



# DRAINAGE ASSESSMENT

Notes for Guidance



Restored canal basin, Stable Grove, Paisley

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## PREFACE

This guidance note on Drainage Assessment is produced by Renfrewshire Council, as planning, roads and building standards authority, in association with Scottish Water and the Scottish Environment Protection Agency (SEPA).

Sections 1-2 provide an introduction to the drainage situation in Renfrewshire. Section 3 provides information on the roles and responsibilities of the various bodies which are involved in the assessment of drainage. These sections are provided for readers who have little knowledge of the drainage situation in Renfrewshire or the regulatory procedures associated with drainage in new developments. Section 4 provides technical details of how drainage should be assessed in respect of development proposals.

The development of the guidance note on Drainage Assessment has been supported by the Interreg IIIB North-West Europe Urban Water Project.

# INTRODUCTION

The purpose of this guide is to set out the requirements for the preparation and submission of Drainage Assessments in support of planning applications within the Renfrewshire Council area.

Drainage Assessment is a statement of the drainage issues relevant to a development proposal and the suitable means of providing drainage. It may include existing drainage systems and problems, infiltration, groundwater, surface water flow, foul and storm water disposal, sustainable drainage systems and drainage related flooding issues. In the design of a new development, interrelated issues associated with such matters require to be dealt with. Flood storage, drainage configuration, both line and level, and sustainable drainage devices may well be crucial to the final design layout. Consequently, there is a need to consider drainage matters at the earliest stage in the design process.

Drainage design is complex and a number of regulatory authorities are involved in its approval. This guidance note clarifies the roles and responsibilities of the regulatory authorities. The preparation of a Drainage Assessment and its consideration through the planning application process should help to achieve a coordinated approach to the resolution of drainage design matters between the developer and the various regulatory authorities.

A Drainage Assessment should be prepared by the developer to accompany larger planning applications and those areas where drainage is already constrained or problematic (see sections 4.6 - 4.7 for details).

This document provides introductory guidance. It is intended to add more detailed drainage design and sub-catchment guidance in due course. The guidance note is relevant to developers and all regulatory authorities.



Housing development and watercourse restoration at Glenpatrick Road, Elderslie





## RENFREWSHIRE DRAINAGE

### 2.1 Background

Drainage is required to make the land suitable for development, to protect existing and proposed development from the effects of flooding and to deal with pollution arising from the interaction of rainfall and the development. As a catchment develops, the proportion of land covered by impervious surfaces (roads, footways, parking areas, roofs and driveways) increases, preventing infiltration of rainfall into the ground. With infiltration much reduced, direct run-off can increase to 90% of the rainfall volume. At the same time, since water travels more rapidly over paved and/or positively drained surfaces, the run-off rate is much more sensitive to rainfall intensity and volume. Heavy rainfall can result in flash flooding, particularly where successive developments have overtaken the capacity of the installed drainage system. The most critical drainage issues for development in Renfrewshire are caused by the interaction between intense rainfall events, surface water discharges, the constrained nature of the sewerage system and watercourse flooding.

Much of the urban drainage system in Renfrewshire is a legacy from nineteenth century investment in sewerage infrastructure. The Victorian attitude to drainage was to get rid of unwanted water as quickly as possible, hidden away in underground pipes and culverts. A single pipe called a “combined sewer” was used to carry both foul and surface water drainage to a treatment works and after treatment to a watercourse. The preferred

practice in recent years has been to have separate sewer systems for foul and surface water, with surface water directed to watercourses. However, this practice has not always been fully adopted and separate surface water drainage from new development has often connected to the existing combined sewer system. Most drainage, even in recently developed areas, is still carried through combined sewers.

The design of combined sewerage systems is complicated because of the significant and variable burden caused by rainwater. Problems arise with this system when there is a heavy rainstorm and the combined sewer pipes cannot take the volume of water. Combined sewer overflows (CSOs) provide relief to the system by allowing discharge to watercourses. However, this can adversely affect river water quality. During extreme rainfall events and watercourse flooding, the sewer system itself can surcharge and sewage contaminated flooding occurs. It is increasingly evident that the public sewers in Renfrewshire are overloaded. Flood events, in recent years, have demonstrated that the biggest threat to the largest number of properties, when high rainfall events occur, is from constrained sewerage infrastructure.

