

Klaus W. König



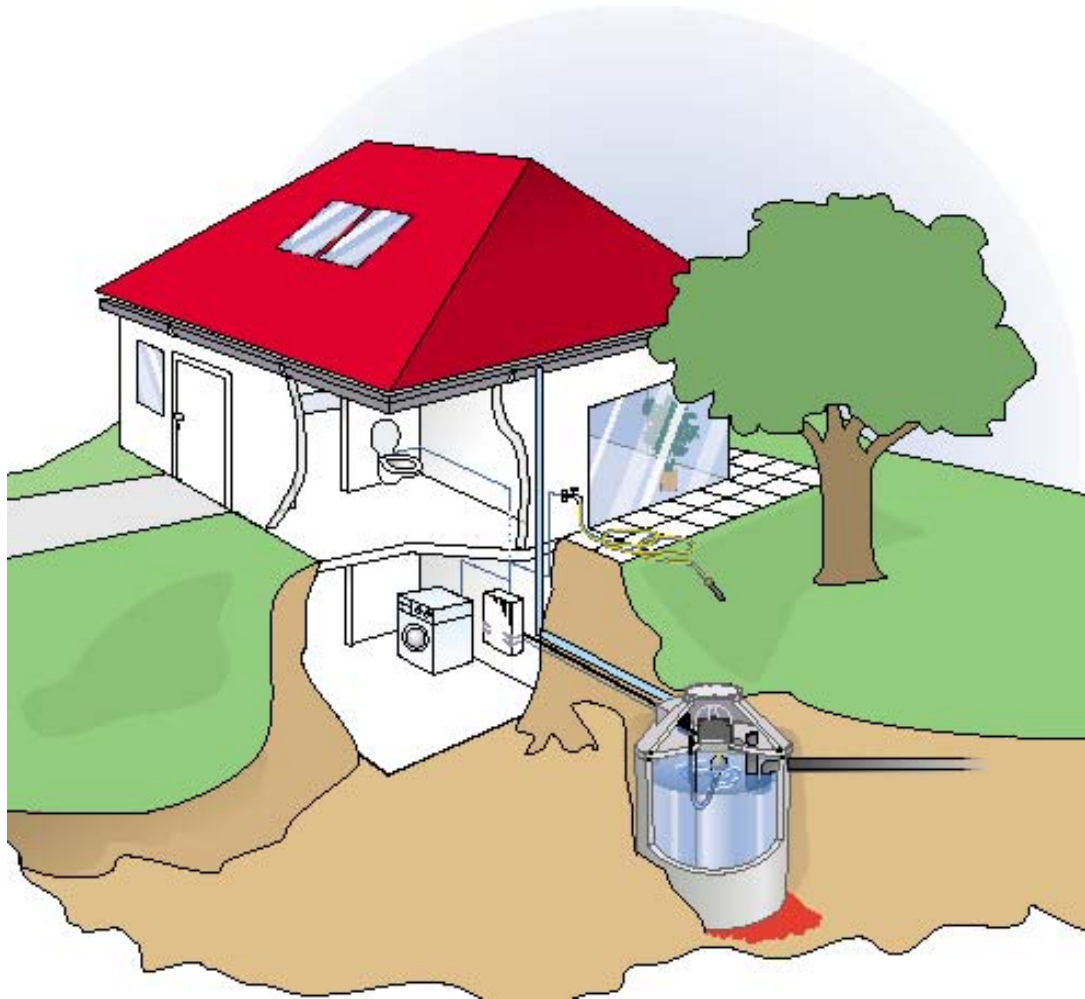
**Water Sensitive Urban Development
On-the-Ground**

Rainwater Harvesting Workshop

Victoria, 2005-06-20

2.1 Applications

Options for using rainwater by German water supply statutes:



Domestic use for:

