



LOCAL SUSTAINABILITY

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Mosbach, Germany

Ecological drainage process

Integration of Environmental Criteria in the municipal contract award process

Short Description

Mosbach is located in the rural area of Neckartal and over the last few years has experienced a high demand for building land. For the 19 ha development area *Waldsteige-West II*, the building specifications contained a number of ecological stipulations and objectives that follow a holistic planning philosophy. These criteria applied even in *the earliest planning stages*. In the fields of drainage planning and road construction, a close degree of co-operation between municipal politicians, engineers, tradesman and all the other people involved is particularly important. The use of a so-called modified separation system, road surfaces that allow seepage and various other methods aimed at open rainwater drainage in the sense of a holistic concept for the utilisation of rainwater have given Mosbach a great deal of experience in the area of seepage and drainage systems. These systems are so exemplary that the town regularly receives regular international visitors interested in inspecting how the systems work.

Map



Town Portrait: <ul style="list-style-type: none"> • Number of residents: 5,300 • Municipal Area: 6224 ha 	Profile of the local economy: <ul style="list-style-type: none"> • Small and medium-sized businesses, • Service industries and public administration 	Environmental activities: <ul style="list-style-type: none"> • Ecological town marketing
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Background - Information And Goals

City marketing is how Mosbach describes its concept for municipal development based on soft location factors such as nature, culture and community. This concept was first formulated in writing by the municipal council in July 1999, however, in this case practice was well ahead of theory: For instance, Mosbach has practised various municipal ecological activities in the environmental area for many years, all of which follow the same guideline: implementing the objectives of Agenda 21, the resolution document of the Earth Summit in Rio de Janeiro (1992), on a local level.

In order to comply with the ecological goals as well as the technical requirements of the land improvements for *Waldsteige-West II*, the seepage rate for the areas to be developed was to be high and rainwater was to be collected efficiently so that it would be possible to recycle it and eventually drain it away separately. The almost double expense of two completely separate wastewater systems was reduced by means of the so-called modified separation system, in which both pipes run in the same trench and are fed into the same shaft. Besides this, the municipal council offers private households advice on installing cisterns for collecting rainwater. Retention basins and ponds, planting vegetation on trenches, installing rough channels (limestone gravel layers), basin trenches (special gravel trenches) and the use of single grade concrete pavers (a material with a seepage rate of 1,500 l/s ha) for roads and cycle paths round off the nature-friendly drainage concept.

Environment Friendly Contract Award Process

Strategy:

1. Prerequisites: As the development area is situated in a water protection zone IIIb, high demands were placed on protecting the ground water table. The intention was to renew ground water reserves by increasing the rate of seepage, while a system of open rainwater drainage would prevent the danger of flooding.
2. Planning: In line with the municipal council resolution concerning social and ecological planning, the administration and the municipal specialist commission developed a performance specification. The decisive planning principles for the area of water drainage were as follows: avoidance and reduction of sealed surfaces, opening up sealed surfaces, reducing the flow of water in drainage systems.
An interdisciplinary working group (engineers, town planners, water resources management specialists, etc.) developed an implementation concept that was used to form the basis of the development plan.
3. Consultancy: A qualified municipal staff member was given the full-time job of monitoring building specifications, advising private owners of building land and keeping the water-permeable pavers clean.

Measures, Activities:

- No water-bonded coverings were used for roads and paths, as the seepage capacity decreases with increased compression loads. Instead, single-grade concrete pavers were used that allow the water to seep away due to the percentage of large pores. The road surface material was also required to have the necessary degree of stability and load-bearing capacity.
- A particularly strong layer of gravel was used beneath the pavers, which balances out the low water retention capacity of the substratum through increased seepage properties.

In this way, 90% of the rainwater can seep away; a separate drainage system ensures that the water is drained away if the rain is particularly heavy.

- Wastewater and rainwater are drained via a separate sewage system, i.e. only the contaminated wastewater is fed to the sewage treatment plant, while rainwater is permitted to seep away or can be fed to ponds, streams etc. The calculable expenses that would have been almost double those of a traditional combined sewage system were reduced by means of a so-called "modified separation system" in which both drainage systems are laid on top of each other in the same trench and lead to a common shaft.
- Basin trenches were constructed for open water drainage. These are gravel filled trenches with a high water retention capacity in which the top surface is formed as a basin and planted with vegetation.
- Rough channels that imitate the natural bed of a stream in form and vegetation are a further aesthetic landscaping element that allow water to seep away and drain openly.
- Ponds are used as collecting basins for openly drained water. This allows the water to seep away and evaporate and at the same time the vegetated areas provide nearby residents with a leisure and relaxation area: in this way water becomes part of the living environment.

