



SUDS IN THE UK

COMBATting THE
INCREASING RISK
OF FLOODING WITH
SUSTAINABLE DRAINAGE

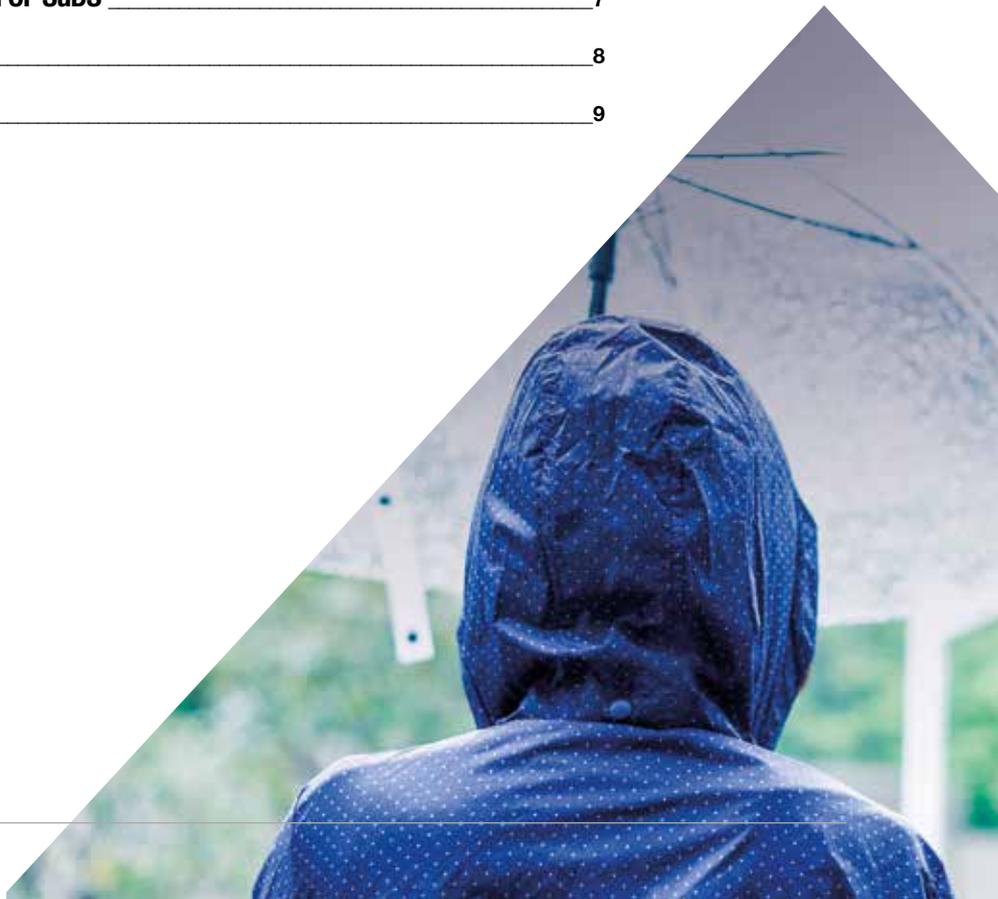
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SuDS IN THE UK - COMBATTING THE INCREASING RISK OF FLOODING WITH SUSTAINABLE DRAINAGE

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FOREWORD

THIS WHITE PAPER IDENTIFIES SOME OF THE KEY ISSUES AROUND FLOODING IN THE UK, INVESTIGATES THE CURRENT LEGISLATION WHICH APPLIES TO THE MANAGEMENT OF FLOODING AND INCLUDES CURRENT BEST PRACTICE TO ADDRESS FLOODING THROUGH THE IMPLEMENTATION OF SUSTAINABLE DRAINAGE SYSTEMS.

BACKGROUND

The UK has experienced some extreme flooding events in recent years. The floods in 2007 were the worst experienced in 60 years, affecting some 55,000 homes and resulting in an insurance pay out of some £3 billion. As a result the Government commissioned the Pitt Review which was published in 2008 and contained 92 recommendations including: '10: The automatic right to connect surface water drainage of new developments to the sewerage system should be removed'.

