# Infiltration tightness at materials changeover and transition points



Is it possible to repair damage like this infiltration-proof?

Comparative investigations performed at material changeover points are to be used to draft independent and impartial information on the infiltration tightness, installation and operational quality of repair procedures for sewer laterals. The refurbishing of such laterals is, in practice, frequently performed in conjunction with the refurbishing of main sewers, by means, for example, of CIPP liners, and this application is therefore of particular interest for comparative tests and analyses. Large-scale tests on a 1:1 scale are planned.

Essential acceptance criteria for "infiltration tightness" have already been evolved, and an informationally useful and practically orientated test programme for comparative tests at material changeover and transition points drafted, during an initial phase of this research project.

#### Project title

"Analyses of infiltration tightness at material changeover/transition points for support of development work; Phase II: Comparative analyses at material changeover and transition points"

#### **Project management**

IKT - Institute for Underground Infrastructure

#### **Project participants**

Institute of Hydrosciences, Water Resources Management and Resources Engineering, University of the German Federal Armed Forces, Munich

#### Client

Ministry for Climate Protection, Environment, Agriculture, Nature Conservation and Consumer Protection of the German State of North Rhine-Westphalia (MKULNV)

#### **Contacts**

Martin Liebscher

Dipl.-Ing.

T: +49 (0) 209 17806-23

E: liebscher@ikt.de

Markus Gillar

Dipl.-Ing.

T: +49 (0) 209 17806-6-46

E: gillar@ikt.de

### Optimising sewer cleaning



The target: Flushing only when it's necessary!

The first phase of this project has examined the extent to which cleaning intervals can be extended, efficiency improved and savings generated, using synergies between the organisation of cleaning activities and modern technology. Field tests were undertaken at a Ruhr University Bochum sewer site and expert workshops and discussions with operators were organised at IKT.

The influence of gradient, fluctuation in run-off, time of year, time of day and ingress of mineral burdens, are now to be studied in a second phase, to determine further potential savings.

Selected sewer network operators are to be provided with support to implement the findings in order to optimise the benefits of this research.

The key output from the project will be a recommendation for action which will assist and support sewer network operators in the implementation of optimising sewer cleaning strategies, exploiting synergies and realising potential savings.

#### Project title

"Investigations into optimising sewer cleaning — Phase II"

#### **Project management**

University of Bochum, Chair of Urban Water Management and Environmental Engineering

#### **Project participants**

IKT - Institute for Underground Infrastructure

#### Client

Ministry for Climate Protection, Environment, Agriculture, Nature Conservation and Consumer Protection of the German State of North Rhine-Westphalia (MKULNV)

#### **Contacts**

• Markus Treinen

M.Sc.

T: +49 (0) 209 17806-26

E: treinen@ikt.de

Serdar Ulutas

Dipl.-Ing. (FH), MBA

T: +49 (0) 209 17806-32

E: ulutas@ikt.de

# Installation, operation and maintenance of central water-drainage systems

Groundwater management in the Emscher region has increasingly gained in importance in recent years in view, in particular, of rises in the groundwater table caused by drain/sewer refurbishing projects and the influence of mining activities. Such rises in the groundwater table can result in widespread



effects on structures and sites in the affected region, and thus harbour significant potentials for conflicts. It may therefore be necessary, depending on the local (and, in particular, on the local hydrogeological) situation to limit the upward movement of the groundwater table.

So-called "central drainage systems" are one solution option which is in use for groundwater management in the Emscher region. These are installed at a corresponding depth in the soil and assure maintenance of a "zero-conflict" groundwater table across a large area, after refurbishing of the public drain/sewer system.

There is, at present, a need for determination of the extent to which certain factors (such as ochering, depositions and root infiltration, for example) critically influence service-lives and maintenance requirements, and the engineering and operational provisions necessary to assure the long-term functioning of such systems. The aim of this study is that of providing a well-founded overview of practical experience in this field, defining the current state-of-the-art, and

publicising the latest scientific discoveries. Analogous experience from construction and operation, and also from the regeneration and refurbishing of wells, and of horizontal wells, in particular, are also to be analysed and evaluated in the context of this study.

