

Comhairle Chontae Laoise

Laois County Council



STORM WATER MANAGEMENT POLICY

FEBRUARY 2007

**ROAD DESIGN
PLANNING AND ROADS**

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1 STORM WATER MANAGEMENT POLICY OVERVIEW

Laois County Council, as the sanitary and planning authority, is required to implement both national and European legislation in relation to development control matters. This document sets out a county-wide policy for storm water management relating to planning applications for single domestic properties, residential developments and commercial and industrial developments in both rural and urban environments.

This policy is based in part on the Greater Dublin Strategic Drainage Study and Laois County Council's "Roads and Parking Standards", and sets out the minimum requirements and practices to achieve an acceptable design of storm water management systems for developments to be taken in charge by Laois County Council.

The policy adopts principals of Sustainable Drainage Systems (SuDS), a concept that includes long term environmental and social factors in decisions about drainage. SuDS takes account of the quantity and quality of runoff, and the amenity value of surface water in the urban environment, and aims to avoid problems of flooding, pollution or damage to the environment from inadequate or unsuitable drainage design.

This document describes the policy to be applied in controlling the rate of storm water runoff from new developments. Laois County Council will approve only appropriately designed storm water management systems that will improve the sustainable management of water for a site by:

- Reducing peak flows to watercourses or sewers and potentially reducing the risk of flooding downstream;
- Reducing volumes and the frequency of water flowing directly to watercourses or sewers from developed sites;
- Improving water quality over conventional storm water sewers by removing pollutants from diffuse pollutant sources;
- Replicating natural drainage patterns, including the recharge of groundwater so that base flows are maintained.

Failure to apply this policy could lead to increased flood or pollution risk in the storm water network, rivers and streams through built up areas of towns and villages throughout the county at potentially significant private and public economic costs.

For single dwellings and residential, commercial and industrial developments to be taken in charge by Laois County Council, the applicant must satisfy Laois County Council that:

- Flow to receiving waterways or sewers will not be increased above pre-development levels;
- No flooding will take place within the development for a 1 in 30 year flood;
- The site will retain excess floodwater from the 1 in 100 year flood;
- Storm water drainage of the public road will not be impaired and will provide for improved road drainage where practicable;
- There will be no impact on surrounding lands and properties;
- The development will be designed, constructed and operated to prevent further deterioration of, protect and enhance the status of water resources, including surface water bodies and groundwater;
- Storage facilities will isolate hazardous materials from storm water runoff;
- Storm water runoff from industrial, manufacturing and large scale commercial developments will pass through an approved oil separator prior to discharge from the site.

The document deals separately with single dwellings, residential developments and commercial/ industrial developments.

2 STORM WATER MANAGEMENT FOR SINGLE DOMESTIC PROPERTIES

This chapter deals with storm water management for single domestic properties in respect of planning applications forwarded to the Laois County Council Road Design Office. The preferred storm water management option is to drain storm water to an adequate soakaway or other infiltration system. If the site cannot drain to an infiltration system, the next favoured option is to discharge to a watercourse. Where this is not feasible, storm water should discharge to the nearest storm water sewer. The applicant shall bear the costs of installing any required new pipe work to connect to the existing storm water sewer. Under no circumstances shall storm water be permitted to discharge to a foul water sewer.

2.1 ACCESS ROAD DRAINAGE

An access road is defined as the private road used to transport traffic from the public road to the applicant's development.

The discharge of storm water from roofed and paved areas onto the public road will not be permitted.

Provision shall be made for storm water disposal to soakaways, watercourses or storm water sewers.

The existing road drainage to grass verges shall be incorporated into any new storm water drainage system along the site boundary adjacent to the public road. Adequate provision shall be made for the disposal of storm water runoff from the public road in any supporting calculations for the method of storm water disposal.

