



Water on the move:
slow the **flow**

The graphic features a white rounded rectangle with a grey cloud icon at the top left containing two blue raindrops. A yellow arrow points from the bottom left towards the word 'slow'. At the bottom right, there are two blue water drop icons of different sizes. The background is a photograph of a paved area with a puddle reflecting the sky and clouds.

**Community
Design Challenge**

Learning outcomes

Pupils will:

- Identify a suitable location for using SuDS techniques and generate ideas
- Evaluate and improve their solution
- Describe their solution, justifying their design choices.

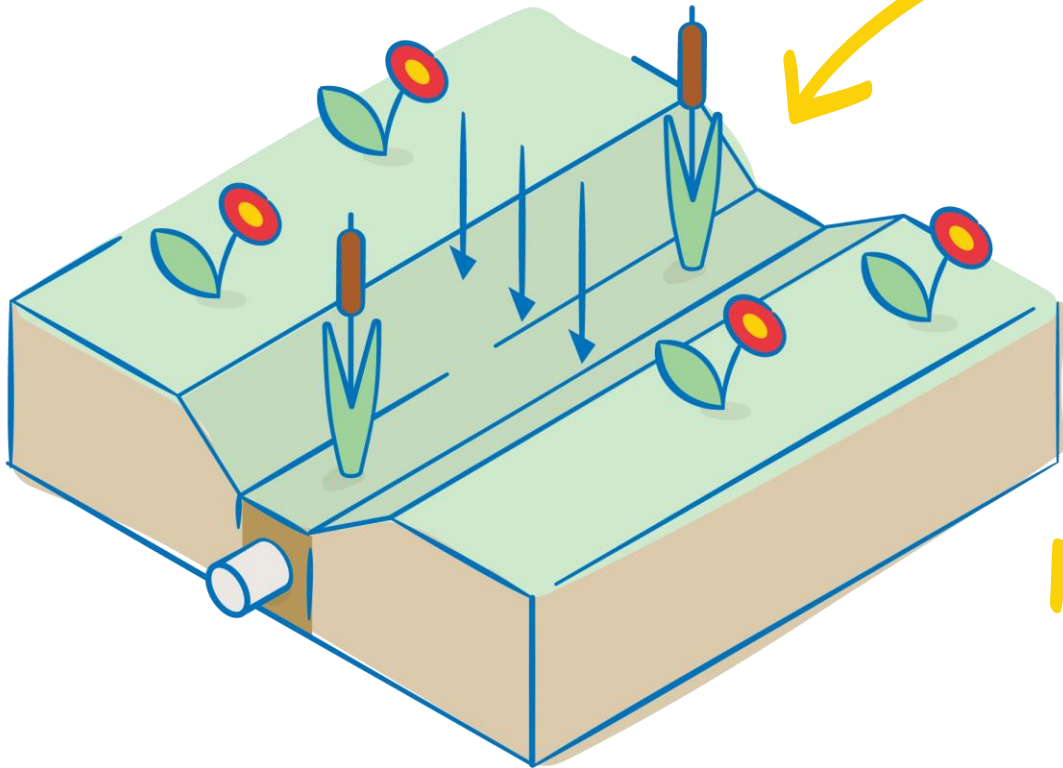


Why are SuDS important?

Sustainable Drainage Systems help water flow more naturally.

SuDS work more like nature by reducing or slowing the flow of water so sewers and rivers aren't overwhelmed.

SuDS help to prevent flooding.



Why are SuDS helpful?

More water is stored to use in the future. Sewers are less likely to be overwhelmed, reducing local flood risk.

Lower water quantity

Less flooding means less waste and pollution will be carried into the natural environment.

Water in SuDS is naturally filtered.

More water can soak naturally into the ground - so flooding is less likely.

