Verband Schweizer Abwasser- und Gewässerschutzfachleute

Association suisse des professionnels de la protection des eaux

Associazione svizzera dei professionisti della protezione delle acque

Swiss Water Association

Sponge City – Key elements

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vsa.ch/kontakt

Design of sponge city infrastructures: Examples of key elements

1. Basic Principles
2. Clear definition of goals and functions
3. ~~Acceptance by residents~~
4. ~~Legislative aspects~~
5. ~~Consider existing infrastructure~~
6. ~~Costs (construction AND maintenance) planned adequately~~
7. Impermeable/permeable surfaces to consider
8. Design Rainfall: appropriate return period
9. Consideration of runoff hazard
10. ~~Soil/subsoil quality~~
11. Selection of appropriate Sizing Tool
12. ~~Infrastructure maintenance and monitoring: who, how, frequency, costs?~~

Today for your exercice …

Sizing of blue infrastructures – 1. basic rules

Two basic rules :

1. Keeping rainwater on the surface and managing it in a decentralised way
2. Always think about the case of overload (heavy precipitation) ➡ surface runoff

Rule n°1:
Keep rainwater on the surface!!
(and manage it in a decentralized way)

Rule n°2:

Always think about the case of overload!!
(not only at the local level, but also at the municipal/watershed level)

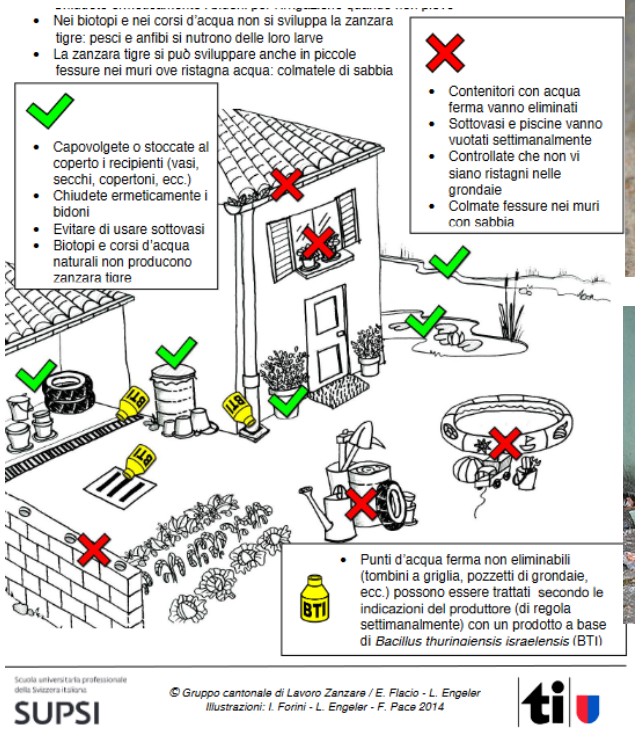
Consequences in the case of overloading

Another disadvantage of “evacuation": Network capacity is limited

Sizing of blue infrastructures –
2. Clear definition of goals and functions

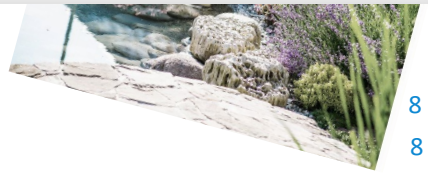
- Flood control
- Urban quality
- Biodiversity
- Retention in the field of the PGEE
- Fight against heat islands
- Multifunctional
- …

Sizing of blue infrastructures – 3. Public acceptance



bfu bpa upi

Bureau de prévention des accidents



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Sizing of blue infrastructures – 4. Legislative aspects

