

The specialist magazine for environmentally-aware planners, building contractors and investors



GRUND:
WASSER

*Need for
clarification*

Sustainable decentralised stormwater infiltration
with groundwater protection



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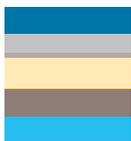
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*We must make clear today,
what we will live on
tomorrow*





Prof. Dr.-Ing. Carsten Dierkes

Prof. Dr. Carsten Dierkes has been working intensively with stormwater management for almost 15 years, primarily on aspects of pollutants in the urban water cycle and the effects of this. The hydrogeologist and graduate civil engineer has carried out multiple research projects at home and abroad on this subject with Prof. Geiger at the University of Essen. His projects were primarily in Australia and China with additional projects in France, Spain and Switzerland. Since 2001 he has managed two engineering offices in the field of research, development and investigation of decentralised stormwater treatment facilities. In addition to the development of products and methods, research projects were also carried out for public institutions such as the Ministry for Environment and Nature Conservation, Agriculture and Consumer Protection for North Rhine-Westphalia and the Bavarian State Office for the Environment, which targeted the impact of polluted stormwater on groundwater and surface water as well as the impact of climate change on urban drainage. Since 2011, Dierkes has been a professor of water management at the University of Applied Sciences in Frankfurt (Main). Prof. Dierkes is a member of the committee of experts on stormwater treatment for the Deutsches Institut für Bautechnik (DIBt), which issues general technical approvals for decentralised facilities for stormwater treatment and infiltration.

Germany is playing in the Champions League, at least when it comes to surface sealing. That is not something to be proud of. Climate change is causing longer dry periods and heavier rain events in the summer, local flooding is already daily on the agenda for many places. The urban climate is suffering from the dry, dusty air and the pollutants from the roads and car parks endanger surface water and groundwater in the long-term. Time is pressing on and important changes must be made. It is not just our pensions which are based on a generational contract but also ultimately the conservation of our water resources. It is therefore the task of those who have responsibility today to maintain the quality of life and the associated water resources for those who will pay into pensions in the future.

There is no doubt that we need public streets and car parking in our towns and cities. But why are we not surfacing these areas in a sustainable manner? The 1980s saw the appearance of the first circulation areas surfaced with water-permeable coverings. These were viewed with great scepticism. Do permeable paving surfaces open a path for pollutants to enter the groundwater? Do they quickly become clogged and can they actually be cleared again? Since 2000, work has been carried out on the dependability after initially mixed experience. Today there is a general construction approval from the Deutsches Institut für Bautechnik (DIBt) which confirms that approved surfaces protect the ground water and can be cleared. Dependability is the greatest priority. Modern, approved water-permeable paving is proven to protect groundwater, prevent local flooding, improve the urban climate and above all, is a complete, sustainable, state-of-the-art drainage system. They fulfil the highest design demands. And economically, they are the best alternative in urban drainage, being more cost-effective than any traditional type of drainage. This fulfils the intergenerational contract. We must all help design a future which is worth living. If we can save money in doing so, why have we been delaying it for so long?

With this in mind, this current magazine aims to educate and demonstrate to all responsible meaningful routes away from the water crisis.

Prof. Dr.-Ing. Carsten Dierkes

Every day in Germany an area the size of 90 football fields is sealed - around 75 hectares. The effect is alarming: the whole water balance is disrupted because precipitation can no longer naturally infiltrate into the earth. This can lead to both local flooding and to lowering the groundwater table. In addition to this, the drinking water supply is compromised by infiltrating pollutants. A lack of evaporation causes a hotter, drier climate in urban areas. Simply diverting the stormwater into the existing sewer system increasingly overwhelms the underground supply network and bodies of water. These systems already often reach their capacity limits when there is heavy rainfall.



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system increasingly overwhelms the underground supply network and bodies of water. These systems already often reach their capacity limits when there is heavy rainfall.

This situation will become even more dramatic in future in the light of expected climate change. All research indicates that the intensity of the summer rainfall in Germany will increase substantially. Solutions for handling stormwater which are more natural are therefore urgently required. This situation has also been recognised by legislators.