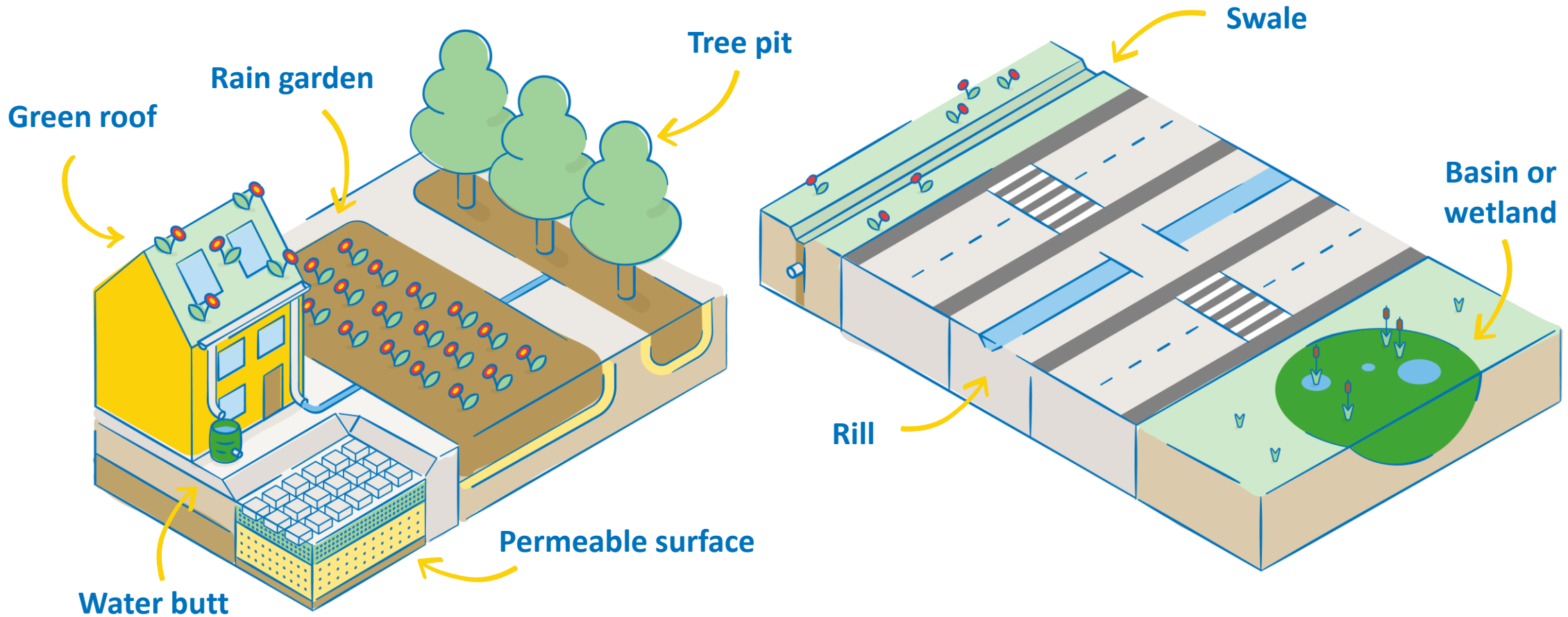
Better for people

Higher water quality

SuDS create natural spaces in urban environments which are good for people as well as nature. SuDS can also reduce carbon emissions.

Better for nature

What do SuDS techniques look like?



Store > **Soak** > **Move** > **Contain**

SuDS techniques: Storing and soaking water

A **green roof** slows water flow and helps more water evaporate.

SuDS techniques can **capture and store rain** where it falls. This water can be used for watering plants when it is dry.