Furthermore, the winter of 2013-2014 was the wettest on record in the UK and November 2015 to January 2016 saw the most recorded rainfall ever for that period, resulting in some of the most extreme and severe floods in a century. However, care needs to be exercised as there is not a direct correlation between increased rainfall and increased flooding. Some areas are better able to cope with increased rainfall than others; be it due to soil type, gradients, or size of site.

Whilst the issue of global warming is outside the scope of this paper, it is also clear that the UK has become significantly warmer over the last few decades - and put simply, a warmer world means more intense rainfall.



PROBLEM

Flooding

The inevitable result of heavy or extreme rainfall is that on occasion the capacities of sewers and other drainage systems will be exceeded. Drainage exceedance will occur when the rate of surface water runoff exceeds the inlet capacity of the drainage system, when the receiving water or pipe system becomes overloaded, or when the outfall becomes restricted due to flood levels in receiving water. When drainage system capacity is exceeded the excess water surcharges above ground causing surface water flooding and indiscriminate flooding of property can occur when this flow of water is not controlled.



POTENTIAL SOLUTIONS

Sustainable Drainage Systems

Sustainable Drainage Systems (SuDS) aim to imitate the natural drainage of a site before development. The fundamental principle is to slow down the movement of surface water run-off, or encourage it to infiltrate into the ground, to reduce its impact further down the catchment. It gives equal consideration to:

Water Quantity to control the quantity of run-off – support the management of flood risk and maintain and protect the natural water cycle.

Water Quality to manage the quality of run-off to control pollution.

Amenity to create and sustain better places for people.

Biodiversity to create and sustain better places for flora and fauna.

APPLICABLE LEGISLATION

1.0 England: Flood and Water Management Act 2010

The Act provides a more comprehensive management of flood risk for people, homes and businesses, protects water supplies to the consumer and helps safeguard community groups from unaffordable rises in surface water drainage charges.

Some of the key features of the Act include:

- A. The Environment Agency will be the lead body to provide a strategic overview of all flood and coastal erosion risk management and unitary and county councils will lead in managing the risk of all local floods.

- B. Encourage the uptake of sustainable drainage systems by removing the automatic right to connect to sewers and providing for unitary and county councils (lead local flood authorities) to adopt SuDS for new developments and redevelopments.

The Act also introduces the concept of flood risk management rather than flood defence. However, SuDS Approval Bodies (SAPs) at County and Unitary level were not introduced and Section 3 of the Act which covers Sustainable Drainage Systems was subsequently replaced by Ministerial Statement HCWS 161 December 2014 which put in place some significant clarifications including:

- A. sustainable drainage systems will be provided in new developments wherever this is **appropriate**.
- B. the sustainable drainage system should be designed to ensure that the maintenance and operation requirements are **economically proportionate**.
- C. planning applications relating to major development - developments of 10 dwellings or more; or equivalent non-residential or mixed development must ensure that sustainable drainage systems are put in place unless demonstrated to be **inappropriate**.
-

2.0 FLOOD RISK REGULATIONS 2009

The purpose of the Flood Risk Regulations is to transpose the European Flood Directive into domestic law and to implement its provisions. The regulations are based on a four stage process of:

- ▶ Undertaking a Preliminary Flood Risk Assessment (PFRA)
- ▶ Identifying flood risk areas
- ▶ Preparing flood risk and hazard maps
- ▶ Preparing flood risk management plans

The duty is placed on the Environment Agency as the Lead Authority and Lead Local Flood Authorities are responsible at a local level for preparing the flood risk assessments, flood risk maps and flood risk management plans.

3.0 PLANNING AND DEVELOPMENT PROCESS PLANNING POLICY

This provides guidance to local authorities on what can be built where. National policy states what should be included in strategic and local policies.

