Reimagining Rainwater

in Gardeners' New World

ACO House & Garden

Reimagining Rainwater

"We need to think about how water moves through our space and how we interact with water. Water is an interesting and textural element to add to a garden, bringing light, reflection and sound; but also can be stored and harvested for use later with rainwater harvesting systems. We must also think about how water moves into our main sewers. When water moves too quickly over the landscape and into the sewers, they become overwhelmed and we get discharges of toxic sewage into our waterways. It is essential to think about the way water is managed in our garden spaces."

Tom Massey, designer of the RHS Resilient Garden, RHS Hampton Court Flower Festival 2023 and author of *The Resilient Garden* (Dorling Kindersley, 2023)

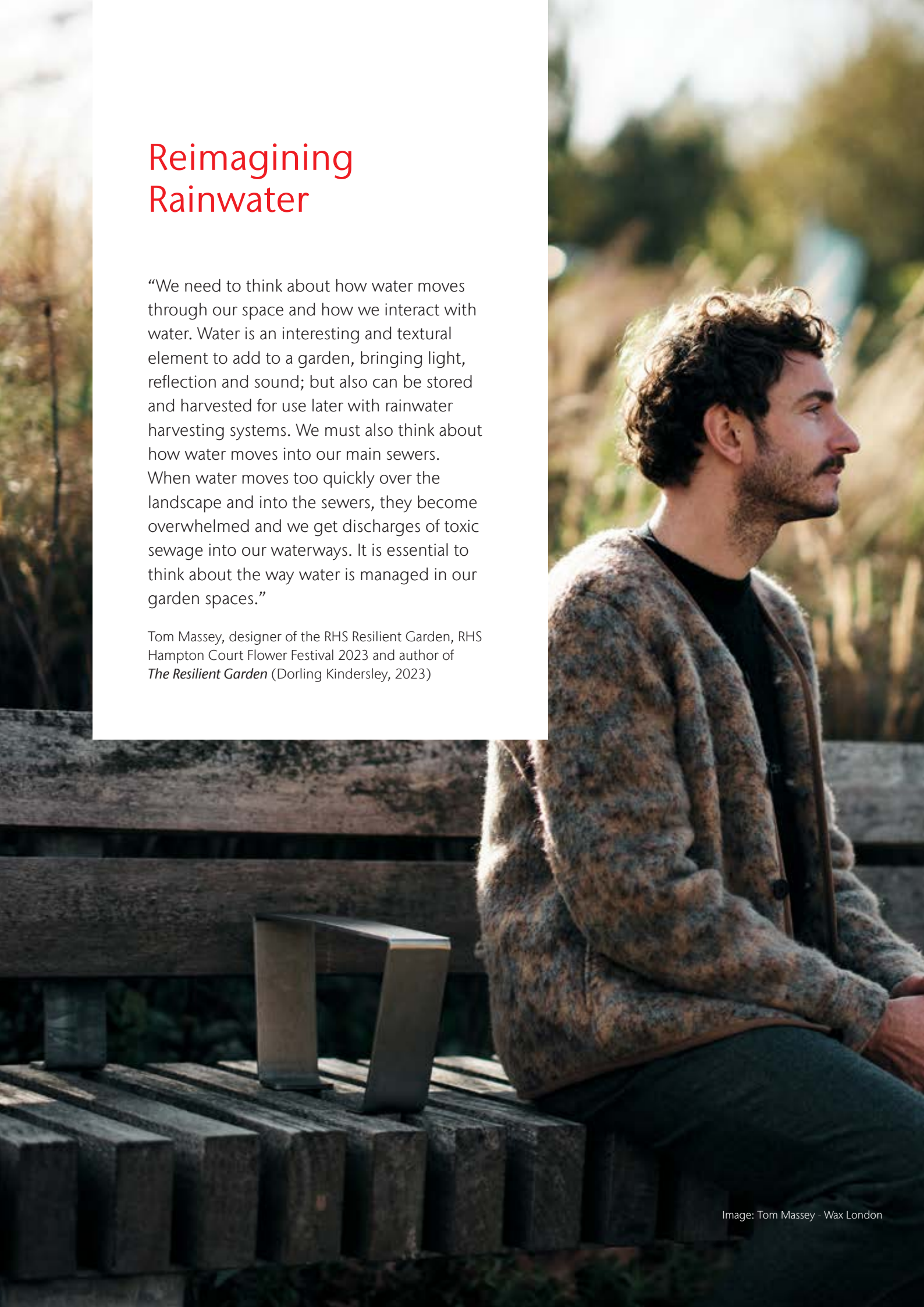

Image: Tom Massey - Wax London

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The sources of information and rationale for the calculations used in this booklet are available at www.aco.co.uk/water-talk

