20 Years of Rainwater Management by Dresden Municipality

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Magdeburger Gewässerschutzseminar
Prag, Oct. 18-19 2018

Dresden.

Why Rainwater Management in Dresden

1990s: The town is growing rapidly, sealing of large area:

→ Problems with rain water discharge!

How to avoid overload in sewage system?

How to minimize overload in waters/hazards by flash flood?

How to avoid damages by ground water rise?

How to ensure drinking water supply from local aquifer?

How to take care for a good local climate in town?

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Average Water Balance

precipitation = evaporation + runoff

660 mm/a = 390 mm/a + 270 mm/a

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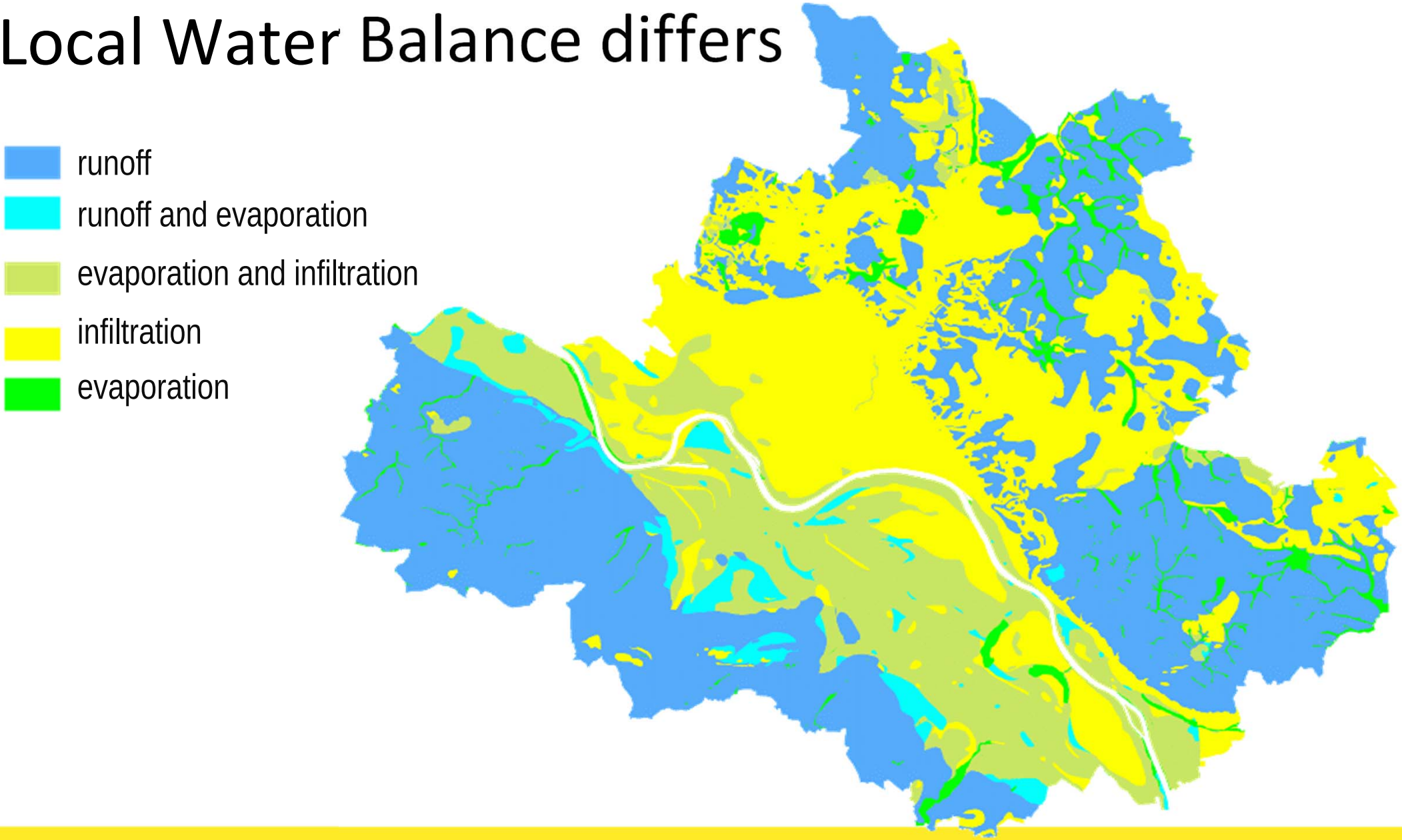
Local Water Balance differs



