

Handling of drainage-system water from private sites

The discharge of site and drainage-system water into the public sewer network is expressly prohibited in the majority of waste-water regulations in North Rhine-Westphalia. In many municipalities there are, nonetheless, numerous such drainage connections. How, then, should this issue be handled at local level? A guideline drafted by the IKT and the NRW Municipal Agency (KommunalAgenturNRW) provides orientation.

There can be a range of reasons for connected water-drainage systems. It may be, for example, that a drainage system was actually intended only for the construction phase, but then remained connected "just to be on the safe side". Or the drainage system might have been installed despite the ban on permanent drainage. Leaking building sewer laterals and site sewer laterals can also act as drainage systems. Why do the municipalities prohibit the discharge of ground and drainage-system water, and why is drainage-system water discharged, despite the ban?



Illegal drainage system connection to a public sewer
source: Municipality Möhnesee

Entirely divergent interests are obviously at work here. The "Handling of drainage-system water from private sites - Pragmatic conceptual solutions and aids to argumentation" guideline provides an aid to orientation concerning how a system operator can make his strategic decision for the handling of drainage water and justify it to citizens, politicians and supervisory authorities in a substantiated manner. This aid has been drafted by the IKT - Institute for Underground Infrastructure and the NRW Municipal Agency at the initiative of and in co-operation with the Detmold regional government.

Possible problems caused by drainage water Interflow water, confined water or seepage water and, where groundwater tables are high, also groundwater, can ingress, as "drainage-system water", from private sites into a sewer network. Discharge of drainage water into the public sewage or combined drain/sewer system has in many cases been tolerated in the past, despite the fact that it is generally not permitted under municipal waste-water regulations. Groundwater and drainage water becomes "extraneous water" as soon as it enters a sewer system. It is not possible to state a global limit, as from which extraneous water run-off becomes a problem for a specific area. The reason is that this depends on a range of different factors, such as the hydraulic capacities of the network and the treatment plant, and the capabilities of the sewage treatment facilities affected.

Particularly in areas with high water tables, the extraneous water content in the public sewer



system can rise as a result of the discharge of drainage-system water, and cause problems such as the following:

- There may be more frequent overloads for sewer conduits and pumping stations.
- The discharge of drainage-system water dilutes and cools the sewage. This can impair the cleaning performance of the sewage treatment plants and endanger environmental water by overloading such plants and rainwater ponds. Elevated carry-over of pollutants into environmental water may be the result if no countermeasures are implemented.
- There may also be a significant increase in the operating costs for sewage collection and treatment (e.g. cleaning). In many cases, the sewage charge may be increased, or exemption from a sewage charge sacrificed.

In the future, the increase in heavy rainfall events as a consequence of climate-change, causing further burdens on systems, will also exacerbate this situation.

Drainage for the protection of man-made structures must, on the other hand, be set against this (DIN 4095). Drainage systems are intended for temporary collection and removal of any slope interflow, confined water or seepage

water below the site datum surface, in order, in combination with the building's sealing system, to prevent damp damage to buildings. The question of where the water can be routed should be examined on building-law and water-law criteria during the planning and dimensioning work on the drainage system.

In each individual case, there are frequently conflicts of interest between the following factors when examining drainage systems:

- Protection of buildings (drainage systems against damp in basements);
- Assuredness of supply (protection of drinking water, as a necessary resource, from ground-water and river water);
- Assuredness of disposal (correct and assured functioning of the overall drainage/sewer system);
- Protection of environmental water (avoidance of high frequencies of discharge into environmental water at storm-water overflow structures, adherence to permissible burden levels in the case of discharge flows from treatment plants and overflow structures);
- Avoidance of soil pollution (prevention of overflows into the drainage systems from combined and/or sewage systems)

Guideline as an aid to orientation

The question of how a municipality should handle drainage systems in a specific area is coming increasingly into the foreground. The problems examined above provide the reasons for this.