From the European Union to the Bundestag to municipal administration - laws are being ad-

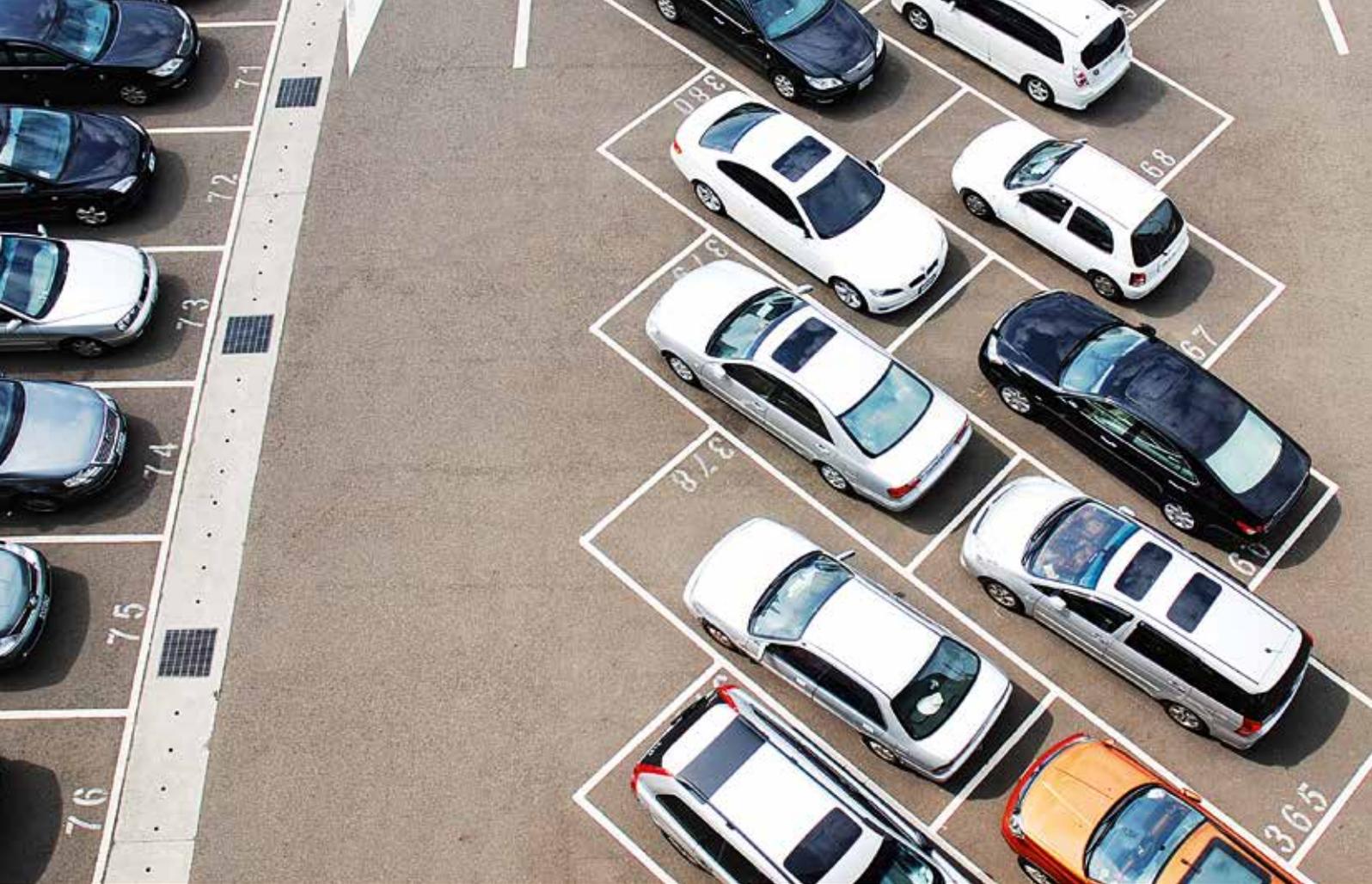
opted at all levels which require decentralised infiltration. However, when implementing this in practice the problem reveals itself in detail. This results from selecting the right technology, financial aspects and the demand for permeable surfaces to be designed with a suitable visual impact.

90 football fields:

That is the size of the area which is sealed each day in Germany – with dramatic consequences for the water balance. This results in a need for decentralised stormwater infiltration. However, attention should still be paid to ensuring that the groundwater is protected from harmful pollution.

Surface seal an





Desealing and groundwater protection

The legislators require not only giving priority to decentralised stormwater treatment and infiltration on site but also simultaneously demand that groundwater is protected from pollution. A few years ago the danger of simple infiltration without additional water protection, as was the requirement then, was recognised. Since then, a preventative measure has been included in the appropriate regulations: Pollutants from the rain and from traffic using the area must be reliably trapped and remo-

ved from the infiltrating water. This is the only way to guarantee the quality of the groundwater which frequently serves the drinking water demand of the population. Heavy metals appear to be particularly problematic. These arise from the abrasion of brake pads on the streets. However, tyre debris and pollution containing mineral oils also compromise the provision of clean drinking water. Desealing measures or other types of decentralised infiltration must therefore also always guarantee effective protection of the groundwater.

d urban climate



THIS MEANS: SAFER WATER PROTECTION FOR THE FUTURE



Stormwater should be able to infiltrate and evaporate decentrally for ecological and economic reasons, in order to limit disruption to the natural water cycle as far as possible. In doing so, the requirements regarding groundwater protection should also be taken into account: Extensive desealing measures can only be carried out once it is ensured that this basis for our drinking water supply will not be polluted.