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Principle of Rainwater Management in Urban Planning

- Restoration of the terms of water balance after development close to natural state at the site
- discharge from sealed areas is to be limited to the natural runoff rate for a statistic 2 (outskirts)…10 (dense settlements) year rainfall
- Pre-treatment if needed before discharge into waters
- Ensurance of sanitary standards and comfort, low costs

Methods of Rainwater Management in Urban Planning

- Minimization of sealing the ground
- Defined infiltration of rainwater into underground
- Reduced and delayed surface runoff (water retention)
- Controlled discharge into watercourses
- Increase of evaporation (green roofs, greening, e.g.)
- Rainwater use (gray water) in house and garden

→ **Conflict with the development goals has to be solved!**

Reminder for city planners:

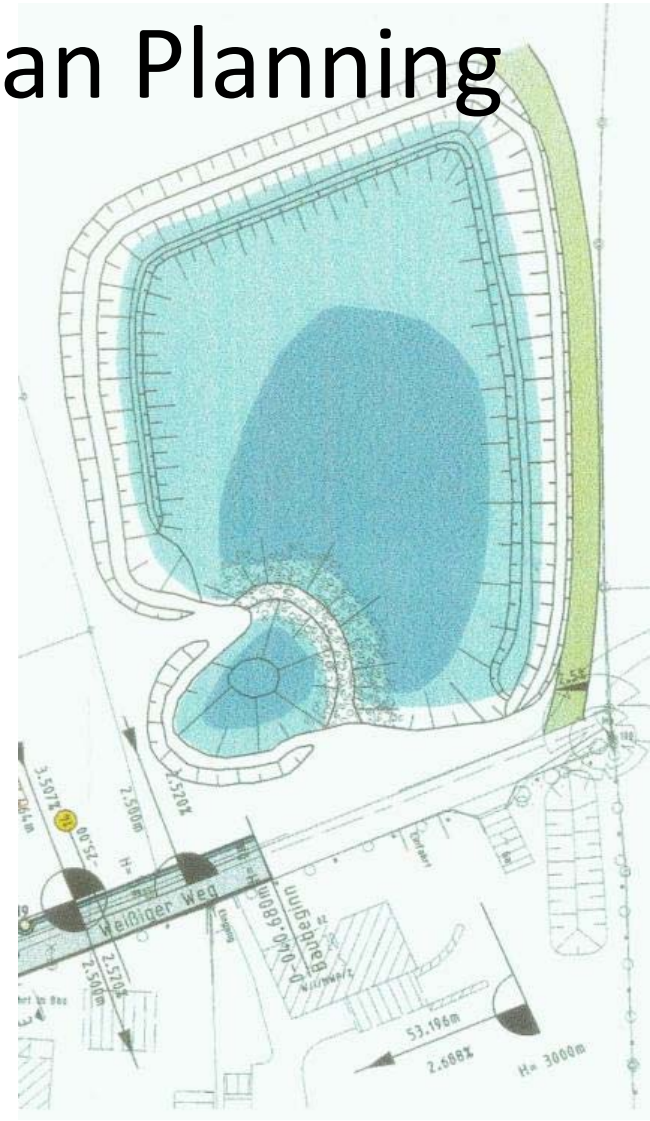
Waters need (competed) space.

At first in the minds of the planners and decision makers.

Then in town.

Dresden Approach: Early on Implementation of Rainwater Management in Urban Planning

- Planning authority specifies development goals
- Environmental agency explores terms of local water balance and fixes features of rain water management
- Reconcilation of development goals and space needed to fulfil the requirements (Compromise!)
- rainwater management plan becomes part of the building and greening plan → local law!



