

**MAYOR OF LONDON**

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**Reimagining  
rainwater in  
social housing**



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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 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 beautiful spaces and places for people and wildlife, as well as reducing the risk of waterlogging, local flooding and water pollution.

### Figure 1.1 SuDS planting at Renfrew Close, Beckton, London

Image courtesy Robert Bray Associates



## 1.1. PURPOSE OF THIS BOOKLET

This document explains SuDS, their contribution to climate change adaptation and other benefits enabling readers to make informed decisions about their inclusion in existing social housing. This document is designed for those operating and managing social housing and

making decisions on the quality and upkeep of premises and surrounding estate. This includes housing support workers, housing managers or officers, Tenant and Resident Associations, asset managers, site managers or supervisors and financial or project managers.

### Figure 1.2 Queen Caroline Estate, Hammersmith, London

Image courtesy Groundwork London



## **2.0 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 which reduces the risk of flooding. 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).

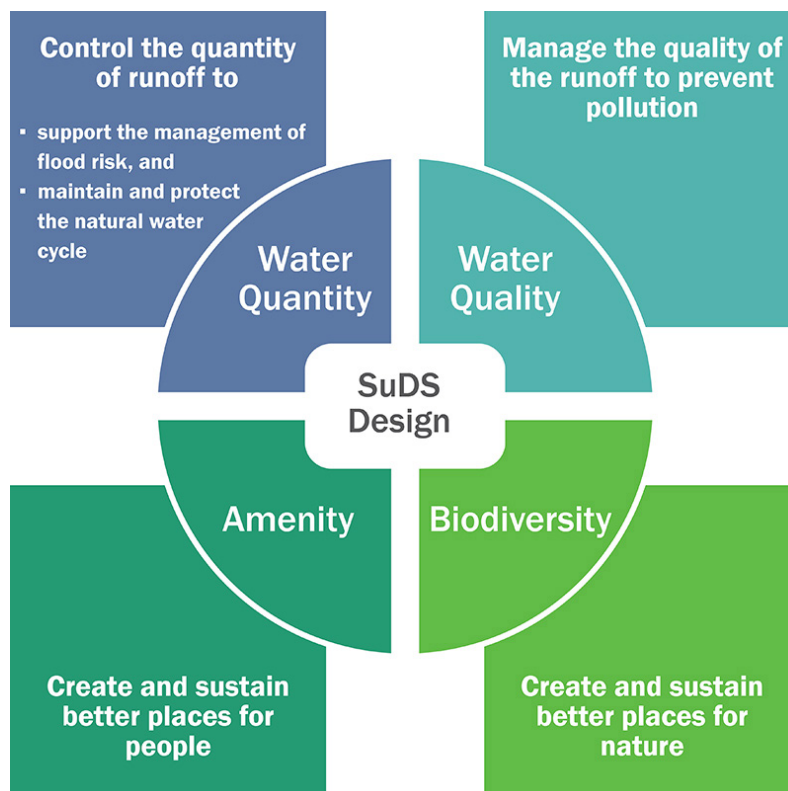
Typical SuDS features used in and around social housing are presented in table 2.1, they include rain planters, rain gardens, ponds and swales. Where it is not possible to manage water on the surface (e.g. where space is at a premium) SuDS can also include underground storage tanks, permeable paving, 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 rainwater downpipe into a rain planter (→ table 2-1) and other approaches where runoff soaks into the ground. SuDS can also include more complex features such as a wetland, or a larger scheme where many features are connected (→ case studies in section 5).

SuDS for new major developments have been a planning requirement since 2015. However, the SuDS approach is not new, it is also no more difficult than traditional drainage, it is just different. There are case studies of successful SuDS retrofitting in Section 5 of this document. The [susdrain website](#) also includes over a hundred case studies or award submissions where SuDS have been successfully delivered.

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 poor water management.

SuDS also offer a fantastic opportunity to improve social cohesion, connecting people to each other, places and nature which all improve wellbeing.

Well-designed SuDS provide more benefits and are often cheaper than traditional approaches to drainage. SuDS for social housing are easy to maintain, often requiring nothing more than standard landscape maintenance which in most instances can be undertaken by site managers and residents.

Social housing tends 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 social housing providers, residents and the local community that include improvements for:

- Spaces and places for people – amenity
- Spaces and places for nature – biodiversity
- Managing water quantity – flooding and water availability
- Managing water quality - pollution
- Social housing operations and management

### Figure 2.2 SuDS landscape, Queen Caroline Estate, Hammersmith, London

Image courtesy Groundwork London



### 2.1.1 Spaces and places for people - amenity

SuDS features that manage rainfall on the surface provide attractive vibrant places and spaces that can revitalise public areas enabling people to meet, socialise and play (figure 2.3). They can improve spaces and places for people living locally, improving their quality of life and also help provide a sense of community and pride. Many of the case studies in section 5 brought local residents and community members together to design, plant and maintain SuDS.

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 healthier and more comfortable living 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 help absorb and reduce noise from traffic.

**Figure 2.3 Play, visual interest and biodiversity combined in a SuDS basin, Renfrew Close, London**

Image courtesy Robert Bray Associates



### 2.1.2 Spaces and places for wildlife - biodiversity

SuDS provide welcome opportunities to integrate food growing and urban horticulture into the estate that can be integrated with other programmes that focus on nutrition and healthy lifestyles. SuDS also deliver attractive and lush green places for biodiversity by creating new habitats or improving existing ones. SuDS features deliver important urban biodiversity, plants and wildlife that encourage pollinators.

### 2.1.3 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 housing. SuDS enable a once waterlogged garden, play area or car park to be more accessible and useable. SuDS also reduce the impact of rain entering our drainage and sewerage systems, which in many parts of London is easily overwhelmed. This can often trigger overflows of sewage into our streams and rivers (creating pollution), and worse still 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 improve water efficiency by reducing mains water usage and also subsequent bills.

### 2.1.4 Managing water quality - pollution

Most of London's rivers or streams are polluted to some degree, with only one of London's 41 rivers being classed as "good" under EU environmental legislation. SuDS can improve our water quality through filtration, adsorption and break down of pollutants by the sun, potentially reducing pollution in our surface water runoff by up to 90%.



**Figure 2.4 Retrofitted biodiverse green roof**

Image courtesy Groundwork London

### 2.1.5 Social housing operations and management

As well as managing and adapting to the risks of climate change the improvement of the local environment and quality of place by the inclusion of SuDS positively contributes to the social housing providers' Corporate Social Responsibility, providing reputational benefits and an important differentiator.

The delivery of multiple benefits from SuDS also helps improve the relationship between the social housing provider, residents and the local community. The Queen Caroline Estate project (→ case study) used a Green Team that trained local people to construct and maintain the SuDS features.