### Combined sewer overflows (CSOs) to White Cart at Forbes Place, Paisley



# REGULATION

## 3.1 Approvals

Formal approval for a drainage system is needed from:

- The water authority (drainage construction consent)
- The planning authority (planning permission)
- The building standards authority (building warrant)
- The roads authority (road construction consent)
- Scottish Environment Protection Agency (consent to discharge/ conditional prohibition notice).

Each regulatory authority has its own powers. There is no hierarchy in the regulations.

## 3.2 Water Authority

Under the Sewerage (Scotland) Act 1968 (as amended), Scottish Water is responsible for the provision of sewerage infrastructure for domestic sewerage, trade effluent and surface water. Surface water is defined as the run-off from roofed areas and paved ground surfaces within the curtilage of premises; this is often referred to as statutory surface water. The authority is not obliged to do anything which is not practical at reasonable cost. The authority has no duty to drain roads and footpaths outwith the curtilage of

premises or to drain groundwater. The authority issues technical approval of the proposed sewerage infrastructure to serve the development and, at present, on completion would adopt and maintain the system as a public sewer. Scottish Water's policy, design and construction guidance for developers for the provision of drainage infrastructure is set out in "Sewers for Scotland".

**Waste Water.** Where a development will lead to the production of waste water, a Drainage Assessment should include a section on waste water drainage. This should examine the availability of public sewers to carry waste water from the development. Where a public sewer is not available the developer should first discuss with the water authority the possibility of providing a public sewer to carry waste water to an existing waste water treatment plant; otherwise the developer will require to consider the provision of infrastructure for adoption by the water authority. If private drainage arrangements are proposed, the developer should consult with SEPA in relation to discharge of sewage effluent to land or controlled waters.

**Surface Water.** Surface water discharge and the constrained nature of the sewerage system are critical drainage issues for development in Renfrewshire. The water authority recognises that during extremely wet weather, the capacity of the surface water sewers may be inadequate. Under





such conditions, sewers may surcharge and surface water may escape from manhole covers which lie below the hydraulic gradient. Within Renfrewshire, surface water sewerage problems are exacerbated by the prevalence of the combined sewerage network (see section 2.0 above). Developers should ensure that an adequate level of protection against the flooding of properties internally is achieved. The sewerage system should generally be designed not to flood any part of the site in a 1:30 year return period design storm.



**Sewage treatment works, Inchinnan**



**Effluent discharge to White Cart from Abercorn sewage treatment works**



## REGULATION

Scottish Water has completed Drainage Area Plan (DAP) investigations for sewerage catchments within Renfrewshire. The DAPs provide detailed information on the condition of the sewerage network and indicate the extent of the constrained nature of the sewerage system. In response to such constraints, Scottish Water has indicated that it will strongly enforce its preferred practice of discharging surface water direct to a watercourse and that it may refuse to accept any surface water discharge into the combined public sewer.

Whilst the combined sewerage network may be relieved by the discharge of surface water direct to a watercourse, such discharge may result in the two detrimental impacts:

- ◆ it may change flow characteristics in the watercourse producing increases in peak flows downstream of the development and increased potential for flooding; and,
- ◆ it may adversely affect water quality.

To help reduce such problems, Scottish Water recommends the impact of surface water run-off to a receiving watercourse should be minimised by use of sustainable drainage systems (SuDS). Developers should take account of guidance provided in the CIRIA publication, Sustainable Urban Drainage Systems: Design Manual for Scotland and Northern Ireland.

The Water Services Act has amended the 1968 Act and places responsibility for adoption of SuDS on Scottish Water, subject to the preparation of regulations to establish construction standards and vesting conditions. The regulations are not yet available.





### 3.3 Planning Authority

The planning authority is responsible for the control of development under the Town and Country Planning (Scotland) Act 1997. The Scottish Executive's planning policy on new development and flooding is set out in Scottish Planning Policy 7 (SPP 7): Planning and Flooding. The central purpose of SPP 7 is to prevent further development which would have a significant probability of being affected by flooding from any source or which would increase the probability of flooding elsewhere. It emphasises that drainage is a material planning consideration and advises that drainage measures proposed as part of a planning application should have a neutral or better effect on the risk of flooding both on and off the site. It encourages the use of sustainable drainage systems wherever practical. Detailed advice on how the planning process should encourage co-ordination of sustainable drainage systems in new development is provided in Planning Advice Note 61: Planning and Sustainable Urban Drainage Systems. The drainage principles set out in Government guidance are, generally, incorporated in the flooding policies of Renfrewshire Local Plan. This guidance on drainage assessment provides further refinement.