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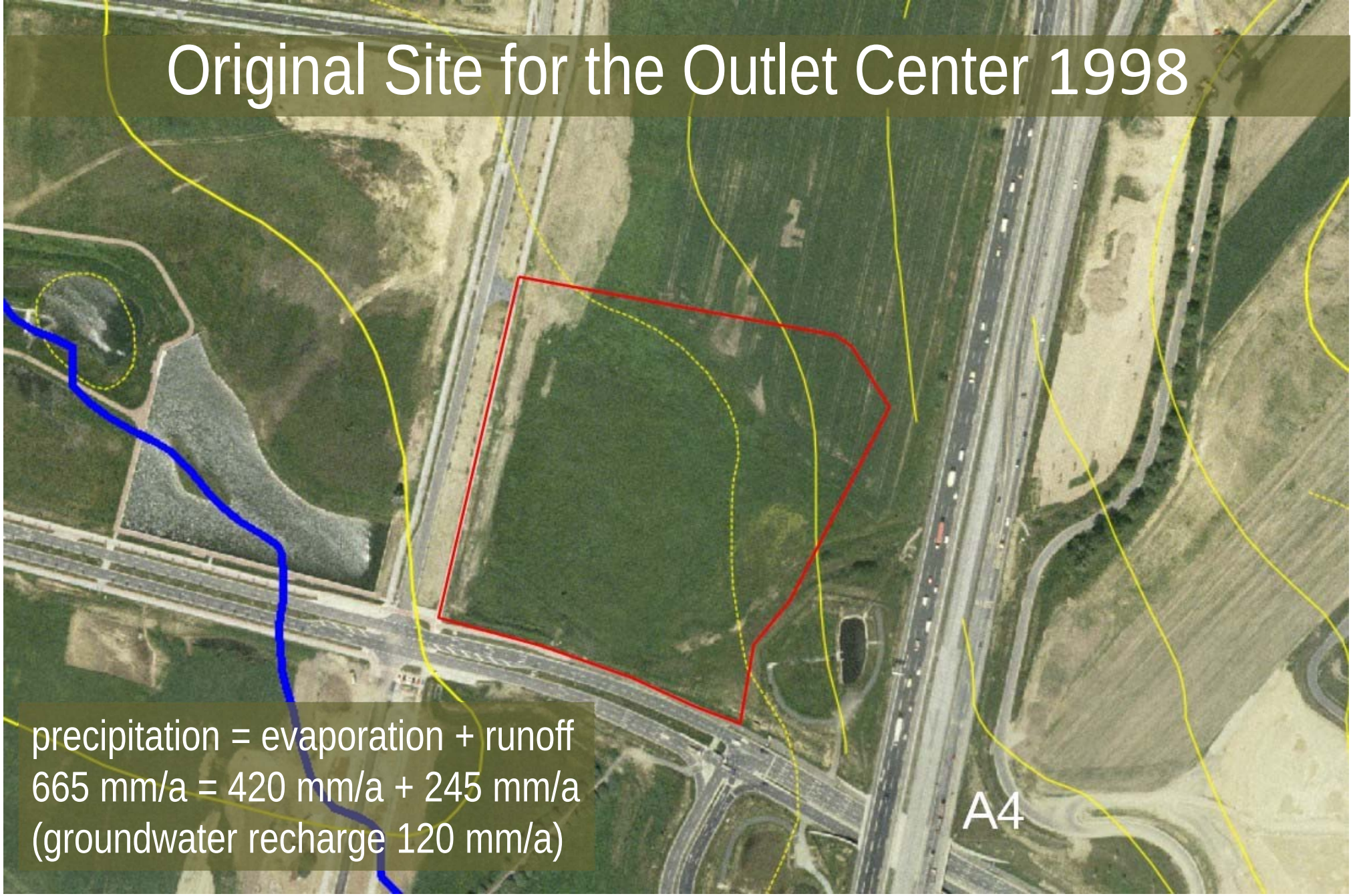
Original Site for the Outlet Center 1998