Drainage systems are intended to protect against damp in basements

The reduction of extraneous water in sewage systems and thus, ultimately, indirectly the handling of drainage systems, is also anchored in the range of provisions for implementation of the Water Framework Directive. The focus in this context is, in particular, on plant and system safety, and on the reduction of pollution of environmental water due to the discharge of sewage. In addition, this topic is also under discussion in connection with the tightness testing of private sewage installations. It has, in the past, been perfectly normal practice to connect drainage systems to the public sewer system, despite the fact that discharge of drainage-system water was generally prohibited by waste-water regulations. It must, for this reason, be assumed that successive investigations of public site sewer laterals and private sewage lines will reveal a large number of water-drainage system connections.

There will never be universally applicable procedures for the handling of drainage systems, since pragmatic conceptual solutions are required to take account of the commensurateness of the provisions, against the background of local boundary conditions. The IKT - Institute

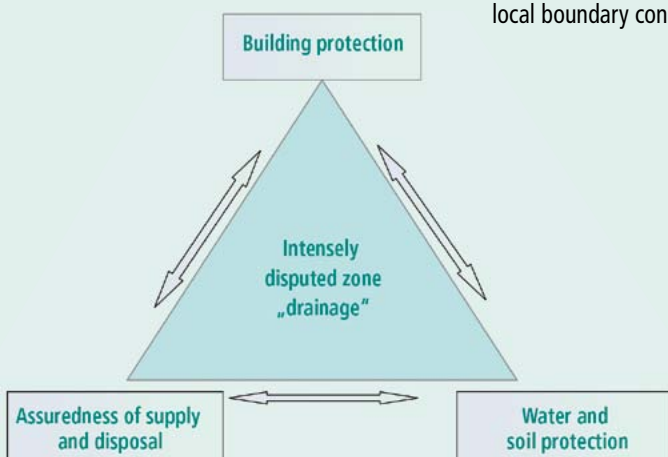
for Underground Infrastructure and the NRW Municipal Agency therefore drafted the "Handling of drainage-system water from private sites - Pragmatic conceptual solutions and aids to argumentation" guideline on the initiative and in co-operation with the Detmold regional government, in order to provide municipalities and system operators with an aid to orientation.

This guideline is intended as an instrument to support municipal system operators in their practical work. The involvement of a group of municipal system operators ensures the practical relevance of the guideline. An expert workshop assured the incorporation of further arguments and conceptual solutions. In addition, all the regional governments of NRW were included in the relevant discussion. The project was funded by the environment ministry of the state of North Rhine-Westphalia (MKULNV). This guideline is available for download on the state environment agency's homepage (www.lanuv.nrw.de/wasser/abwasser/forschung/kanal.htm, German version only)

Contents of the guideline

The guideline provides notes, suggestions and examples for the assessment of the drainage-system water situation. It outlines ideas for solutions, and also methods of assessing and selecting suitable pragmatic provisions, and supplies aids to argumentation to support the implementation of a strategic decision once taken. The guideline also includes notes on the manner and handling of communications with the various target groups, and is thus intended to achieve greater acceptance for the planned provisions at both the citizen's and at local political level, and facilitate in advance the dialogue to be conducted with the supervisory authorities.

The emphasis in this guideline is on its practical benefits for the user. It therefore includes "tools", such as check-lists for assessment of the drainage-system water situation, detailed specimen scenarios, and a "question/answer" list to improve argumentation. These tools assist the system operator in orientation concerning the handling of drainage-system water, but leave him the necessary discretion to take into account the individual situation in the particular area (e.g. hydrology, demography, regulations, overall drainage system).



The intensely disputed zone of water-drainage systems

The guideline is orientated around the following processing phases:

- Assessment of the drainage-system water situation and of the need for action
- Definition of aims and taking of a strategic decision
- Identification and evaluation of ideas for solutions
- Drafting of an argumentation list specific to the particular municipality
- Establishment of a communication strategy for the process as a whole

The user can start at the corresponding processing stage in the guideline, depending on the particular application and the progress already made in processing. The most important "Guiding principles for handling of drainage systems", which have been derived from discussion and interchange between the municipalities, experts and NRW regional governments involved in the project, are also included.