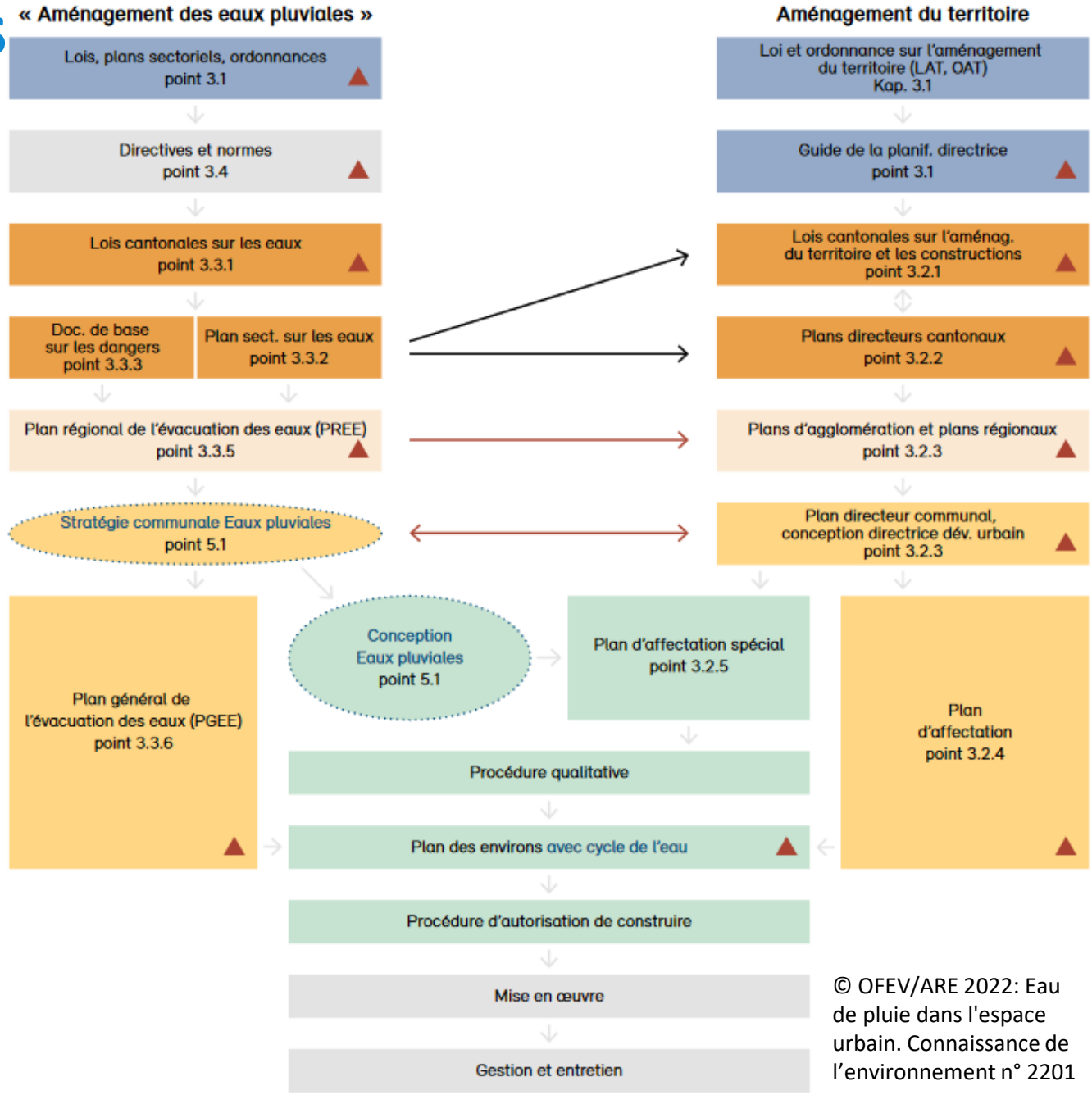
- PGEE, Water reuse, discharge permits, etc.
- Discuss with the authorities from the very beginning of the project to avoid future problems
- Protected areas (S1, S2, S3, Au…), sensitive areas, specific infrastructure (e.g. roads, SBB…)