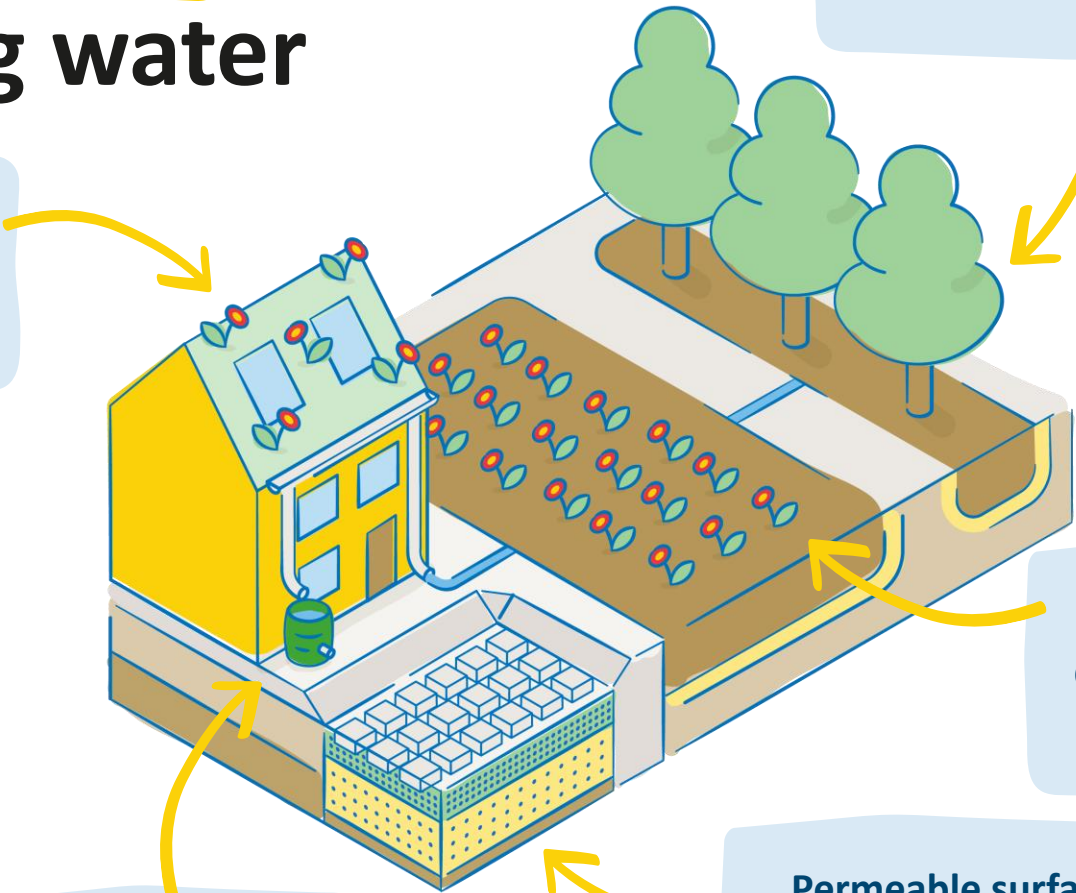
A **water butt** stores water.

Tree pits let rain soak in around the trunk.

SuDS techniques can help water to **soak into the ground** so less water flows into our sewers.

Rain gardens in dips contain water-tolerant plants.

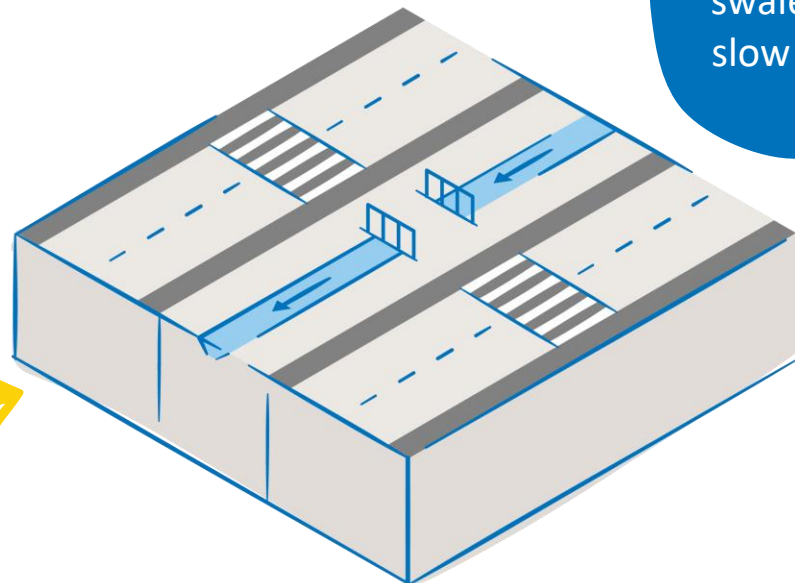
Permeable surfaces have gaps that let rain through.



