakaways. This will in turn improve SUDS performance/life expectancy and so reduce flooding problems.

Gulley cleaning schedules will be developed for public highways and footways which optimise frequencies with more frequent cleaning at low spots where flooding is known to result from blocked gullies and where gullies drain to soakaways or surface water sewers which discharge directly to watercourses.

Such areas will be jointly identified by The Drainage Engineering and Highways and Construction Services.

17 USEFUL PUBLICATIONS, REFERENCES AND CONTACTS

17.1 Publications & References

The Department for Environment, Food and Rural Affairs (DEFRA - Formerly MAFF) High Level Targets for Flood and Coastal Defence and Elaboration of the Environment Agencies Flood Defence Supervisory Duty (Nov 1999)

"Planning Policy Statement 25 - Development and Flood Risk (CLGDecember 2006)

Sustainable Urban Drainage Systems – An Introduction, The Environment Agency (2000)

Soakaway Design. Building Research Digest BRE365 (1991)

Infiltration Drainage Manual of Good Practise C156 Construction Industry Research & Information Association - CIRIA (1996)

The SUDS Manual C697 CIRIA (2007)

Designing for exceeedance in Urban Drainage -good practice C635 (CIRIA 2006)

Source Control using constructed pervious surfaces – C582 (CIRIA 2002)

Rainwater & Greywater use in Buildings –Best practise Guide C539 CIRIA (2001)

The Building Regulations 2000 – Drainage & Waste Disposal – Approved Document H (The Stationary Office -TSO) June 2006)

Ipswich Local Plan Supplementary Planning Advice – Reducing the Environmental Impact of New Housing Development – A Good Practise Guide, Ipswich Borough Council, (1999)

Environment Agency Policy regarding Culverts -Explanation of Policy (March 1999)

SEPA /Environment Agency Pollution Prevention Guidelines:

PPG3 Use and design of oil separators in surface water drainage systems.
PPG5 Works in, near or liable to affect watercourses.
PPG6 Working at Construction and demolition Sites.
PPG20 Dewatering of underground Ducts and chambers.
PPG21 Pollution Incident – Response Planning
(And many others)

17.2 Contacts

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Web Site www.ipswich.gov.uk
Email enquiry@Ipswich.gov.uk

Development Control: Steve Miller - Head of Development Control.

Planning Policy: Sarah Barker – Principal Planner

Engineering: Peter Hussey Operational Manager -Transportation,
Denis Cooper – Flood Risk Manager
Christopher Fish – Team Leader Development control

Building Control : - Colin Hook - Building Control Operations Manager

Emergency Plan: Bob King - Borough Emergency Planning Manager

Environment Agency
Environment Agency – General Enquiries

National Customer Contact Centre
PO Box 544
Rotherham
S60 1BY

Tel 08708 506 506
Web site: http://environment-agency.gov.uk/

Environment Agency Incident Hotline (eg water pollution)
Tel 0800 807060

Environment Agency – Floodline
Tel 0845 988 1188

Anglian Water – Pre Development and Planning Application enquiries:
Planning & Equivalence
Anglian Water
PO Box 1067
Peterborough
PE1 9JG

Tel: 01733 414690
Email planningliaison@anglianwater.co.uk

Web site http://www.anglianwater.co.uk/developers/

Anglian Water – Sewer blockages and sewer flooding:

Anglian Water
Customer Services
PO Box 770
Lincoln LN5 7WX

Tel 08457 145 145

Email Anglianwatercustomerservices@anglianwater.co.uk

Web site http://www.anglianwater.co.uk/household/wastewater-services/sewers-and-drains/

The River Gipping Internal Drainage Board
Mr I Hart,
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