3.1 THE NATIONAL PLANNING POLICY FRAMEWORK 2018

The National Planning Framework 2018 replaced the Policy Planning Statements in 2012 and sets out the Government's planning policies for England and how these are expected to be applied. It sets out the Government's requirements for the planning system only to the extent that it is relevantly proportionate and necessary to do so.

It provides a framework within which local people and their accountable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their local communities. For example, Gateshead Metropolitan Council has published **Interim Surface Water (SuDS) Guidelines for New Development Version 2016** as a guide for developers submitting planning applications. It is anticipated that they will issue a Supplementary Planning Document for consultation early in 2019.

3.2 PERMITTED DEVELOPMENT RIGHTS 2008

Permitted Development Rights were introduced in 2008 for householders wishing to pave their front gardens; planning permission is required to pave more than 5m² with traditional impermeable materials that do not control rainwater running off onto roads. However, planning permission is not needed if permeable or porous materials are used or if rainwater is directed onto a lawn or border to drain naturally.

4.0 THE BUILDING REGULATIONS 2010 APPROVED DOCUMENT H 2015 EDITION

Sustainable drainage is the preferred option for dealing with rainwater from buildings and paved areas around the building. If a soakaway or any other infiltration device is not practical then rainwater should be discharged to a watercourse. If this option is not reasonably practical, the runoff should be discharged to a sewer.

5.0 CODE FOR SUSTAINABLE HOMES 2007

The Code which was managed by Building Research Establishment Global became operational in 2007 but was withdrawn in 2015 and been replaced by new national technical standards.

6.0 NATIONAL STANDARDS FOR SUSTAINABLE DRAINAGE

Non-statutory technical standards have been produced by Defra for England and the Welsh Government for Wales. There is an expectation that SuDS will be designed and constructed in accordance with these standards which are also consistent with the SuDS Manual. As a number of local authorities have produced their own policies and guidance, the Local Planning Authority should be contacted with regards to their local requirements at the earliest opportunity.

6.1 (DEFRA) SUSTAINABLE DRAINAGE SYSTEMS NON-STATUTORY TECHNICAL STANDARDS FOR SUSTAINABLE DRAINAGE 2015

6.2 (LOCAL AUTHORITY SUDS OFFICER ORGANISATION) NON-STATUTORY TECHNICAL STANDARDS FOR SUSTAINABLE DRAINAGE 2016

Guidance Documentation

(The Construction Industry Research and Information Association, Ciria) The SuDS Manual (C753) 2015 This document provides comprehensive guidance covering the planning, design, construction and maintenance of Sustainable Drainage Systems (SuDS) to assist with their effective implementation within both new and existing developments. The following approaches are described in detail in the Technical Section:

- ▶ Rainwater harvesting
 - ▶ Green roofs
 - ▶ Infiltration systems
 - ▶ Proprietary treatment systems
 - ▶ Filter strips
 - ▶ Filter drains
 - ▶ Swales bioretention systems
-

CIRIA GUIDANCE ON CONSTRUCTION OF SUDS 2017

The SuDS Manual was supplemented with the publication of Guidance on Construction of SuDS in 2017 which considers SuDS in the construction planning and management of a site. It discusses the construction of different SuDS components, using photographs of actual site works to illustrate both good practice and what can go wrong. Case studies are provided to show how good construction has been achieved or problems resolved.

The planning system is designed to ensure that SuDS are put in place, with the expectation that SuDS will be provided in new developments wherever appropriate.

LOCAL AUTHORITIES AND THE ADOPTION OF SUDS

Sue Illman's Sustainable Drainage Systems presentation to the Landscape Institute in York in 2016 set out some of the client concerns currently surrounding the construction and maintenance of SuDS. Sustainable Drainage solutions must be designed to comply with The Construction (Design & Management) Regulations (CDM 2015), in order to 'design out' risk and give consideration to how the system will be built and maintained. In particular, the following areas of concerns were identified:

- ▶ Liabilities and risks of claims
- ▶ Fear of Drowning
- ▶ Risk of vehicles over-turning into swales
- ▶ Toxic material in sediment
- ▶ Injuries through open channels

What must also be considered is the year on year budgetary cuts which Local Authorities have had to face and their limited resources to maintain their assets. However, there are specific examples of successful negotiation of the challenges faced by Sustainable Drainage Systems by Local Authorities, such as Gateshead Metropolitan Borough Council, whose approach to adoption is illustrated within its Interim Surface Water (SuDS) Guidelines for New Development Version 2 2016:

INCLUSION OF SUDS IN PRIVATELY OWNED SPACE

The Council will not accept responsibility for maintenance operations and upkeep of SuDS components within private land.