#### Project title

"The installation, operation and maintenance of central water-drainage systems — Practical experience, state-of-the-art, and scientific findings (study)"

#### **Project management**

IKT - Institute for Underground Infrastructure

#### **Project participants**

Bieske und Partner Beratende Ingenieure GmbH (Prof. Dr. habil. Christoph Treskatis) engineering consultancy

#### Client

Emschergenossenschaft/Lippeverband water authorities

#### Contact

Thomas Brüggemann Dipl.-Ing

T: +49 (0) 209 17806-18

E: brueggeman@ikt.de

### Root intrusion into wastewater sewers - passive preventative measures



Pipe joint exhibiting severe root intrusion

Measures to prevent root intrusion into waste-water conduits, drains/sewers and manholes are to be assessed and recommendations for action derived to assist engineering consultancies involved in the planning of networks.

The IKT has researched the fundamental relationships between root growth and underground infrastructure in a number of research projects, and has been involved in the drafting of the (German-language) standard, "Trees, underground conduits and drains/sewers" (published in German as DWA M 162, DVGW GW 125 and FGSV No. 939).

The project is being managed and coordinated by the Water Research Centre (WRc), of the United Kingdom, with support from IKT - Institute for Underground Infrastructure.

#### Project title

"Root intrusion into waste-water conduits — passive preventative measures (Tree Root Barriers to Protect Sewer

#### **Project management**

WRc plc - Water Research Centre, Swindon (UK)

#### **Project participants**

IKT - Institute for Underground Infrastructure

#### Client

Four British sewer-system operators

#### Contact

Christoph Bennerscheidt Dipl.-Ing.

T: +49 (0) 209 17806-25 E: bennerscheidt@ikt.de

## Effects of sewer sealing on treatment plants and water balance

The effects of high extraneouswater influxes on the following are to be investigated:



- waste-water treatment performance
- treatment-plant energy balance
- the burden on the water environment caused by combined sewer overflow systems

The costs caused by extraneous water are to be compared against the costs for refurbishing of sewers and site-drainage pipes. The sustainability of the refurbishing materials and methods used are also to be examined.

Possible problems for buildings and vegetation caused by rises in the water table as a result of sewer sealing projects are also to be recorded. The data and information determined will be verified in practice in a specific municipality.

The aim of this research project is to draft proposals for refurbishing requirements, which can then be used by the decision-making bodies as a basis for the redrafting of the Waste Water Ordinance.

#### Project title

"Sewer sealing: Effects on treatment-plant cleaning performance and on the local water balance"

#### **Project management**

IKT - Institute for Underground Infrastructure

#### **Project participants**

- Pirker + Pfeiffer Ingenieure GmbH & Co. KG, Münsingen consultant engineers
- University of Bochum, Institute of Environmental Engineering and Building Ecology
- University of the German Federal Armed Forces, Munich,
  Institute of Hydrosciences, Sanitary Engineering and
  Waste Management
- University of the German Federal Armed Forces, Munich,
  Institute of Hydrosciences, Water Resources Management
  and Resources Engineering

#### Client

Federal German Environmental Agency (UBA)

#### Contact

Thomas Brüggemann Dipl.-Ing.

T: +49 (0) 209 17806-18 E: brueggemann@ikt.de

### Root-proof pipe bedding systems



How can root intrusion be prevented?

A test system was created within the framework of Sub-Project I, "Planting of large trees with an underground test system (root trenches) in Osnabrück", in order to investigate various bedding materials for their effects on the regeneration of tree roots.

Sub-Project II is now pursuing two aims:

- the creation of rehabilitation zones to create optimum growth conditions for the roots of large trees.
- studies of a structurally optimised lava-based substrate with a view to its more extensive use for rainwater storage.

#### Project title

"Environmentally safe sewer construction by means of rootresistant pipe bedding — Part II: Creation of rehabilitation zones with an underground test system (root trenches) around the large trees planted, at the Osnabrück location"

#### **Project management**



Pipe joint exhibiting severe root infiltration

IKT - Institute for Underground Infrastructure

#### **Project participants**

- Funke Kunststoffe GmbH
- Humberg Metall- und Kunstguss GmbH
- Opitz International GmbH & Co. KG
- Osnabrücker ServiceBetrieb
- Dipl.-Ing. Klaus Schröder
- Stadtwerke Osnabrück AG (municipal utility)
- Peter Stockreiter GmbH & Co. KG
- Dr. Markus Streckenbach (expert consultancy for urban vegetation)
- VulkaTec Riebensahm GmbH

#### Client

German Federal Environmental Foundation (DBU)

#### Contact

Christoph Bennerscheidt Dipl.-Ing.

T: +49 (0) 209 17806-25 E: bennerscheidt@ikt.de