



SCOTS



# SUDS for Roads



Scottish Enterprise



---

# QM

Issue/revision	Issue 1	Revision 1	Revision 2	Revision 3
Remarks	First draft	Second draft	Third draft	Consultation
Date	May 2009	10 July 2009	7 August 2009	18 August 2009
Prepared by	Chris Pittner Gordon Allerton	Chris Pittner Gordon Allerton	Chris Pittner Gordon Allerton	Chris Pittner Gordon Allerton

**WSP Development and Transportation**  
4/5 Lochside View  
Edinburgh Park  
Edinburgh  
EH12 9DH

**Tel: +44 (0)131 344 2300**  
**Fax: +44 (0)131 344 2301**  
**<http://www.wspgroup.com>**

WSP UK Limited | Registered Address WSP House, 70 Chancery Lane, London, WC2A 1AF, UK | Reg No. 01383511 England | WSP Group plc | Offices worldwide

---



## **FOREWORD**

As a consequence of their military conquest, the Romans constructed roads in the UK with what is still recognised as durable technology. Later designers such as Macadam brought us our modern roads and attempted to address the problems of drainage. Since then drainage has been uppermost in designers' minds in protecting the structural integrity of the road.

'SUDS for Roads' is now intended to further advance our knowledge of the interaction between roads and drainage within an urban context where roads are now multifunctional and must provide much more than sealed surfaces for wheeled vehicles.

SUDS (Sustainable Urban Drainage Systems) were introduced to the UK more than 10 years ago and much of the early work developed here in Scotland concentrated on the hydrology and water quality aspects of SUDS. Roads designers have been required to adapt to this new strategy without apparently having input to the processes. Equally, legislation has advanced significantly in the area of water management and, arguably, roads legislation has not kept up.

The design of roads now incorporates SUDS systems and together provides long term environmental and social factors.

This recent growth and accrued benefits from the use of SUDS has been supported by the work of a range of public and private sector organisations, and facilitated by a series of documents. While many of these documents describe the suitable design of SUDS, few have provided appropriate advice and direction for practitioners involved in the design approval and adoption of SUDS within the road network boundary.

Early in 2008 the SUDS Scottish Working Party, guided by practitioners, took ownership of this disconnect and, from then on, a committed group of professionals, from a variety of industry stakeholders have worked collaboratively to resolve this issue.

This document, commissioned and guided by SCOTS and SUDS Working Party, and authored by WSP, is the result of careful partnership working between a range of public and private sector organisations including the Scottish Government, Scottish Water, Scottish Enterprise, Homes for Scotland, University of Abertay Dundee and Transport Scotland.

The document is supported by robust research, and evidence gathering, and provides a guide for all professionals involved in the road design process. It is anticipated the primary readership of SUDS for Roads will be Local Authorities and Private Developers however the principles contained herein apply equally to designers in other disciplines such as Architecture and Landscaping.

The purpose of the document is to guide the reader through the design of roads incorporating SUDS that are suitable as best practice at reasonable cost.

The Sustainable Urban Drainage Scottish Working Party believe,

*"SUDS can be incorporated into every new development in Scotland if all those involved in the decisions about drainage work together."*

A handwritten signature in black ink, appearing to read "Colin Bayes".

Colin Bayes, Chair of SUDS Working Party

A handwritten signature in blue ink, appearing to read "Ian Bruce".

Ian Bruce, Chair of SCOTS

---

---

## **STRUCTURE OF THE GUIDANCE MANUAL**

The following chapter descriptions identify where key information is located within the guidance document:

Chapter 1 **Introduction** describes the traditional and historical context of road drainage design. It describes the responsibilities of the roads drainage adopting authorities and provides an over view of concepts of SUDS and its relationship with road pavement construction. It also looks at surface water management plans and their importance in providing an integrated regional drainage strategy.

Chapter 2 **SUDS Applications for Roads** deals with details of road hierarchy and site classification and will set out the hydrological criteria requiring consideration in the design process, the principles of water quality enhancement by utilising SUDS for roads drainage, and the environmental risk addressed by applying these principles. It will introduce the types and applicability of SUDS features for roads at pre-treatment, source control and site control and will outline the framework enabling design and detailing of these features taking into account of structural integrity of the road, hydraulic considerations, water quality, amenity and ecological performance objectives associated with various road types. A selection matrix and flow chart for the selection of SUDS for various roads applications is described within this chapter.

