CASE STUDY

01: Arkadien Winnenden

Introduction:

Arkadien Winnenden is located in Winnenden, about 20 km northeast of the city of Stuttgart.
The Zipfelbach River flows from the east side of the community. The site is an abandoned factory. Up to 95% of the impervious surface and heavily polluted soil make the area's planning very important to the relationship with the river. By changing the original surface properties, repairing contaminated soil, and using the system's low-impact development facilities, it greatly promotes the retention, infiltration and purification of rainwater, creating a comfortable and pleasant microclimate environment, and restoring the natural water cycle of the site.

In the Wennendeng community, various low-impact development facilities form a complete system, and rainwater infiltration facilities such as green roofs and pervious pavements collect rainwater and merge them into open channels or grass ditch, which are then transported to sinking green spaces around the building. Or large-scale bioretention ponds in the center of the group for purification and treatment. The treated rainwater is eventually discharged into the Zipfelbach River on the east side and into the river system of the area. This approach allows stormwater runoff to be transmitted throughout the stormwater management network.

Building:

Stone swale: Arranged under the rainwater pipe. A considerable part of the vegetation in the plantation is also planted and maintained by the residents themselves. This will trap some of the rainwater, and the excess rainwater will spill directly into the grass or water storage facilities.

Property:

Rain garden: A number of short-formed piles of natural form are scattered throughout the green space, which can be used to record changes in water levels and enhance the participation and interest of rainwater facilities.

Pervius pavement: In the community, the pavement are paved with pervious asphalt, and the sidewalks also use pervious bricks and recycled granite, successfully reducing the impervious surface from 95% to only 50%.

Street:

Open channel: The community mainly uses open channels to transport rainwater. The open channel section is a gentle parabolic shape paved with small stones. It is mainly placed on the side of the road and under the rainwater pipe of the residential building. The surface runoff is infiltrated through the gap of the open channel stone. The texture of the material is different from the road, which plays a role in distinguishing the type of road and indicating the direction of the road.

Open space:

Artificial Lake: Provides a beautiful landscape for the community, as well as rainwater runoff from other low-impact development facilities in the community, which is the main area for rainwater storage. Rainwater treated by artificial lakes can be used for waterscape construction, greenland irrigation and car washing in the community.

Rainwater management is carried out through a series of low-impact development facilities. The proportion of impervious surfaces in the site is reduced from 95% to 30%, and the retention capacity is about 850m3. All rainwater will be naturally purified and some will be purified by artificial equipment. 90% of the stormwater runoff is consumed within the community rather than entering the municipal pipeline, thus reducing the pressure on the construction of the municipal network.

02: Kronsberg Ecological Community

Introduction:

The Kongsberg community is located in the southeastern part of Hannover, the capital of Sachsen, Germany, 9 km from the city centre. The planned total area is 150 hectares, providing 6,000 housing units for 15,000 residents. The community is built with high ecological standards. At present, 63 hectares have been built in the first phase. Its scale and facilities are equivalent to a complete community, including three kindergartens and one Primary school, a middle school, a church and a medical center.
In the early 1990s, housing demand in Hanover was extremely urgent. The Kongsberg area takes advantage of the new concept of housing construction. The construction of the community follows the requirements of regional planning, and works closely with Hanover's planning, environment, water, roads and other departments to develop residential buildings along the public rail transit lines to create sustainable neighborhood relationships.

Building:

Green roof: The building adopts the method of roof greening, and some of them adopt the form of sloping roof, which can well store rainwater and delay the ineffective loss of rainwater.

Water storage: 12~30m wide sunken lawn.It also combines local stone, vegetation and trails to create a richer landscape.

Property:

Lawn:

Rrain garden: In the center of the block, a rain garden is arranged, with a width of 25~35 meters. It is usually used as a space for rest. During the rainfall, the runoff from the block is collected for infiltration and purification.

Parking:

Perious pavement: Increase surface water permeability and reduce runoff. Surface runoff that exceeds the amount of seepage through the permeable floor will collect into the nearby permeable zone indicating the ditch.

Street:

Grass ditch: The grass ditch is about 30~40 cm deep and is arranged along the side or sides of the main and secondary trunk roads of the community between the parking belt and the sidewalk. It can quickly collect rainwater runoff from roads and plots, and then purify and flow to water storage facilities, greatly improving the quality of living environment and water use efficiency.

Open space:

Rainwater Greenway: 12~30m wide rainwater greenway that can penetrate rainwater, control runoff and flow rate, and also serve as a large public space and linear green corridor in the community.

Large rainwater retention area: It is planted with local weeds and trees. It can be used as a park green space, and the overall landscape is full of original natural atmosphere. When it rains, it can accommodate rainwater from the community to avoid internal disasters.

The Kongsberg community developed the design through low-impact systems. The community's runoff after development was maintained at 19mm, close to 14mm before development, and the rainwater was completely eliminated within the community.
At the same time, the rainwater management concept of low-impact development has also enabled community residents to have a more acute understanding of the ecological concepts promoted by the community through a series of visualized facilities, and promoted the coordination between residents and the environment.