INCLUSION OF SUDS IN NEW ADOPTABLE HIGHWAY

The Council will adopt SuDS in new highway schemes within a Section 38 agreement which will include a commuted sum and management plan agreed between the Developer and the Council.

SUDS IN PUBLIC OPEN SPACE

The Council will take freehold ownership of the land, which would then be leased back together with maintenance responsibilities to a service management company funded by private owners paying an annual rent (a mechanism is available should the management company default under the terms of the lease). This will involve a Section 106 planning agreement including a tri-party SuDS Agreement and Open Space Management Plan between the Developer, Council and Water Authority.

APPENDIX: PERVIOUS PAVEMENTS: PERMEABLE BLOCK PAVING

Permeable Block Paving is typically 80mm thick precast concrete blocks incorporating 5mm spacer nibs to create a consistent 5mm gap between the blocks. The paving is laid on 50mm of 2-6.3mm grit bedding layer on geotextile on 4-20mm aggregate without fines providing 30% void to solid ratio to meet the hydraulic and structural requirements of the particular project.

TYPICAL MAINTENANCE

Maintenance should be no more onerous than with conventional impervious block paving, with the exception of topping up of joints and maintenance recommendations, details of which are set out below:

- ▶ Top up joints and vibrate three months after Practical Completion is achieved and at also Completion.
- ▶ Monthly inspections of car park areas
- ▶ Remove litter/leaves or other large debris
- ▶ Every three months inspect chambers and rainwater pipes and gulleys for silt build up
- ▶ Every three months vacuum sweep pervious surfaces with mechanical sweeper and replace grit within joints if required

Controlled standard de-icing road techniques including use of rock salt may be used. Interpave Maintenance Guidelines permits the use of glyphosate to control weeds, however Charcon's Maintenance Procedures makes no reference to the use of chemicals, and would advise to utilise vacuum sweeping to control weeds.

Local Authorities claim to have minimal maintenance budgets which must include the maintenance of hard and soft landscaping. To put this in context the Chancellor announced in 2018 Budget that an additional £420 million of funding was being made available for Local Authorities in England to address pothole repair. However the Asphalt Industry Alliance has stated that more than £8 billion would be needed for a one-time fix of potholes in England. These levels of disparity between funding provided and funding required are evident across the board.

COST COMPARISON

Cost comparisons between sustainable drainage systems and conventional underground piped drainage systems should be carefully undertaken to ensure that they are being compared on a like for like basis. Where SuDS are designed to make efficient use of the space available they can often cost less to implement than underground piped systems. For example whilst there may be significant capital costs involved in acquiring land to incorporate a detention pond, there will be significant benefits in the provision of public open space, improved water quality and the provision of biodiversity which will not result from the adoption of a conventional underground piped system. The following Defra case studies indicate savings identified for SuDS versus traditional piped systems:

LAMB DROVE RESIDENTIAL SUDS SCHEME, CAMBOURNE CAMBRIDGE

35 residential units incorporating hard and soft landscaping solutions the overall capital cost savings due to SuDS was estimated at 10%.