**Surface Water Run-Off from Development.** To prevent surface water run-off unduly affecting the catchment drainage system and the development site, the following criteria should be applied for surface water discharge direct to a watercourse.

For surface water discharge direct to a watercourse, the post development 25 year run-off associated with a development should be limited to the corresponding 2 year pre-development greenfield run-off value, with the 200 year run-off being contained within the site without causing any flood risk to buildings or resulting in a depth of inundation in excess of 300mm. (See Appendix 1)



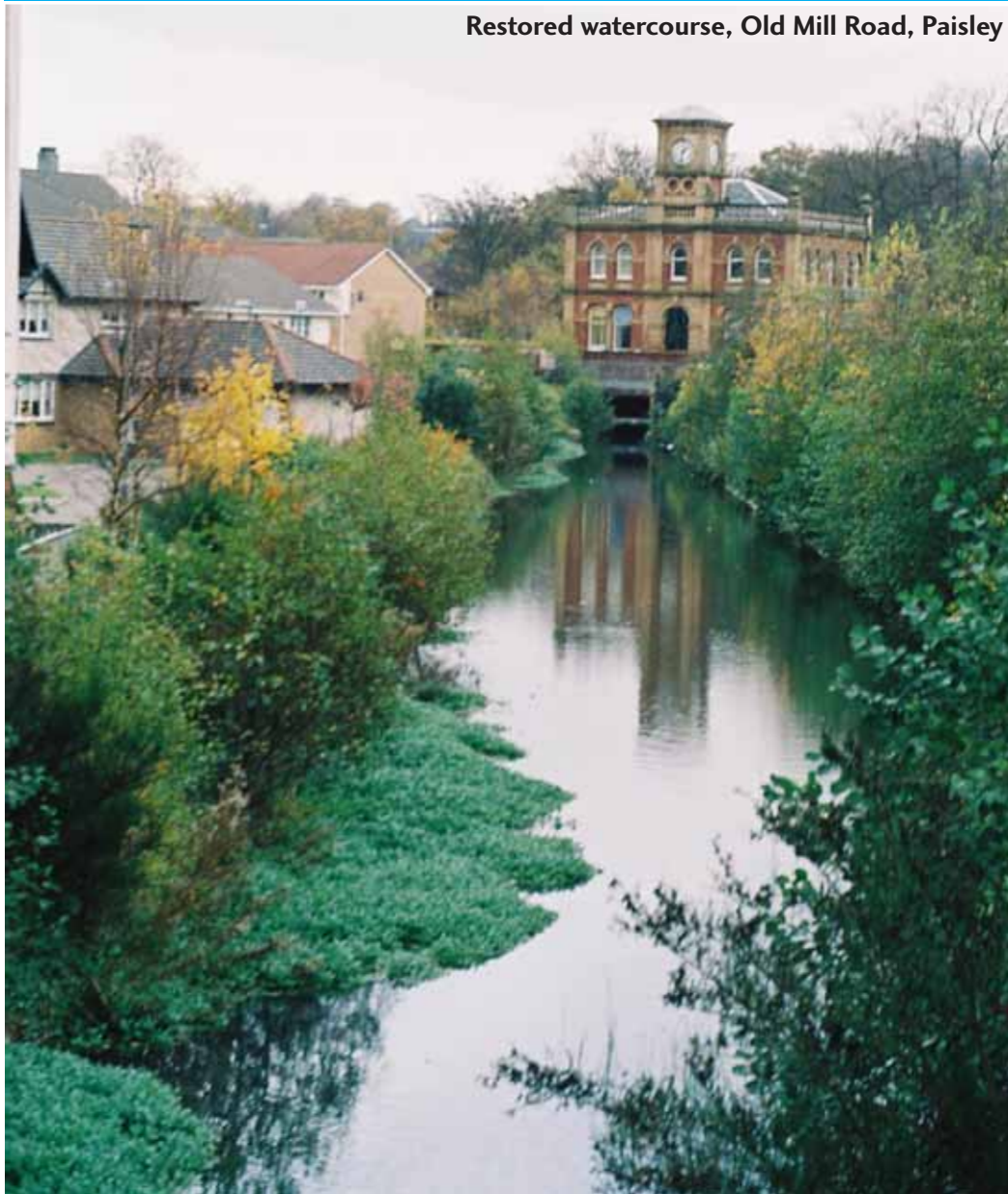
Restored water feature within housing development at Dykebar, Paisley





## REGULATION

Restored watercourse, Old Mill Road, Paisley



The developer will be required to provide suitable attenuation/storage to satisfy the criteria. In certain circumstances the requirements may be varied, for example:

- ◆ surface water discharges direct into the River Clyde from riverfront developments where tidal surges are the controlling factor will not require any attenuation;
- ◆ if the water authority agrees to take surface water into a combined public sewer system, consideration should be given to the under capacity in the sewerage system and the potential for effluent to discharge during severe storm events into adjacent watercourses via combined sewer overflows.