Operationally SuDS can be readily integrated within the capital and maintenance investment programmes of housing associations. Features like green roofs can prolong the life of other assets (i.e. extend the life of a flat roof) and SuDS (especially those on the surface) can be easier to maintain when considered within existing landscape design and maintenance activities.

## 2.2 SuDS FEATURES FOR SOCIAL HOUSING

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 site, but their flexibility means that better rainwater and surface water management can be delivered by SuDS anywhere. Table 2.1 provides some examples of common 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>Rain planter at the entrance to a building</p>	<p><b>Rain planter</b></p> <p>A raised planter with the ability to collect and soak roof runoff into soil and drainage layers in the planter.</p> <p>An overflow into a drain or another SuDS feature is recommended as it is rare the planter alone will cope with rainfall from a heavy storm.</p>	<ul style="list-style-type: none"> <li>• An attractive display of sustainable rainwater management.</li> <li>• Enables SuDS where space is limited, or is only available close to buildings.</li> <li>• Can be integrated with additional outdoor seating.</li> <li>• Can be used for food growing and gardening.</li> </ul>
 <p>Rain garden at entrance to social housing estate</p>	<p><b>Rain garden</b></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"> <li>• Highly visual and attractive feature.</li> <li>• Easily incorporated into small green spaces which are fairly close to buildings.</li> <li>• With appropriate planting supports biodiversity.</li> <li>• Effectively cleans runoff.</li> <li>• Reduces runoff for day-to-day rainfall.</li> </ul>

Table 2.1 continued

	SuDS feature	Benefits
	<p><b>Swale</b></p> <p>This is a shallow, flat bottomed ditch with gentle sloping sides.</p> <p>They can be planted with grasses or more attractive vegetation.</p>	<ul style="list-style-type: none"> <li>• Can form a wildlife corridor.</li> <li>• Can be visually appealing.</li> <li>• Effectively cleans runoff.</li> <li>• Connects people to water on the surface and is simple to maintain.</li> <li>• Reduces runoff for day-to-day rainfall.</li> <li>• Collects, cleans and transports runoff to other parts of the site.</li> </ul>
		
	<p><b>Filter drain</b></p> <p>A stone-filled trench that collects runoff from hard surfaces (road or car park) to clean and transport it.</p> <p>It can include a perforated pipe to slow the flow and enable runoff to soak into the ground.</p>	<ul style="list-style-type: none"> <li>• Effective where space is limited.</li> <li>• Collects, cleans and transports runoff to other parts of the site.</li> </ul>

Vegetated swale

Grassed swale

Filter drain next to car park

Table 2.1 continued

	SuDS feature	Benefits
 <p data-bbox="97 884 563 972">Meadow planted basin with play boulders</p>	<p data-bbox="563 376 1029 448"><b>Basin</b></p> <p data-bbox="563 448 1029 593">Typically a shallow depression covered with amenity or meadow grass.</p> <p data-bbox="563 593 1029 761">Basins capture water and allow it to soak into the ground where possible, or slow the flow of runoff.</p>	<ul data-bbox="1029 376 1497 604" style="list-style-type: none"> <li>• Can be a multifunctional space (if designed appropriately).</li> <li>• Reduces runoff for day-to-day rainfall.</li> </ul>
 <p data-bbox="97 1451 563 1541">Formal wetland at the heart of a housing project</p>	<p data-bbox="563 972 1029 1041"><b>Wetland or pond</b></p> <p data-bbox="563 1041 1029 1209">A permanently wet area designed as a wildlife habitat resource, amenity feature or both.</p> <p data-bbox="563 1209 1029 1400">Before entering a wetland, or pond, runoff may need to go through other SuDS features to clean it.</p>	<ul data-bbox="1029 972 1497 1299" style="list-style-type: none"> <li>• Creates a valuable ecological and amenity resource.</li> <li>• Can be a raised feature if levels allow, enabling wheelchair access.</li> <li>• Cleans runoff.</li> </ul>
 <p data-bbox="97 2049 563 2130">SuDS tree pit Image courtesy Groundwork London</p>	<p data-bbox="563 1541 1029 1601"><b>SuDS tree pits</b></p> <p data-bbox="563 1601 1029 1780">SuDS tree pits can be used on their own or integrated into other SuDS features like rain gardens, wetlands etc.</p> <p data-bbox="563 1780 1029 1971">The tree canopy intercepts rain and trees also draw up large amounts of water through the soil.</p>	<ul data-bbox="1029 1541 1497 2130" style="list-style-type: none"> <li>• Attractive feature that contributes to health and wellbeing.</li> <li>• Supports biodiversity.</li> <li>• Can provide cooling and shade.</li> <li>• Can improve air quality.</li> <li>• Reduces runoff for day-to-day rainfall.</li> <li>• Cleans runoff.</li> <li>• Can be used as part of traffic calming.</li> </ul>

Table 2.1 continued

	SuDS feature	Benefits
 <p data-bbox="97 824 561 913">Permeable paving system</p>	<p data-bbox="561 376 1029 481"><b>Permeable or pervious surfaces</b></p> <p data-bbox="561 481 1029 728">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="1029 376 1497 728" style="list-style-type: none"> <li>• Good range of attractive product types available.</li> <li>• Enables use of surface for a play area or parking.</li> <li>• Cleans runoff.</li> </ul>
 <p data-bbox="97 1435 561 1525">Retrofitted green roof</p>	<p data-bbox="561 913 1029 974"><b>Green or blue roof</b></p> <p data-bbox="561 974 1029 1344">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="561 1344 1029 1525">A blue roof captures more water to slow the flow and reduce the volume of runoff.</p>	<ul data-bbox="1029 913 1497 1525" style="list-style-type: none"> <li>• Supports biodiversity.</li> <li>• Can provide cooler buildings in the summer.</li> <li>• Can improve air quality.</li> <li>• Cleans roof runoff.</li> <li>• Improves efficiency of solar panels on the roof.</li> <li>• Reduces runoff for day-to-day rainfall.</li> <li>• Can prolong the lifespan of a flat roof.</li> </ul>
 <p data-bbox="97 2069 561 2148">Rainwater harvesting tank and control unit, courtesy OTA water</p>	<p data-bbox="561 1525 1029 1585"><b>Rainwater harvesting</b></p> <p data-bbox="561 1585 1029 1944">Rainwater from roofs and impermeable surfaces can be stored and used in and around buildings. They can range from simple water butts to systems that harvest and provide water for garden watering and toilet flushing.</p> <p data-bbox="561 1944 1029 2148">Rainwater harvesting can slow the flow of runoff, reducing the amount of water that is released to drains or other SuDS features.</p>	<ul data-bbox="1029 1525 1497 1944" style="list-style-type: none"> <li>• Reduces runoff for day-to-day rainfall.</li> <li>• More sophisticated systems can be used to manage heavy rainfall</li> <li>• Reduces mains water usage.</li> </ul>

## 2.3 INCLUDING SuDS IN AND AROUND SOCIAL HOUSING

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

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

Approaches to the introduction of SuDS in social housing vary. Some estates have relatively simple interventions introduced like rain planters and rain gardens and stop there. Other projects develop a more aspirational masterplan with phasing of delivery, starting with 'quick and easy wins' and adding more features as interest grows and funds become available.