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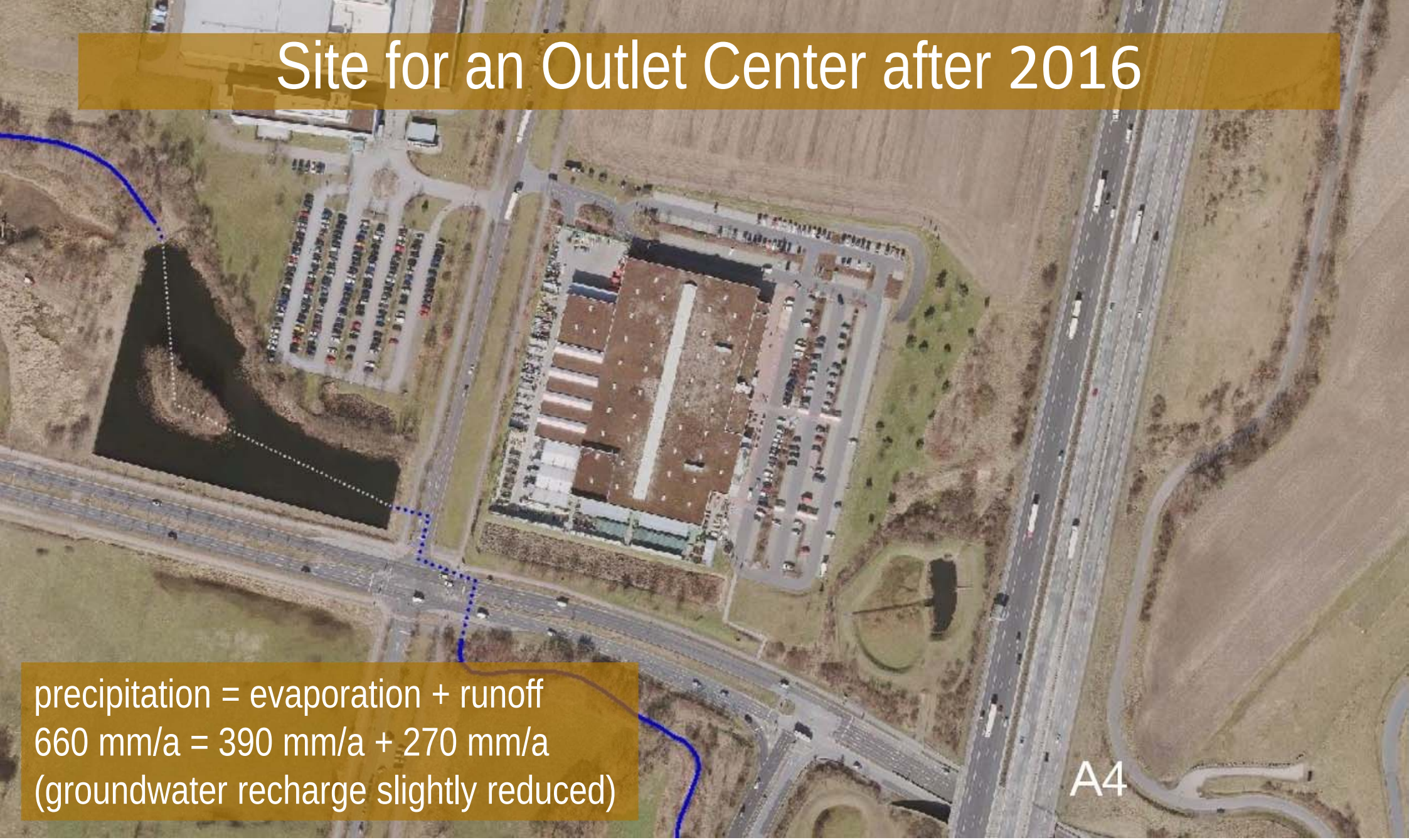
Rainwater Management in Building Plans

Plan 1.1 (Globus Hardware Store, Dresden-Hellerau No. 2)

- flat roofs bigger than 600 m² are greened
- parking ground is paved permeable to water (30 % gaps)
- excess rain water is discharged into a green water reservoire for evaporation and infiltration
- no connection to sewer system
- remission of rainwater fee if storm water is not discharged into sewer

Site for an Outlet Center after 2016



precipitation = evaporation + runoff
660 mm/a = 390 mm/a + 270 mm/a
(groundwater recharge slightly reduced)