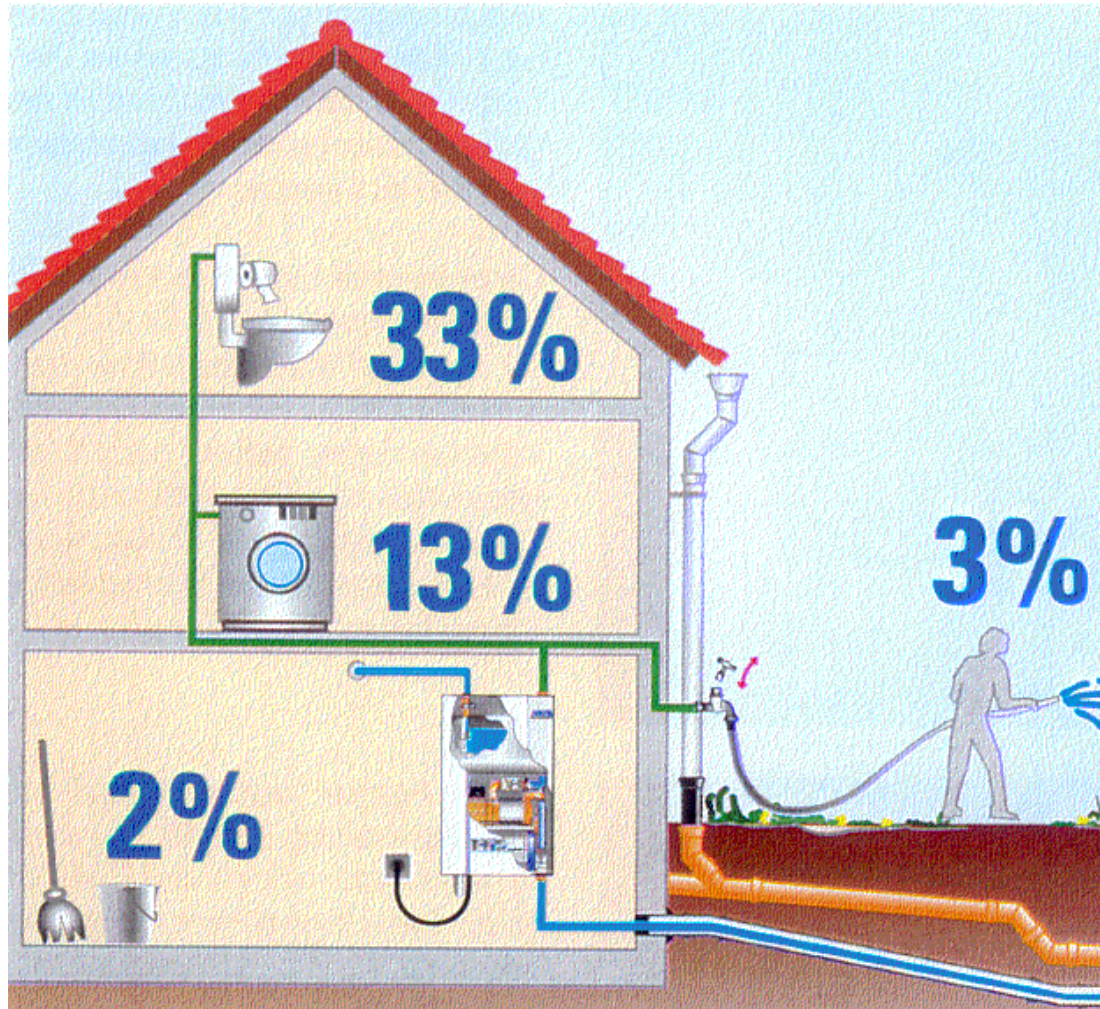
- Irrigation
- Cleaning floors
- Flushing toilets
- Laundry

Industrial use for:

- Cooling
- Cleaning
- Production process

2.2 Cost / Benefit

Irrigation first, toilet flushing second, laundry third application.
Priority due to system cost and water quality requirements



German experience for best practise:

Substitution of potable water:

- Max. 51 %

if the size of the roof and tank is big enough

Availability for max. substitution min.