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 2.6 to 2.9 present how particular SuDS features can be used in and around social housing and how people 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 2.10 is a typical SuDS plan and demonstrates a range of SuDS features that could be created in an existing social housing estate, with figure 2.11 suggesting how SuDS may be retrofitted where space is at a premium. By and large with retrofitting SuDS into housing schemes, the soft landscape offers the most cost effective solutions and greatest benefits.

### Figure 2.5 Rain garden with play at Cheeseman's Terrace

Image courtesy of Groundwork London





Figure 2.6 SuDS feature from raingarden to swale

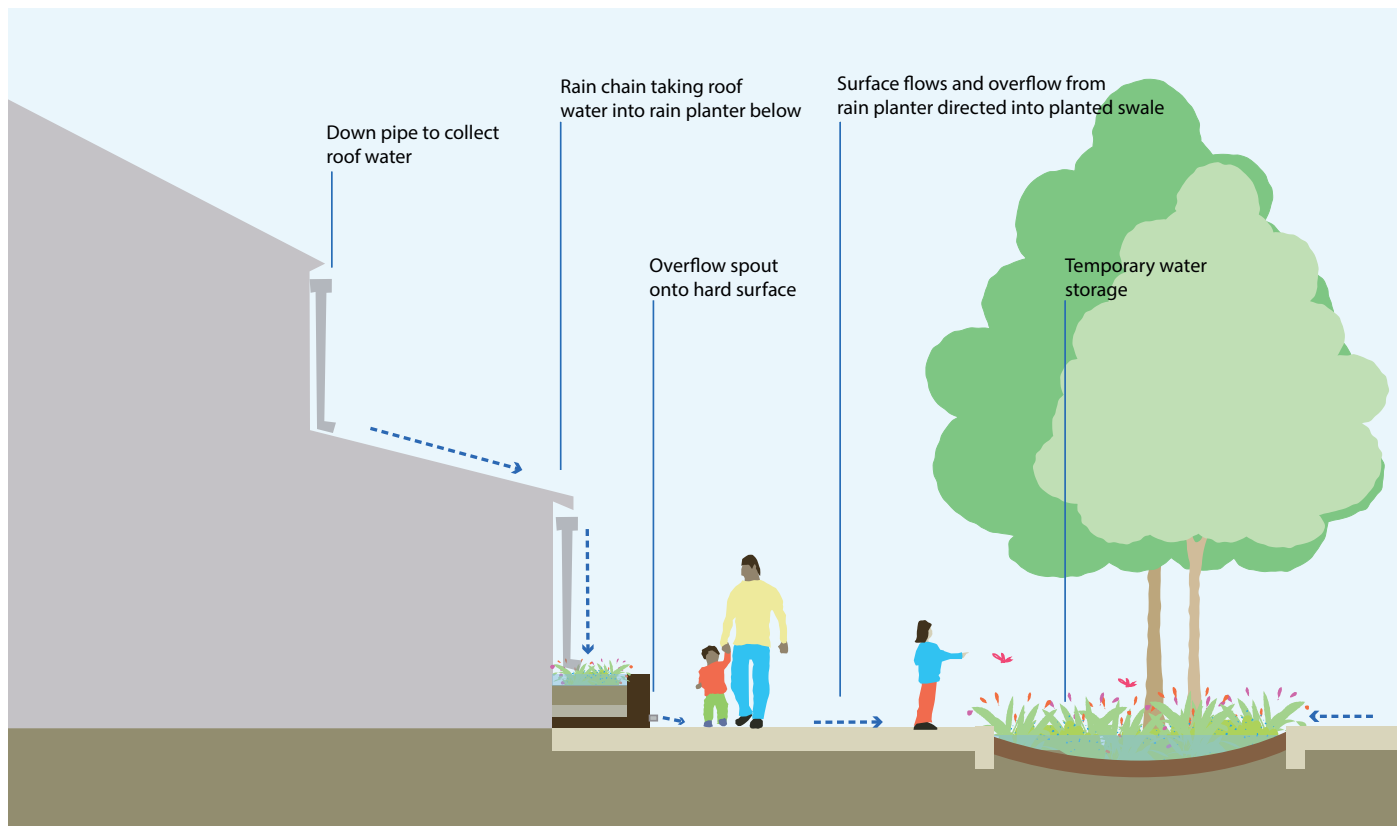


Figure 2.7 SuDS feature from roof to basin (with a bridge)