All calculates are estimates and are for illustrative purpose only. Every site is unique, therefore you are advised to consult the relevant design professional in relation to designing and installing domestic rainwater solutions in line with the relevant legislation.

Old-World Water Habits in Gardeners' New World

We talk about the quality and quantity of water in the news.
We talk about too little or too much water in our own homes.
We need to talk about water solutions, solutions that transform both our homes and the national water conversation.

Our Old-World Water Habits

Predictable and sustaining rainfall has evaporated from our gardens. Our skies have delivered boom-bust cycles of flood and drought, scorchers and freezers. Garden chatter is dominated by this concern. During 2022, a quarter of Monty Don's monthly columns in *Gardeners' World* magazine directly address the issue of our changing weather patterns.

However our actions lag behind our concerned talk. We still channel rainwater from our roofs, patios and drives down storm drains. This contributes to sewage overflowing into our rivers and seas more than 800 times a day last year. We use drinking-quality water in both our kitchens and gardens, yet by 2050, demand for drinking water will outstrip supply. Figure 1 shows annual rainwater runoff and drinking water use for an average property in London. Despite our experience of flood and drought, we continue to throw rainwater down the drain and drinking water on the garden (or the car).

New Water Habits for Gardeners' New World

We practice old-world water habits in Gardeners' New World of drought and flood. We can reimagine rainwater from expendable runoff to precious resource that we channel, store, enjoy, slow and disperse, using the power of plants and products. These solutions flow from one to another, starting at roof level when rain first lands, ending at ground level when rainwater leaves, and everything in-between. Only then will our homes and gardens be ready for Gardeners' New World.

Figure 1:
Annual property rainwater runoff and household external drinking use in London

	Property or household	Street	London
London property runoff	65,550 litres	4 million litres	241 billion litres
London household external drinking water use	11,000 litres	0.6 million litres	37 billion litres

Rainwater Runoff Basics

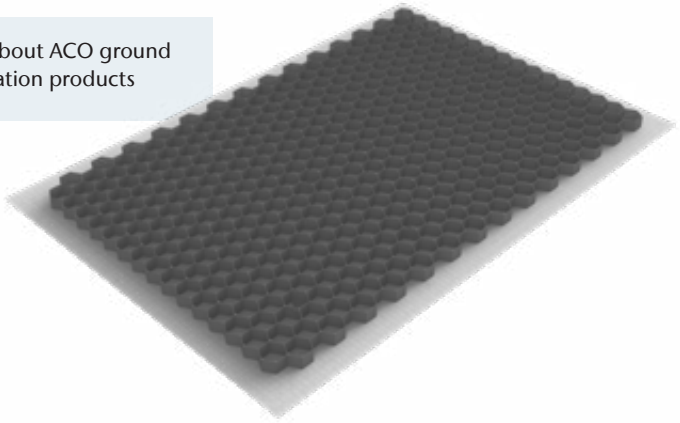
Our properties need impervious surfaces – surfaces that stop water penetrating to what lies beneath. We go to considerable effort and expense to make our roofs watertight and to channel rainwater runoff via gutters and downpipes away from our properties to avoid damage caused by damp, flooding and subsidance. This is particularly important at doorway and garage thresholds, where inadequate or non-existent drainage can result in a flooded home or garage.

Impervious Surfaces Seal Soil

However, every impervious surface seals the ground underneath from the rain. The more surfaces we seal over in our properties, the more runoff enters stormwater drains. Figure 1 shows what happens if we begin to scale up runoff from an individual London property to the whole city. This contributes to the flooding headlines that we read and even worse experience.