2.2 DISPOSAL OF STORM WATER TO WALLED SOAKAWAYS

This is the preferred option for storm water disposal from a single domestic site. All walled soakaways should be designed and constructed to BRE Digest 365, Soakaway Design. Laois County Council requires the following information to support an application for discharge of storm water to a soakaway:

- A plan drawing showing pipe types, sizes, gradients, ground levels and invert levels of the pipe network connection to the soakaway;
- A cross section drawing showing the pipe bedding and cover indicating the type of backfill material to be used;
- Detail drawing of the soakaway showing dimensions, invert level of the incoming pipe, construction materials including specification of the fill material and separating membrane;
- Details of soil type and prevailing water table;
- Contour survey map of the site;
- Supporting calculations to BRE Digest 365, Soakaway Design.

Maintenance of all soakaways serving single domestic properties shall be the responsibility of the property owner.

2.3 DISPOSAL OF STORM WATER TO WATERCOURSES

The following list indicates the required information to support an application for discharge of storm water to a watercourse:

- A plan drawing showing pipe types, sizes, gradients, ground levels and invert levels of the pipe network;
- A cross section drawing showing the pipe bedding and cover indicating the type of backfill material to be used;

- Details of the discharge pipe where it discharges flow to the watercourse, including the invert level of the bed of the watercourse in relation to the invert level of the discharge pipe, shown as a sketch;
- Wayleaves for route of pipe to watercourse outside the applicant's site boundary;
- In respect of field drains, statements from owners of adjacent lands through which the watercourse crosses downstream of the outlet pipe, confirming that they have no objection to the applicant discharging to the watercourse;
- Engineering sketch of outfall structures, including details of reinforced concrete elements and hydraulic controls.

2.4 DISPOSAL OF STORM WATER TO EXISTING STORM WATER SEWERS

No applicant shall be permitted to connect to a combined sewer network. The following list indicates the required information to support an application for discharge of storm water to a Storm Water Sewer:

- A plan showing pipe types, sizes, gradients, ground levels and invert levels of the proposed pipe network as well as the location, ground levels and invert levels for manholes upstream and downstream of where the connection shall be made. All pipework shall be connected crown to crown;
- A detail showing the method of connection to the existing public sewer, and if a manhole is required;
- A typical detail of the new connection manhole showing invert levels, ground levels, rocker pipes, manhole access, benching and lid;
- A cross section showing the pipe bedding and cover indicating the type of backfill material to be used.

2.5 FUEL STORAGE

All home heating oil tanks shall be sited within bunds capable of retaining 110% of the tank capacity. The bund shall be rendered impervious to home heating oil. All inlets and outlets to the tank shall be contained within the bund. No pipework shall pass through the bund structure.

3 RESIDENTIAL DEVELOPMENTS

Residential developments shall be taken to mean any domestic development or estates consisting of two or more houses with shared access to a publicly owned road.

3.1 GREEN FIELD AND BROWN FIELD SITES

The majority of developments within County Laois are taking place on green field sites. As Laois County Council intends to restrict the construction of housing developments to main urban centres within the 60kph zone, a greater emphasis will be placed on existing resources required to transport storm water from the development site to its receiving waters.

Previously, new developments discharged directly to the nearest watercourse or directly into a storm water sewer or combined sewer network without an assessment at the overall inputs into the network. In many cases this resulted in surcharging of existing networks or flooding of watercourses. As Laois County Council will be held directly responsible for any damage or injury caused by surcharging of pipe networks, and to conform to both national and European legislation, the approach to storm water management of new developments needs to be reviewed and amended.

In a defined water catchment area, the effect on the flow of an adjacent watercourse is dependent upon its impervious area. A green field site will allow a proportion of rainfall to percolate through the unsaturated subsurface strata allowing a lag time between the rainfall event and flow entering the nearest watercourse. The duration of this lag time is dependant on the permeability of the soils on the site. After new urban development in a catchment, the following differences can be identified in the watercourse flow compared with that of the equivalent undeveloped catchment:

- There is a higher proportion of rainfall appearing as storm runoff and so the total volume of discharge is increased;
- For a specific rainfall event, the catchment response is accelerated. The lag time and time to peak runoff are reduced;
- Runoff peak magnitudes are increased;
- Water quality may become degraded in the streams and rivers which drain the new development area.