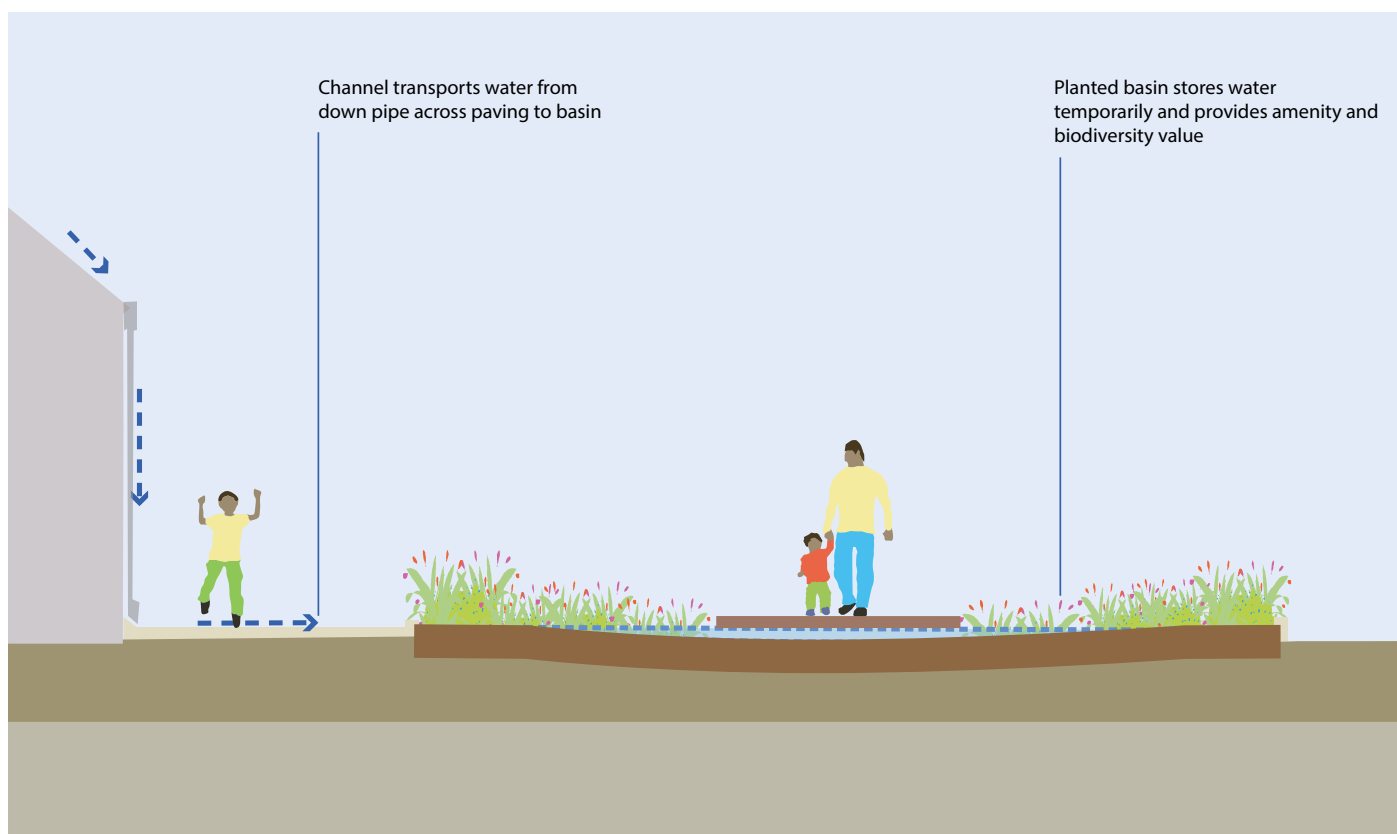


Figure 2.8 Permeable surface and raingarden

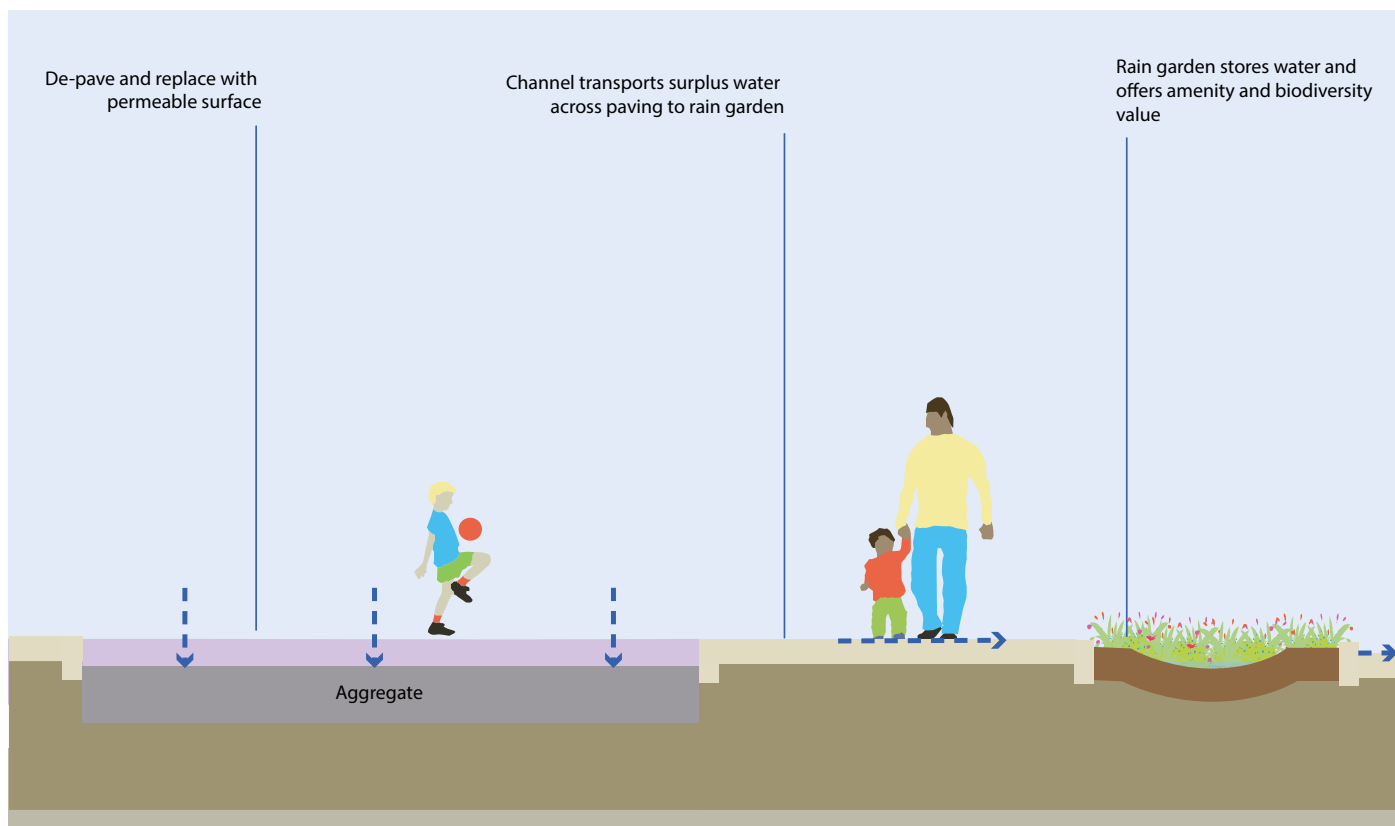


Figure 2.9 Car park and wetland

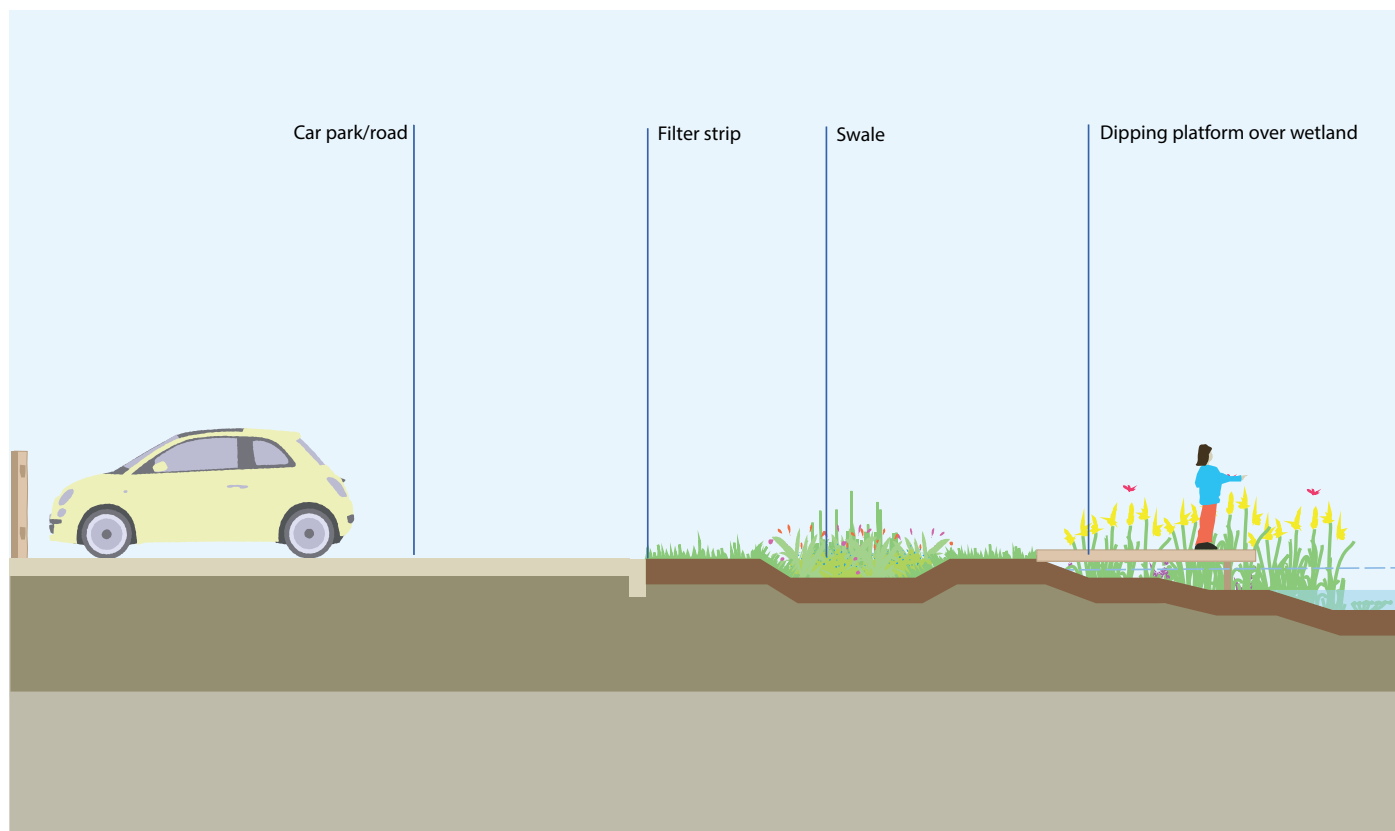
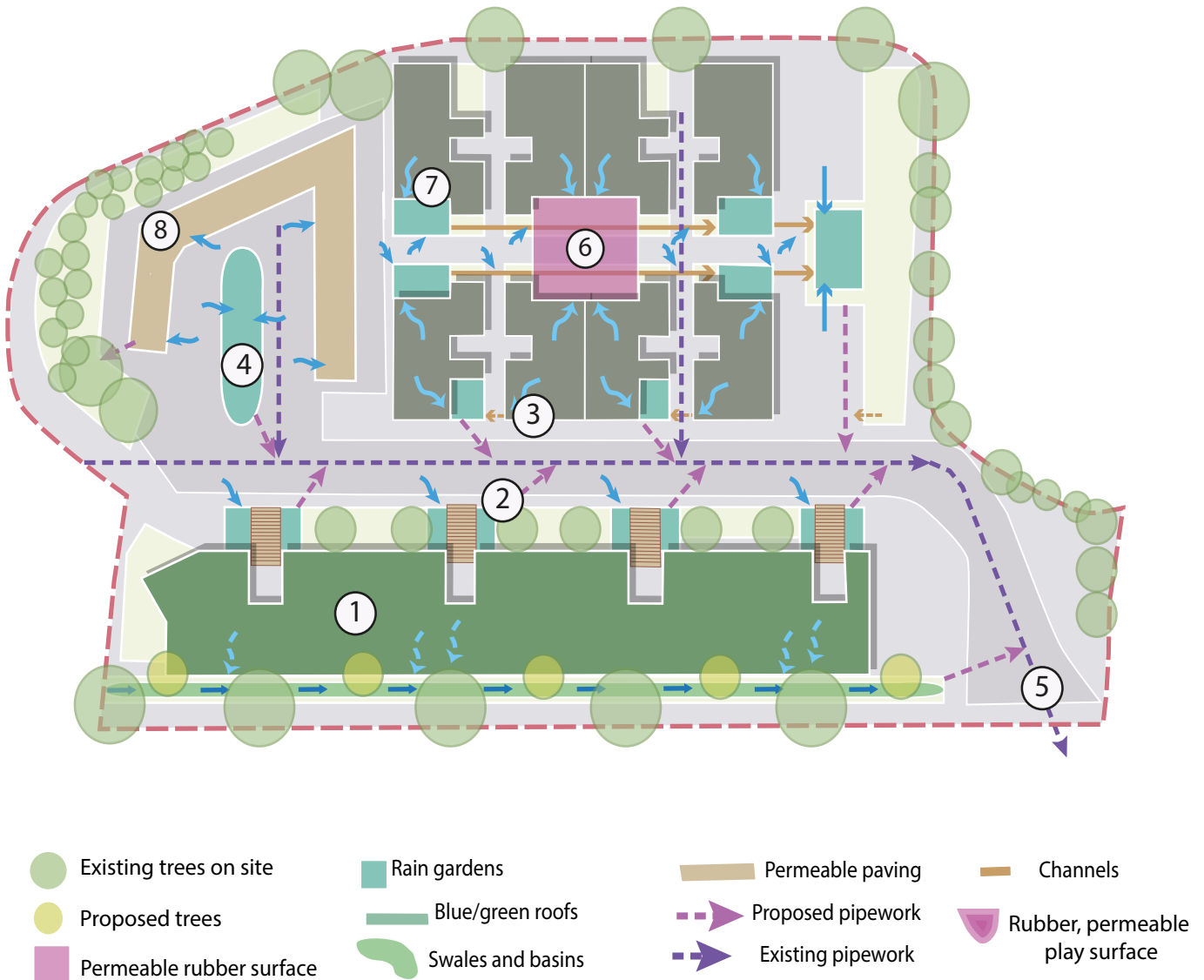


Figure 2.10 Concept for SuDS in social housing



1. Planted raingardens collect and clean runoff from roads, carparks, pavements and roofs. Rain gardens can be installed in existing grass islands.
2. Linear rain garden is used to create an attractive edge to the play park.
3. Play area improved by including permeable rubber surface and sunken areas that can manage runoff from adjacent areas
4. Shallow swales take roof runoff to rain gardens
5. Biodiverse, flowering meadow basins transforming boring spaces into wildlife havens with play features such as stepping stones, boulders and balance beams
6. New, permeable paths can be installed on pervious paths
7. Green roofs can be installed on ‘pram shed’ storage buildings

Figure 2.11 Concept for SuDS in constrained social housing



1. Retrofit green roof captures rain and provides opportunities for biodiversity and cooling buildings
2. Rain gardens collect and manage road runoff and include attractive bridge features to enhance building entrances
3. Rain water pipes from adjacent buildings connect to gardens by grated channel
4. Grassland converted into rain gardens to collect and manage road runoff as well as offering amenity and biodiversity value
5. In the absence of a watercourse to discharge to, this scheme discharges into the existing sewer network on site
6. Improvements to community play space, including permeable play surface
7. Rain water pipes from roofs directed into rain gardens
8. Impermeable parking bays replaced with permeable paving

## **3 Getting the best outcomes**

### 3.0 GETTING THE BEST OUTCOMES

Obtaining engagement and buy in from residents and key decision makers 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.