"Tools" included in the guideline

The guideline for action and the tools make it possible to take individual account of the specific situations and aims of the municipalities. The guideline is intended to make tackling of the subject of "Handling of drainage-system water from private sites" easier for system operators. It provides them with a system for the holistic examination and evaluation of existing problems

and for the delineation of a pragmatic solution embedded in the necessary independent (municipal) strategic decision.

The guideline contains the following working aids:

- **Drainage-system water situation**
A list of questions - with suggestions for possible answers - can be used to estimate the extent to which there is a need for action regarding the reduction of drainage-system water within the municipal territory or a part thereof, and those solution options which can be excluded as a result of specific boundary conditions. The concluding assessment can be made only by the municipality itself, against the background of the current situation and anticipated developments.
- **Definition of aims**
Once the municipality has provided itself with an overview of the drainage water situation and any resulting need for action, it can then define overall targets and strategies for its entire municipal territory and/or individual districts of it. The main emphases (water-management targets, environmental aspects, official requirements) can be extremely diverse. Costs, the various interests, and the acceptance of decisions concerning the handling of drainage systems and integration of the procedure into an overall water-management concept must all be taken

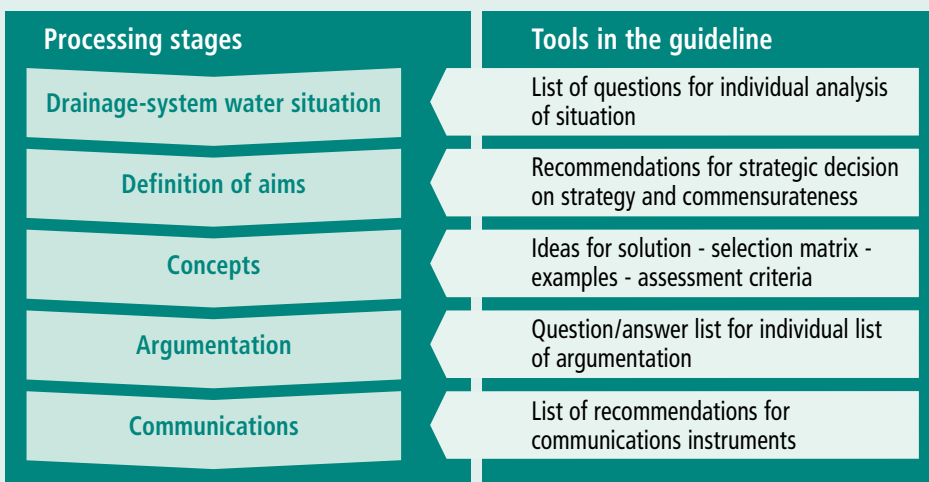
into account in any examination of commensurateness. Corresponding recommendations are compiled in the guideline. The target-definition phase concludes with the strategic decision for handling of drainage systems.

● Concepts

On a holistic view, the influence of drainage-system water on the overall sewer and drainage system is of importance - from the place of occurrence up to and including discharge into environmental water.

Due to the interactions between the individual elements, conceptual solutions for drainage-system water can start at various points in the overall system: at a building, in the sewage/drainage-system water facilities sector, and at special installations, such as pumping stations, rainwater ponds and treatment plants. The provisions adopted for a particular planning zone may be extremely diverse, depending on local boundary conditions and objectives, and may range from (1.) tolerance and retention of the current situation, via (2.) provisions for stopping of existing discharges of drainage water into the sewage system (e.g. disconnection of drainage systems and retrospective sealing-off of the existing buildings), (3.) prevention of new discharges of drainage water (e.g. via construction only of impermeable-concrete structures in new development zones), (4.) provision of an alternative receiver for the drainage water (by means of construction of a new main water drain, for example), up to and including (5.) expansion and/or uprating of the above-mentioned special facilities as a supporting measure or - in an absolutely exceptional case - as an end-of-pipe solution.