SuDS techniques: Moving water to another place

Some SuDS techniques move water to another place where it is contained until it can flow slowly away or soak into the ground.

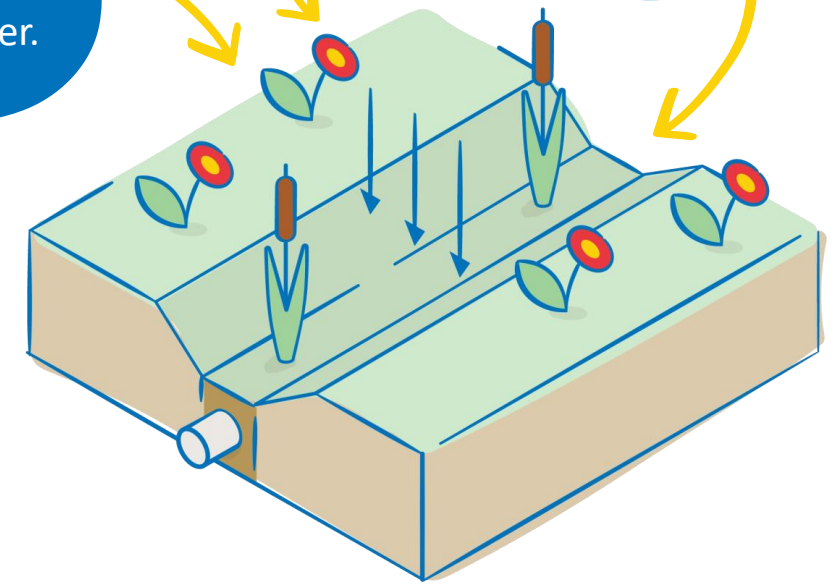
Rills are small, shallow channels that collect and move water on the surface of a pavement or road.



Plants in the swale filter and slow the water.

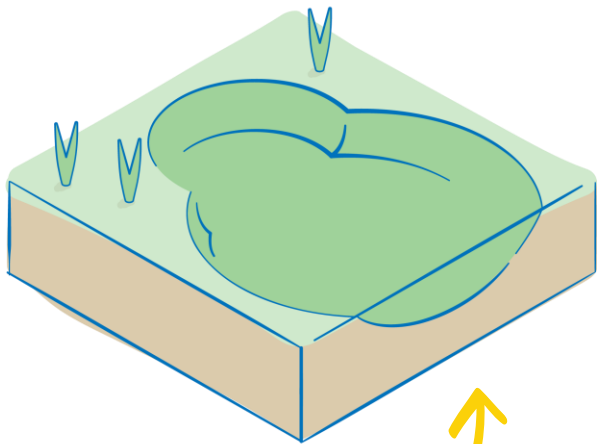
Swales are shallow ditches that contain plants. The swale moves rainwater away from where it falls.

The bottom is permeable so some of the water can soak into the ground.