The Water Management Act/Information sheet DWA-M 153 likewise states: Groundwater contamination is to be excluded, water and soil requirements must be taken into account. There are a number of further legal and technical provisions to be taken into account when planning and constructing facilities for decentralised stormwater treatment. In addition to water law provisions such as the EU Water Framework Directive and its national implementation with legal regulations and technical standards, requirements for road construction are of course also relevant.



Numerous pollutants can enter into the groundwater through infiltrating stormwater. In order to protect our drinking water supply, it is stipulated that these must be reliably trapped and removed.





The general technical approval confirms: the ECOSAVE protect branded paving systems are certified as “surface coverings for treatment and infiltration of stormwater runoff from circulation areas”.

It follows from these regulations that conventional water permeable paving systems are only permitted on circulation areas with low surface pollution and a low traffic load. They are not allowed on areas of medium and heavy use in order to protect the soil, groundwater and bodies of water

However, there are exceptions: The ECOSAVE protect brand includes three permeable paving systems which have received a general technical approval (GTA) from the Deutsches Institut für Bautechnik – DIBt – because it has an effective pollutant barrier. This approval, which is given for construction products/methods which have not been standardised, reliably indicates long-term functionality and protects those responsible from liability risks.

If circulation areas are to be designed with permeable surfacing, there are numerous legal and technical provisions to be taken into account, particularly regarding groundwater protection. The ECOSAVE protect paving system has been granted a general technical approval, which protects planners and building contractors from liability claims.



The problem of pollutants and its solution is clearly illustrated:

www.ecosave-protect.de

entirely different

Many paths to sustainable environmentally responsible surfacing

EVERYONE IS AGREED ABOUT THE AIM OF DECENTRALISED STORMWATER INFILTRATION OF CIRCULATION AREAS. THERE IS LESS AGREEMENT ON THE PATH TO THIS. VARIOUS SYSTEMS ARE USED WHICH ARE SUBSTANTIALLY DIFFERENT IN TERMS OF COSTS AND THE CONSTRUCTION EXPENSES AS WELL AS VISUAL IMPACT.

Options for decentralised stormwater treatment

In these the stormwater is directed straight into the soil through lawns, unsurfaced shoulders or water-permeable paving. This comes closest to natural infiltration, however it is not permitted in areas of heavy traffic – from 300 vehicles/24 hours, a tightening to 200 vehicles /24 hours is planned - due to the associated pollution discharge into the groundwater.

Swale Trench infiltration

This method directs the stormwater away from the covered area, collects it and directs it into the Swale French drain. It infiltrates through the troughs and active subsoil, is cleaned through this and infiltrates into the infiltration ditches in the soil after intermediate storage.



Shaft infiltration

If the stormwater cannot infiltrate into the soil or a cleaning system, pretreatment is required, for example in a decentralised soakaway treatment facility with DIBt approval. It is then discharged into a receiving water.



Infiltration and discharge into a receiving water via filtration channels

In this case a filtration channel with DIBt approval is used to clean the stormwater. The water is directed into the channel where it is cleaned through a built-in filter substrate. It is then directed to surface water via shafts and conduits or it infiltrates.



Surface infiltration via paving systems

The ECOSAVE protect permeable paving system has a sustainable, effective pollutant barrier for groundwater protection, which is validated by the general technical approval. This dispenses with the need for expensive facilities for pre-treating the stormwater and furthermore enables a visually appropriate design of the circulation area. A further advantage is the proven ability for regeneration. Full, long-term functionality is ensured through a special cleaning process



THE KEY WORDS ARE: ECOLOGY AND ECONOMY

ASSUMING COMPARABLE FUNCTIONALITY, ECONOMIC REASONS ARE GENERALLY DECISIVE WHEN CHOOSING BETWEEN DIFFERENT SYSTEMS. HOWEVER, THIS MUST TAKE INTO ACCOUNT NOT ONLY THE ONE-OFF INVESTMENT COSTS BUT ALSO THE LONG-TERM COSTS, FOR EXAMPLE THOSE NECESSARY FOR MAINTENANCE WORK.

Arcadis Deutschland GmbH carried out a study comparing the efficiency of various drainage and treatment methods frequently used in Germany. This was based on a car park with 107 parking spaces and an area of approx. 2.400 m² total area.



It compared:

Variant 0: The status quo: discharge of the stormwater into the public sewer system without pretreatment and surfacing with paving or asphalt.

Variant 1: Paving systems from the ECOSAVE protect brand.

Variant 2: Swale-French drain infiltration with cleaning of the stormwater in the active subsoil.

Variant 3: Pretreatment in decentralised shaft treatment facility and discharge into a receiving water.