Chapter 3 **Practical Guidance for Construction, Operation and Maintenance of Road SUDS** will outline practical guidance for particular SUDS features for use in roads taking cognisance of particular issues associated with construction detailing and installation/ construction guidelines. It will also provide an overview on the maintenance of completed SUDS, why and when they need to be maintained and by who.

Chapter 4 **Procedure for Adoption** sets out the current position, relevant at the time of writing, with respect to legislation and statutory obligations, ownership and maintenance responsibilities. It will outline the adoption process from the land use planning system to Road Construction Consent, adoption agreements and maintenance responsibilities. The importance of Building Control related issues will also be considered.

Chapter 5 **Un-adopted SUDS and Retrofitting** summarises the retrofitting options available for existing un-adopted SUDS, their applicability and technical feasibility to a required standard where they can be adopted. It will also consider the introduction of SUDS to roads where they have been previously drained solely by conventional piped drainage techniques.

Chapter 6 **Factors affecting Cost** presents the initial and long-term costs that are likely to be required to support the SUDS scheme from 'cradle to grave'. It will present a framework for whole life costing of the SUDS features including an assessment of the environmental costs and benefits.

---

---

# Contents

	<b>Contributors</b>	<b>1</b>
<b>1</b>	<b>Introduction</b>	<b>2</b>
1.1	Scope of the guidance	2
1.2	Background	2
1.3	Surface water management plans	7
<b>2</b>	<b>SUDS Applications for Roads</b>	<b>10</b>
2.1	Road hierarchy	10
2.2	Road construction consent	14
2.3	Design criteria	15
2.4	Levels of treatment	26
2.5	Design considerations	44
2.6	Selection criteria	51
2.7	Worked examples	59
2.8	Use of proprietary systems	60
<b>3</b>	<b>Practical Guidance for Construction, Operation and Maintenance of Road SUDS</b>	<b>69</b>
3.1	Detailing practice	69
3.2	Installation/ construction guidelines	72
3.3	Construction and site handover inspection	73
3.4	Maintenance guidelines	76
3.5	Reinstatement guidelines/ remedial maintenance	83
<b>4</b>	<b>Procedure for Adoption</b>	<b>86</b>
4.1	Legislation and statutory obligations	86
4.2	Procedure guidance	92
4.3	Maintenance responsibilities and liabilities	95
4.4	Section 7 agreements (Scotland)	95
<b>5</b>	<b>Un-adopted SUDS and Retrofitting</b>	<b>98</b>
5.1	Background	98
5.2	Scenarios	98
5.3	Applicability	99
5.4	Technical feasibility	103
5.5	Benefits of un-adopted SUDS adoption and SUDS retrofitting	104

---

<b>6</b>	<b>Factors Affecting Cost</b>	<b>106</b>
6.1	Capital cost transfer from conventional road drainage to SUDS in roads	106
6.2	Construction and land take costs	108
6.3	Operational and maintenance costs	109
6.4	Residual land value	110
6.5	Disposal and decommissioning	110
6.6	Retrofitting cost benefits	111
6.7	Environmental costs and benefits	111
6.8	Whole life cost analysis	112
	<b>Glossary</b>	<b>115</b>
	<b>Acronyms</b>	<b>120</b>
	<b>Appendix A</b>	<b>List 1 And 2 Group Substances</b>
	<b>Appendix B</b>	<b>Road SUDS Selection Tools</b>
	<b>Appendix C</b>	<b>Case Studies</b>
	<b>Appendix D</b>	<b>Specimen Section 7 Agreement and Minute of Agreement</b>

---

---

# Contributors

## **STEERING GROUP**

The preparation of this document was guided by a steering group, as listed below:

<b>Chair</b>	Frank Guz	Consultant
<b>Secretary</b>	Neil McLean	SEPA
<b>Members</b>	Barbara Barbarito	Scottish Water
	Andy Bogle	City of Edinburgh Council
	Doug Buchan	Scottish Water
	Bill Gladstone	Scottish Enterprise
	Drew Hill	Transport Scotland
	Ron Jack	Homes for Scotland
	Arthur McKenzie	Highland Council
	Ken Morrison	Aberdeenshire Council
	Mic Ralph	Glasgow City Council
	Stephen Tingle	Renfrewshire Council

## **CORRESPONDING MEMBERS**

Graeme Hedger	West Lothian Council
Malcolm Taberner	Aberdeenshire Council
John Trakalo	East Ayrshire Council

## **ACADEMIC PARTNERS**

Chris Jefferies	University of Abertay
Taye Akinrelere	University of Abertay

## **AUTHORS**

Chris Pittner	WSP
Gordon Allerton	WSP