- Roof 40 m² per person
- Tank 2 m³ per person

2.3 Cost / Benefit

Net benefit calculation for detached houses in 2005, including German taxes based on the exchange of 1 Euro equivalent to 1,60 Canadian Dollars

To buy

- Tank unit	+ 2,880 can\$
- Rain-Center unit	+ 2,080 can\$
- Connecting units and pipes, fittings, valves	+ 2,240 can\$
- Municipal subsidy	- 3,200 can\$
- Capital cost 8 years	+ 1,000 can\$

Total

5,000 can\$

To save per anno

- Mains water $4P.x51\%x127Literx365=95m^3x10$ can\$= +950 can\$

To maintain annual cost

- Filter 1 hour, electricity 5 can\$ + repair 1,5%/75 can\$= -80 can\$

Difference earned per anno

870 can\$

Amortisation: 5,000 can\$: 870 can\$ p. a. = 5,8 a. Equivalent: 200 apple trees

- Life cycle of construction: tank 70 a., rain-center 25 a., pipes etc. 35 a.

2.4 Specific products for cold-climate

Indoor tank, ready-made plug-in system



- Additional tanks available
- Self controlling with automatic mains water backup
- Switch to reserve pump in case of failure

2.5 Marketability

„buy-in“ of system concept – how was it achieved?

All components of the system from one company

- Complete information for the design
- Simple order and delivery
- Clear responsibility for the product quality with guaranty, hot-line

Ready-made units, plug-in systems

- Tank unit including filter, sedimentation items and fittings for plug-in connection of pipes, overflow with backflow prevention
- Easy maintenance
- Failure prevention by automatic self controlling system
- Service company available everywhere / anytime

State of the art, publishing best practice

- Case studies published in journals and magazines
- State of the art fixed by DIN, fbr, municipal guidelines

2.6 Cost / Benefit

Plug-in module „Premanufactured exterior tank“, made of concrete



Including

- Calm inlet
- Filter 0.5 mm mash
- Overflow with automatic sewer back flow prevention valve

2.7 Cost / Benefit

Plug-in module „rain-center“, fixed at the wall in the basement



Including

- Multistage, horizontal centrifugal pump
- Municipal water make up feed, automatically working, self controlling
- Noise absorbing items
- No maintenance

2.8 Regulations

By German national law mandatory
in accordance with German water supply statutes and DIN 1989:



1.
Mains water backup
only by free outlet

to ensure that the individual
rainwater system cannot have
an effect on the public water
network

- 20 mm air gap
- No cross-connections

2.9 Regulations

By German national law mandatory in accordance with German water supply statutes and DIN 1989:



2.
Labeling the rainwater distribution pipes

2.10 Regulations

By German national law mandatory in accordance with German water supply statutes and DIN 1989:



3. Labeling the rainwater serving valves

4. The customer must notify the public health office and the water supplier prior to the installation

2.11 Overcoming constraints

Rainwater Utilization progress in Germany, Chronology of development

1980 Legislation

- 1980 German legislation allows domestic rainwater harvesting

1988 Grant programs

- 1988 Federal State of Hamburg: 7 years for all citizens
- 1992 Federal State of Hessen: 7 years for citizens and public projects
- Today State of Bremen, Northrhine-Westfalia, Schleswig-Holstein and Saarland are offering different programs (25% of all federal states); also municipalities in other German states

1993 Building regulations

- 1993 Hessen empowering municipalities to make rainwater harvesting mandatory; 1995 Bremen, 1996 Saarland and Baden-Wuerttemberg

1996 Health concerns

- 1996 PD Dr Hollaender et al publishing an evaluation, showing there is no health risk for domestic use of rainwater for toilet and laundry

2002 Technology certification

- 2002 DIN 1989 is published as technical code for construction, O&M

2.12 Marketability

Environmental protection and sustainability bringing to everybody's mind



NGO / NPO

Professional Association for Rainwater Harvesting and Water Recycling, founded 1995.