Variant 4: Pretreatment in filtration channels and discharge into a receiving water.

The various variants were assessed, the investment and operation costs determined and the project costs calculated for an observation period of 50, 25 and 10 years.

The conclusion

Under the assumed average hydraulic and geological conditions, the ECOSAVE protect system with general construction approval represents the most cost-effective variant of stormwater treatment and infiltration. For overall efficiency, it is best to remove the surface covering, as further investment for drainage and stormwater treatment is no longer required. The operating costs are also relatively low in comparison.

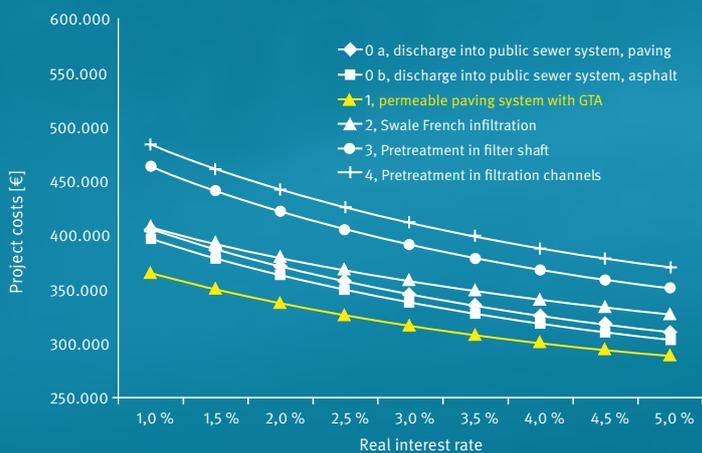
Assuming a stormwater fee of 1€/m², variant 0 (discharge into a public sewer system) is around 8% more expensive than surface infiltration.

With high charges, which can be expected in future, discharge into a public sewer system will in the long-term be around 25% more expensive than soil infiltration. The project costs for the “Swale Trench system” and “Shaft” variants are around 14-30% higher.

In terms of a non-monetary comparison, where drainage convenience, maintenance/operation, appearance, stormwater treatment and groundwater distance are taken into account, the surface sealing is assessed as good for all points and identified as comparable or better in comparison.



GOODS REASONS FOR ECOSAVE protect



- Can be used without verification procedures thanks to the general construction approval
- Saves expensive drainage planning, systems and costs
- Reduces or avoids costs for the expansion of the sewer system
- Prevents expensive damage resulting from soil sealing
- Enables exemption from stormwater fees
- Is eligible for subsidies for measures to desal surfaces
- Simplifies the approval processes and the official approval

We are happy to provide the results of the Arcadis efficiency investigation if requested.

OPEN SPACES DESIGNED FOR FUTURE GENERATIONS

Sustainability is always demanded today and this includes ecological, economic and social aspects. The ECOSAVE protect paving systems are suitable for these demands in every regard.

The paving systems are ecological because they allow stormwater to infiltrate on site and therefore promote the natural water cycle in towns and cities.

They are economic because they are the most cost-efficient way of dealing with rain – particularly in heavily used circulation areas, which must generally be surfaced. With ECOSAVE protect, no further treatment and no costly drainage systems are required. ECOSAVE protect paving systems have an effective pollutant barrier which protects the groundwater from pollution. In other systems this can lead to substantially higher costs.

Finally, it also corresponds with the requirement for social sustainability: thanks to the water permeability and simultaneous groundwater protection, the ECOSAVE protect makes an important contribution to guaranteeing the drinking water supply for future generations.

The ECOSAVE protect range with general technical approval is so versatile that it offers a suitable paving system for almost every area of application. The large selection of natural surfaces, formats and colours inspires creative design. As this does not require any drains to be planned and narrowed as usual, joints complying with the regulations can be constructed, offering clear advantages for the design and use. As an attractive, easily used environment contributes to quality of life, the ECOSAVE protect once again demonstrates its advantages in terms of sustainability.