3.2 DESIGN APPROACH

Laois County Council is now implementing this policy document in the absence of detailed catchment studies that might identify spare hydraulic capacities in watercourses for urban areas outside of Portlaoise. The policy will apply to developments within Portlaoise town and environs until such time as the recommendations from the Portlaoise Main Drainage Report have been implemented.

The policy promotes the use of SuDS techniques to effectively control storm water flows from developed sites. SuDS uses the following hierarchy of techniques to reinforce or follow the natural pattern of drainage:

- Prevention – the use of good site design to prevent runoff and pollution;
- Source control – control of runoff at or near its source;
- Site control – management of water from several sub-catchments;
- Regional control – management of runoff from several sites.

Prevention and source control of storm water are key elements which should be incorporated in the design of sustainable storm water management systems where practicable.

3.2.1 Prevention

Prevention techniques are designed to reduce the quantity of storm water generated on a site, which would require suitable control and management. These techniques include:

- Minimising the impervious areas on a site by using pervious paving materials to allow greater infiltration of water to the subsurface, e.g. using gravel in driveways and parking areas;
- Minimising areas directly connected to the storm water collection system by promoting drainage from roofs and paved areas to soakaways or unpaved areas with adequate infiltration capacity, such as swales;
- Minimising potential contamination of storm water with good housekeeping practices such as regular sweeping of paved areas. Prevention of contamination shall be achieved by storing contaminants, including home heating oil, in sheltered and/or bunded areas. Heating oil bunds shall be capable of storing 110% of the capacity of the heating oil tank. Silt traps, downpipe filters and oil separators can be used to treat runoff before it reaches the drainage system. It is important to regularly maintain these items to ensure consistently good performance;
- Preventing wrong connections of foul sewers to storm water sewers.

3.2.2 Source Control

Source control techniques are designed to control storm water runoff as close to the source as possible and to control the quantity being passed forward to the sewer or watercourse.

These range from small-scale techniques applicable to private property to large scale ones constructed within the storm water sewer or storm water drainage system.

Control of runoff can be achieved in two ways:

1. Reduction of flows entering storm water sewers or watercourses;
2. Attenuation of flows either before entry to the storm water sewer or within the downstream drainage system so that the available capacity of the system is utilised and the need for further capacity deferred or avoided.

A reduction in volumetric input to downstream storm water sewers or watercourses can result from one or more of the following courses of action:

- Infiltration of urban runoff to subsurface strata;
- Controlled inlet to storm water sewers or watercourses, resulting in a reduction in the peak flow and, in some instances, reducing the volume of runoff.

In broad terms, control of runoff by attenuation methods requires a hydraulic control to restrict the magnitude of flows passing downstream, together with an upstream storage capacity to contain the volume of runoff held back by the hydraulic control.

Attenuation of flows within the drainage system can be divided into three types:

1. Upstream of the storm water sewer system;
2. Within the storm water sewer system;
3. Within the water course.

The categorisation of the types of storm water control systems is shown in Figure 3.2.2 together with a list of control measures in each category. Refer to CIRIA Report No. C609 "Sustainable Drainage Systems – Hydraulic, Structural and Water Quality Advice" for a detailed description of each type of control and current design practices.

