



MAYOR OF LONDON

Reimagining rainwater in schools

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1 Introduction

1.0 INTRODUCTION

How we manage water within our spaces and places has a huge impact on the quality of our environment and lives. Good management of rainfall and surface water within towns and cities can make the places in which we live, work, learn and play greener, more attractive and resilient to climate change.

Sustainable Drainage Systems, or SuDS, are widely accepted as a better approach to managing rainfall than traditional drainage. They create interesting places to learn, beautiful spaces and places for people and wildlife, as well as reduce the risk of waterlogging, local flooding and water pollution.

Figure 1.1 Open day for a SuDS in Schools project

Image courtesy South East Rivers Trust



1.1. PURPOSE OF THIS BOOKLET

This document explains SuDS, their benefits and enables readers to make good decisions about their inclusion in existing schools. This document is designed for those managing schools and making decisions on the quality and upkeep of premises and surrounding

estate. This includes head teachers, business managers, school governors, site and building managers.

Figure 1.2 Outdoor lessons at St George's School

Image courtesy Robert Bray Associates



2 What are SuDS?

2.0 WHAT ARE SuDS?

Sustainable Drainage Systems (SuDS) manage surface water runoff (the flow of rainwater across the surface) by capturing, using, absorbing, storing and transporting rainfall in a way that mimics nature. SuDS slow the flow and reduce the amount of rainfall that drains into sewers, streams and rivers. They can also treat and reduce pollutants in runoff. The most beneficial SuDS manage rain close to where it falls, are on (or close to) the surface and often include vegetation.

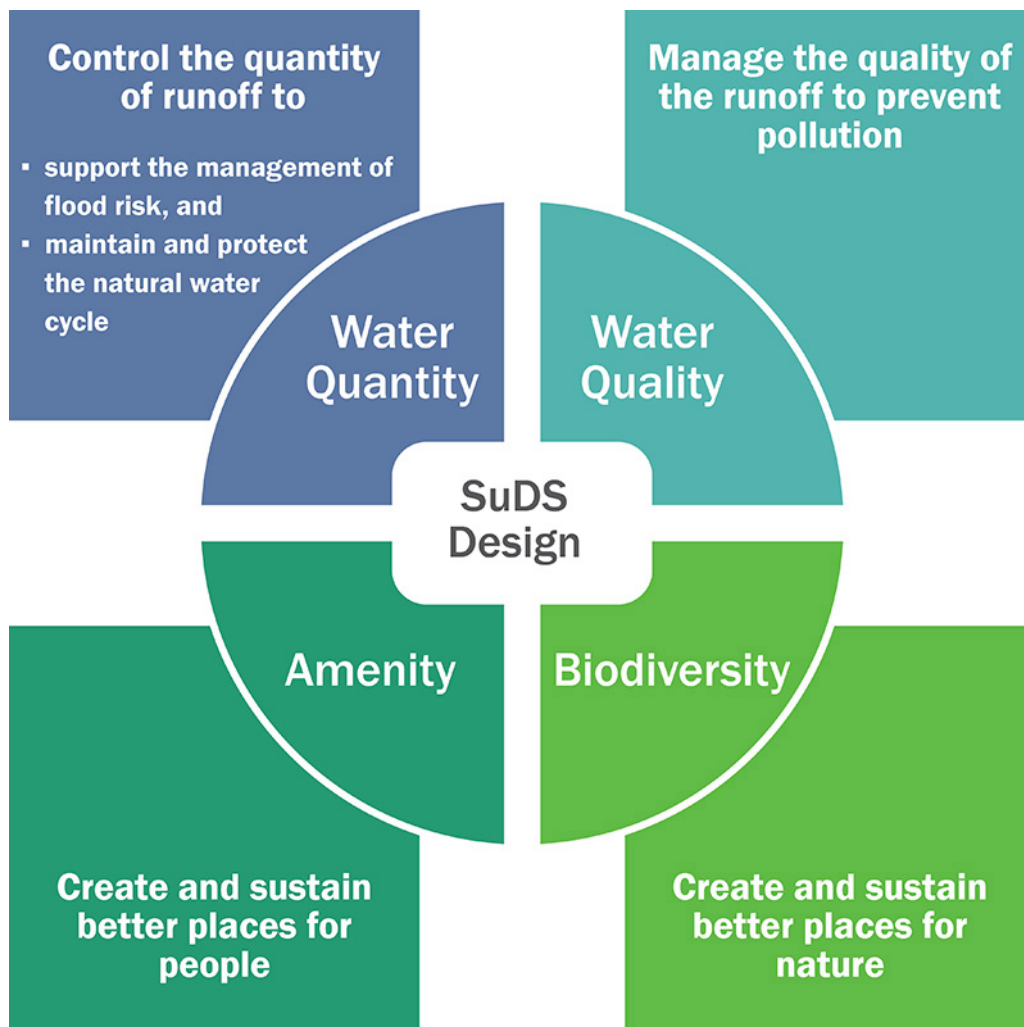
High quality SuDS deliver a variety of benefits, this delivery of multiple benefits is sometimes referred to as the “four pillars of SuDS” (figure 2.1).

Typical SuDS features used in and around

schools are presented in table 2.1, they include rain planters, rain gardens, ponds and swales. Where it is not possible to manage water on the surface (e.g. where space is at a premium) SuDS can also include underground storage tanks, permeable paving, green roofs and hard landscaping. Rainwater harvesting can also reduce runoff and the amount of mains water used for watering gardens and flushing toilets.

SuDS can be inexpensive to design, build and maintain. The SuDS approach includes simple changes, like diverting a downpipe into a rain planter (→ table 2.1) and other approaches where runoff soaks into the ground. SuDS can also include more complex features, or a larger scheme where many features are connected (→ case studies in section 5).

Figure 2.1 The four pillars of SuDS



2.1 WHY USE SuDS TO MANAGE RAINWATER

SuDS help us adapt and respond to the challenges posed by climate change, urbanisation and water pollution.

SuDS also offer a fantastic opportunity to connect children and adults to nature and water which improves wellbeing.

Well-designed SuDS provide more benefits and are often cheaper than traditional approaches to drainage. SuDS for schools are easy to maintain, often requiring nothing more than standard landscape maintenance which in most instances can be undertaken by students and community members.

Schools tend to have large roofs and extensive areas of hard impermeable surfaces that all lead to significant amounts of surface water runoff. Using SuDS to manage rainfall delivers exciting opportunities and a range of benefits for the school and its local community that include improvements for:

- Learning and play
- Spaces and places for people - amenity
- Spaces and places for nature - biodiversity
- Managing water quantity - flooding and water availability
- Managing water quality - pollution

‘Our little project is amazing. It has cleared up the problem of our car park flooding on a regular basis and provided a pretty, green corner...’

Susi Earnshaw, Headteacher at Susi Earnshaw Theatre School

(→ case studies)

Figure 2.2 Children enjoying a planting day



2.1.1 Learning and play

SuDS provide an attractive, stimulating and sensory learning environment. The SuDS add interest to landscapes and can include features like mini water wheels, water shoots and engaging water sculptures that support play and child led learning.