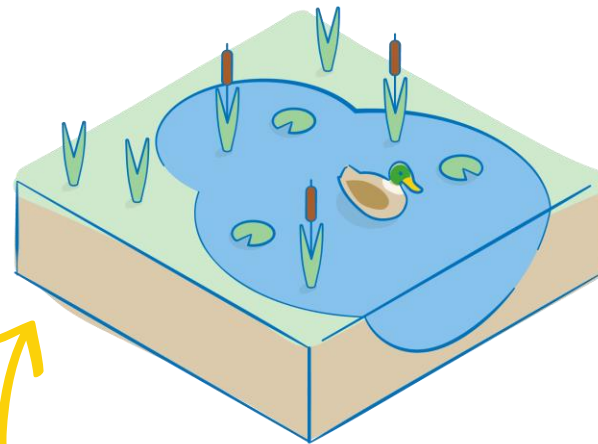


SuDS techniques: Containing water

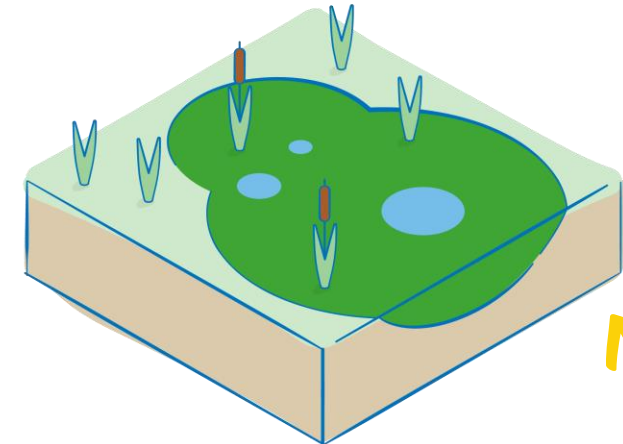
Some SuDS techniques contain rainwater that falls over a large area, like a housing development. The water slowly drains so rivers and sewers are not overwhelmed.



A **dry basin** fills with water during heavy rain.



A **wet basin** is a pond that can fill after heavy rain. Sediment in the stormwater settles at the bottom.



A **wetland** is a pond or marsh that contains water plants and animals. Storm water is filtered and cleaned.

Case study

Here are some examples of how you could use SuDS techniques.

Watering can downpipe and planter

SuDS techniques can be fun and colourful! This watering can drainpipe stops water from entering the surface water sewer by redirecting it into a flower bed.

Inside the planter, there is a layer of soil, gravel for drainage, and plants that can tolerate both high rainfall and times without rain, too. The roots of the plants filter the rainwater and trap any pollutants.

If there is lots of heavy rain in the area, the planter also has an overflow pipe, so that the plants don't become too waterlogged.



Case study

Rain garden and tree pit

SuDS techniques can work together to give water more space to soak into the ground. The plants in the rain garden can absorb more water than the grass, which helps stop the whole area from getting waterlogged.

Any excess water runs off into the tree pit. Before the tree was planted, workers installed a network of recycled plastic soil cells underground. These make space for the tree's roots to spread out and support the weight of the tree as it grows.

The paving around the tree is permeable, so water can soak through to the tree's roots, instead of flowing into the surface water sewer or creating puddles in the playground.