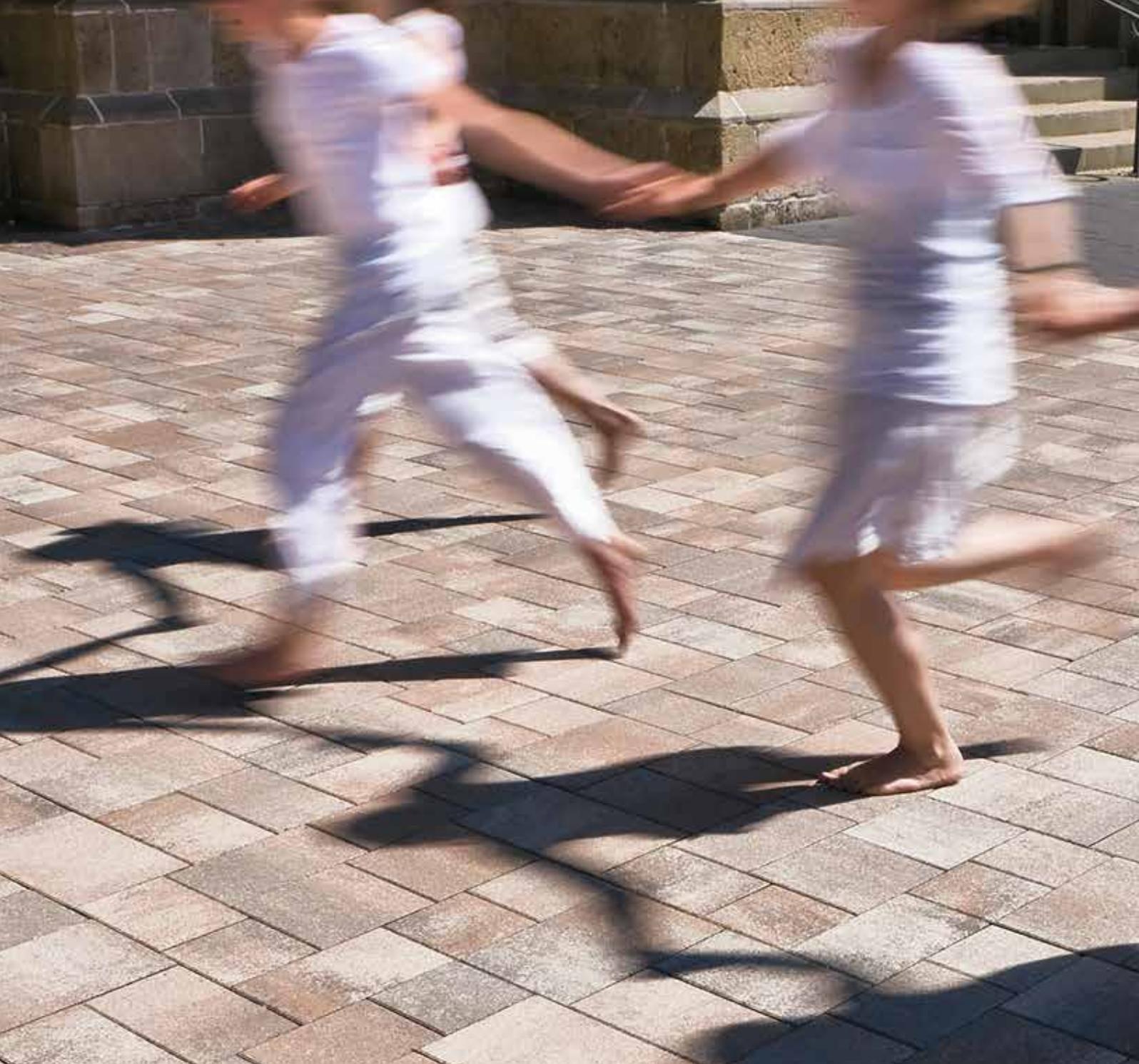
AND
THE
WINNER
IS...



ECOSAVE protect is nominated for the Greentec Award 2014 in the “Galileo Wissenspreis” category

The GreenTec Awards are Europe’s largest environmental and business award. Once a year they honour the most innovative green products, projects and environmental technology.

A subcategory is the Galileo Wissenspreis, which is presented for inventions and initiatives which design or help our life in our environment to be more harmonic and protect the environment. The focus is on inventions and ideas for a more sustainable and environmentally friendly lifestyle. Particular attention is paid to the connection between every day life, commitment and technology.



ECOSAVE[®]protect
Soil infiltration with groundwater protection

BRIGHT PROSPECTS FOR SUSTAINABLE DE- SIGN OF OPEN SPACES



With ECOSAVE protect, the pioneers of the permeable paving system present a comprehensive range of environmentally responsible solutions for almost every construction project - it has groundwater protection, is economic and offers the security of a general construction approval, is regenerable and has numerous variants for an appropriate, tailored appearance.

ECOSAVE protect complies with the environmental protection requirements and the current requirements for water protection as the paving systems guarantee stormwater infiltration with simultaneous pollutant trapping and removal. The systems fulfil the requirements for road construction and enable them to be used safely with type approval (GTA). This makes many new areas of use available to planners, building contractors and investors, including in terms of cost. ECOSAVE protect is efficient, economic and eligible for subsidies.