SuDS features can be creatively used in all Key Stages and most subjects of the curriculum, linking to science, maths, creative writing and geography (figure 2.3). Projects in London such as the Wildfowl and Wetlands Trust and the South East Rivers Trust 'SuDS in schools' have raised awareness around environmental issues and the water cycle in schools. Students, their parents and the local community have learnt about SuDS and helped to design and plant them. SuDS have typically been embraced by schools through:

- **Demonstrating the water cycle** - SuDS features show how rain can be managed – learning about SuDS principles and helping to explain the water cycle and climate change in lessons.
- **New educational resources** – features like ponds enable lessons to be held locally (in outdoor classrooms) and swale mazes can be used for physical education. SuDS can link to science by including nature gardens and food growing as well as include features like water wheels (→ Preshute Primary School) and bug hotels.
- **Student eco-councils** – students, their parents and the wider community can be involved in the design, planting and maintenance of SuDS features. Child led eco-councils discuss SuDS schemes with SuDS Champions, sometimes providing guided tours of SuDS features for other students, parents and guests.

Figure 2.3 Students learning about rain and runoff

Image courtesy South East Rivers Trust



2.1.2 Spaces and places for people - amenity

SuDS features that manage rainfall on the surface provide attractive opportunities to learn, play and mingle (at drop-off and pick-up times). In some schools (→ Hollickwood Primary School case study) SuDS features have added to the local sense of community.

SuDS can also cool neighbouring buildings. Trees provide shade from the sun, and SuDS features on, or around buildings

(e.g. green roofs, or rain gardens) help cool through evaporation (from surface water) and transpiration (from plants and soil). These types of features provide a more comfortable learning environment in both the summer and winter. SuDS can also improve local air quality by absorbing, filtering and diverting harmful airborne pollutants from vehicles. They also absorb and reduce noise from traffic.

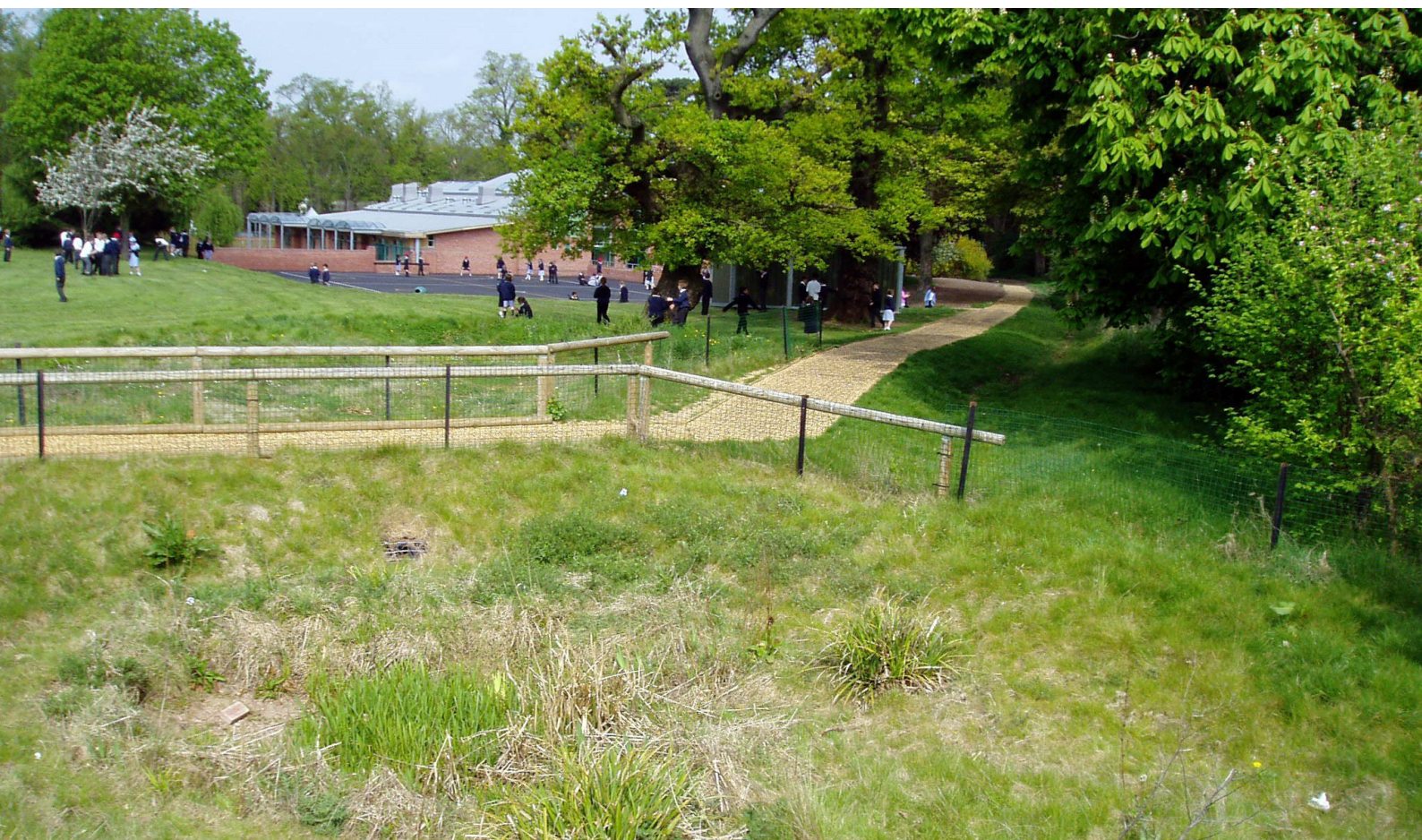
'It has encouraged more wildlife into our grounds, provided an aesthetically pleasing and calming waiting area for our parents, transforming the original surroundings'

Alison Kelly, Headteacher at Moorlands Junior School

(→ case studies)

Figure 2.4 Ponds and basins at Red Hill School

Image courtesy Robert Bray Associates



2.1.3 Spaces and places for nature - biodiversity

SuDS deliver attractive and lush green places for biodiversity (figure 2.5) by creating new habitats or improving existing ones. SuDS features provide another educational resource for schools by providing shelter, food and breeding opportunities for a variety of wildlife including amphibians, invertebrates, birds, bats and other mammals.

2.1.4 Managing water quality - flooding and water availability

SuDS slow the flow and reduce the amount of surface water runoff that can cause flooding in and around schools and their local area. SuDS enable a once waterlogged garden, playground, field or car park to be used more often. SuDS also reduce the impact of rain entering our drainage and sewerage systems, which in many parts of London is easily overwhelmed. This can trigger overflows of sewage into our streams and rivers (creating pollution), and worse still can cause sewer flooding of homes and businesses.

Some SuDS features also allow water to soak into underground aquifers helping maintain the flows of rivers and streams in periods of dry weather. Rainwater harvesting systems (also SuDS) can help reduce mains water usage and subsequent bills.

2.1.5 Managing water quality - pollution

Most of London's rivers or streams are polluted to some degree, with only one of London's rivers being classed as "good" under EU environmental legislation. SuDS can improve our water quality through filtration, adsorption and biodegradation of pollutants, potentially reducing their presence in our surface water runoff by up to 90%.



Figure 2.5 SuDS delivering biodiversity in Ramsbury Primary School

Image courtesy Wendy Allen Designs (for Rivers Trust 'Action for the River Kennet')

2.2 SuDS FEATURES FOR SCHOOLS

The SuDS approach includes a ‘toolkit’ of various SuDS features, offering different benefits that can be used at different scales and budgets.

Not all SuDS features will be suitable for every school, but their flexibility means that better

rainwater and surface water management can be delivered by SuDS on any site. Table 2.1 provides some examples of SuDS features. These have been ordered on the basis of ease of delivery, i.e. overall level of disruption caused, ease of construction, likely costs and the potential value.