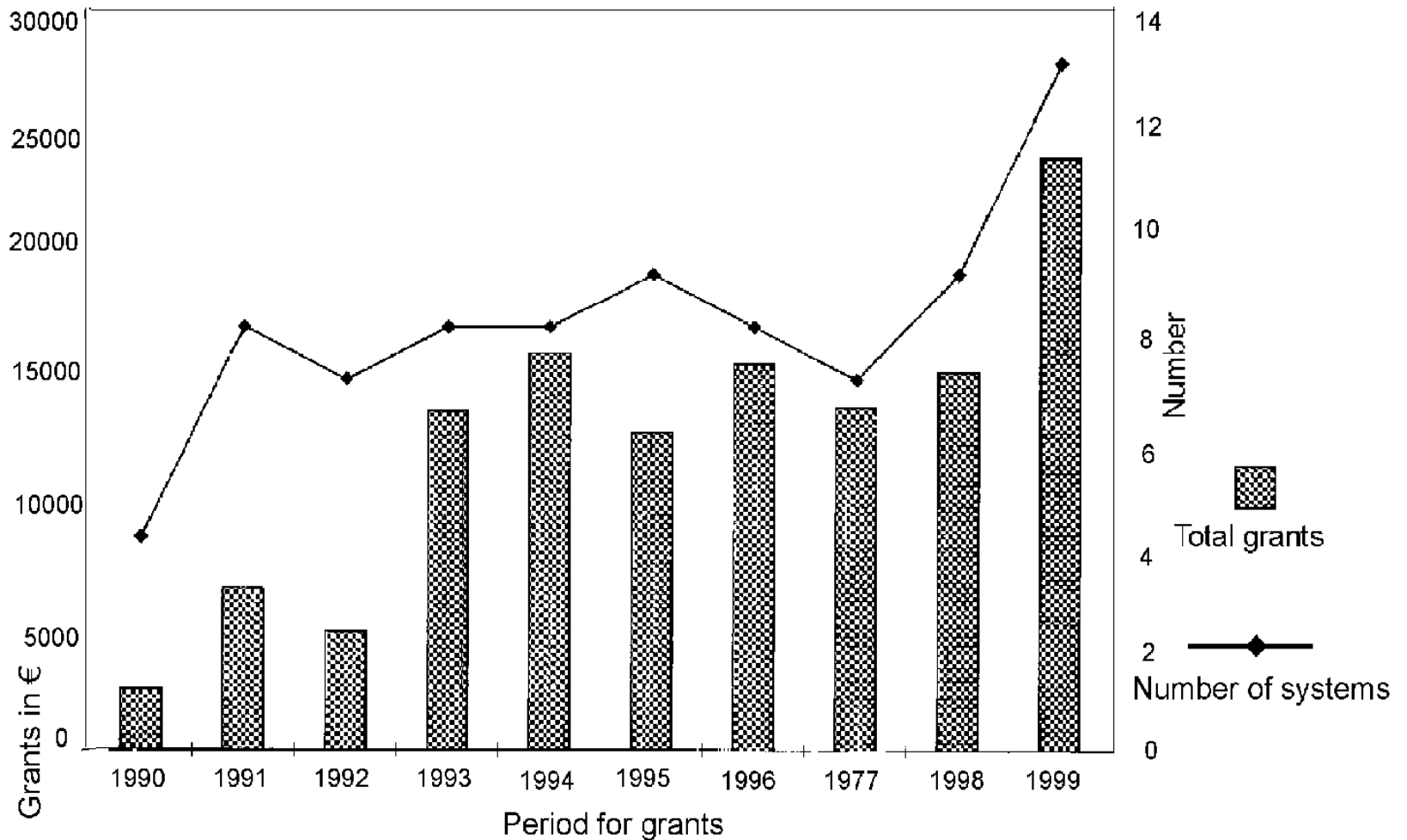
Members: users, planers, manufactures, traders, municipalities

www.fbr.de

www.klauswkoenig.com

2.13 Implementing Rainwater Harvesting

Community of Pleidelsheim, member of fbr: 10 years of grants/subsidies given by the municipality, requiring standards and specifications