There are some inspiring examples of effective engagement in social housing in London, where the residents have helped with the design, planting and maintenance of SuDS in and around their area (→ figure 3.1 and Queen Caroline Estate case study). SuDS were delivered as part of Groundwork's Life+ Climate Proofing Housing Landscapes project and delivered around £4 of benefits for every £1 invested.

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

### 3.1 MAXIMISING THE VALUE FROM SUDS

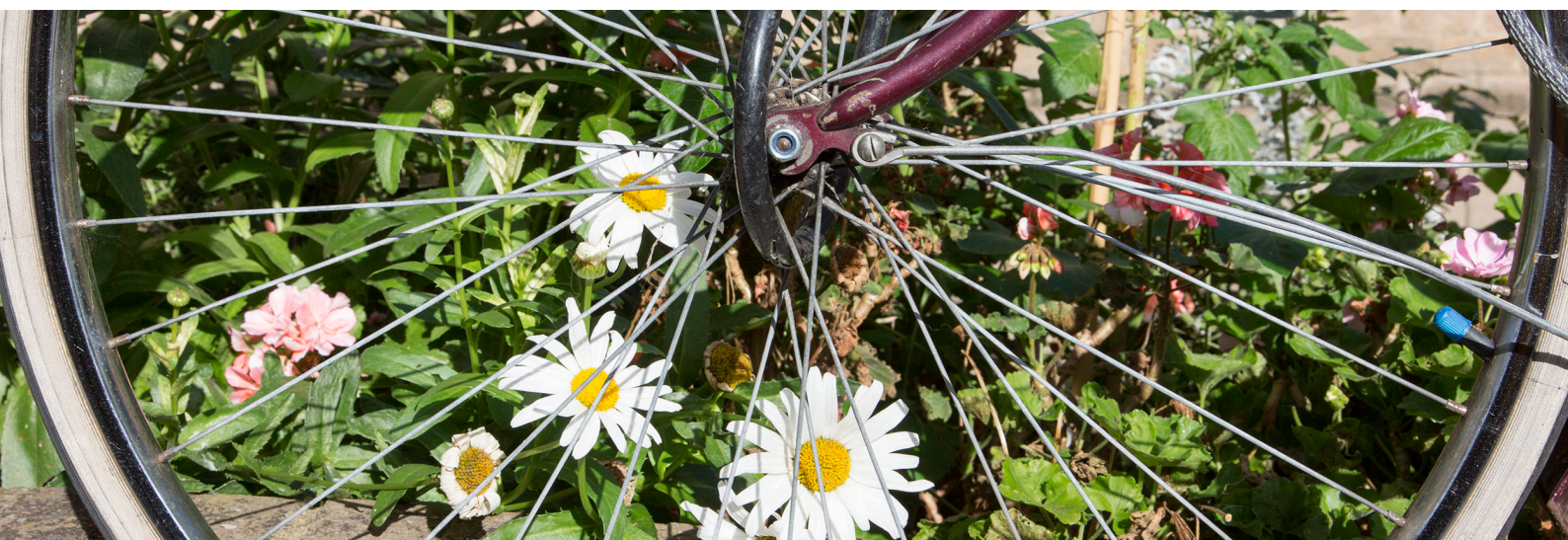
Understanding the context, drivers and potential funders for the SuDS scheme helps to focus on what benefits are desired from the scheme. This will also be informed by those likely to design and use the space. There are some common approaches to getting the best from SuDS, these should be discussed with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

- Manage water on the surface as much as possible. It enables people to connect with SuDS and makes them easier and cheaper to construct and maintain. It also allows breakdown of pollutants by sunlight 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 residents 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 community engagement 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 SuDS at Cheeseman's Terrace

Image courtesy of Groundwork London



**Table 3.1 Approaches to maximising the benefits**

Category	Approach
<b>Social housing operations and management</b>	<ul style="list-style-type: none"> <li>• Consider whether funding opportunities and changes to the building fabric, or other parts of the site will enable SuDS features to be retrofitted.</li> <li>• Ensure the designers consider ease of construction and maintenance of SuDS features when planning and designing the SuDS.</li> <li>• Encourage designers to exploit natural gradients, flow paths and existing waterlogging to keep flows on the surface and thereby reduce overall costs of the SuDS (by reducing the need for excavation).</li> <li>• Capitalise on any community engagement to improve relationships with residents and local community. Celebrate the site and the potential to improve the quality of places and spaces.</li> <li>• Consider approaches to actively involve, where appropriate train and develop the skills of local residents in the delivery and maintenance of SuDS features.</li> </ul>
<b>Amenity</b>	<ul style="list-style-type: none"> <li>• Positively and meaningfully engage with the local community and residents as early as possible to obtain their involvement in design decisions, planting and potential upkeep. Work with them to run community events to celebrate the new green space they have.</li> <li>• Consider the number, variety and quality of the uses of SuDS, such as recreation, car parking, rainwater harvesting etc.</li> <li>• Consider multifunctional SuDS features that can: <ul style="list-style-type: none"> <li>• promote play and learning (e.g. by integrating natural play mounds, balance beams, stepping stones, amphitheatres, rain chains etc.),</li> <li>• provide shady meeting places</li> <li>• be planted and managed by residents</li> <li>• be used for food growing by the residents</li> <li>• help support urban cooling (e.g. green roofs)</li> <li>• help improve urban air quality.</li> </ul> </li> <li>• Ensure that safety is considered as part of the design process for SuDS features – this does not mean fences!</li> <li>• Consider how the SuDS feature and places will be used by residents and people walking through the site.</li> <li>• Consider the inclusion of interpretation boards to inform all residents about the function of the SuDS features.</li> </ul>

**Table 3.1 Approaches to Maximising the benefits cont.**

Category	Approach
<b>Biodiversity</b>	<ul style="list-style-type: none"> <li>• Use vegetated SuDS features wherever possible.</li> <li>• Improve habitats for local wildlife by using the local authority's Biodiversity Action Plan to help inform the design.</li> <li>• Prior to runoff being drained into the areas designed for biodiversity ensure it is managed and clean.</li> <li>• Create diverse, attractive and connected habitats designed to attract wildlife.</li> </ul>
<b>Water quality and pollution</b>	<ul style="list-style-type: none"> <li>• Prioritise SuDS features that include vegetation and healthy soils to assist with the treatment of pollution.</li> <li>• Ensure the designers consider risk of pollution and include the right type and right number of connected SuDS features.</li> </ul>
<b>Water quality and availability</b>	<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• Include water harvesting (such as water butts, or rainwater harvesting systems) to reduce the dependency on mains water.</li> <li>• Consider where the water will flow during extreme rainfall or if there is a blockage in the system and design-in a flow path.</li> </ul>

'This project has made a lot of improvements to the look of the estate, as well as helping to gel our community'

**Ros O'Connell, Treasurer, Queen Caroline Estate Tennant Residents Association**

(→ case studies)



### 3.2 DELIVERING SuDS

The SuDS design 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 site and have considered what you would like to achieve you should engage a 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 residents and local community.

