

Answers to climate change: the sponge city principle

What does climate change mean for our cities and the people who live in them? Weather phenomena such as torrential rain or extreme heat are increasing. Wherever roads are asphalted and plots of land are developed, water is unable to find natural drainage routes. In heavy rain, drainage systems reach capacity with increased frequency and then overflow. And on hot summer days the air quality in the city becomes unbearable. What is to be done? Berlin's Schumacher Quartier is taking a different approach. The residential buildings and open spaces on the grounds of the decommissioned Tegel Airport are being planned on the sponge city model. The Quartier is becoming Berlin's reference project for urban development that is adapted to the climate and sensitive to its water needs.

A sponge city retains rainwater within the residential estate. During hot spells it evaporates and thereby cools the residential district without additional energy expenditure. Surplus water seeps slowly into the groundwater instead of being drained off by the sewage system. Keeping rainwater in the Quartier brings several advantages:

The sponge city principle in the Schumacher Quartier

- improves the micro-climate and enhances the quality of life
- reduces drainage costs
- supports biodiversity through spacious and open areas that are rich in species
- protects Berlin's stretches of waters against inputs of oxygen-depleting nutrients, since waste water from the drainage system during heavy rains overflows less frequently and flows into natural bodies of water.

The Schumacher Quartier is being developed in the western section of the Kurt-Schumacher-Platz. With more than 5,000 homes and the associated social infrastructure the Quartier provides space for more than 10,000 people. Innovative concepts for transport and the power supply reduce the creation of greenhouse gases and make the new district a model project for a climate-neutral city neighborhood.

Master Plan for Rainwater and Adaptation to Heat

An urban development plan that is adapted to the climate and sensitive to water needs goes a step beyond. It prepares the Schumacher Quartier for the climate challenges of the future. The basis for this is the "Master Plan for Rainwater and Adaptation to Heat", published in November 2017. The objectives of water-sensitive urban development and a city adapted to heat can also be found in the 2011 urban development plan "Berlin's Climate" and in the Berlin Senate's 2016 urban development plan "Specifically Climate". In the Schumacher Quartier they are the basis for the construction of an entire residential district.

For the Master Plan, first of all a calculation was made of the area required for receiving, collecting, evaporating and distributing rainwater. In addition, another crucial factor is the precise arrangement and gradients of those areas. Further to this, a balance must be found with numerous other requirements, for footpaths and bike paths, for instance, and for the designing of the residential buildings. Since it is a car-free urban district, the Schumacher Quartier has no parking spaces on its streets - these are available in Quartier parking garages on the outskirts of the district. Instead, space is provided in the streets for areas where rainwater can evaporate and leach into the ground. And in addition more greenery is brought into the district.

Water management according to the cascade model

In the Schumacher Quartier the management of rainwater follows the cascade principle. Water is stored on several levels and then retained so that as much as possible evaporates. Plants play an important role here. Their leaves increase the surface area for evaporation and cool their environment naturally.

First of all, in accordance with the cascade principle plants are used to turn most roof surfaces into "green roofs". The roofs then become water reservoirs. Next, surplus water from roofs and development areas runs off into the open spaces of the Quartier and into evaporation and retention areas in the inner courtyards of the buildings. Here, incidentally, retention means rainwater retention. There should not be any areas where there is standing water for any lengthy period. This is why areas for evaporation and retention are planted with trees or other green plants. If the rainfall continues to increase, the water finally flows into seepage troughs and from there into the ground.

With water management the Schumacher Quartier profits from its comprehensive concept of open space. In the Quartier and its environs there will be around 30 hectares of public green spaces, playgrounds and city squares.

According to the master plan the Schumacher Quartier will be undrained. This means that it is largely disconnected from the central drainage system.

Heat adaptation through greening and wellness locations

In addition to water-sensitive urban development, adaptation to climate is a central planning principle for the Schumacher Quartier. Several methods are employed for this: Greening, evaporation, solar shading, solar heat reflection, ventilation, and configuration of places to relax.

The rainwater management already described ensures cooling via water evaporation and retention areas. Green planted facades - especially on the south-facing sides of houses - further reduce the heating up of exterior walls and at the same time ensure cooling through



evaporation. Providing shade, firstly solar protection equipment such as blinds and roller shutters on buildings, as well as trees in squares and open spaces.

The albedo effect will be used in the Schumacher Quartier to reflect solar heat. Light and smooth materials reflect solar radiation more strongly than dark and rough surfaces. Buildings with surfaces that have a high albedo value heat up less rapidly and store heat to a lesser degree.

Rural space as a source of fresh air

At night cold air will flow unobstructed into the Schumacher Quartier from the more than 200 hectares of the rural space at Tegel and ventilate the residential district. The Landscape Park has been designed as a transition area so that it does not form a barrier. This is aided by patches of woodland and trees with high branches, for example. Fresh air can flow from the Landscape Park through the garden belt and the Quartier Park to the densely built-up Kurt-Schumacher-Platz. The centrally located Quartier Park has itself a compensating effect on the temperature. It supplies the Quartier with cool air via a green strip, a second garden belt and the network of paths.

Shady spots where people can feel comfortable will provide opportunities to get away from it all and relax, and where on days of extremely high temperatures there are places to sit and spend good quality time.