2.14 Implementing Rainwater Harvesting

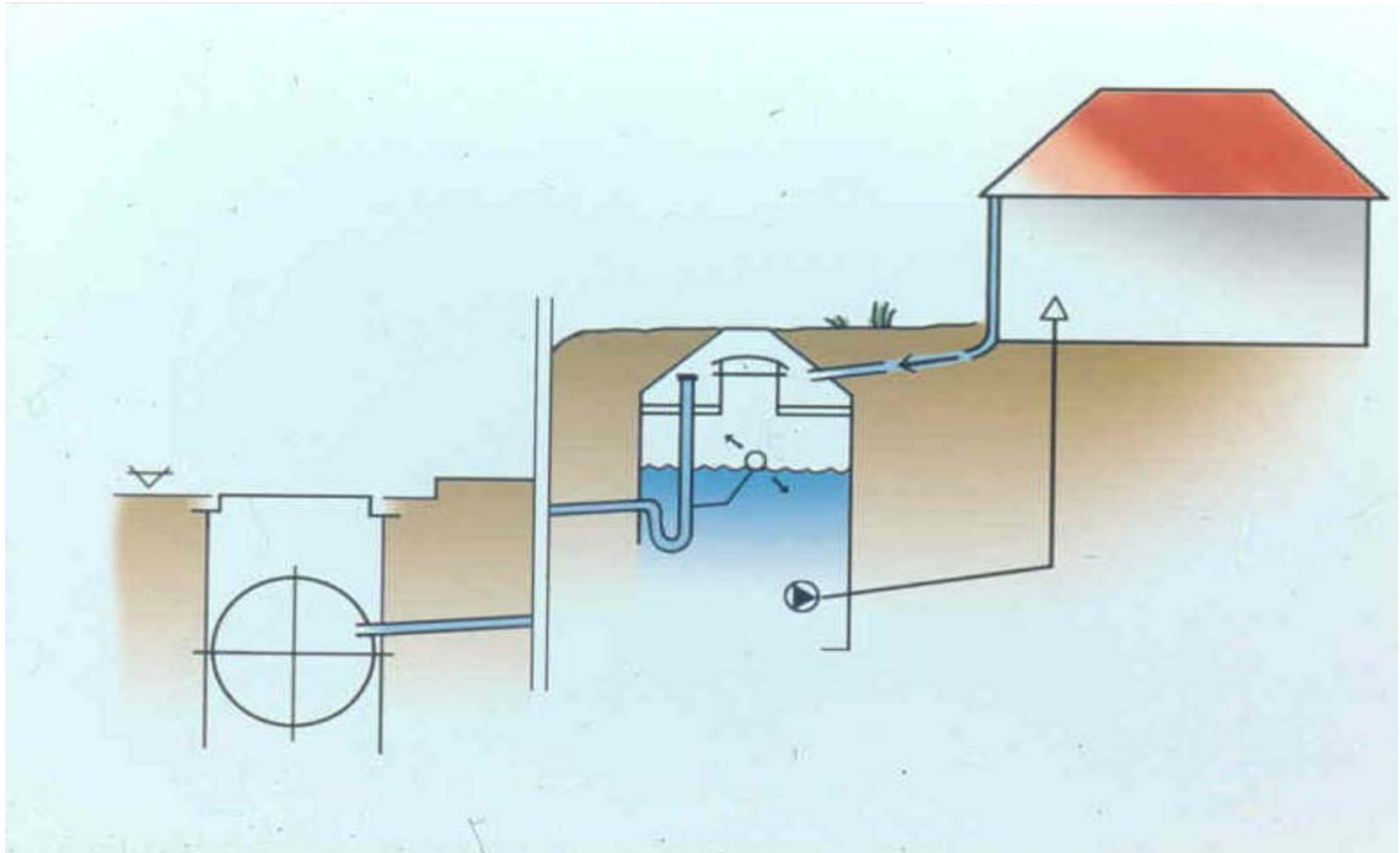
Residential development in Arnstadt, Thuringia.