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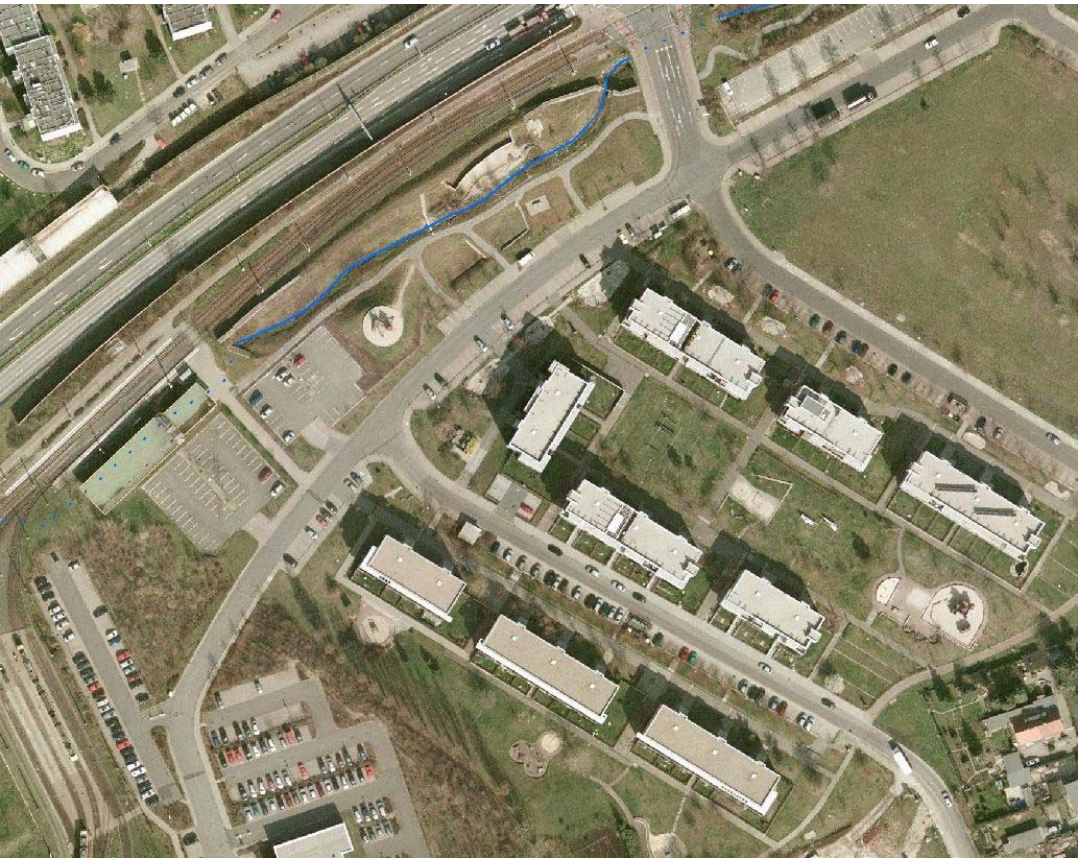
Conversion of Existing Rainwater System in Dresden (Kräutersiedlung)

Renaturation of rainwater system and river Weidigtbach



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Depression-Drain-Element (Kräutersiedlung)

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Approach Channel to Depression-Drain-Element (Kräutersiedlung)

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From Parking to playground and vivid water in Dresden (Kräutersiedlung)

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„Back to Nature“

(Kräutersiedlung)


Weidigtbach Schlehenstraße 2001


Weidigtbach Schlehenstraße 2013

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Green roofs store water for evaporation and cooling and reduce runoff

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Challenges to Rainwater Management

- Longer dry periods/heavy rainfall
- more serious floods and droughts
- heat stress in urban areas
- dry falling watercourses
- under-/overload of the sewer system
- **groundwater deficit**