It is intended to improve the criteria in due course by providing detailed, individual sub-catchment guidelines.

**Sustainable Drainage Systems.** Renfrewshire Local Plan Policy F3 requires that developments should make satisfactory provision for sustainable urban drainage. The Local Plan endorses the CIRIA design manual on sustainable drainage. The Local Plan recognises that sustainable drainage is, primarily, concerned with the quality of water discharges, but may also assist in reducing risk of off-site flooding by moderating the flow of surface water run-off to watercourses. Sustainable drainage systems are relevant to a wide range of developments (see section 4.3 for more details).





**Sewer flooding from blocked drainage culvert Stockholm Crescent (1994)**

**Flood Risk.** The Local Plan provides flood risk indicators as a guide to those areas where flood risk assessment may be necessary and also sets out standards of flood protection that are required for development in flood risk areas. For further information, reference should be made to the Local Plan (Section 16, Flooding and Sustainable Urban Drainage).

It should also be noted that under the terms of the Flood Prevention (Scotland) Act 1961 and the Flood Prevention and Land Drainage (Scotland) Act 1997, Renfrewshire Council as flood prevention authority has specific responsibilities, powers and duties in relation to flooding and flood prevention matters. This includes the role of checking the adequacy or otherwise of development proposals in terms of surface water run-off control and flood prevention as well as a duty to maintain watercourses and reduce the likelihood of flooding on non-agricultural land. This specialist function is undertaken by the Design Services section of the Planning and Transport Department.

### 3.4 Building Control

The local authority as building standards authority has to be satisfied that adequate provision has been made for drainage. The proposed system should be designed and constructed to meet the Technical Standards for compliance with the Building Standards (Scotland) Regulations 2002 (as amended). Sustainable drainage is included in Part M for areas with more than 200m<sup>2</sup> of hard surface.

### 3.5 Roads Authority

Under the Roads (Scotland) Act 1984, the local authority as roads authority is responsible for the provision of surface water drainage for





adopted roads and for the issue of roads construction consents. Effective road drainage is fundamentally important for road safety and to the integrity and structural stability of the road. When considering construction consents, the roads authority will want to be satisfied that SuDS employed meet road drainage requirements and will not require onerous maintenance. Where it is proposed to drain surface water run-off from roads into the surface water system, the water authority requires the roads authority to enter into an agreement under Section 7 of the Sewerage Act. This agreement specifies the terms and conditions agreed between both parties for provision management and future maintenance of the systems. Provisions in the Water Services (Scotland) Act may alter this situation.

**Road drainage, Kings Inch Road, Renfrew**



### 3.6 Scottish Environment Protection Agency

Under the Control of Pollution Act 1974 (as amended), SEPA has powers to regulate discharges to controlled waters which include rivers, lochs, ponds, groundwater and coastal waters. Discharge of surface water does not currently automatically require consent from SEPA. At present, the agency has discretionary powers which allow it to use a prohibition notice or conditional prohibition notice. It is SEPA policy to promote sustainable drainage as the preferred option for drainage of surface water run-off including roofwater for all proposed development, greenfield or brownfield. SEPA, also, provides advice through consultation with the planning authority on the probability of flooding and flood risk, based on the information it holds.

SEPA will have a lead role in implementing the requirements of the European Union Water Framework Directive (WFD) which requires that all discharges liable to cause pollution are subject to some form of prior approval. The provisions of the WFD have been translated into Scot's Law by the Water Environment and Water Services (Scotland) Act 2003.



# DRAINAGE ASSESSMENT: PRINCIPLES AND PRACTICE

## 4.1 Catchment Management

Even without the threat of global warming effects on the watercourse and sewerage network, it is now apparent that drainage matters within new development or redevelopment can no longer be treated as discrete matters to be dealt with in isolation. A Drainage Assessment should treat drainage matters systematically as an integral part of the sub-catchment and sewer network. The assessment should ensure that surface water run-off and groundwater levels within developments do not unduly affect the sub-catchment drainage system.