ECOSAVE protect – good for the environment

- blends into the new stormwater management
- reduces flooding and the subsequent costs
- promotes groundwater recharge
- supports the natural soil functions
- revives the microclimate of the urban area
- is regenerable and therefore environmentally responsible in the long term

ECOSAVE protect – sophisticated technology

- fulfils the high requirements of the German Regulations (ZTV Pflaster StB/TL Pflaster StB)
- the general technical approval guarantees maximum planning and execution reliability
- also offers solutions for circulation areas with heavy loads/ Bk 3.2 in accordance with RStO

ECOSAVE protect – versatile usage

- is available in three product lines Basic, Plus and Select
- offers a product design for demanding designs
- is versatile in terms of format, colouration, surface finish
- based on decades of experience and expertise
- is supported by comprehensive consultancy services



The ECOSAVE protect

Stormwater

It should infiltrate into the earth, however pollutants should be removed beforehand in order to protect the groundwater. It is primarily hydrocarbons and heavy metals such as copper and zinc from traffic use which must be reliably trapped and removed.

Paving areas with joints

These are either open pored and therefore permeable or dense and impermeable to water meaning the stormwater infiltrates through the joints.

Bedding

Together with the jointing material, this layer acts as a pollutant barrier. Paving stones, joints and bedding are therefore to be understood as a system according to the abZ. It only fulfils its functions if constructed according to the instructions.

Frost Protection / Base Course

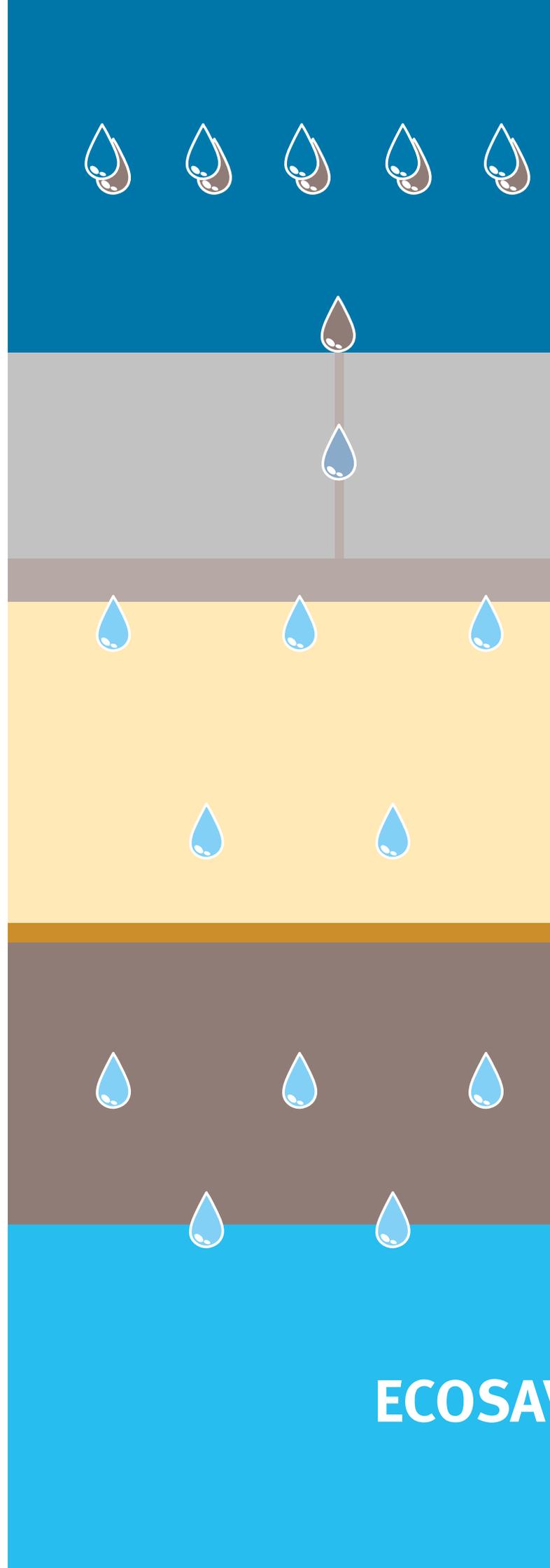
This concerns the weight-bearing structure of the surfacing. If the layers are sufficiently water permeable, the percolating water runs into the subsoil without delay or buildup.