Therefore the most basic action we can take is to stop sealing over ground on our properties and even remove impermeable surfaces where we can. Permeable surfaces, such as gravel or grass, allow the rainwater to pass straight through into the absorbing soil below. ACO's ground stabilization products support this water-responsible option by locking in the gravel and supporting the grass, allowing easy access for everything from prams to SUVs. ACO GravelGuard with a built-in supportive membrane is ideal for pedestrianised areas, whereas stronger ACO GroundGuard is appropriate for trafficked areas. ACO BoarderGuard creates a stable boundary for both products against a flower bed or lawn.

Learn about ACO ground stabilisation products



If we imagine the ground around our properties as a gigantic sponge that can absorb and filter rainwater, then rainwater runoff basics demands we limit and even reduce the sealing over of rain-absorbing ground.

ACO GroundGuard for grass and gravel

Channel Water Collect and direct

We can reimagine our impervious surfaces into large catchment areas which allow us to channel rainwater into storage for reuse and for enjoyment in our gardens. So we use gutters, downpipes, channel drains, gullies and rills to direct rainwater to achieve these solutions.

ACO's Effective Channels

Rainwater runoff is no longer an inconvenient waste product to dispose of swiftly, but a precious resource to conserve and use responsibly. Furthermore by law we can no longer put rainwater down the drain or let it run off into the road – or flood a neighbour's property.

ACO manufactures a wide range of channel drains to provide effective drainage for different locations around the home:

- Doorway and garage thresholds
- Patios and paths
- Driveway entrances

Choosing Channels

Channels must be selected with sufficient depth and outlets to carry water from the area being drained. Both the channel and grating must be strong enough to support what travels over them, from prams to SUVs, or even bin lorries. ACO's free Design Service will support you to choose the correct channel and grating for your project.

Legislation alert

- For the legislation on dispersing rainwater from a property, see equivalent box on *Page 18.*

Stylish Finish

ACO's channels come with a wide range of slots and gratings so they complement the surrounding paved surface. Use ACO's online visualizer to see the impact of different gratings on a range of surrounding paving: a minimalist Slot; stylish Wedge Wire, sturdy Mosaic Heelguard or dependable Galvanised Grating.

Learn more about ACO's 'Complete the Look' grating range

Store Water Hold to reuse

Rainwater is a precious resource to collect and reuse in our gardens and homes. Storing can be as simple as putting a drip-trays under our pots, through self-watering planters, downpipe diverters/water butts to full-scale rainwater harvesting systems.

Staring into 'the Jaws of Death'

By 2050 demand for drinking water will outstrip supply. Longer periods of dry weather coupled with increasing population drives this. Sir James Bevan, head of the Environment agency, calls this 'the jaws of death – the point at which, unless we take action to change things, we will not have enough water to supply our needs.' To combat this, we can reduce our use of precious drinking water by using our stored rainwater to water the garden, wash the car and even, within our homes, to flush toilets and wash clothes. Figure 1 estimates a household's use of drinking water outside over a year.

Rain4Me Rainwater Harvesting

ACO's Rain4Me underground rainwater harvesting systems come in a range of different sizes, depending on your rainwater usage. They can be supplied with the necessary pump and attachments so the collected rainwater can be used in the garden during dry periods. If you are on a water meter, you will reduce your water bills.

Learn more about ACO's Rain4Me underground rainwater harvesting

ACO's Rain4Me underground rainwater harvesting systems

Mains2Rains

The RHS' Mains2Rains Campaign has excellent advice on garden water use.

Learn more about ACO's Mains2Rains campaign

There are many ways to store rainwater and use it wisely

Legislation alert

If you install a comprehensive rainwater harvesting system, you must notify your water company, ensure an air gap isolates the rainwater system from the mains drinking water and clearly identify pipes carrying rainwater

Enjoy Water Delight for all

We are all drawn to water, especially children: a trip to the seaside, pausing by a stream, sitting by a garden pond. We can channel rainwater through our ponds, slowing its path, to create enjoyable spaces for us and to encourage wildlife to visit. Channel drains, gullies and rills can direct rainwater from roof downpipes into rainwater ponds, combining functionality with high-end design and delight for all.