It is the intention, in due course, to streamline the Drainage Assessments, by making detailed individual sub-catchment guidelines available, and to standardise the appraisal formats. At this stage, the guidance consists of generalised requirements that assist all parties to circumvent abortive evaluation and process.

## 4.2 Staged Approach

The Drainage Assessment should be viewed as a process involving a number of stages.

- ◆ Prior to land acquisition, the developer should undertake an assessment of the site in terms of the requirements set out in

this guidance in order to assist appraisal of site development constraints and land acquisition costs.

- ◆ A Drainage Assessment should accompany the submission of an outline or detailed planning application requiring waste or surface water to be drained. The level of detail required will depend on the scale and type of development, site conditions and the sensitivity of the receiving waters as defined in this guidance.
- ◆ Evaluation of the submitted Drainage Assessment will be undertaken by the planning authority in conjunction with the other regulatory authorities, seeking further information where necessary.
- ◆ Before being accepted by the planning authority, the Drainage Assessment should be satisfactory to all the appropriate authorities. Acceptance of an assessment does not constitute approval of final detail, but it does demonstrate that the approving bodies are satisfied in principle with the proposed drainage scheme.
- ◆ The Drainage Assessment will be used by roads and building standards authorities, SEPA and the water authority as a basis of their considerations of detailed drainage requirements.





Carts Corridor regeneration

### 4.3 Sustainability

The Drainage Assessment should demonstrate that surface water is drained according to sustainable drainage principles. Surface water drainage methods that take account of water quantity, quality and amenity issues are collectively referred to as sustainable urban drainage systems (SuDS).

Sustainable drainage systems manage the flow of rainwater run-off from a site and mimic natural systems by providing storage, flow attenuation and biological treatment. Some drainage techniques, such as retention ponds, slow the rate of run-off by temporary storage and this can help reduce peak flows to watercourses and reduce the loading on conventional piped drainage systems. Sustainable drainage systems can, therefore, make an important contribution to limiting off-site flood risk and managing the water environment, but they are not a flood prevention measure for on-site flooding.

Where sustainable drainage solutions are not possible, the assessment should identify the principles behind the chosen approach and demonstrate that the method which gives the best environmental protection available at the site will be adopted. The general presumption will be that sustainable drainage systems will be incorporated within any planning application. They should not be dealt with as a condition of planning consent. For further information see CIRIA publication, Sustainable Urban Drainage Systems: Design Manual for Scotland and Northern Ireland.



# DRAINAGE ASSESSMENT: PRINCIPLES AND PRACTICE



SuDS permeable paving at Braehead, Renfrew

## 4.4 Drainage Assessment and the Planning Process

Planning authorities have a responsibility to take account of drainage matters as material considerations in the determination of planning applications for new developments. They are, also, required under statute to consult with Scottish Water, SEPA and roads authorities, each of whom has individual responsibility for giving approval to drainage proposals. The consideration of Drainage Assessments as part of the planning process will assist co-ordination between the regulatory authorities in the resolution of drainage design and, also, ensure developers are fully aware of all regulatory requirements and decision making procedures.

A Drainage Assessment should be submitted by the developer with the first outline or detailed planning application for development requiring waste water or surface water to be drained. It will be a material consideration in the determination of the planning application. Proposals must be incorporated in submitted plans. Planning consent may be conditional, so all land required for sustainable drainage measures must be included within the site (defined by red line on plans) or on land in the applicant's control (defined by blue line on plans) or otherwise governed by a Section 75 Agreement. Submission of a Drainage Assessment with all the required information will facilitate consideration of the planning application. The failure by a developer to demonstrate that a satisfactory means of waste water or surface water drainage can be provided, may be a reason for refusal of planning consent.

Drainage Assessment requirements for outline and detailed planning permissions are provided in sections 4.8 and 4.9. They represent minimum requirements. Depending on the scale and type of development, site conditions and the sensitivity of the receiving watercourse, additional requirements may be specified by the planning authority. The developer should, therefore, confirm requirements before preparing the Drainage Assessment. For larger developments, it is recommended that, prior to the submission of a planning application, a scoping report should be agreed with the planning authority based on the guidance. This will help focus discussion at any pre-application meeting between the developer and





White Cart at Paisley Abbey

relevant regulatory authorities. The Drainage Assessment will form the basis of statutory consultation with the water authority, SEPA and the roads authority and liaison with the building standards authority. The assessment should be satisfactory to all the appropriate authorities before being accepted by the planning authority. Acceptance by the planning authority of a Drainage Assessment indicates that the other regulatory bodies are satisfied, in principle, with the proposed drainage scheme, but it does not constitute approval of drainage details.