Municipal bylaw makes private stormwater management mandatory



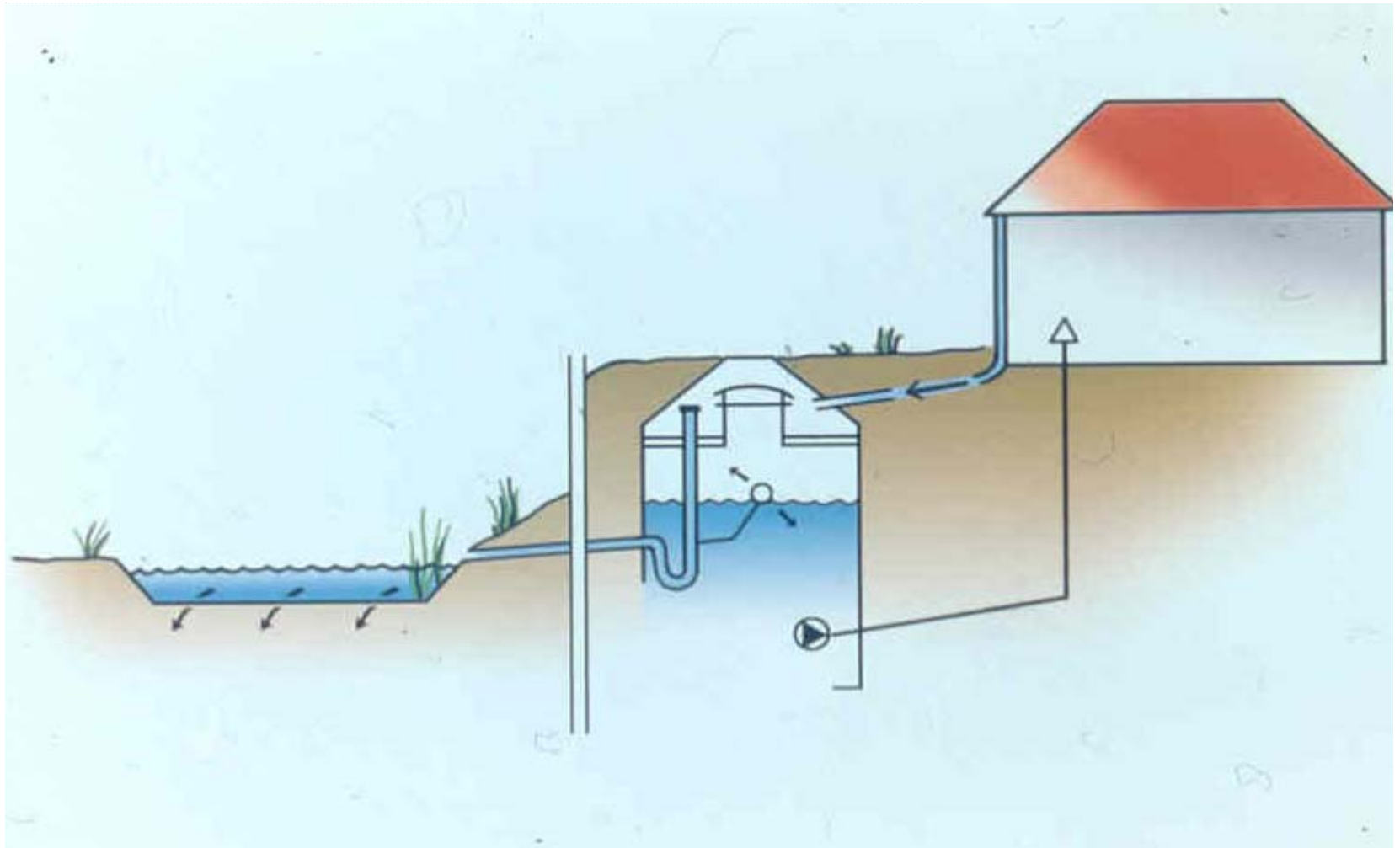
2.15 Implementing Rainwater Harvesting

If infiltration is not possible and sewer connection is necessary: Building permit requires utilization and overflow with limited amount of l/sec.



2.16 Implementing Rainwater Harvesting

Discharge to rain-sewer costs extra: Munich 1,30 €/m². Private stormwater management saves the fee. Utilization, delayed drainage, infiltration.



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Thank you very much for your attention!

For more information in German, English, French see
www.klauswkoenig.com