Table 2.1 SuDS features



	SuDS Feature	Benefits
 <p>Brick rain planter by a school entrance</p>	<p>Rain planter</p> <p>A raised planter with the ability to collect and percolate roof runoff into soil and layers in the planter.</p> <p>An overflow into a drain or another SuDS feature is recommended as it's rare it will cope with the runoff from a heavy storm</p>	<ul style="list-style-type: none"> • An attractive and educational display of sustainable rainwater management. • Enables SuDS where space is limited, or is only available close to buildings. • Can be integrated with outdoor seating.
 <p>Rain garden visible through stairwell window</p>	<p>Rain garden</p> <p>A small planted basin, typically designed to receive runoff from roofs or hard surfaces.</p> <p>The water can be directed to the rain garden using pipes or rills.</p>	<ul style="list-style-type: none"> • Highly visual and attractive feature. • Easily incorporated into small green spaces close to buildings. • With appropriate planting supports biodiversity. • Effectively cleans runoff. • Reduces runoff for day-to-day rainfall.

Table 2.1 SuDS features continued





	SuDS Feature	Benefits
 <p data-bbox="97 674 563 741">Vegetated swale</p>  <p data-bbox="97 1070 563 1137">Grassed swales with tree planting</p>	<p data-bbox="563 383 1029 450">Swale</p> <p data-bbox="563 450 1029 607">This is a shallow ditch with a flat base and gently sloping sides.</p> <p data-bbox="563 607 1029 741">They can be planted with grasses or more attractive vegetation.</p>	<ul data-bbox="1029 383 1495 943" style="list-style-type: none"> • Can form a wildlife corridor. • Can be visually appealing. • Effectively cleans runoff. • Connects people to water on the surface and is simple to maintain. • Reduces runoff for day-to-day rainfall. • Collects, cleans and transports runoff to other parts of the site.
 <p data-bbox="97 1626 563 1738">Filter drain at the foot of a gabion wall, taking runoff from the asphalt playground</p>	<p data-bbox="563 1249 1029 1317">Filter drain</p> <p data-bbox="563 1317 1029 1496">A stone-filled trench that collects runoff from hard surfaces (road or car park) to clean and transport it.</p> <p data-bbox="563 1496 1029 1697">It can include a perforated pipe to slow the flow and enable runoff to soak into the ground.</p>	<ul data-bbox="1029 1249 1495 1473" style="list-style-type: none"> • Effective where space is limited. • Collects, cleans and transports runoff to other parts of the site.

Table 2.1 SuDS features continued

	SuDS Feature	Benefits
	<p>Basin</p> <p>Typically, a shallow depression covered with amenity or meadow grass.</p>	<ul style="list-style-type: none"> • Can be a multifunctional space (if designed appropriately). • Reduces runoff for day-to-day rainfall.
<p>Grass basin used as a play and teaching space</p>	<p>Basins capture water and allow it to soak into the ground where possible, or slow the flow of runoff.</p>	
		
<p>Planted basin</p>		
	<p>Wetland or pond</p> <p>A permanently wet area designed as a wildlife habitat resource, amenity feature or both.</p> <p>Before entering a wetland or pond, runoff should go through other SuDS features to clean it.</p>	<ul style="list-style-type: none"> • Creates a valuable ecological and amenity resource. • Can be a raised feature if levels allow, enabling wheelchair access. • Can add to a 'soundscape' where moving water is incorporated.
<p>A wildlife wetland designed to be habitat for the local newt population at The Hazeley Academy</p>		

Table 2.1 SuDS features continued

	SuDS Feature	Benefits
 <p data-bbox="97 875 560 965">Courtesy Groundwork London</p>	<p data-bbox="560 383 1031 427">SuDS tree pits</p> <p data-bbox="560 450 1031 629">SuDS tree pits can be used on their own or integrated into other SuDS features like rain gardens, wetlands etc.</p> <p data-bbox="560 651 1031 831">The tree canopy intercepts rain and trees also draw up large amounts of water through the soil.</p>	<ul data-bbox="1031 383 1493 965" style="list-style-type: none"> • Attractive feature that contributes to health and wellbeing. • Supports biodiversity. • Can provide cooling and shade. • Can improve air quality. • Reduces runoff for day-to-day rainfall. • Cleans runoff. • Can be used as part of traffic calming.
 <p data-bbox="97 1435 560 1525">A permeable entrance plaza to a science block</p>	<p data-bbox="560 965 1031 1055">Permeable or pervious surfaces</p> <p data-bbox="560 1077 1031 1323">Hard surfaces that can support vehicles, which also allow rainwater to soak into the ground, or into underground storage to slow the release of runoff.</p>	<ul data-bbox="1031 965 1493 1323" style="list-style-type: none"> • Good range of attractive product types available. • Enables use of surface for a play area or parking. • Cleans runoff.
 <p data-bbox="97 2040 560 2130">A wildflower green roof on a school kitchen</p>	<p data-bbox="560 1525 1031 1570">Green or blue roof</p> <p data-bbox="560 1592 1031 1973">Sometimes called a 'living roof' these are roofs that are adapted or designed to support plants. A range of plants can be used. The roofs can slow the flow of runoff, reducing the amount of water that is released to drains or other SuDS features.</p> <p data-bbox="560 1995 1031 2130">A blue roof captures more water to slow the flow and reduce the volume of runoff.</p>	<ul data-bbox="1031 1525 1493 1973" style="list-style-type: none"> • Supports biodiversity. • Can provide cooler buildings in the summer. • Can improve air quality. • Cleans roof runoff. • Improves efficiency of solar panels on the roof. • Reduces runoff for day-to-day rainfall.

2.3 INCLUDING SuDS IN AND AROUND SCHOOLS

Opportunities for SuDS differ from school to school depending upon budget and whether the school has reasonable amounts of green space, or is in a constrained dense urban setting with predominantly hard surfaces.

In existing schools most SuDS features that can be introduced will have a benefit for the school and local environment. The more features that can be created, the better, but this may be limited by budgets and space.

The following diagrams show multiple SuDS features in cross-section and plan views. Many of these features such as rain gardens, rain planters, swales, ponds and wetlands can be installed individually and still provide significant benefits.

Figures 2.7 to 2.10 present how particular SuDS features can be used in and around schools and how children and teachers may interact with them. The suitability of these features is outlined in table 2.1 and will depend on the opportunities and constraints of the site, as well as the benefits you are looking for.

Figure 2.11 is a typical SuDS plan and demonstrates a range of SuDS features that could be created in an existing school, with figure 2.12 suggesting how SuDS may be retrofitted where space is at a premium.