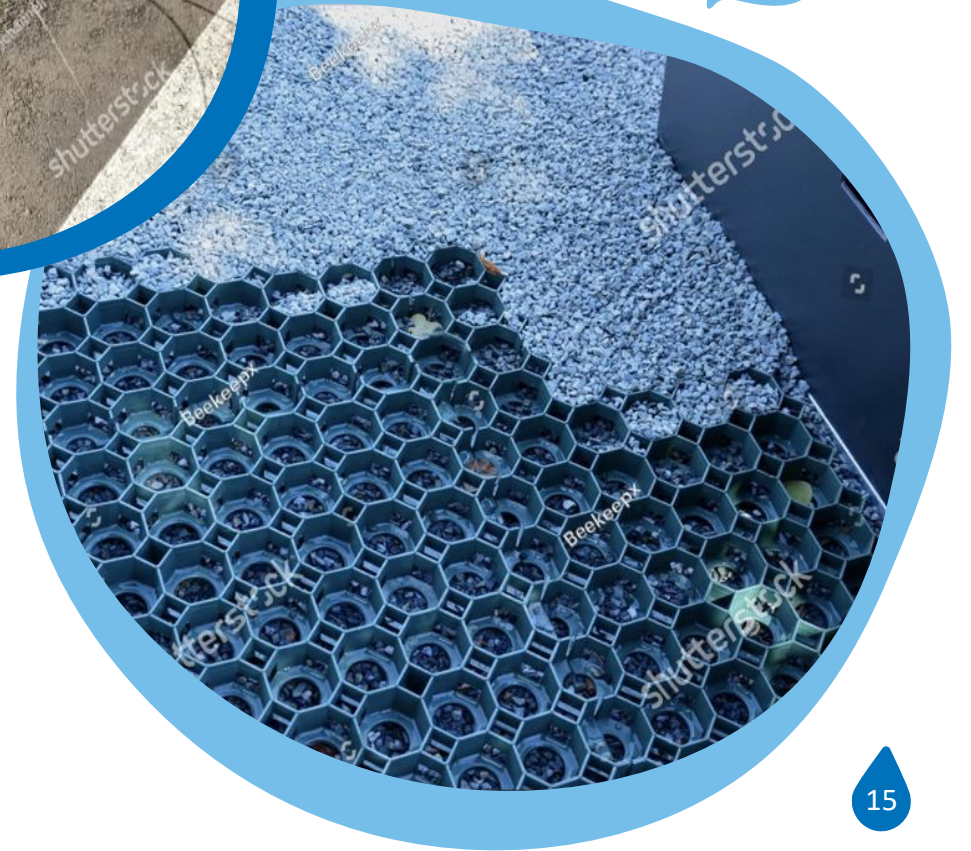
Case study

Permeable paving and cut curbs

Car parks are often made from concrete or tarmac, which are not permeable materials. When it rains, water will flow into the surface water sewer instead of soaking into the ground.

Replacing concrete with permeable paving, such as gravel, can improve this, as water can soak through the surface into the soil below. It can also trap pollutants like car oil and chemicals, saving them from flowing into the surface water sewer.

If you can't replace the whole surface, then putting cuts into the curb around the car park can also help any excess water to flow into nearby rain gardens, swales or wetland, instead.



Identify where to use SuDS techniques



You may have already found a site that will benefit from SuDS techniques when you completed the Community Action Challenge!

Identify where to use SuDS techniques

Level 3

In addition, identify 3 possible locations and explain why one is most important to help with SuDS techniques.



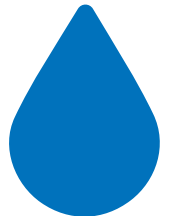
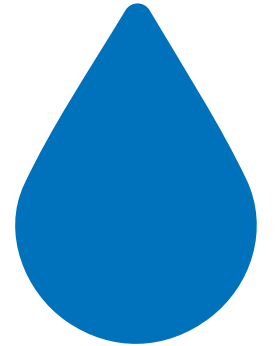
Level 2

Give reasons for why SuDS techniques are needed at your location.