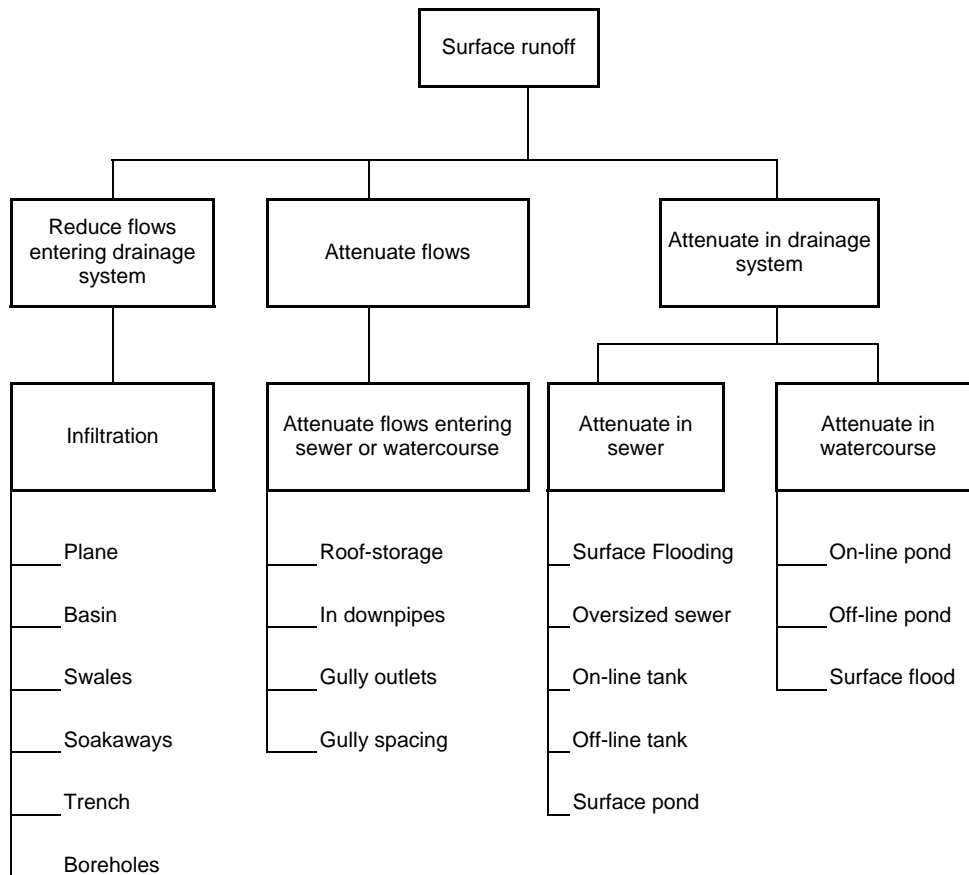


Figure 3.2.2 Options for the control of Urban Runoff

It is the responsibility of the developer to design the system most appropriate to a particular site and to submit the design and calculations to the Roads Design Office. Approval for a source control system must be obtained in writing from Laois Roads Design Section before the development can proceed.

3.2.3 Safety, Health & Welfare at Work [Construction] Regulations, 2001

For all methods of attenuation within a drainage system a Health and Safety Statement must be submitted, prior to commissioning of works, to Laois County Council Roads Design Office. A full risk assessment must be completed identifying all hazards likely to affect the general public and Laois County Council operations staff and/or their subcontractors. All work from the design stage through to construction and maintenance should be carried out in accordance with the Safety, Health & Welfare at Work [Construction] Regulations, 2001 and any subsequent amendments. This should identify particular risks and address issues such as drowning risks associated with ponds and other open water bodies, design of handrails of open chambers, step irons and ladders, covers, ventilation of gases, life saving equipment, warning notices and the precautions to be taken before entering storm water sewers or storage tanks.

3.3 STORM WATER DISCHARGE POLICY

3.3.1 Introduction

In line with international best practice, the maximum permitted storm water discharge rate from any new residential development shall be restricted to that of a pre-development green field/brown field site. In some cases, reduced discharge rates may be applied to brown field sites in the interests of preventing surcharging of sewers or flooding along watercourses downstream of the site.

This discharge rate will be the estimated mean annual peak flow and may be expressed either as a fixed flow rate for the whole development or as a fixed flow rate per hectare of development area drained.