Figure 2.6 Planting to manage rainwater



Figure 2.7 Potential for an outdoor classroom

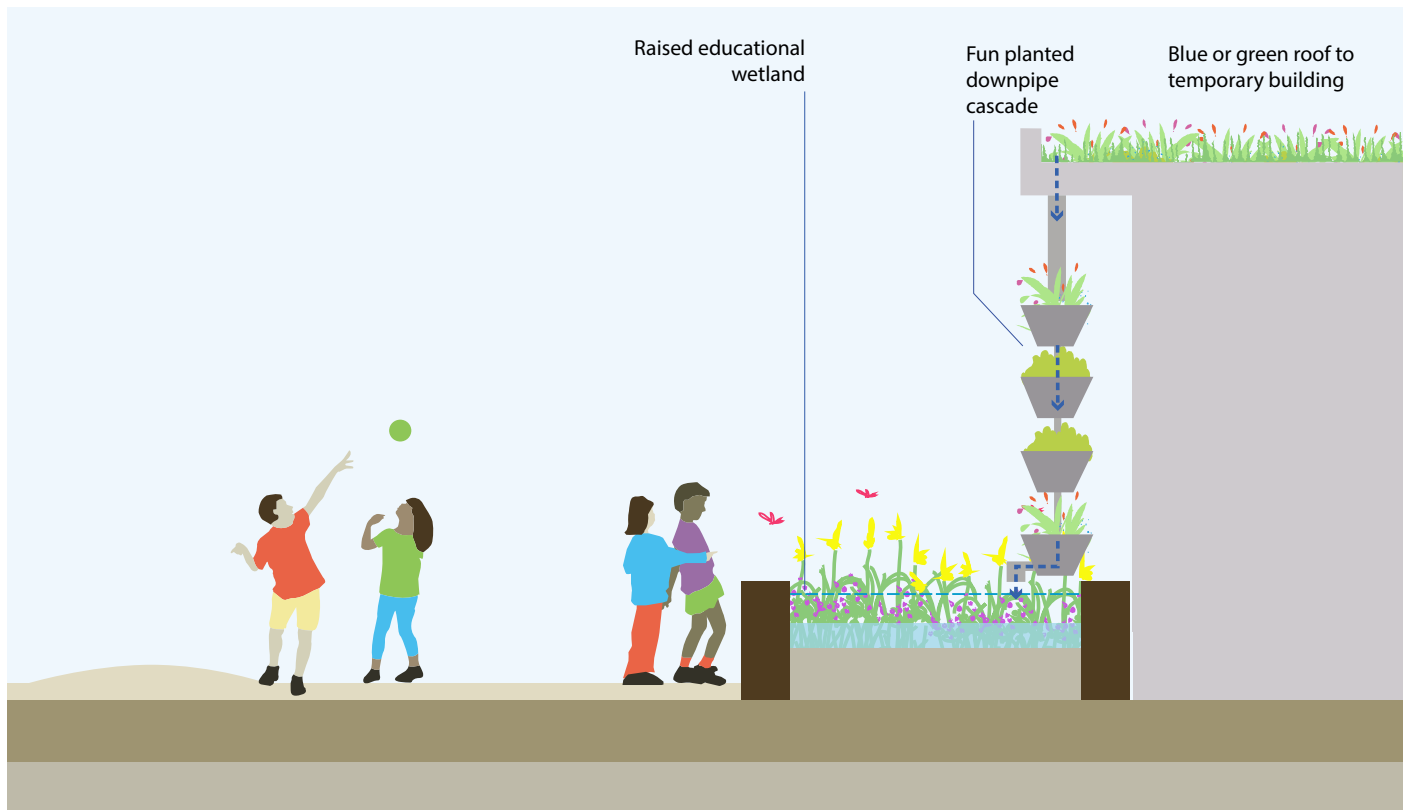


Figure 2.8 Linking a rain planter to a swale

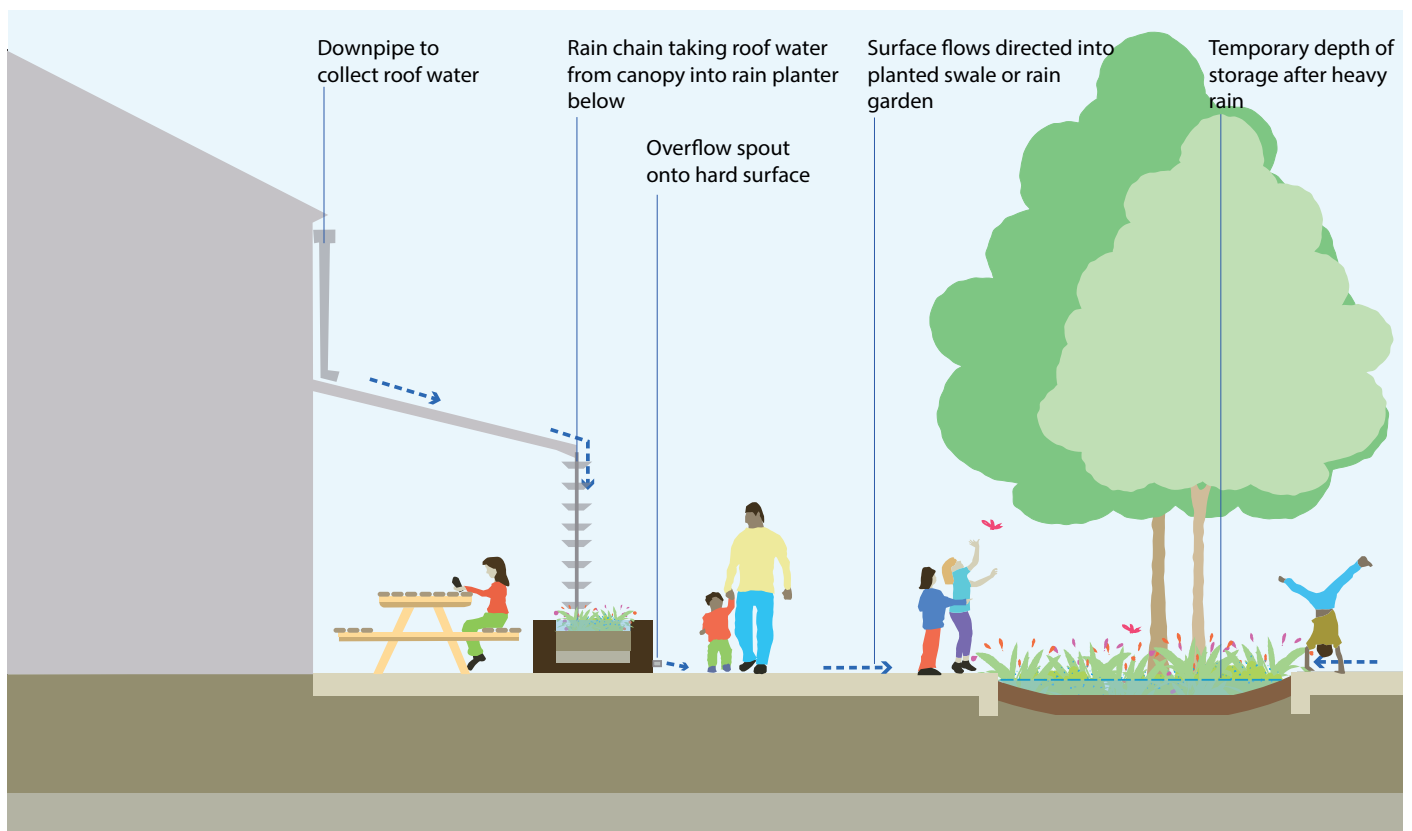