DANIELS CROSS NEWPORT SHROPSHIRE

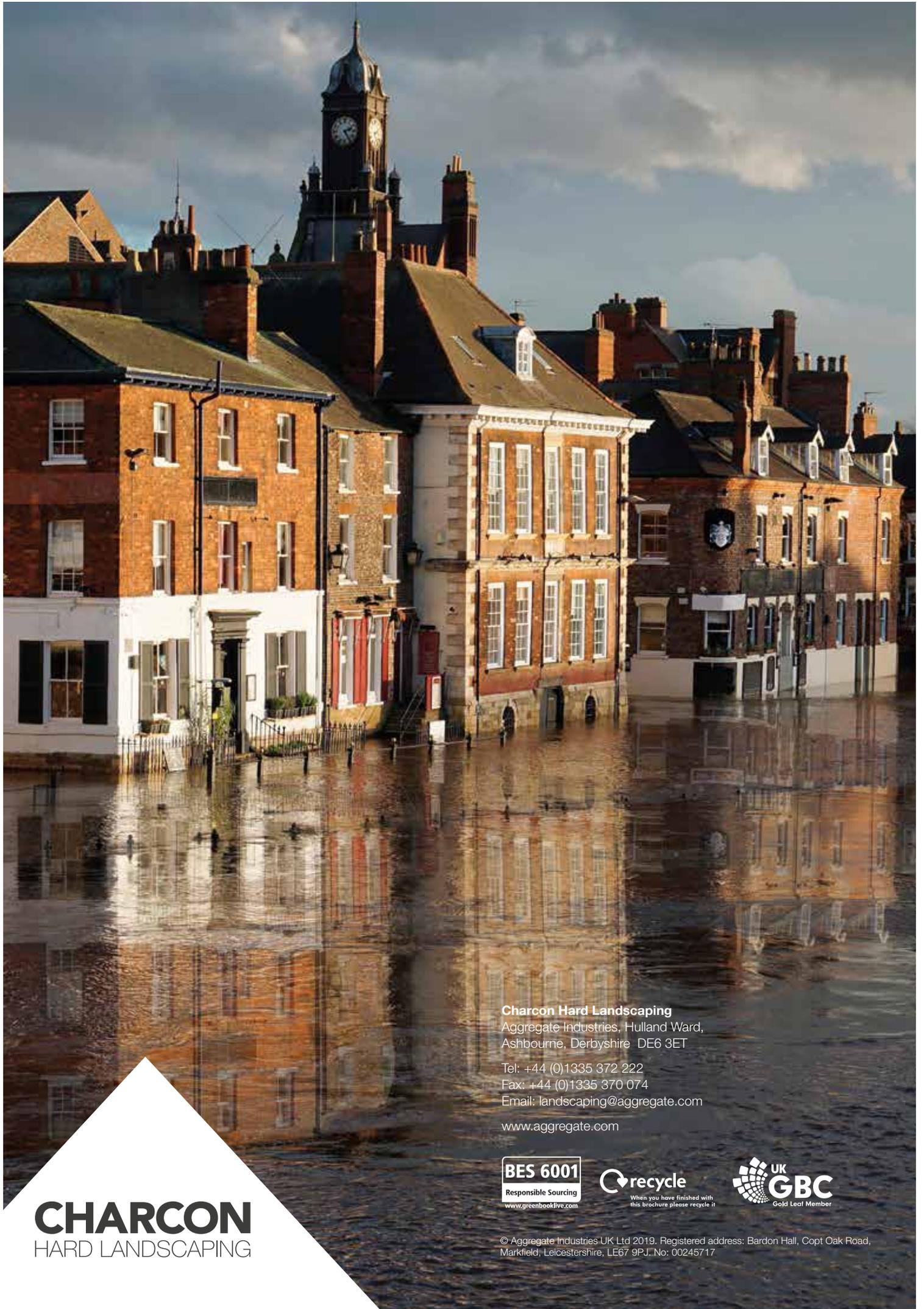
171 residential units with potential to retrofit SuDS to an existing pipe layout realising potential capital costs savings of 12%.

CALEDONIAN ROAD HOUSING, ISLINGTON

150 residential units incorporating hard and soft landscaping and green roofs realising a potential capital cost saving of 62%.

NB: Typical unit costs for SuDS components for permeable surfaces are £30-40/m² (Ciria at 2007 prices).
Delivering benefits through evidence cost estimation for SuDS summary of evidence: Defra 2015.

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