Developers should be aware that, in addition to planning approval, formal consents are required from the other regulatory bodies (see sections 3.1 - 3.6). The Drainage Assessment will be used by these bodies in their decision making processes. The onus is on the developer to ensure development is undertaken in accordance with the Drainage Assessment approved as part of the planning application. Where significant change to drainage design, is required by another regulator, appropriate amendment must be obtained to the planning consent.

#### 4.5 Maintenance

The important issue of future maintenance is not dealt with here. The Water Services (Scotland) Act has amended the 1968 Sewerage (Scotland) Act to allow SuDS to be maintained by the water authority, subject to the



# DRAINAGE ASSESSMENT: PRINCIPLES AND PRACTICE

preparation of regulations to establish construction standards and vesting conditions. Further details will be provided when available.

## 4.6 Exceptions

The following categories of development will not generally require Drainage Assessment, but the best option for waste and surface water drainage is expected to be demonstrated:

- ◆ Householder applications.
- ◆ Developments of less than 10 new dwelling houses unless development may affect a sensitive area.
- ◆ Non-residential extensions under 100 m<sup>2</sup>.
- ◆ Non-residential new build, developments with floorspace or hardstanding less than 1,000m<sup>2</sup> unless development may affect a sensitive area.
- ◆ Applications forming part of a larger development for which a Drainage Assessment has already been accepted.

## 4.7 Sensitive Areas

Developers need to be aware that some receiving waters and site conditions are particularly sensitive in relation to drainage and special attention will be required. With the exception of householder applications, Drainage Assessment will be required for all developments affecting the following sensitive areas:

- ◆ Areas where there is no available public sewer - see water authority for details.
- ◆ Areas where a Drainage Area Plan indicates the sewer system is constrained - see water authority for details.
- ◆ Areas requiring flood risk assessment under flooding policies of Renfrewshire Local Plan - see planning authority for details.
- ◆ Areas within or upstream of a Special Protection Area or Site of Special Scientific Interest - see planning authority for details.
- ◆ Areas of land contamination - see SEPA and Director of Environmental Services, Renfrewshire Council for details.





#### 4.8 Outline Planning Requirements for Drainage Assessment:

For the purposes of an outline planning application, the Drainage Assessment should establish, in principle, that the site is capable of being drained for the scale and type of development proposed, in accordance with sustainable drainage principles. Development should not create or intensify an unmanageable risk of flooding elsewhere. The assessment should include as a minimum the requirements outlined below. These are for general guidance. The planning authority may decide given the circumstances of the case that additional information may be required or that it is unable to entertain an outline application.

- ◆ An examination of current and historic drainage patterns, including culverts traversing the site.
- ◆ Confirmation from the water authority of the capacity of the sewer network to accommodate waste water drainage, statutory and non-statutory surface water drainage from the development or statement of sewerage system constraints.
- ◆ Pre and post-development run-off calculations to provide an indication of surface water drainage requirements and flood mitigatory surface water storage. The normal criteria to

be applied for discharge direct to a watercourse is that the 25 year run-off associated with the development should be limited to the corresponding 2 year pre-development greenfield run-off value.

- ◆ An indication of the types of SuDS measures to be used and which measures will be considered in the detailed design.
- ◆ Evidence of sub-soil porosity and site suitability for SuDS, infiltration devices.
- ◆ Assessment of flood risk if required in terms of the flooding policies of Renfrewshire Local Plan. This should include consideration of the flood flow route for the 200 year return period.
- ◆ Estimate of land take for SuDS options based on initial calculations and for any flood prevention measures.