The guideline provides, depending on the connected drainage-system situation in the existing buildings, a selection matrix which outlines the range of options and evaluates them on the basis of various criteria, such as ecology, cost-efficiency, technical feasibility, public acceptance, legal aspects and prospects of success. Selected solutions already implemented in practice are described in detail and awarded grades in specimen scenarios.



The content of and tools included in the guideline

Argumentation:

The implementation and acceptance of the concept selected are furthered by means of knowledgeable and broadly based argumentation. The guideline therefore includes a list of question and answers, plus notes, which provide orientation for the municipality in communicating its need for action, its concept and its strategic decision to local politicians and citizens, in particular. This "fund" of material can be used by the municipalities to compile an individual list of arguments, covering the aspects of ecology/environmental protection, operation, building-safety/health, cost-efficiency/financing, feasibility/acceptance and legal/supervisory-authority requirements.

Communications:

One important precondition for project success is that politicians, supervisory authorities and citizens all support the municipality's strategic decision. The involvement of all parties is necessary at an early stage to achieve this. In addition, an uninterrupted flow of information must be assured throughout the process. The communications strategies listed in the guideline provide assistance in selecting the correct mode and scope of communication for each particular target group.

Guiding principles for handling of drainage systems

The following guiding principles for handling of drainage systems stated here in abbreviated form are a result of the project and are derived from the project discussions. They provide municipalities in NRW with orientation concerning the implementation of applicable legal requirements via pragmatic conceptual solutions.

● Ecology/environmental protection

1. Alterations to the aquifer should be avoided wherever possible. Exceptions may be permissible if conflicts of utilisation would otherwise result.
2. In order to avoid the above-mentioned problems, drainage-system water from private sites should, as a matter of principle, never be discharged into public or private sewage systems.

3. End-of-pipe and/or plant-technology solutions (modifications to rainwater-treatment facilities, pumping stations or treatment plants) should always be the absolute exception, since it will remain necessary to collect the entire extraneous water and, where necessary, pump and treat it.

● Operation

4. The handling of drainage systems should be viewed differently in the context of new and of existing buildings (connection to rainwater, combined sewer and purely sewerage systems). Exceptions involving the continued use of existing drainage-system connections (in case of potential damp damage to buildings) may be appropriate in the existing range of buildings in individual cases.
5. Provided the sewage system is otherwise operated in accordance with the generally recognised rules of technology and there is no other need for action (elevated amounts of extraneous water, for example), the municipality can decide on its own responsibility how it wishes to deal with drainage-system water discharges.
6. Where there are problems with extraneous water and/or where the sewage system does not conform to the generally recognised rules of technology, there is need for action from the viewpoint of the supervisory authorities.
7. In areas of heavy extraneous water concentrations, drainage systems should be diverted and alternatives created if there is otherwise a danger of damp damage to buildings or the problem could simply shift to other system elements.
8. In areas other than extraneous water territories, the municipality should take the decision concerning handling of existing drainage systems within the framework of its strategic decision for the specific area. Corresponding provisions should be incorporated into the municipal waste-water regulations (Article 7, Para. 2, No. 11 of the specimen regulations).

9. The handling of drainage systems in many cases necessitates differing strategic decisions for individual municipal districts, depending on local boundary conditions such as hydrology, demography, regulations, drainage/sewage system as a whole, for example.

● Building protection/health

10. Holistic concepts, including approaches which take account of anticipated future developments, are recommendable, in order to make allowance for the effects of planned provisions on (for example) the groundwater table and existing buildings.
11. Wherever possible, the status quo concerning the groundwater table should be retained, with consideration of building protection/health.

● Cost-efficiency/financing

12. Drainage-system water as an element in extraneous water causes costs. Every municipality should consider, and decide within the political sphere, how such costs are to be apportioned in future (using the "causer-pays" principle, if appropriate).

● Feasibility/acceptance

13. Burden measurements and observations are always recommendable for assessment of the extraneous water/drainage-system water situation. Where these indicate that specified concentration data requirements have been achieved contrary to the state-of-the-art practice as a result of dilution, there is, even for this reason alone, a need for action. The investigation results will then provide a firm basis for argumentation to the relevant political personages that the municipality needs to take action.