It is difficult to provide an indication of costs, as each site is 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

**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 <sup>2</sup>
Construction of surface SuDS features in existing hard landscape	£50-£100/m <sup>2</sup>
Permeable paving	£50-£70/m <sup>2</sup>
Construction of green/blue roof	£50-£150/m <sup>2</sup>

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).

#### Figure 3.2 SuDS Planting

Image courtesy of Groundwork London



### 3.3 DISPELLING THE MYTHS

Although widely and successfully used across the UK, misconceptions on SuDS can arise which should be challenged. Most concerns (e.g. from colleagues, residents and the local community) can be overcome with good design, effective engagement and education.

There are a number of examples of SuDS being delivered in and around housing developments (→ 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

**Table 3.3 Overcoming challenges for SuDS delivery**

Misconception	Response
<p><b>Safety</b></p> <p><b>‘Do SuDS have permanent water and can they be dangerous?’</b></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"> <li>• The ages and abilities of people that will encounter or interact with the SuDS.</li> <li>• Whether the location will mean children and/or young people are supervised (or not) either formally or by being overlooked by residents.</li> <li>• The visibility and rescue implications of fences over 0.6m height (fenced off water is harder to get out of).</li> <li>• The design of the features in relation to ease of access and egress.</li> <li>• The frequency of SuDS being full of surface water runoff.</li> <li>• Depths of SuDS features.</li> </ul>

**Table 3.3 Overcoming challenges for SuDS delivery cont.**

Misconception	Response
<p><b>Costs</b></p> <p><b>‘Are SuDS more expensive?’</b></p>	<p>SuDS do not need to be more expensive than traditional drainage, often they are cheaper in new build and can easily be achieved in retrofit situations (→ Queen Caroline Estate was cost neutral). 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 are incorporated into the fabric of development to manage rainwater, the more cost effective they become. Note that SuDS features such as planting, trees, block paving and play features should not be considered as extra costs if these items would be provided anyway.</p>
<p><b>Maintenance</b></p> <p><b>‘Are SuDS difficult and expensive to maintain?’</b></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>

**Table 3.3 Overcoming challenges for SuDS delivery cont.**

Misconception	Response
<p><b>Antisocial behaviour</b></p> <p><b>‘Will SuDS encourage anti-social behaviour and more nuisance?’</b></p>	<p>Antisocial behaviour can include noise, alcohol or drug use and dog fouling. This should be considered through the design process as with any landscape design, considering ‘Secured by Design’ crime prevention and safety perception principles.</p> <p>When retrofitting SuDS into existing landscapes, consideration should also be given to promoting positive use of the landscape. By revitalising neglected communal spaces SuDS can help reduce antisocial behaviour by giving residents a sense of pride and ownership of their environment.</p> <p>It is important that positive and meaningful community engagement is carried out so that the communities are supportive of emerging designs and the finished scheme.</p> <p>Where possible, involve residents in the construction and maintenance of SuDS features through planting days, construction skills training and weeding - if they truly feel that they have helped create the new landscape, they are far more likely to protect it from antisocial behaviour and vandalism and help keep it tidy.</p>
<p><b>Litter</b></p> <p><b>‘Will SuDS create more litter?’</b></p>	<p>Soft landscape areas tend to collect litter because of the trapping effect of planting, however, corners in raised surfaces such as kerbs, edges and walls as well as sheltered spaces beneath seating also tend to collect litter.</p> <p>Litter often needs to be collected to keep the public realm tidy and attractive. There are many factors that affect the amount of litter in our landscapes including the types of uses/activities, the amount of footfall and the number of litter bins. Studies have shown that spaces that look more attractive and cared for suffer less littering than unattractive, poorly maintained spaces.</p>
<p><b>Suitability of ground conditions</b></p> <p><b>‘If water cannot soak into the ground, or we have poor ground conditions can we use SuDS?’</b></p>	<p>The ability of rainfall to soak into the ground (infiltration), the levels of the water in the ground, and potential soil contamination can influence the type of SuDS feature used. These conditions however will not prevent SuDS being used.</p> <p>SuDS do not need to soak runoff into the ground. It is quite common for schemes to use other ways to manage the runoff if clay and other factors stop or slow infiltration. This includes using flow control devices to slow the flows of runoff and allow it to be drained to a watercourse, surface water sewer or combined sewer if neither of these is available.</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 challenging and is likely to be required from multiple organisations. This is also where effective and early engagement can be helpful.

It may also be possible to alter the programming and approach to annual maintenance to enable gradual implementation of SuDS features or implementation of SuDS principles.

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**

Potential funding source	Comments
<b>Local Authority</b>	<p>Those managing flood risk or the public realm may have the ability to unlock funds from others sources (e.g. Section 106 Agreements and Regeneration projects). They may also be able to provide links to other Council funding pots, such as community greening initiatives as well as external partnerships and funders.</p> <p>If appropriate the Local Authority may also support a grant application for Central Government funds related to flood risk management.</p>
<b>Central Government</b>	<p>Government departments like Homes England and the Ministry of Housing, Communities &amp; Local Government occasionally make funds available to improve the quality of housing and local areas.</p>
<b>Greater London Authority (GLA)</b>	<p>The GLA occasionally provides grants for delivering greener communities and improving housing.</p> <p>The funding opportunities are often time limited so for ‘greening’ projects look at <a href="https://glagrants.org.uk/">https://glagrants.org.uk/</a> for further information.</p>
<b>Thames Water</b>	<p>Thames Water is setting up a fund (for 2020-2025) to improve surface water in their catchment, this specifically includes SuDS. Funding decisions will be based on the site and the potential social and environmental benefits of the proposed scheme. For further information contact <a href="mailto:swm.partnerships@thameswater.co.uk">swm.partnerships@thameswater.co.uk</a> or contact your Local Authority’s Flood Risk Manager.</p>
<b><u>Local Wildlife Trusts</u></b> <b><u>Local River Trusts</u></b>	<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>
<b>Groundwork</b>	<p>Groundwork is a national charity working to improve local communities. It has been involved in many projects to green communities and deliver SuDS. It regularly has funding grants available and it is possible for them to lever funds from other organisations. <a href="https://www.groundwork.org.uk">https://www.groundwork.org.uk</a></p>
<b>Other charity and third sector groups</b>	<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



## THE LANCASTER ESTATE

### BANKSIDE, LONDON

A rain garden was implemented in an area of social housing as part of a feasibility study for Bankside Open Spaces Trust (BOST) who are keen to deliver improvements to green spaces within local estates. The new rain garden designed by Petrow Harley was funded by Section 106 contributions.