3.3.2 Runoff Estimation Methods

The permissible discharge should be calculated using the estimation method contained in the Institute of Hydrology Report No. 124:

$$QBAR = 0.00108 \times (AREA)^{0.89} \times (SAAR)^{1.17} \times (SOIL)^{2.17}$$

where

QBAR = mean annual peak flow (m³/s)

SAAR = Standard Annual Average Rainfall (mm). SAAR is available for specific sites from Met Éireann, and is provided with extreme rainfall event data tables which are required for the design of storm water management system sizing calculations (see Section 3.4)

AREA = Catchment Area (km²)

SOIL = Soil Index Value, a composite index determined from soil survey maps and is derived from the formula

$$SOIL = \frac{(0.15S_1 + 0.3S_2 + 0.4S_3 + 0.45S_4 + 0.5S_5)}{S_1 + S_2 + S_3 + S_4 + S_5}$$

where S₁ to S₅ denotes the proportions of the catchment covered by each of soil classes 1 to 5. Soil class 1 has the highest infiltration capacity and hence the lowest runoff potential, while soil class 5 has the lowest infiltration capacity and the highest runoff potential. SOIL has a value between 0.15 (site covered in highly permeable soil) and 0.5 (site covered in low permeability soil). Appendix A shows typical values of discharge rates for developments of different sizes located in the main urban centres of County Laois.

The formula for determining the peak greenfield runoff rate should not be applied to areas less than 50 hectares. As most developments are smaller than this size this constraint is avoided by calculating QBAR for 50 hectares and linearly interpolating flow rates for smaller areas.

The estimation method proposed for a particular development will be subject to approval by Laois County Council. For any development Laois County Council reserves the right to require runoff estimation by another method. Laois County Council recommends that developers and their consultants discuss the drainage aspects of individual applications prior to proposing estimation methods to achieve the optimum solution for the site in a cooperative manner. The applicant will submit figures for the pre-development runoff which will be subsequently checked. It is the responsibility of the applicant to provide evidence to Laois County Council that successfully demonstrates the pre-development characteristics of the site.

3.4 STORM WATER MANAGEMENT OPTIONS

Table 3.4 provides a guide to the likely suitability of a number of SuDS techniques for the range of development sizes which could be used to reduce discharge rates to the permissible limits described above. The permeability of the underlying soil has a major influence on the suitability of most source control techniques.

Technique	Small	Medium	Large
Porous Pavement	◆		
Swales	◆		
Soakaways	◆		
Infiltration Trench	◆		
Boreholes	◆		
Roof Storage	◆		
In Downpipes	◆		
Gully Outlets	◆		
Gully Spacing	◆		
On-Line Tank	◆	◆	◆
Off-Line Tank	◆	◆	◆
Surface Pond		◆	◆
On-Line Pond		◆	◆
Off-Line Pond		◆	◆

Table 3.4: Suitability of techniques for different scale of developments

Where storm water retention facilities are proposed, the retention capacity shall be sufficient to store the 1 in 30 year storm event. An emergency overflow shall be provided from the facility, capable of passing flows up to the 100-year storm event. Overflow from the facility shall be retained within the site area up to the 100-year event, or as agreed with Laois County Council. The retention structure sizing shall be based on site-specific extreme rainfall data, provided by Met Éireann. This data shall be submitted with the hydraulic calculations for the storm water management system.

The minimum design life for all storm water management structures shall be 50 years.

3.5 HYDRAULIC ANALYSIS

The parameters for the hydraulic analysis of the proposed storm water sewer network for any development is as indicated below:

- Rainfall Intensity: 50mm/hr, or for sites in excess of 5 ha, applicants may request rainfall intensity based on site specific Met Éireann extreme rainfall data.
- Time of Entry: 4 minutes
- Contributing Areas:
 - All Roofed & Paved Areas: 100% Impermeable
 - Open Spaces & Grass Margins: 10% Impermeable
- Flow Velocity Range: 0.8m/sec-3.0m/sec

Storm water drainage sewers shall be designed to cater for a storm return period of a 1 in 5 year storm without surcharge and to cater for the 1 in 30 year storm without flooding.

3.6 TAKING IN CHARGE PROCEDURES

Taking in charge is the process whereby ownership and future maintenance of drainage assets passes from the developer to Laois County Council. The developer must satisfy Laois County Council that the assets have been designed and constructed properly, are functioning satisfactorily and have accompanying records, drawings, manuals, etc. to enable them to be maintained in the future.