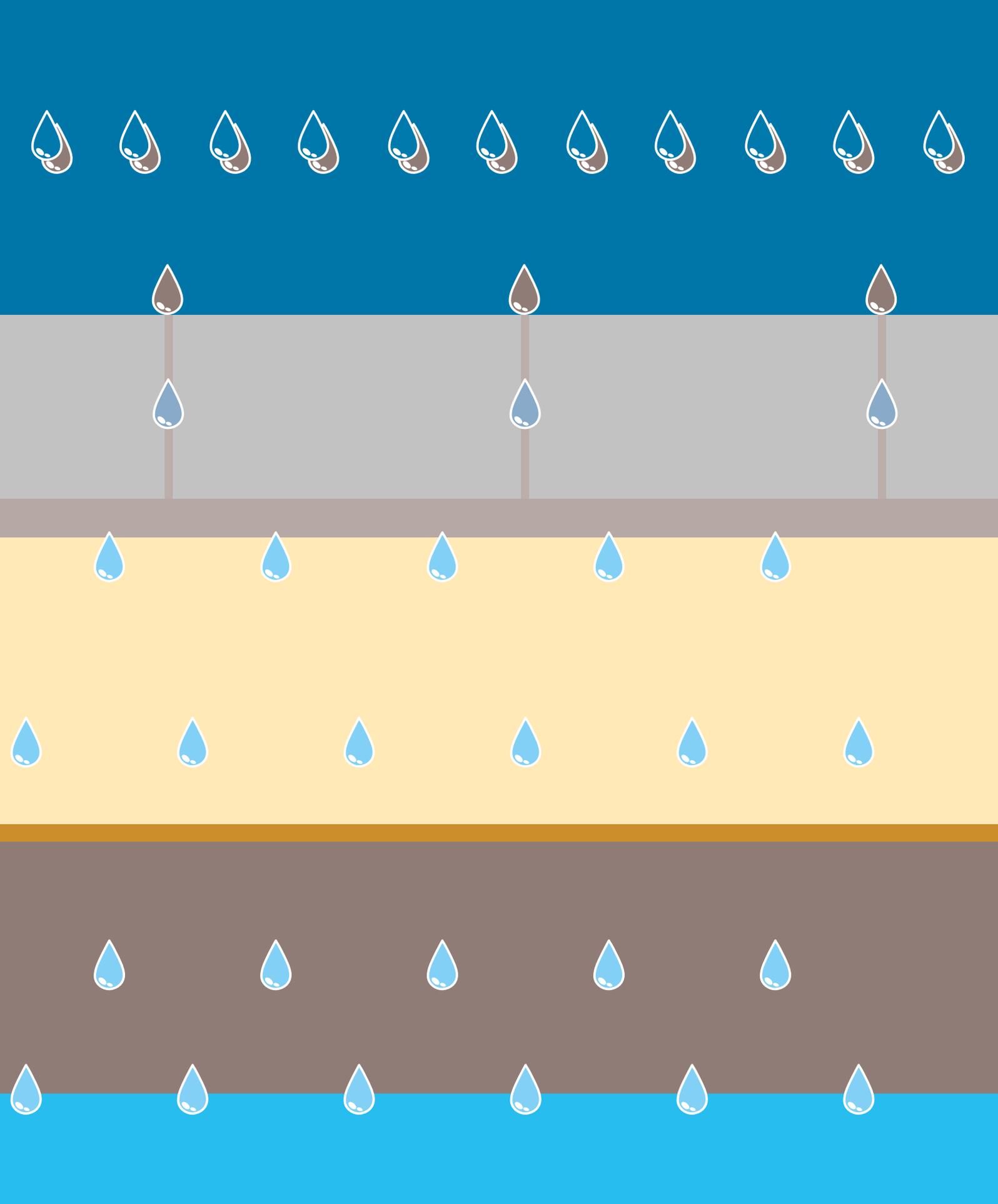
Substrate and substructure

Only when the soil in situ is water permeable can the paving system also fulfil its infiltration function. The k_f -range should be within $5,0 \times 10^{-6} < k_f < 3,0 \times 10^{-2}$ m/s. The permeability is proven in accordance with DIN 18130-1 or on site through infiltration tests

Groundwater

In contrast to other systems, a distance to the groundwater of only 1 m from the surface of the paving is sufficient for areas with ECOSAVE protect. This considerably extends where it can be used.





VE protect: open for the water balance

natural infiltration
and groundwater protection!



ECOSAVE[®]protect
Soil infiltration with groundwater protection

Three good
reasons:

Basic.
Plus.
Select.

Basic

GEOSTON protect – the basic solution for soil infiltration

GEOSTON protect is a no-fines concrete paving block in accordance with DIN 18507. The approved porous paving system offers the highest infiltration and evaporation performance. It enables the infiltration of the stormwater through its porous stone structure and the joints. GEOSTON protect is available in different colours, forms and stone thicknesses from 8 to 12 cm



GEOSTON protect: The water infiltrates directly through the open-pored stone structure and the joints.



Contents:
GEOSTON protect paving system
(optional jointing and bedding material)

Plus

DRAINSTON protect – an extra Plus thanks to the preinstalled canal system

DRAINSTON protect is a system made of densely jointed concrete paving blocks in accordance with DIN EN 1338 as well as special jointing and bedding material. The stormwater infiltrates via the joints and the integrated canal system in the stone flanks.

For the areas of highest traffic, DRAINSTON protect offers maximum planning and execution security with creative open spaces



DRAINSTON protect: The water infiltrates via the joints and the horizontal and vertical channels in the stone.



