



THE STORMWATER EXPERTS
INGENIEURGESELLSCHAFT
PROF. DR. SIEKER MBH

Stormwater Management Strategies in Berlin

Dr. Heiko Sieker

Linköping, 8th March 2005



Consulting company IPS

- Specialized on Urban Water Management
 - Engineering Design & Master planning
 - Applied research
 - Software development
 - Invention (Patents)
 - Education (Seminars, Books)
- Manager:
 - Prof. Dr. Friedhelm Sieker, Hannover
 - Dr. Heiko Sieker, Berlin
- Staff (12)
 - Civil engineers
 - Environmental engineers
 - Geographers

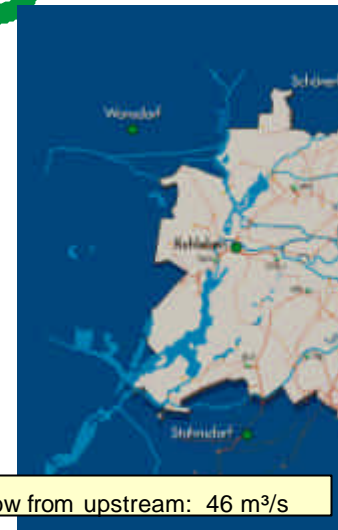


Berlin

• Politics	
• Capital of Germany	
• Federal State	
• Municipality	
• Area:	900 km ²
• Inhabitants	3.4 Million
• Climate	
• Temperature in August	23° (38°)
• Temperature in January	-3° (-21°)
• Precipitation	600 mm/year
• Design storm (1 year, 15min)	115 l/(s ha) 10.3 mm



Berlin's Water System

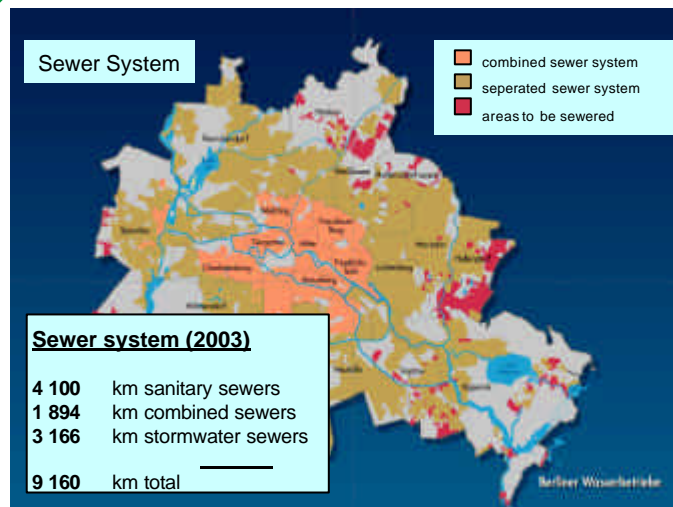


Mean Inflow from upstream: 46 m³/s





Sewer System



Planning Strategies - SWM

- Important in Berlin
 - Water quality
 - Flood protection is from minor importance
- General objective: Avoiding stormwater drainage
- Priorities:
 - Reduction of stormwater run-off (e.g. green roof)
 - On-site infiltration & retention
 - Infiltration & retention in ponds for subcatchments
 - End of pipe treatment & discharge into surface waters



Regulation - Berlin's Water Act:

§ 36a Infiltration of stormwater

... Stormwater should be infiltrated over an activated soil layer...

§ 40 Connection to wastewater & stormwater system

... Properties have to be connected to the sanitary sewer, but not to the stormwater system...



Storm Water Fee

- Until 2000 cost for stormwater drainage was included in waste water fee (measured in m³)
- In 2000 fee was separated
 - Before 4,85 DM/m³ (Drinking water)
 - After 3,86 DM/m³ (Drinking water)
2,44 DM/m² (Sealed surface connected)
 - In 2005 1,50 €/m²
- Consequences

Example	Differenz
	%
Department Store (City Center)	-14%
Apartment Building	-12%
Single (Detached) house	-20%
Town hall	54%
Bus station	313%
Shopping Centre (outskirts)	377%
School	653%
Brewery	1034%



Measures

- Combined Sewer System
- Separated System



Measures – Combined Sewer System

- Disconnection & reduction of surface sealing
- Treatment of combined sewer overflow
- Increase of pumping capacity
- Storage & retention of combined sewage
 - Adjustment of weirs
 - Construction of storage volume
 - Activation of storage volume in the network by real time control