Structuring a public park into a green retention basin of 30,000 m³

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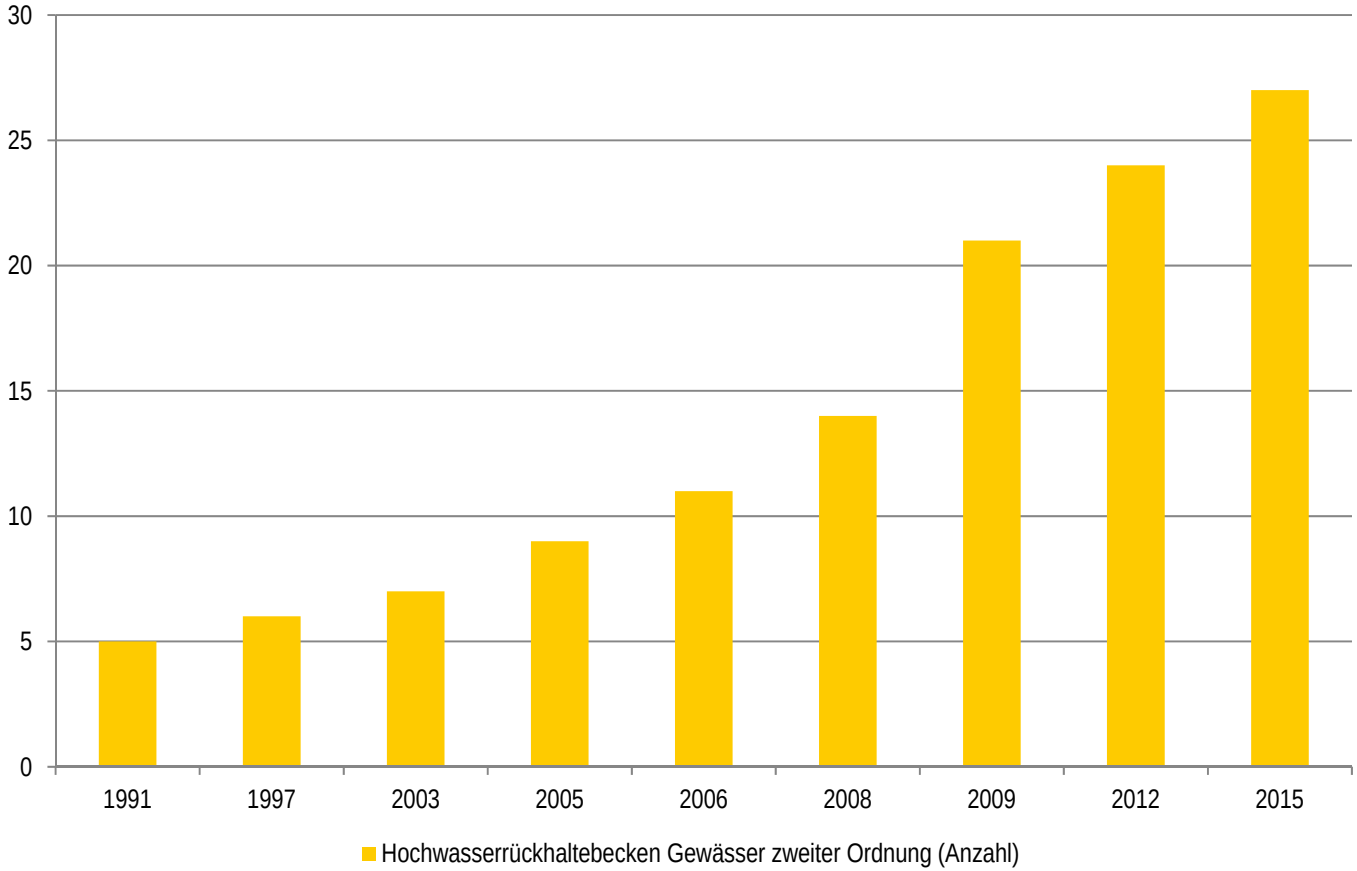
Green Retention Basins at Urban Waters in total 210,000 m³ (+360,000m³ for Flood Retention)



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Water storage in Retention Basins or in the Underground?

Retention Basins:

- Need of competed space
- Limited volume (some 100.000 m^3
- Evaporation losses of about 1000mm/a