The following information should be submitted by a developer for meeting Taking-in-Charge requirements:

- Updated information supplied in the planning application to reflect actual construction;
- Up to date Health & Safety file;
- CCTV records of all pipelines in accordance with Local Authority requirements;
- Data records in accordance with Local Authority requirements;
- Hydraulic models using Council approved software;
- Design calculations, checked and reflecting the final systems installed;
- Records of all tests of materials, installations and equipment;
- Operation and Maintenance manuals for all equipment;
- Maintenance plans for all SuDS installations;
- Flow surveys to be carried out as required by Local Authority;
- As-built record drawings of all pipelines, installations, buildings and compounds.

All drainage systems shall be designed and constructed to the same standards as those to be taken in charge.

4 COMMERCIAL, INDUSTRIAL, MANUFACTURING, RETAIL AND OFFICE DEVELOPMENTS

The guidelines for Residential Development shall apply in principle to commercial and industrial developments, with the following additional requirements.

Oil separators shall be installed to treat storm water from hardstanding areas of the following developments:

- All industrial developments;
- All manufacturing developments;
- Commercial Developments with greater than 20 car parking spaces;
- All Petrol Service Stations.

Unless otherwise specified, oil separators shall be designed in accordance with Pollution Prevention Guidelines "Use and Design of Oil Separators in Surface Water Drainage Systems: PPG3". The oil separator class and type (bypass/full retention) shall be submitted for approval by Laois County Council as part of the planning submission.

All oil and other hazardous material shall be stored in areas rendered impervious to the stored materials. Tank and drum storage areas shall be bunded to hold a volume not less than the greater of:

- 110% of the capacity of the largest tank or drum within the bunded area and
- 25% of the total volume of substance which could be stored within the bunded area.

Where appropriate, storage areas should be sheltered from rainwater. Where this is not appropriate, drainage from storage areas shall be diverted for collection and safe disposal. Design of bunds shall be submitted to Laois County Council, having regard to the quantities and characteristics of the materials to be stored. The applicant may be conditioned to carry out bund integrity tests on constructed bunds from time to time. In the event of a test failure, the bund shall be repaired or otherwise remedied and retested.

5 FLOOD PLAIN DEVELOPMENT

Laois County Council shall refuse to consider any developments, which wholly or partially encroach on flood plains as detailed on the National Flood Hazard Mapping website unless a full Hydrological Assessment of the catchment area has been completed.

The Hydrological Assessment shall comprise, but shall not be limited to, the following:

- A detailed study and modelling exercise of the catchment area;
- An assessment of the catchment characteristics indicating the appropriate flood level of the site;
- An assessment of the flood plain at the development site in terms of storage and conveyance and its flooding regime;
- An assessment of the need for mitigation;
- An assessment of the consequences of the proposed development on river levels and flooding upstream and downstream of the development taking into account the mitigation measures.

The applicant (and his/her agent) is responsible for the accuracy and reliability of the submitted flood history data for watercourses to receive attenuated surface water flows from development sites.

The required flood history data of the receiving watercourse includes:

- Known peak water levels in the watercourse channel;
- Report on physical evidence of flooding and overtopping of watercourse channel;
- Report on any erosion of watercourse upper-banks;
- Report on local knowledge of flooding of adjoining areas.

Laois County Council will not be liable for any action or complaint brought against it on account of erroneous or misleading flood history data supplied by the applicant as part of the planning application for the site.

6 BRIDGES, CULVERTS AND DIVERSIONS OF WATERCOURSES

Proposals to construct or alter a bridge over a watercourse or a culvert conveying a watercourse shall be accompanied by the consent from the Commissioners of Public Works that is required for such works under Section 50 of the Arterial Drainage Act 1945.

Proposals to divert a watercourse shall be accompanied by the consent from the Commissioners of Public Works that is required for such works under Section 47 of the Arterial Drainage Act 1945.

OPW consent does not confer permission to construct and does not absolve the developer from fulfilling any other legal obligations or from third party claims that might arise from the development.