14. The handling of drainage systems is a controversial subject in the intensely disputed zone of building protection/assuredness of supply and disposal/protection of environmental water and the soil, and one in which the financial and actual commensurateness of various alternative solutions must be verified.

● Law

15. Where there is a need for action (in case, for example, of non-adherence to official requirements, hydraulic problems, damp problems), the subject of drainage systems must be tackled, even irrespective of tightness testing of private sewage systems.

● Strategic decision/higher-level target for solution options

16. A strategic decision which includes a holistic concept for the rehabilitation of smaller sub-areas should be preferred over a solution concept which is aimed at a large area but does not permanently and sustainably solve the problems.

The series of discussions and interchanges of experience which took place with the participating municipalities, the experts and the representatives of the regional governments in NRW in the context of this project demonstrated that there is, in principle, a requirement for a standard implementation procedure, without intervening in the individual decisions that form part of the mandatory discretion of the supervisory authority. In addition, freedom of decision, taking due account of local conditions, continues to reside with the municipality in question.

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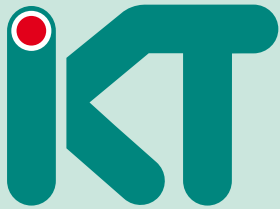
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IKT - Institute for Underground Infrastructure

ABOUT IKT



IKT - Institute for Underground Infrastructure is a research, consultancy and testing institute specialized in the field of sewers. It is neutral and independent and operates on a non-profit basis. It is oriented towards practical applications and works on issues surrounding underground pipe construction. Its key focus is centred on sewage systems. IKT provides scientifically backed analysis and advice.

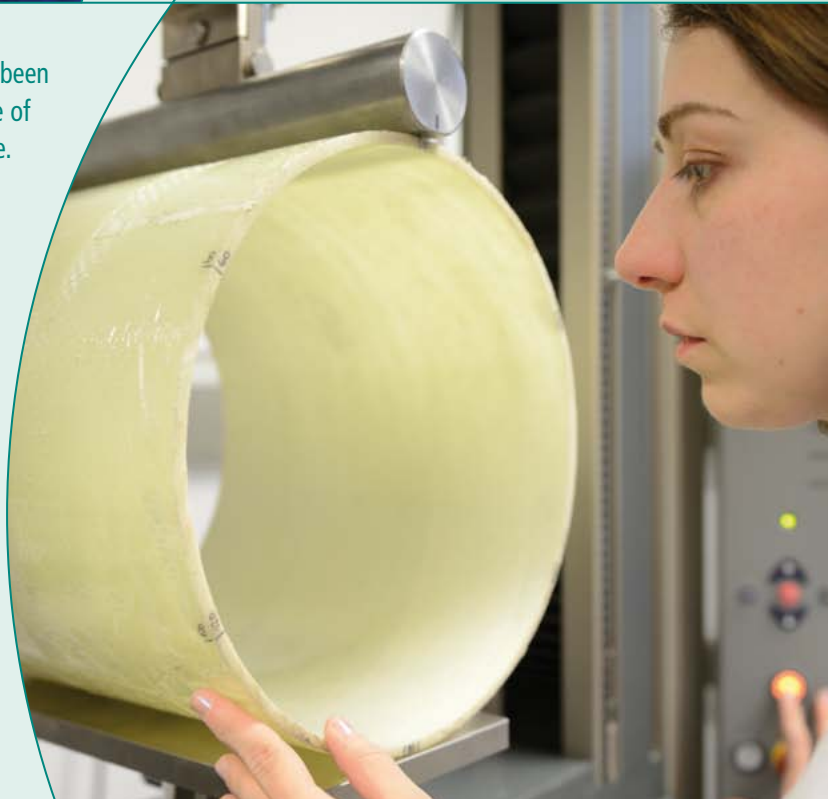
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However, IKT is not owned by the Government. Its owners are two associations which are again non-profit organizations of their own:

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