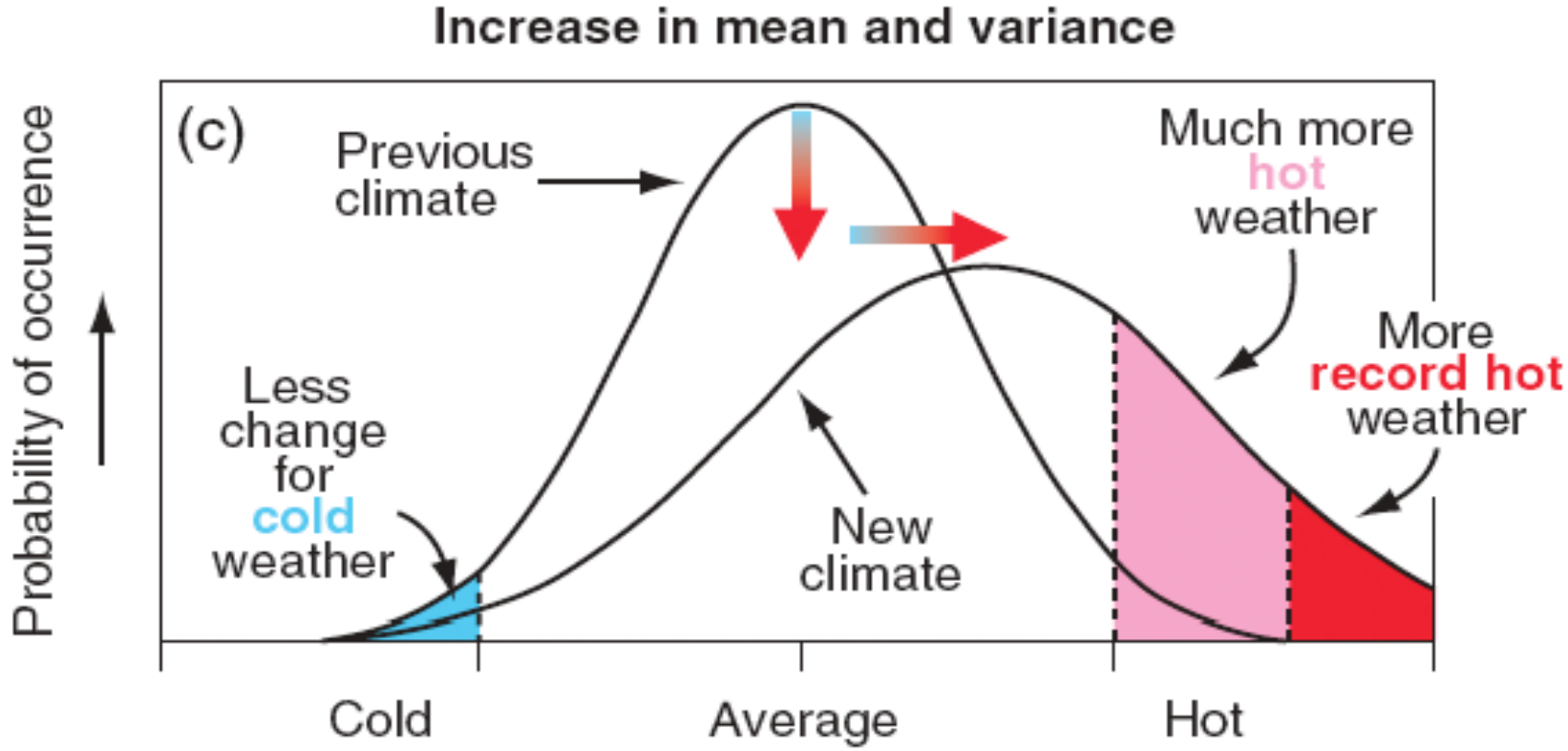
Groundwater storage

- Large volume in alluvial aquifer (some 10 mio m^3)
- No Evaporation losses but discharge to water courses

Chances and Limitations

- Rainwater management can re-establish water balance in building areas in average
- It cannot shift water balance to a natural behaviour in case of 50+ year rain fall
- It can reduce flash floods and defuse droughts in many cases
- It cannot stop or prevent serious flooding in case of 50 or 100year rain fall
- It can improve local climate and give impact for the development of multifunctional green area
- It cannot completly take out rain water from sewage system due to the need of flushing the sewers

Climate change shifts the mean value of the distribution function for the probability of a weather situation and enlarges the variance



Source: "**CLIMATE CHANGE FUTURES - *Health, Ecological and Economic Dimensions"***

Harvard Medical School, Swiss Re & United Nations Development Programme, November 2005

Remark to climate debate:

We do not have much time to do nothing.

We do not have any time to do wrong things.

Let us together go on working out the right things to do.

Thank you!

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