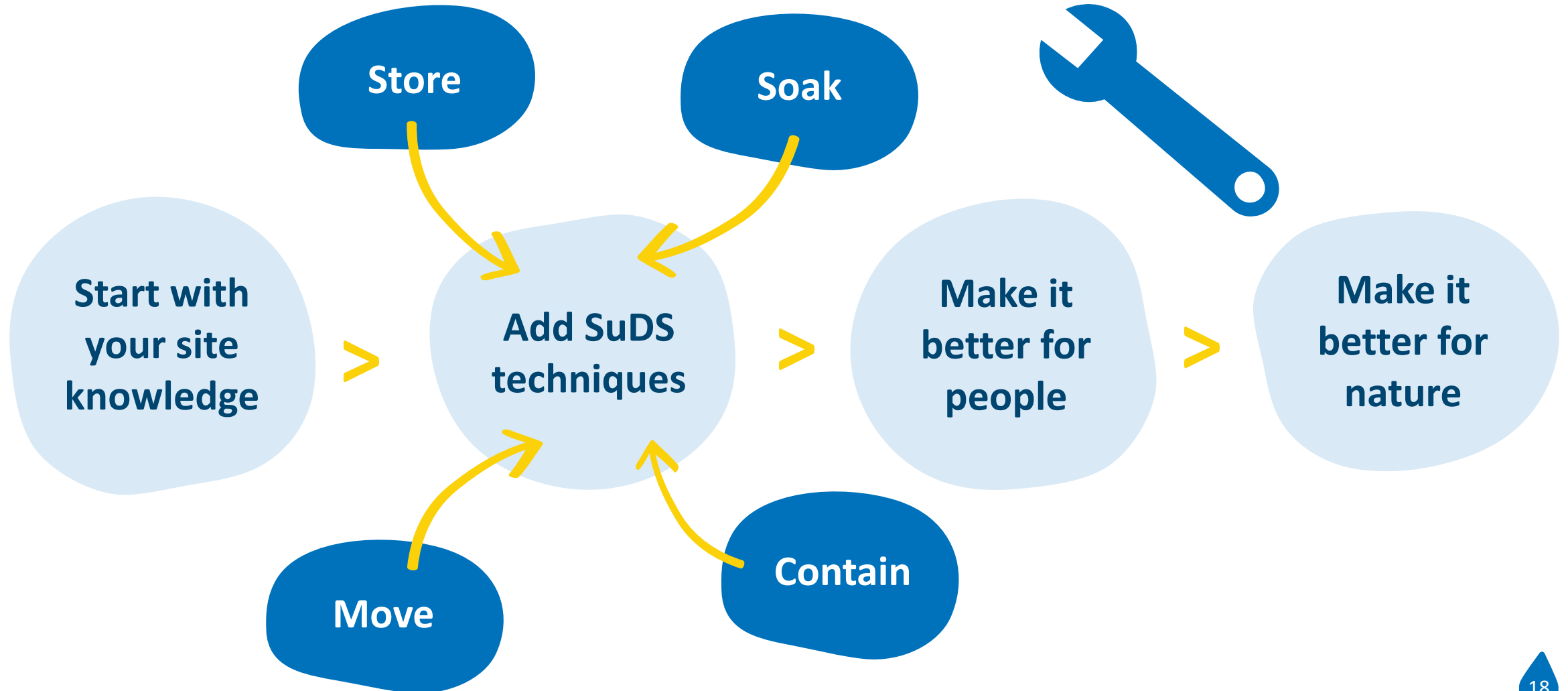


Level 1

Identify a location that will benefit from SuDS techniques.



Generate your ideas



Evaluate your solution

Level 3

Think of seven ways to improve your plan: 2 ways that improve water quantity, 2 ways that improve water quality, and 3 ways that make it better for people and/or nature.

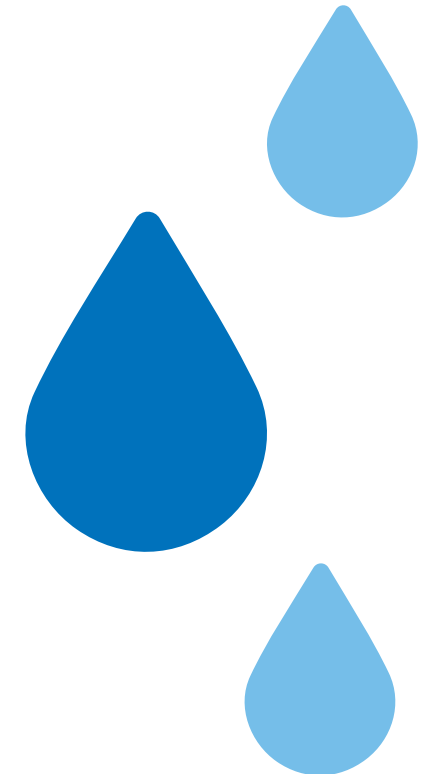
Level 2

Think of five ways to improve your plan.
Explain how each improvement will help.

Level 1

Use 'What works well' and 'Even better if'
to evaluate your ideas.