#### 4.9 Detailed Planning Requirements for Drainage Assessment.

Any Drainage Assessment submitted previously with an outline application should form the basis for the assessment at the detailed stage. The study



## DRAINAGE ASSESSMENT: PRINCIPLES AND PRACTICE

for a detailed planning application should set out clearly the criteria adopted for water quantity, quality and amenity issues related to the development concept and to the site. It should take into account effects on related sites upstream and downstream and on the sewerage network. The study for a detailed planning application should report on the matters outlined below:

- ◆ Examination of current and historic drainage patterns including culverts traversing the site and their potential to function as open watercourses.
- ◆ Confirmation from the water authority of the capacity of the sewer network to accommodate waste water drainage, statutory and non-statutory surface water drainage from the development or statement on sewerage system constraints and alternative drainage arrangements.
- ◆ A detailed drawing of the development proposal.
- ◆ Summary statement of how drainage design provides waste and sustainable surface water drainage.
- ◆ Pre and post-development run-off calculations used to determine

surface water drainage requirements and flood mitigatory surface water storage. The normal criteria to be applied for discharge direct to a watercourse will be that the post development 25 year run-off associated with the development should be limited to the corresponding 2 year pre-development greenfield run-off value, with the 200 year run-off contained within the site without causing any flood risk to buildings or resulting in an unacceptable depth of inundation on emergency accesses.

- ◆ Soil classification of the site.
- ◆ Calculation of pollution treatment volume for SuDS both individually and combined if necessary. Demonstration that the level of treatment and available treatment volume for SuDS are adequate.
- ◆ Plan identifying SuDS devices, land requirements and final discharge points where relevant i.e. existing surface water drainage system/ roads drainage network or watercourses.
- ◆ SuDS measures in relation to the roads drainage network design.
- ◆ Subsoil porosity test including the location of any sustainable drainage, infiltration devices.





The Hammills, White Cart, Paisley

- ◆ Assessment of flood risk if required in terms of flooding policies within Renfrewshire Local Plan. This should include the consideration of the flood flow route for the 200 year return period showing no detriment to land, property or SuDS features as a result of overland flow.
- ◆ Maintenance arrangements.
- ◆ Design of safety measures for SuDS accompanied by health and safety risk assessment for areas of open water.
- ◆ A method statement dealing with contaminated water run-off from construction works.
- ◆ Proposals for integrating drainage with landscape and open space.
- ◆ Survey of existing habitats and species.
- ◆ Demonstration of good ecological practice including habitat enhancement.

# APPENDIX 1

## Surface Water Discharge Criteria

For surface water discharge direct to a watercourse, the post development 25 year run-off associated with a development should be limited to the corresponding 2 year pre-development greenfield run-off value, with the 200 year run-off being contained within the site without causing any flood risk to buildings or resulting in a depth of inundation in excess of 300mm.

The purpose of the surface water discharge criteria is to prevent surface water run-off unduly affecting the catchment drainage system and the development site. The criteria set out in the Drainage Assessment represent the hydraulic engineer's shorthand for a set of complex, technical calculations to demonstrate that there will not be more run-off from the site when developed than there is in its greenfield condition and that the effects of flood water from the 200 year return period storm will have no detrimental effects on the development.

### Calculation of the 2 year pre-development greenfield run-off

The pre-development surface water outflow from the site is based on estimation of the run-off from a proportion of the undeveloped, greenfield

site. The rate of run-off is determined from various methodologies with the following components:

- a. calculation of site area;
- b. a percentage figure for existing runoff; and,
- c. rainfall.

The calculation provides existing outflow from the site in litres per second per ha.

### Calculation of the 25 year post development run-off

A twenty-five year storm event is used as the basis for calculating surface water run-off from the site after development. Account is, also, taken of matters such as the increased impermeable area of the development and different rates of flow from roofs, roads and car parking areas etc. The aim is to limit the amount of surface water run-off from the development, thus determined, to the two year pre-development greenfield run-off value. Attenuation/storage would normally be required to satisfy this requirement. The criteria should ensure that drainage proposed as part of a development would have a neutral or better effect on the risk of flooding both on and off site.





The criteria apply to both brownfield and greenfield development locations.

As an additional flooding safeguard, the developer should demonstrate the effects of a two hundred year storm on the proposed development and confirm that it would not cause any detrimental impact on property.

The criteria augment the existing practice of the water authority in the design of the sewerage system in relation to flood risk. The criteria are, also, consistent with the following guidance in Scottish Planning Policy 7, Planning and Flooding:

- ◆ drainage measures proposed a part of a planning application should have a neutral or better effect on the risk of flooding both on and off site; and,
- ◆ development which would have a significant probability of being affected by flooding from any source or which would increase the probability of flooding elsewhere should be prevented.



Refurbished mill building, White Cart, Paisley

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# DRAINAGE ASSESSMENT



Notes for Guidance