Biodiversity Decline

The built environment continues to erode the habitats of plants and animals, causing a catastrophic decline in biodiversity. Our gardens are therefore vital sanctuaries, particularly in our cities. Birds and amphibians can be our allies against less welcome visitors such as aphids, slugs and snails.

ACO produces a range of wildlife products to encourage visitors to take up permanent residence:

- Refuges with opening sizes that vary for different animals
- Bat boxes with textured internal wood surfaces for the bat to grip
- Nest boxes suitable for small garden birds like blue tits

The Bat and Nest Boxes have the unique feature of matching brick sizes. The front access panel allows periodic inspection and cleaning.

Learn more about the ACO Wildlife range

Record Our Biodiversity Haven

We can record the wildlife in our gardens and upload our observations to ACO's Habitat Matters website, sharing our findings to reveal our gardens as networks of biodiversity in our neighbourhoods.

Learn more about ACO's Habitat Matters

The Garden's Power to Protect Waterways

Our use of rainwater in our properties is connected to the sewage overflows that haunt the news. The rain we put down the drain contributes to raw sewage overflowing into our waterways.

Sewage Overflows and Our Homes

We have already seen that every time we seal over rain-absorbing ground, we generate runoff that flows on elsewhere. As we continue to seal over our gardens or build more houses for our increasing population, the volume of rainwater entering the sewerage system increases. Once in the sewers, much of this rainwater combines with waste water from our kitchens and bathrooms. As a result, the rainwater is contaminated and then needs to be treated at the sewerage works. Higher rainfall, as a result of climate change, makes the problem even worse. This is having a disastrous impact on aquatic life and human health for those taking to our waterways for recreation.

In 2022, the Environment Agency recorded on average 825 overflows per day of untreated sewage. It now only takes a small amount of rain before the sewerage system cannot cope and untreated sewage overflows into our watercourses (see Figure 2). Our rainwater habits at home connect to sewage overflows in the news.

Therefore, we need to keep rainwater out of the sewerage system and instead disperse it within the boundaries of our properties. Or if there is no alternative, we can slow its entry into the system to reduce the risk of overflows. The next two solutions demonstrate how we can use the power of our gardens to protect our waterways. So how do we choose whether to slow or disperse? It all depends on what lies beneath our gardens.

Figure 2:
Thames Water's online raw sewage overflow map.

During a dry spell (6th Feb 2023)

After light rainfall (25th March 2023)

Keep the Rain out of the Drain

If the soil is heavy with clay particles and the ground water level close to the surface, it is very difficult to disperse water into the ground using a soakaway. Furthermore soakaways must be constructed 5 metres away from your house and its boundary. Water seeping under your house's foundations (or your neighbour's) alters the soil structure and can cause subsidence, damp and other structural problems. In such situations, you can slow the water first and then direct it to a stormwater drain. These slowing solutions can be the only practical option when the property occupies the majority of the plot and so there is insufficient surrounding garden to disperse the rainwater runoff into.

Every property will vary in terms of the volume of rainwater runoff from roofs, patios, drives and other impermeable surfaces and the soil conditions that determine rainwater solutions. You should seek advice from the relevant design professional to ensure the solutions are appropriate for your property and adhere to current legislation. This may include digging a sized pit, filling it with water and then timing how long it takes to drain, which is called an infiltration test.

Resilient Garden Design. DK, © AVA CGI Ltd, 2023

Slow Water Brake to protect

If soil conditions prevent rainwater being dispersed within our gardens, we can slow the flow of rainwater through our properties. It then enters the stormwater system later on.

Create Holding Tanks

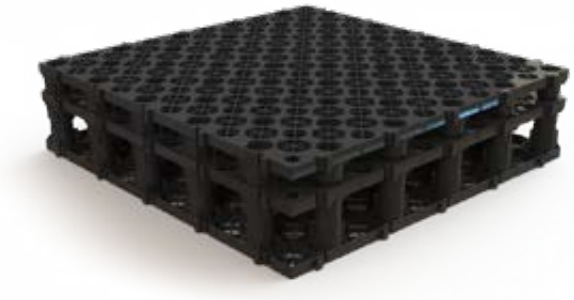
Green roofs and rainwater planters use the power of products and plants to break the flow of rainwater as it travels through our properties. At the heart of both systems is a reservoir that the rainwater flows into, fills up and from which is gradually released into the storm drain. Both systems include an overflow mechanism so that if the reservoir becomes completely full, the rainwater then flows directly into the drain.