Contents:
DRAINSTON protect paving system,
jointing material, bedding material

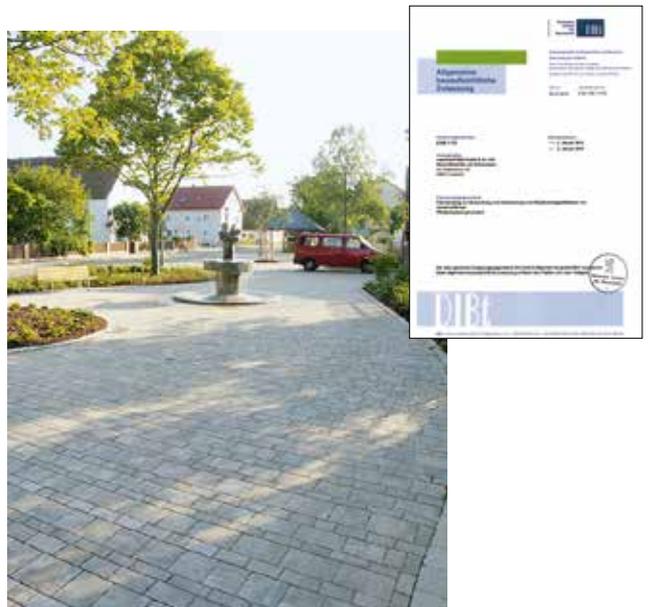
Select

gd protect – variety for creative ideas

The gd protect paving systems consist of dense concrete paving blocks in accordance with DIN EN 1338 and a special jointing material. The joints are at least 5 mm wide and with joints covering 5 to 10% of the area, this means that the stormwater reliably infiltrates. The diversity of the stone variants offered and the huge flexibility of the formats allows attractive, tailored design solutions



gd protect: The water only infiltrates through the joints



Contents:
gd protect paving system and jointing
material (bedding material optional)

A clearer understanding together: presenting the ECOSAVE protect initiative

With the expertise and experience of Godelmann and Klostermann, you not only benefit from sophisticated products but also from comprehensive consultancy services. We can provide intensive support for products with general construction approval if requested - from planning to execution and the later maintenance right up to cleaning. The fruitful partnership of the two family-run businesses also pays off in other areas. Useful synergies and the constant exchange of knowledge leads, for example, to successful developments such as the XXL large-sized panels, which introduce brilliant design options for planners.



Bernhard and Silvia Godelmann



Florian Klostermann

Time to act!

As a family company we are also responsible for our own children and for subsequent generations. It is for this reason alone that we act consistently in the interests of environmental protection. As pioneers, Godelmann and Klostermann have been influencing the development of ecologically sustainable surfacing for over three decades.

In close cooperation with science and research, both companies pro-actively dedicated themselves to this topic at an early stage and developed innovative, practice-oriented solutions. In the future we will continue to face up to the growing demands: clean groundwater and thereby make a contribution to guaranteeing the secure supply of drinking water for future generations

Leading environmentally responsible surfacing for 30 years

1984

The concrete factory partner presented water permeable surface coverings which they have developed in house for the first time.

The 1980s

The problems of pollution in the infiltration were recognised early on: pollutants such as mineral oils and heavy metals find their way into the soil and ground water through stormwater runoff.

1990

The established, permeable GEOSTON paving system was modified. The result was a two-layered stone construction with fine pored decorative concrete for the retention of pollutant.

1992

The first research into the retention of mineral oils was carried out on GEOSTON type no-fines paving coverings.

1997

A pilot project on a car park in the town of Stadtlohn confirmed the pollutant retention with a ten year old surface covering.

1998

The bedding and jointing material for the pollutant reserve were incorporated - recommendations for the permeable paving construction for the treatment of polluted stormwater runoff were developed.

2001

GEOCLEANING (cleaning procedure for restoring the permeability) and GEOCONSULT (pedological investigations and consultations as services) were introduced.

2002

A report was created for the GEOSTON paving stone types and published as a proof of suitability for a construction type.

2003

An application for the granting of a general technical approval for the GEOSTON type surface covering was submitted to the German Institute for Structural Engineering (DIBt).

2006

The DIBt granted the approval.

2013

The ECOSAVE protect product line is extended with the DRAINSTON protect and gd protect paving systems. Both systems have general technical approval and serve as a facility for handling stormwater runoff from traffic areas.



ECOSAVE[®] protect

Soil infiltration with groundwater protection

**Now you can do the right things
both ecologically and economically!**

Need more information?
Talk to us about your specific
construction project.

www.ecosave-protect.de

ECOSAVE protect is an innovative from



KLOSTERMANN



GODELMANN

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GODELMANN and KLOSTERMANN work together as a network of companies and develop groundbreaking concrete systems for the design of open spaces. The focus is on the transfer of ideas, knowledge and technology. An alliance of expertise and creativity and a strong partnership for select quality and products available nationwide.