Figure 2.9 Hard detention basin

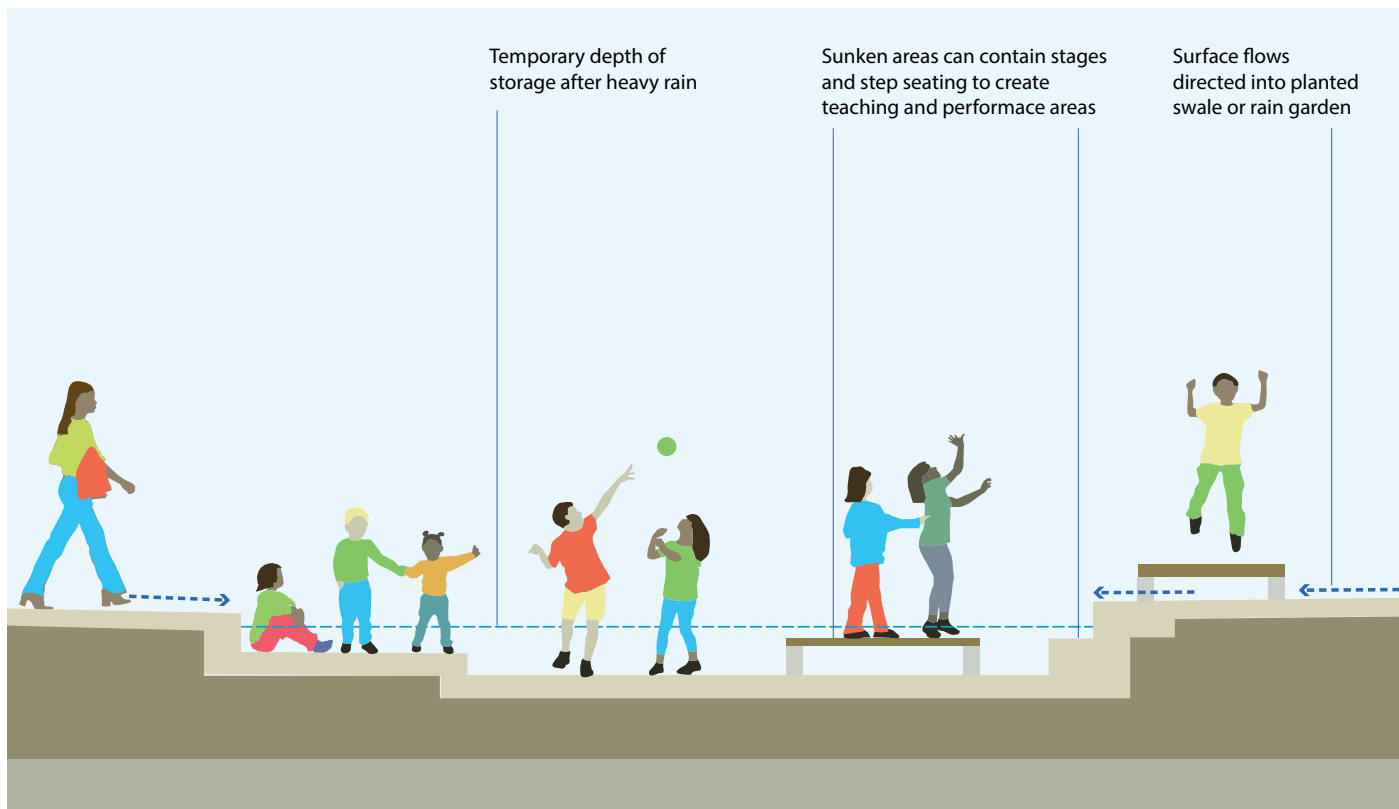


Figure 2.10 Car park draining into a swale that links to a wetland

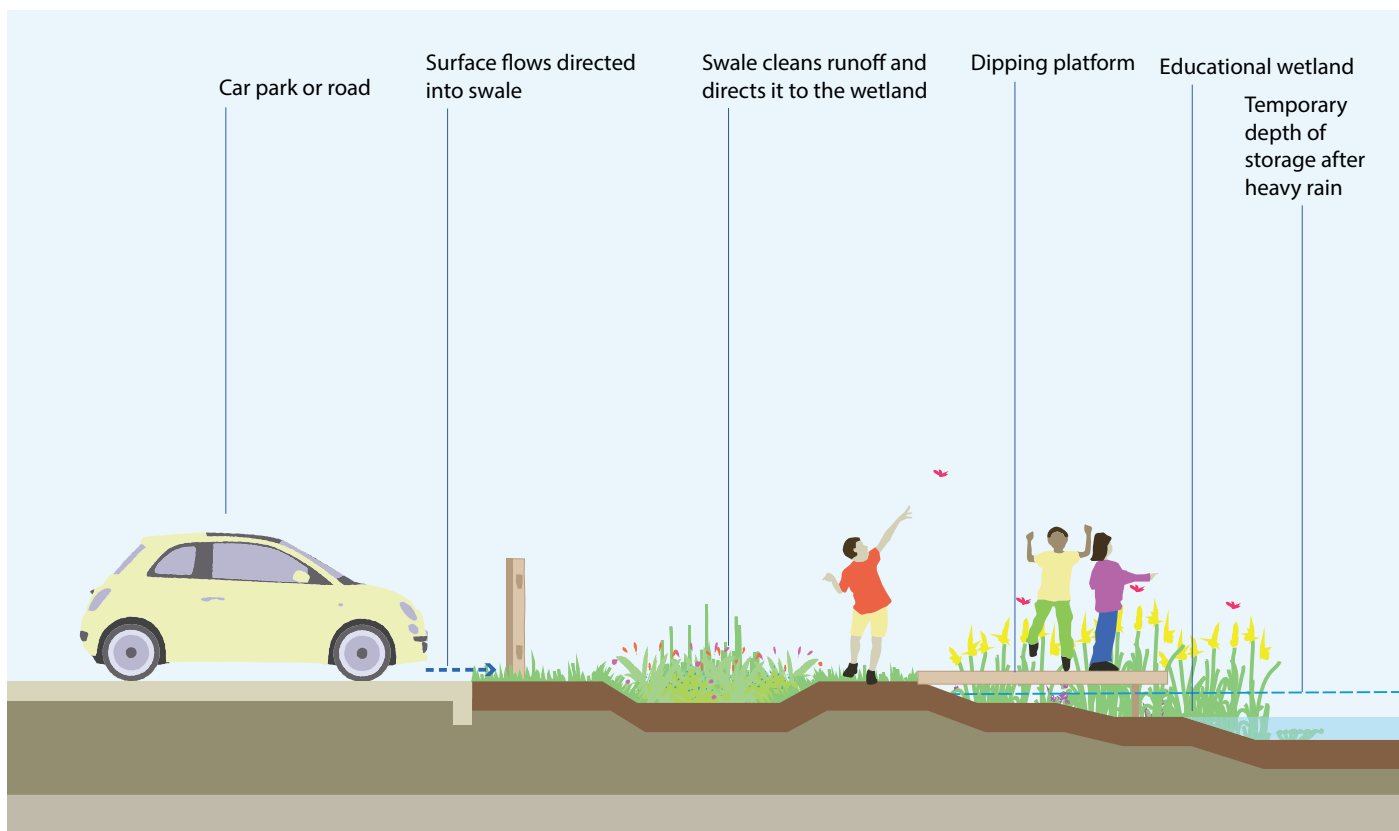
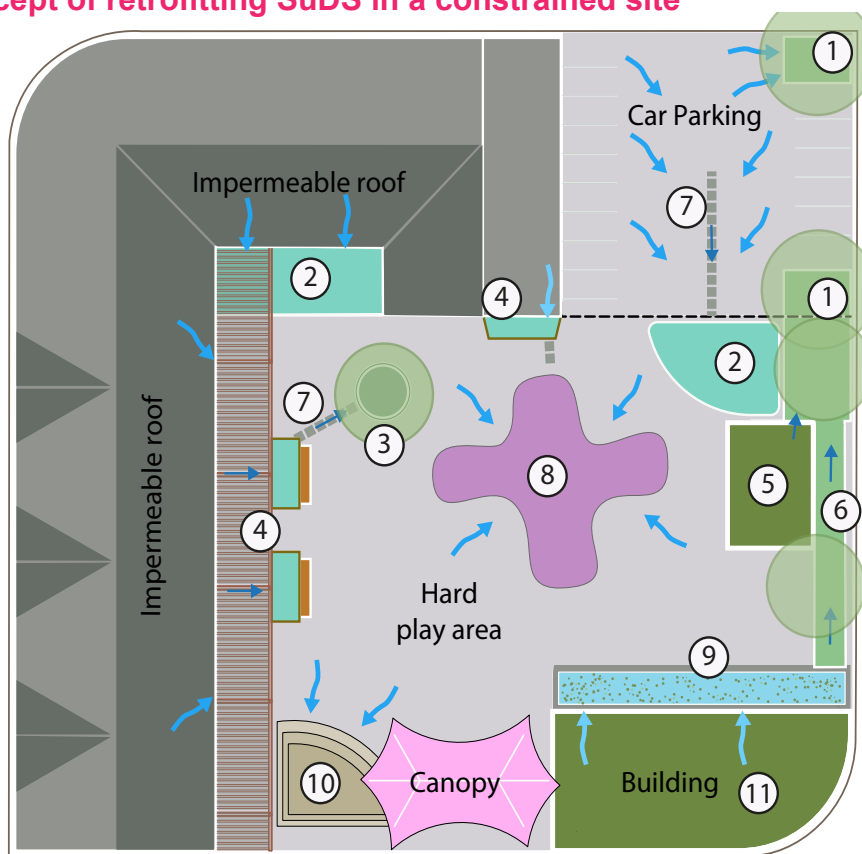