Green roofs can even be constructed so that the water is held in the reservoir for subsequent use, e.g. for irrigation. Given this water is stored high up, it naturally flows down to ground level under gravity, and so don't usually require a pump

The plants and soil in these systems are additional rainwater breaks. The plants suck up the water and disperse it into the air around our homes, which also lowers the temperature in summer, turning planting into outside air conditioning. The additional planting enhances our homes and is a boost to pollinators. In the winter, the soil and planting provides an additional layer of insulation, like an extra blanket on the bed. Up to 50% of the rainwater can be dispersed in this way, depending on the time of year, the construction and slope of the green roof and its planting.

Holding Water with ACO RoofBloxx

ACO's RoofBloxx is a system of stackable modules that can be used to construct reservoirs for green roofs and rainwater planters. Even a relatively small-scale rainwater planter (1.2m wide, 0.6m deep, 1.2 m high) could slow rainwater off a 33m^2 roof over 60 minutes. Contact ACO's Design Service for advice on designing your green roof or rainwater planter.



Learn more about ACO Green roofs

Legislation alert

Some local authority planning departments are now only approving new flat roofs if they incorporate green roofs.

Disperse Water

Soak away to guard

The soil around our properties is like a gigantic sponge, absorbing rainwater from our roofs, patios and drives, so it does not go into the stormwater drain or onto the road.

We can channel rainwater off large areas like roofs into a large and sturdy underground chamber during a downpour, where it then disperses into the surrounding soil at a safe distance from the house or road (usually at minimum of 5 metres).

Soakaways with ACO StormBrixx

ACO StormBrixx are stackable and interlockable plastic crates that can be used to construct these underground chambers. Stormbrixx are strong enough to take the weight of the surrounding soil, but designed so that up to 95% of the space they occupy can be filled with water. The surrounding geotextile wrap keeps the soil from filling up the space and allows the rainwater out. Once the StormBrixx is covered over, you can enjoy your garden above, trusting that StormBrixx is dispersing rainwater into the ground. A roof with an area of 65m^2 requires a soakaway of approximately 1.3m^3, depending on site conditions. Contact ACO Design Service for soakaway advice.

Learn more about ACO StormBrixx

From ACO Channel to Rain Garden

For smaller areas such as drives and patios, we can channel rainwater into a rain garden, a dug-out depression filled with plants that thrive in both wet and dry conditions. ACO's range of fittings for its channel drains enable perforated pipe to be attached to the channel's outflow that can then snake away into the rain garden. Again the power of plants is harnessed to suck up and disperse rainwater from our properties, while producing beauty for us and a boost to pollinators. A 25m^2 paved area can be drained into a 5m^2 rain garden, excavated to a depth of 150mm.

Rain Garden with Crocosmia plants

Legislation alert

- Rainwater must first be dispersed on site, put into a watercourse and only as a last resort into a stormwater drain.
- At the front of a property, when a new drive is laid or an existing drive renovated and the area is more than 5m^2 (England and Wales) or 0m^2 (Scotland), rainwater must be dispersed onsite and not allowed to drain onto the pavement, path or road. Planning permission is required to put this rainwater into a stormwater drain.
- From 2024 in England (already law in Wales), if building work has drainage implications for 100m2 or more of impermeable surfaces, a sustainable drainage plan must be submitted for rainwater management.

- ACO Water Management Civils + Infrastructure
- ACO House & Garden
- ACO Building Drainage
- ACO Access
- ACO Sport
- ACO Wildlife

For ACO's free Design Service to help you create an integrated rainwater management solution for your property, phone 01462 810301 or email technical@aco.co.uk

ACO products are stocked by a wide range of builders' merchants across the country. For further advice on where to purchase ACO products, use the supplier stockiest feature at https://www.aco.co.uk/aco-water-management/stockist-search or you can phone 01462 810302 or email customersupport@aco.co.uk.

www.aco.co.uk/house-and-garden

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