Measures – Combined Sewer System

- ⇒ **Disconnection & reduction of surface sealing**
- Treatment of combined sewer overflow
 - Increase of pumping capacity
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 - Activation of storage volume in the network by real time control



Greened roof/Disconnection





Measures – Combined Sewer System

- Disconnection & reduction of surface sealing
 - Treatment of combined sewer overflow
 - Increase of pumping capacity (to WWTP)
 - Storage & retention of combined sewage
 - Adjustment of weirs
 - Construction of storage volume
- ⇒ **Activation of storage volume in the network by real time control**



Real Time Control





Measures – Separated System

- On-site infiltration
- On-site treatment
- Stormwater treatment & infiltration in ponds
- End off pipe stormwater treatment
 - sandtrap (minimum requirement)
 - stormwater clarifier/settling tank
 - soil filter system
- Stormwater retention

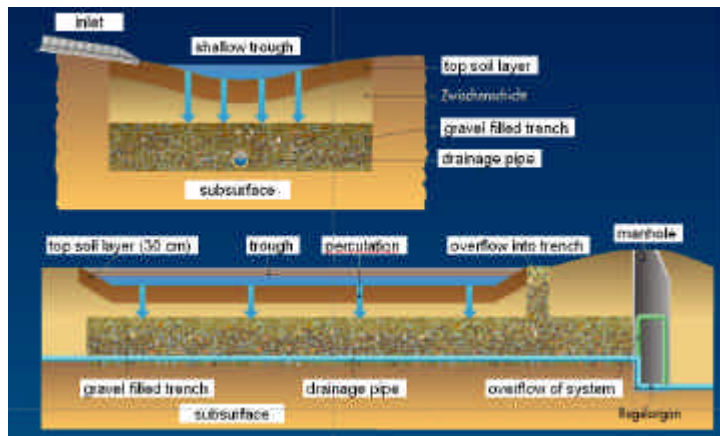


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Trough-Trench-System



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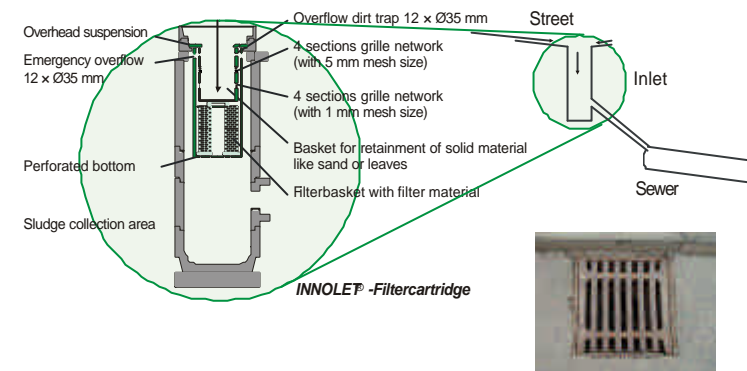
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Innolet®

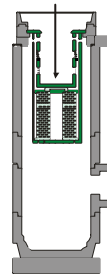
- Idea: Treatment of heavy polluted street runoff in the inlet (gully)





Innolet®

- Treatment comparable with traditional rainwater clarifier
- Advantages vs. End-of-Pipe treatment
 - Efficient treatment of road runoff
 - Slope between Road and sewer is used
 - No space demand
 - No construction work
- Operation
 - Exchange cycle: ~ 2x per year
 - Filter cartridge can be cleaned in central facilities



INNOLET -Filtercartridge

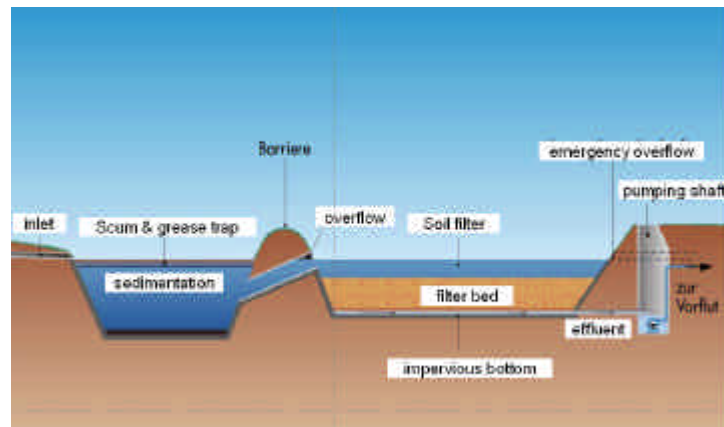


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- Stormwater retention



Soil Filter



Thank you
for your attention!

For more Information
www.sieker.de