Figure 2.11 Concept for retrofitting SuDS



1. Planted rain gardens collect and clean runoff from roads, carparks, pavements and roofs. Rain planters can be placed close to buildings and are designed to collect rainwater from downpipes from roofs.
2. Swales transport surface water through the landscape benefiting plants and wildlife. They can be used to collect runoff from nearby hard surfaces.
3. Areas of hard play surfaces can be replaced with porous rubber surfaces that can clean runoff and allow it to soak into the ground or to be stored beneath.
4. Runoff can be directed to rain gardens by surface channels across hard surfaces or swales across soft landscape areas.
5. Grass basins can collect and store runoff from areas such as Multi-use Games Areas (MUGAs) or other pedestrian hard surfaces.
6. A new pond or wetland can store and clean large amounts of rain in heavy storms. They can attract wildlife and can provide a valuable learning resource. This is normally where runoff drains to the sewer.
7. Landscape features such as bridges, balance beams and stepping stones over swales provide engaging and playful features whilst allowing full accessibility even when it is raining. These features, as well as dipping platforms over ponds and wetlands also allow children to connect to wildlife and integrate it into the curriculum.
8. If the structure supporting the roof is strong enough a green or blue roof can be retrofitted, providing a cooler learning environment and managing rainfall where it falls.

Figure 2.12 Concept of retrofitting SuDS in a constrained site



1. A simple change is to remove hard surfacing and replace it with planting, reducing the amount of runoff and enhancing the appearance of the school. Trees particularly benefit from having hard paving around them removed.
2. Planted rain gardens collect and clean runoff from roads, carparks, pavements and roofs.
3. New trees can be placed in a rain garden to provide shade, shelter and a valuable natural feature in a playground.
4. Rain planters are relatively simple to construct and can be placed close to buildings and are designed to collect rainwater from downpipes from roofs.
5. New playground structures such as bike/scooter stores, shelters or outdoor classrooms can have green or blue roofs on them.
6. Swales transport surface water through the landscape benefiting plants and wildlife. They can collect runoff from nearby hard surfaces.
7. Surface channels across hard surfaces can collect and direct runoff from existing hard surfaces toward features such as raingardens.
8. Areas of hard play surfaces can be replaced with porous rubber surfaces that can clean runoff and allow it to soak into the ground or to be stored beneath. Fun shapes can be used to make an attractive and playful feature.
9. A new pond or wetland can be a raised and engaging learning feature. This allows easy access to the wildlife.
10. An area of hard landscape can be sunken to form a stepped outdoor teaching, performance and socialising area that can also store rainwater from storms. A permeable surface allows water to drain and remains usable during light showers.
11. If the structure supporting the roof is strong enough a green or blue roof can be retrofitted, providing a cooler learner environment and managing rainfall where it falls.



Figure 2.13 Learning and play

Image courtesy South East Rivers Trust

Further guidance (click for weblink)

- [The SuDS Manual \(CIRIA C753\)](#)
- [susdrain \(CIRIA\)](#)
- [A 'How to' Guide – Play with Rainwater and Sustainable Drainage](#)
- [SuDS for schools \(WWT\)](#)
- [Sustainable drainage systems – maximising the potential for people and wildlife \(RSPB and WWT\)](#)
- [Ever wondered where the rain goes? \(susdrain YouTube animation\)](#)
- [The story of SuDS and Forest Way School \(susdrain, YouTube video\)](#)
- [South East Rivers Trust – SuDS in Schools](#)
- [Rain garden guide \(Reset\)](#)

3 Getting the best outcomes

3.0 GETTING THE BEST OUTCOMES

Obtaining engagement and buy in from those at the school, i.e. students (figure 3.1), students' parents, other colleagues and governors is one of the most important tasks in delivering SuDS. It should be one of the first activities undertaken as it helps develop a shared vision for the SuDS.

It is also important to engage with those who will be maintaining the SuDS to ensure they are happy with the design and associated maintenance requirements.

To get the best outcomes contact a SuDS specialist or Landscape Architect early in the process. They will engage an engineer on your behalf if necessary, depending on the scale and type of SuDS required.

3.1 MAXIMISING THE VALUE FROM SuDS

Understanding the context, drivers and potential funders for the SuDS scheme helps to focus on what benefits are desired from the scheme. This will also be informed by those likely to design and use the space. There are some common approaches to getting the best from SuDS, these should be discussed with those involved in designing the SuDS:

- Manage water on the surface as much as possible. This makes them easier and cheaper to construct and maintain. It also allows breakdown of pollutants by sunlight as well as by vegetation and encourages peoples' connectivity with the water and SuDS scheme.
- Manage rainfall as close to where it falls as possible. This ensures that flows through the SuDS features are treated and therefore safe and beneficial for the children and wildlife.
- Ensure that appropriate safety is considered as part of the design process for SuDS features (this does not mean fencing them off). Integrate discussions about risks around water into the curriculum if necessary.

Specific approaches to maximising benefits are discussed in table 3.1 and there is also guidance on overcoming some challenges you may face in table 3.3.

Figure 3.1 Engaging students on SuDS features

Image courtesy South East Rivers Trust



Table 3.1 Approaches to maximising the benefits

Category	Approach
Learning	<ul style="list-style-type: none"> • Consider how children and parents can be creatively and practically involved in the delivery and maintenance of SuDS. • Consider who might use the SuDS and consider what design features could be included and the sensory interest (sight, sound, touch and smell). • Give thought to how the SuDS can contribute to parts of the curriculum and incorporate engaging and interactive design elements (wiggly pipes, transparent panels etc). • Consider features or design elements that visually present differences in rainfall, i.e. measurements, flows etc. • Include interpretation boards and signage to raise awareness and explain SuDS features. • Consider how SuDS can encourage local food growing and gardening within the school.
Amenity	<ul style="list-style-type: none"> • Consider the number, variety and quality of the uses of SuDS, such as recreation, car parking etc. • Consider integrating play features in SuDS such as swale mazes, natural play mounds, balance beams, stepping stones, amphitheatres, pond dipping platforms or forest school areas. • Consider how the SuDS feature and place will be used, particularly for education, during breaks, drop-off and pick-up times
Biodiversity	<ul style="list-style-type: none"> • Use vegetated SuDS features wherever possible. • Improve habitats for local wildlife by using the local authority's Biodiversity Action Plan to inform the design. • Prior to runoff being drained into the areas designed for biodiversity ensure it is managed and clean. • Create diverse, attractive and connected habitats designed to attract wildlife

Table 3.1 Approaches to maximising the benefits continued

Category	Approach
Water quality and pollution	<ul style="list-style-type: none"> • Prioritise ‘green’ SuDS components – those including vegetation and healthy soils to assist with the treatment of pollution. • Ensure the designers consider risk of pollution and include the right type and right number of SuDS features.
Water quantity and availability	<ul style="list-style-type: none"> • Use surface water as a resource, allow it to be used to water gardens and green spaces. Rainfall should also be allowed to soak into the ground to help replenish underground aquifers. • Prioritise SuDS features that manage water at the surface (allowing water to soak into the ground, evaporate and transpire from plants) and discharge to watercourses in preference to drainage and sewer systems. • Include water harvesting (such as water butts, or rainwater harvesting) to reduce the dependency on mains water. • Consider where the water will flow during extreme rainfall or if there is a blockage in the system and design-in a flow path.