APPENDIX A

INDICATIVE PERMISSIBLE DISCHARGE RATES

PERMISSIBLE DISCHARGE RATES

The following table presets indicative permissible discharge rates for developments of different sizes for a typical development sites located in the main urban centres of County Laois. The calculation of QBAR for 50 hectares is linearly interpolated for flow rates for smaller areas, in accordance with the Greater Dublin Strategic drainage Study. Please note that the values below are based on a SAAR value of 850mm and are for illustrative purposes only. As annual average rainfall values across County Laois range from 800mm to over 1400mm, developers should consult with Met Éireann on appropriate SAAR and storm intensities for their site.

Soil classes were obtained from maps reproduced from the NERC Flood Studies Supplementary Report no. 7, 1978. Site specific soil classes may be derived in accordance with a method approved by Laois County Council.

Table B.1: Indicative Permissible Discharge Rates for urban developments in Co. Laois towns

Portlaoise	Site Area (ha)	0.5	1	2	3	4	5	10	15	20	25	30
	Soil Class 2											
	Discharge (l/s)	1.1	2.3	4.6	6.9	9.1	11.4	22.9	34.3	45.7	57.2	68.6
	Discharge (l/s/ha)	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Portarlinton	Site Ares (ha)	0.5	1	2	3	4	5	10	15	20	25	30
	Soil Class 2											
	Discharge (l/s)	1.1	2.3	4.6	6.9	9.1	11.4	22.9	34.3	45.7	57.2	68.6
	Discharge (l/s/ha)	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Mountmellick	Site Ares (ha)	0.5	1	2	3	4	5	10	15	20	25	30
	Soil Class 2											
	Discharge (l/s)	1.1	2.3	4.6	6.9	9.1	11.4	22.9	34.3	45.7	57.2	68.6
	Discharge (l/s/ha)	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Abbeyleix	Site Ares (ha)	0.5	1	2	3	4	5	10	15	20	25	30
	Soil Class 1											
	Discharge (l/s)	0.3	0.5	1.0	1.5	2.0	2.5	5.1	7.6	10.2	12.7	15.2
	Discharge (l/s/ha)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Mounrath	Site Ares (ha)	0.5	1	2	3	4	5	10	15	20	25	30
	Soil Class 2											
	Discharge (l/s)	1.1	2.3	4.6	6.9	9.1	11.4	22.9	34.3	45.7	57.2	68.6
	Discharge (l/s/ha)	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Stradbally	Site Ares (ha)	0.5	1	2	3	4	5	10	15	20	25	30
	Soil Class 2											
	Discharge (l/s)	1.1	2.3	4.6	6.9	9.1	11.4	22.9	34.3	45.7	57.2	68.6
	Discharge (l/s/ha)	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Graiguecullen	Site Ares (ha)	0.5	1	2	3	4	5	10	15	20	25	30
	Soil Class 1											
	Discharge (l/s)	0.3	0.5	1.0	1.5	2.0	2.5	5.1	7.6	10.2	12.7	15.2
	Discharge (l/s/ha)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Rathdowney	Site Ares (ha)	0.5	1	2	3	4	5	10	15	20	25	30
	Soil Class 1											
	Discharge (l/s)	0.3	0.5	1.0	1.5	2.0	2.5	5.1	7.6	10.2	12.7	15.2
	Discharge (l/s/ha)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

Where QBAR is less than 2 l/s/ha it is recommended that 2l/s/ha be used to prevent excessive cost.

APPENDIX B

REFERENCES

Dublin Corporation Stormwater Management Policy for Developers, 1998

Dublin Corporation Stormwater Management Policy Technical Guidelines, 1998

Greater Dublin Strategic Drainage Study, 2005

Laois County Council Roads & Parking Standards, 2004

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Use and Design of Oil Separators in Surface Water Drainage Systems: PPG3, the Scottish Environment Protection Agency, the Environment Agency for England and Wales, and the Environment and Heritage Service in Northern Ireland

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