Think of three ways to improve your plan.



Are you improving water quantity and quality?

Level 3

Have you thought about how much water will soak away vs. how much you will move?

How will you encourage people to use the stored water?

Level 2

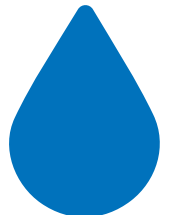
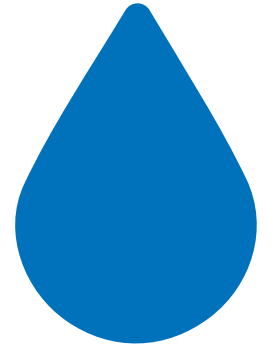
Does your design include enough techniques to deal with the amount of water that collects here?

Will your design help to filter or clean the water?

Level 1

How are you slowing how much water flows into our sewers?

Can you store water on site, to use later?



Are you making your site better for people and for nature?

Level 3

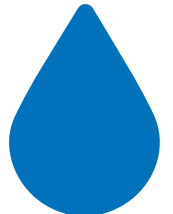
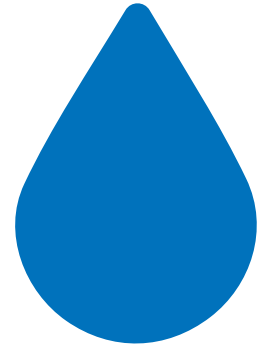
How does your site fit into the wider use of this place?
How does your site help with some challenges of urban environments?

Level 2

What could people do at your site?
What else could make your site even more attractive to wildlife?

Level 1

Will your design make the site a more pleasant place?
Why will insects, amphibians and birds be attracted to your site?



Improve your solution

Use your evaluation ideas to make your plan even better! Think about:

How will we store water
or help it soak away?

Do we need to
move water?

Do we need to contain it?

What features will
make it a nicer place
for people to be?

What could people
do here?

Lower water
quantity

Better for
people

Higher water
quality

Better for
nature

How will we filter or
clean water as it soaks,
moves or is contained?

What features will
attract wildlife?
What types of wildlife
could we attract?

Present your solution

Level 3

Explain how your design fits into the site's wider usage patterns and location.

Include detail about how your ideas to store, soak, move or contain water fit into this.



Level 2

Suggest what materials you'll use in your plans.

Explain how your ideas improve the site.

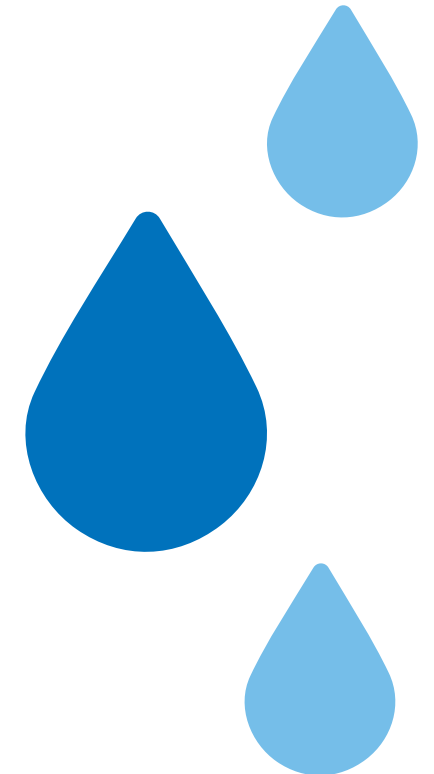


Level 1

Show us your design in a clear labelled drawing.

Explain how your design helps to store, soak, move or contain water.

Explain how it's better for people and for nature.



Present your solution

Other ideas to bring your ideas to life:

Include photos of your site or a video tour.

Film a video to present your idea. Plan what you'll say. Make sure the visuals and audio are clear.

Create a 3D scale model of your ideas.

Present your ideas and get feedback on how to improve your explanations.

What happens next?



Here's what you need to do next as you take the Design Challenge!