3.2 DELIVERING SuDS

The SuDS design for your school should be tailored to the opportunities and challenges of the site as well as how the area will be used. As explained earlier, the effective engagement of stakeholders and early involvement of the right design team will provide greatest chance of success of delivering cost effective SuDS.

Once you have decided that you would like a designed SuDS scheme for your school and have considered what you would like to achieve you should engage a Landscape Architect or SuDS specialist to talk about the process. This is likely to involve an initial consultation, the development of an outline/concept design, detailed design, construction of features and then inspection. During this process it would be useful to discuss how and when to engage with others, the likely costs and timescales involved as well as the timing of works to reduce disruption for the school.

It is difficult to provide an indication of costs, as each school and site are likely to have specific requirements, opportunities and challenges however some rough estimates of costs are provided in Table 3.2. Experience has shown that well designed SuDS are often cheaper than traditional drainage approaches. SuDS also deliver more benefits that may attract funding from other organisations (→ section 4). If funders request quantification of benefits your SuDS specialist can use a free tool called B£ST to provide this information (→ [B£ST resources](#)).

Table 3.2 Estimated costs for delivery activities

Activity	Estimated cost
Cost of initial consultation	£300-£1,200
Cost of design (scale dependent)	£3,000-£10,000
Construction of surface SuDS features in existing soft landscape	£20-£50/m ²
Construction of surface SuDS features in existing hard landscape	£50-£100/m ²
Permeable paving	£50-£70/m ²
Construction of green/blue roof	£50-£150/m ²

3.3 DISPELLING THE MYTHS

Although widely and successfully used across the UK, SuDS uptake is still in its infancy and misconceptions can arise which should be challenged. Most concerns (e.g. from colleagues, parents and children) can be overcome with good design, effective engagement and education. There are large numbers of schools with SuDS in the UK (→ [susdrain case studies](#)), Section 5 also has some relevant case studies. Some potential misconceptions and responses (solutions) are presented in table 3.3. to help you navigate some of these challenges.

‘Our SuDS features need very little care and just seem to work on their own.... We love our SuDS and feel very privileged to have them’

Susi Earnshaw, Headteacher at Susi Earnshaw Theatre School

Table 3.3 Overcoming challenges for SuDS delivery

Misconception	Response
<p>Safety</p> <p>‘Do SuDS have permanent water and can they be dangerous?’</p>	<p>Good SuDS are designed to be safe.</p> <p>Unless a feature has been designed to permanently hold water, such as a pond or wetland, SuDS are dry most of the time except after heavy rainfall.</p> <p>Typically, SuDS are shallow, with gentle side slopes and controlled water flows.</p> <p>A risk assessment should be undertaken for the scheme which takes into account:</p> <ul style="list-style-type: none"> • The ages and abilities of children that will encounter or interact with the SuDS. • Whether the location will mean children are supervised (or not) or can be seen. • The need for fences, the visibility and rescue implications of fences over 0.6m height. • The design of the features in relation to ease of entry and exit. • The frequency of SuDS being full and the potential depths of features.

Table 3.3 Overcoming challenges for SuDS delivery continued

Misconception	Response
<p>Space</p> <p>‘Do SuDS need large areas of land?’</p>	<p>Well-designed SuDS do not need to be space hungry. SuDS features like rain planters and rain gardens can be integrated into existing hard surfaces and soft landscaping. Car parks can be made more permeable and areas of planting, grass and fields can be utilised for SuDS features.</p>
<p>Costs</p> <p>‘Are SuDS more expensive?’</p>	<p>SuDS do not need to be more expensive than traditional drainage. However, costs will be dependent on the site and the design. It is also important to consider the benefits provided; a high quality SuDS scheme will deliver more benefits than traditional drainage.</p> <p>The more that designs exploit the site and layout of the school to manage rainwater, the more cost effective they become. SuDS features can be easily incorporated during grounds upgrades, or building improvements.</p>
<p>Maintenance</p> <p>‘Are SuDS difficult and expensive to maintain?’</p>	<p>Thoughtfully designed SuDS can be easy to maintain with minimal, if any additional costs over a traditionally drained site. Those designing the SuDS features should provide a maintenance schedule that outlines the tasks and whether maintenance should be undertaken by SuDS specialists, or landscape maintenance teams, site managers, or even students and members of the community.</p> <p>When choosing SuDS features, consideration should be given to both the day-to-day and long-term maintenance of the SuDS and whether they are appropriate and practical.</p> <p>Soft-landscape and permeable surfaces usually require the least additional or specialist maintenance.</p>

4. Funding approaches

4. FUNDING APPROACHES

Sufficient funds and resources will be required to cover both the capital and maintenance costs of SuDS. Finding funds can be very challenging and is likely to be required from multiple organisations. This is also where effective and early engagement can be helpful.

Where the benefits can be clearly understood and are greater than the costs of SuDS the case for funding will be more attractive. Some options for finding additional external funds are presented in table 4.1.

Figure 4.1 Planting to manage rainwater



Table 4.1 Potential funding sources

Local Authority	<p>Those managing flood risk, or local education may have the ability to unlock funds from others sources. They may also be able to provide links to other partnerships and potential funders.</p> <p>If appropriate the Local Authority may also support a grant application for Central Government funds related to flood risk management.</p>
Greater London Authority (GLA)	<p>The GLA occasionally provides grants for delivering greener communities.</p> <p>The funding opportunities are often time limited so for 'greening' projects look at glagrants.org.uk for further information.</p>
Thames Water	<p>Thames Water is setting up a fund (between 2020 -2025) to improve surface water in their catchment, this specifically includes SuDS. Funding decisions will be based on the site and the potential benefits of the proposed scheme. For further information contact</p> <p>swm.partnerships@thameswater.co.uk</p>
<p><u>Local wildlife trusts</u></p> <p><u>Local river trusts</u></p>	<p>Wildlife and river trusts may occasionally have access to funds and partners that may be interested in supporting the delivery of SuDS in communities, particularly if they also deliver some of their remit too.</p>
<u>Groundwork</u>	<p>Groundwork can help find sources of funding for SuDS schemes as part of school grounds improvements.</p>
Other organisations	<p>Third sector organisations and charity organisation with aligned drivers (health and wellbeing, improving communities etc) like the Heritage Lottery Fund, and possibly local companies may be interested in supporting SuDS if the benefits for them and their interests are clearly stated.</p>

5 Case studies

HOLLICKWOOD PRIMARY SCHOOL, MUSWELL HILL, LONDON

The scheme helps manage water quality and flooding issues and enrich the school's natural environment.

The school is located on a slope and following heavy rainfall playing fields and a hard court football pitch on lower parts of the site were occasionally flooded and un-usable. Rainfall and surface water is discharged via drains and overland flows into a stream carrying with it pollution.