An existing downpipe was disconnected and a small concrete cobbled area was constructed to receive the initial flow from the downpipe to reduce the risk of soil erosion. The area was planted with a range of plants that will thrive in differing levels of moisture.

#### Benefits include:

- Public engagement influencing landscape design to enable retrofitting SuDS
- Increases the social and environmental value of a once degraded landscape
- Inclusion of attractive planting and biodiversity beneficial to insects and birds
- Reducing the flows and amount of surface water runoff

**Cost: Around £5,500**

Image courtesy of Petrow Harley



## HERON COURT

### WEST DULWICH, LONDON

As part of the 'Lost Effra Project' London Wildlife Trust worked with the Rosendale Gardens Tenants and Residents Association to improve their garden area and manage local flood risk. Rain gardens were created that soak up rainwater and improve places for people and wildlife.

Two new rain gardens were constructed to divert rainwater from the 420m<sup>2</sup> roof. An overflow pipe was also installed to allow excess run off to be discharged into the sewer in heavy rainfall.

#### Benefits include:

- Significant reduction of surface water runoff entering the combined sewer
- Local residents have improved knowledge of surface water flood risk and the benefits of SuDS through engagement and onsite interpretation boards.
- Increased community cohesion and social wellbeing – the garden continues to be cared for and well maintained by residents and community members.

**Cost: £19,300**

[See here for further information](#)

Images below courtesy London Wildlife Trust



## VICTORIA CRESCENT

### SOUTH TOTTENHAM, LONDON

This project was to improve existing amenity space and reduce the risk of surface water flooding. This followed a full SuDS Site Appraisal Study to explore the potential for SuDS, design and engagement and then construction by the local authority's highways contractors.

SuDS was included within a landscaping project, the main features include a series of rain gardens, circular basins and mounds. Swales convey water between the basins and rain gardens. A number of mounds reduce the surface water flow and a small bridge, benches and boulders are included for play features.

#### Benefits include:

- Reduced flows from the area into the highway sewer networks and incrementally reduced risk of flooding in the wider catchment.
- Helping to treat runoff and ensure water entering drains and local watercourses have reduced levels oil and pollutants which can harm wildlife.
- Helped deliver regenerated green space areas that improve the quality of the local environment.
- Use of relatively low-cost options with low maintenance requirements.

**Cost: £130,300**

Images below courtesy Haringey Council



## QUEEN CAROLINE ESTATE

### HAMMERSMITH LONDON

This project was devised and delivered by Groundwork London with the London Borough of Hammersmith & Fulham as part of the LIFE+ Climate proofing Social Housing Landscapes project. Various SuDS features have been integrated within the housing estate landscape using a combination of roof space, pavement, car park, estate road and soft landscaped areas.

Green roofs were installed on bin stores and pram sheds, and rain gardens were installed within paved areas and alongside estate roads. Swales manage the runoff from roofs and paving. Stony detention basins were included to reduce maintenance. Informal play features, including bridges, mounds, stepping logs, balance beams and boulders are included.

#### Benefits include:

- An unused uninspiring landscape converted to diverse, attractive and multi-functional space.
- Runoff (from 1750m<sup>2</sup>) impermeable surfaces has been diverted away from the sewer.
- The capital works were delivered at the same rate as equivalent non-SuDS infrastructure.
- The project had widespread support from local residents.

**Cost: £226,000**

[See here for further information](#)

Images below courtesy Groundwork London



## RENFREW CLOSE

## BECKTON, LONDON

This was a partnership project between the Environment Agency, Groundwork London and London Borough of Newham with design support from Robert Bray Associates. It is a community scale retrofit designed as a demonstration of how SuDS can be incorporated into existing areas. Rain gardens receive water from disconnected roof downpipes and from the impermeable surfaces at ground level.

Four different rain gardens are located within the central amenity area. A shallow detention basin is joined to shallow rainwater channels. During heavy rainfall the rainwater is attenuated by the basins which are connected to an overflow into the sewer.

### Benefits include:

- Attractive, biodiverse, playful and productive rain gardens reduce rainfall and surface water entering existing sewers;
- Successful on site delivery using local authority framework contractors and Groundwork's Green Team - which enabled unemployed residents to gain work experience and accredited qualifications in landscaping and horticulture.
- Over the first 12 months of monitoring approximately 413,000 litres of surface water was attenuated by the rain gardens and diverted from the surface water sewer.

**Cost: £80,000**

[See here for further information](#)

Images below courtesy Robert Bray Associates



## PRIOR'S FARM ESTATE

### CHELTENHAM, GLOUCESTERSHIRE

This typical 1960's housing development with large front gardens and grassed public open spaces was highlighted in the Cheltenham Surface Water Management Plan as an area where disconnecting runoff from the sewers and managing runoff with SuDS would have direct flood alleviation benefits and assist in improving the quality of the water downstream.

Shallow detention basins within existing public open spaces receive runoff from roads. Disconnected down pipes, and rain gardens within front gardens manage roof runoff (for which community consultation and stakeholder engagement was crucial).

Day-to-day rainfall soaks into the ground, and is taken up by the new planting. In heavier and prolonged rainfall the water is stored for short periods (a few hours) and is then released slowly back into the existing surface water sewer via an outfall with flow control devices.

#### Benefits include:

- Reduced localised flooding both within the estate and further downstream.
- Improved amenity benefits to local residents – the public open spaces have new tree and shrub planting that provides seasonal interest. The basins act as natural play features with 'stepping stones' providing further value.
- Improved biodiversity - new planted areas contain both native and ornamental species and have created a range of wildlife habitats.

**Cost: £150,000**

[See here for further information](#)

Images below courtesy Illman Young Landscape Design



## 6 Further guidance

## 6. FURTHER GUIDANCE

- [Bray, B, Gedge, D, Grant, G, Leuthvilay, L. Rain Garden Guide. Reset](#)
- [CIRIA - susdrain website](#)
- [Graham, A, Day, J, Bray, B, Mackenzie, S. \(2012\) Sustainable drainage systems – maximising the potential for people and wildlife. RSPB and WWT](#)
- [Groundwork – Climate Proofing Housing Landscapes](#)
- [Kukadia, J, Lundholm, M, Russell, I. \(2018\). Designing rain gardens – a practical guide. Urban Design London](#)
- [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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