This drainage concept is supplemented by the stipulation that private house builders have to use pavers that allow the water to seep away as well as by advice and recommendations to install cisterns and utilise the collected rainwater (e.g. for flushing toilets). 80% of the building applications follow this recommendation, something that considerably relieves the wastewater system.

Partner

The implementation of this innovative drainage plan and the introduction of a modified separation system were developed in co-operation with the BioPlan engineering office.

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Legal Framework, Awarding Public Contracts

As the Mosbach example illustrates, ecological procurement is not just characterised by choosing environment friendly products such as the pavers that allow the rainwater to seep away, but also by the development of innovative concepts for rainwater utilisation and drainage.

As an example, the following is a segment from the performance description for road construction as part of the development work:

E.g.:Extract from the performance description for road construction:

Item: Sub-base:

Point 4.0.004: Delivery and construction of a ballast sub-base as a combined frost protection sub-base. When the material used is in place it must not have more than 4% fine particles < 0.063 mm in its total thickness (see. ZTVT StG 86, point 2.1.5.3.1, 2nd paragraph). The coefficient of permeability must be at least $K > 2 \cdot 10 \text{ m/s}$. Thickness for roads and parking spaces: 35-50 cm. Modulus of resilience E_{v2} , on the surface, at least 120 MN/m^2 . (...)

Item: Pavers, slabs, kerbs, gutters:

Point 6.0.005: Delivery and sealing of concrete pavers with quality standards in compliance with DIN 18501, water and air permeable, frost resistant and salt resistant. Shape (...), colour (...). Laid in a bonded fashion. Compression strength at least 60 N/mm^2 , water permeability 1500 l/s ha. The pavers must be laid in the gravel bed stipulated in Item (...). A rough grade aggregate should be brushed into the joints, the joints should be brushed clean and, if possible during dry weather, the pavers should be compressed with a suitable rubber roller vibrator from the outside to the middle until they have adequate stability. Finally, the joints should be filled by brushing in fine aggregate. The manufacturer's instructions for laying must be complied with. (...)

Cash and Other Resources

It would not have been possible to finance the development of a building zone with a very high standard of urban planning within the normal municipal financial budget. The municipality received the necessary co-funding through the housing focus programme from the Baden-Württemberg state government.

Approximately DM 100,000 operating costs per year are saved through the more effective drainage system and the lower wastewater treatment costs.

Results and Effects

Mosbach's drainage concept illustrates that an urban planning model, the procurement of environment friendly products and a well thought out concept of greenbelt setting can combine several goals, in particular a higher level of identification of the inhabitants of the region with their living environment. In future this concept will be applied to other areas (adapted to local conditions). It was also pleasing to see the high acceptance ratio of the area's inhabitants. For instance, approx. 80% of private landowners chose to install a rainwater utilisation facility.

But the most outstanding result of this new planning concept is the rate of natural seepage of more than 90% of the rainwater that certainly would be hard to beat.

Limits and Conflicts

In addition to the time consuming consultations and discussions in the municipal council, the large number of participants (land owners, companies commissioned with the work, authorities, committees, residents etc.) was also a hurdle that does not have quite the same level of effect in other areas of procurement. The task of convincing all those involved was decisive for the success of the project: a full-time well-qualified consultant and controller in the building phase who was available to private land owners as well as the construction companies commissioned by the town was also vital to the success.

Correct maintenance of the pavers that have to be rinsed every few years with high-pressure cleaners prevents the pores of the pavers from becoming blocked and reducing the seepage capacity. Effectively persuading residents to keep the pavers clean will also contribute towards reducing the maintenance requirements for the pavers.

Lessons learned from the Project and its transferability

The special commitment of the Bioplan engineering office in Sinsheim in developing the modified separation system greatly contributed to the success of this drainage concept that was implemented for the first time in Mosbach.

Now that the ecological housing estate has proved to be a complete success in spite of initial reserves, further ecological housing areas are to be created in Mosbach: the inter-municipal technology park is currently being developed according to the criteria that were developed for Waldsteige West II; two other housing estates are already in the planning stage. Besides the subject of water, these estates will focus on innovative technologies for ecological energy supply.

Further Information

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