SuDS manage these risks as well as creating **valuable wetland habitats** and **fun, water features** that children **interact** with both in **play** and during **formal** outdoor teaching.

The main SuDS features used were swales, basins and ponds and were all designed with

the needs of children and teachers in mind.

Benefits include:

- Waterlogging has been alleviated and **playing fields dry out more quickly** after rainfall.
- Children are much more **aware** about water management and the value of **wetlands for people and wildlife**.
- Children, parents and the community were **involved** in design, planting (and management).
- The scheme vastly **increased opportunities** for play and learning about wetlands and surface water management.

Cost: Around £16,000

[See here for further information](#)

Images below courtesy WWT



THE SUSI EARNSHAW THEATRE SCHOOL, BARNET, LONDON

This scheme delivered as part of WWT's 'SuDS for Schools' Project manages runoff from the school's roof and car park. Runoff carrying pollutants and sediments previously flooded the doorways of buildings on the site before flowing straight into the street drain and into a tributary of the Pymmes Brook.

A shallow channel referred to as a 'tarmac river' directs runoff away from the car park, into a strip of grass that filters and transports runoff to a gravel garden which slowly allows runoff to soak into the ground.

Rainfall from a roof is discharged into another strip of grass that filters the water and transports it to a bog garden and pond. The pond overflows to a small wetland. Any excess water then flows into the gravel garden.

Benefits include:

- The school community welcomed the **SuDS features** as a **natural environment** where students could **study science and nature**.
- **Habitats have established well** and frogs are breeding in the new pond.
- The scheme has **helped reduce local flooding**.

Cost: Around £22,000

PRESHUTE PRIMARY SCHOOL, MARLBOROUGH, WILTSHIRE

This project was designed by Wendy Allen Designs for the local Rivers Trust, Action for the River Kennet project as part of their Rainscapes initiative. It **raised awareness** of SuDS and the need to **reduce flooding and pollution**. The SuDS were made **visible, fun and functional** to attract a positive response.

Previously the downpipes on the school building discharged onto a small grass verge. Surface water then flowed across the pavement and onto the road and **into the public sewer network**. These downpipes were re-designed to be more attractive, utilise a water butt and discharge into a rain planter.

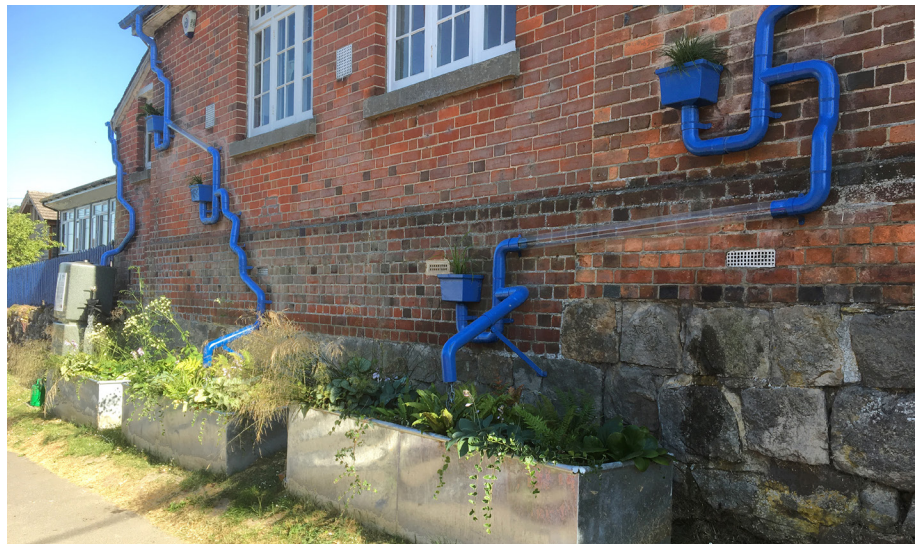
Benefits include:

- The **eye-catching** design together with **engagement** raised awareness of rainwater management at the school, and the **local community** has welcomed the changes.
- **Runoff discharged** to the sewer from the building has been significantly **reduced**.
- A large water butt is used to irrigate the garden, which also **involves the school children**.
- The project **won many awards**, and has been featured in **local press**, all helping to **raise the profile of the school** and Action for the River Kennet.

Cost: Minimum of £11,000 as time and materials were donated by individuals and organisations.

[See here for further information](#)

Images below courtesy Wendy Allen Designs (for Rivers Trust 'Action for the River Kennet')



ALL SAINTS' CEVA PRIMARY SCHOOL, NEWMARKET, SUFFOLK

The local water company is enabling schools to retrofit SuDS to reduce the amount of hard surfaces and the risk of flooding. This school was the first school in East Anglia to receive an eco-drainage scheme from Anglian Water.

A SuDS tree pit with integrated seating for parents has been introduced. A water droplet-shaped rain garden and a series of rain planters that enable the school downpipes to be disconnected from the foul sewer has been delivered.

Benefits include:

- The SuDS features are **attractive and engaging** and can be used for education.
- The project has helped foster a **sense of responsibility and community within the students**, involving them in rain garden planting and decorating the outdoor classroom.
- The SuDS schemes prevent **900m³ of water from being discharged to the sewer**, enough to fill eight double decker buses.
- **Runoff to the sewer is reduced** as more than 1400m² (equivalent to the size of over **five tennis courts**) of impermeable surface area no longer drains to the sewer.

Cost: Around £80,000

Image courtesy Andy Bird for Anglian Water



MOORLANDS JUNIOR SCHOOL, SALE, MANCHESTER

This project was to **cost effectively manage rain from playgrounds, roofs and car parks**. This project demonstrated how SuDS could reduce the amount of surface water entering the sewers.

The main SuDS features used include rain gardens, permeable paving and a trench that enables water to soak into the ground.

Benefits include:

- SuDS provide an **attractive water feature** which is enjoyed by the children and wider community and is used as an **educational resource to learn about water and nature**.
- The school benefited from a **20% reduction in the surface water charge** (The local water company, United Utilities, has a policy that encourages SuDS features). The payback period is 12-15 years.

Cost: Minimum of £22,000 as design time and materials were donated by organisations.

[See here for further information](#)

Images below courtesy Julian Brown for United Utilities



6 Further guidance

6. FURTHER GUIDANCE

- [BITC. \(2017\). The multiple benefits of a strategic retrofit of SuDS in schools across Greater Manchester.](#)
- [CIRIA. \(2019\). Benefits Estimation Tool – valuing the benefits of blue green infrastructure \(B£ST\).](#)
- [CIRIA. susdrain website.](#)
- [Bray, B, Gedge, D, Grant, G, Leuthvilay, L. Rain Garden Guide.](#)
- [Graham, A, Day, J, Bray, B, Mackenzie, S. \(2012\). Sustainable drainage systems – maximising the potential for people and wildlife. RSPB and WWT.](#)
- [Kukadia, J, Lundholm, M, Russell, \(2018\). Designing rain gardens – a practical guide. Urban Design London.](#)
- [Planet Earth Ltd. \(2010\). A ‘How to’ Guide – Play with Rainwater and Sustainable Drainage.](#)
- [South East Rivers Trust. SuDS in schools.](#)
- [Wildfowl & Wetlands Trust. SuDS for schools.](#)
- [Woods Ballard, B, Wilson, S, Udale-Clarke, H, Illman, S, Scott, T, Ashley, R, Kellagher, R. \(2015\). The SuDS Manual, CIRIA C753, London \(ISBN: 978-0-86017\)](#)

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