Sizing of blue infrastructures
4. Legislative aspects

City of Burgdorf - Drainage Regulations– art. 13

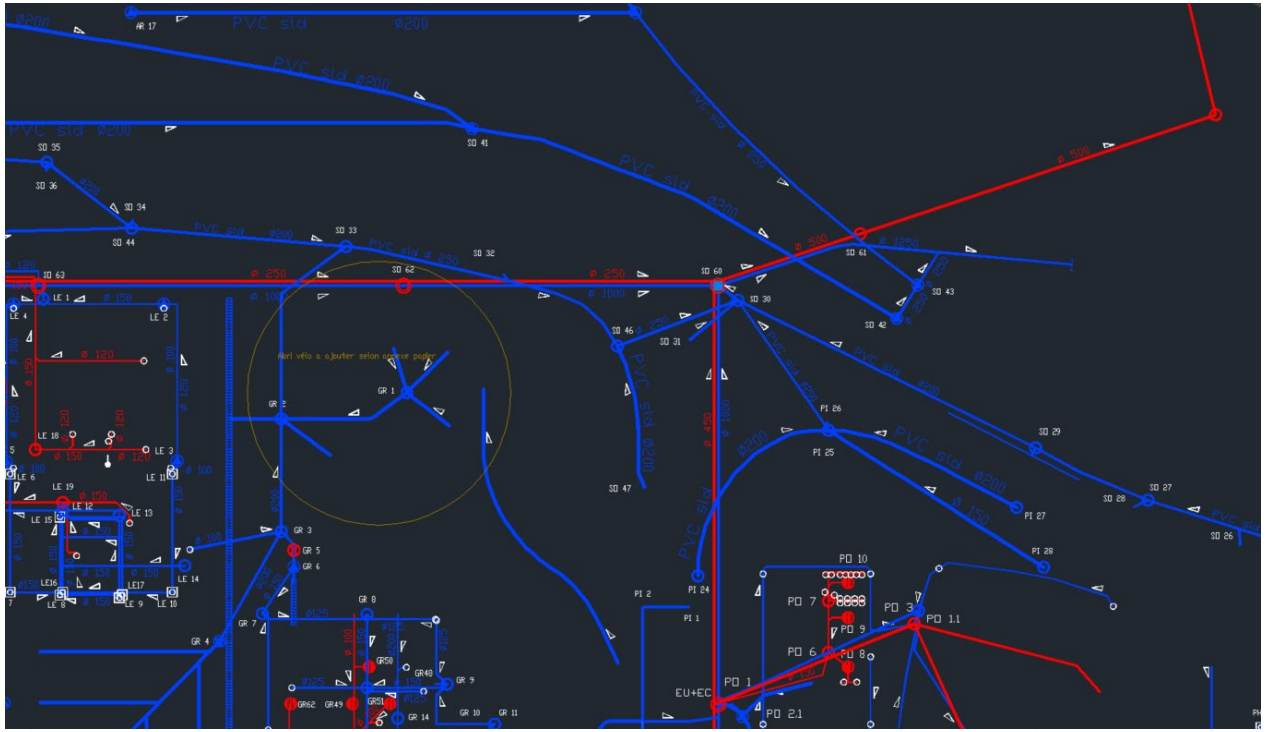
Roof drain pipes must be accessible. They must be evacuated from the building close to the surface.

Fig. 22 : Démarche recommandée pour intégrer l'aménagement des eaux pluviales dans l'aménagement du territoire



Sizing of blue infrastructures – 5. Consider existing infrastructures

- Type of existing infrastructure (sewer system)
- Structural Condition and Capacity
- Optimization of operation



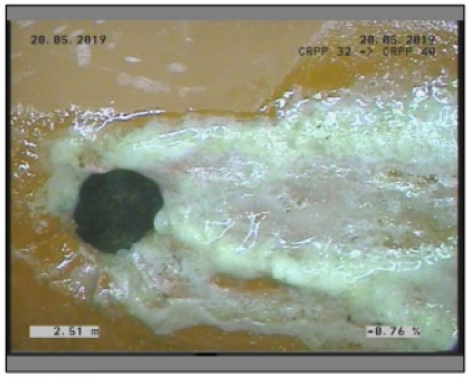


Photo: 1_5B

Photo: 1_6A

Sizing of blue infrastructures – 6. Costs issues

- Construction costs, maintenance costs
- Non-standard infrastructures (no statistics / benchmarking…)
- High maintenance costs ?

3.2 Wiederbeschaffungswert der kommunalen Kanalisationsnetze

3.2 Valeur économique de remplacement des réseaux d'assainissement communaux

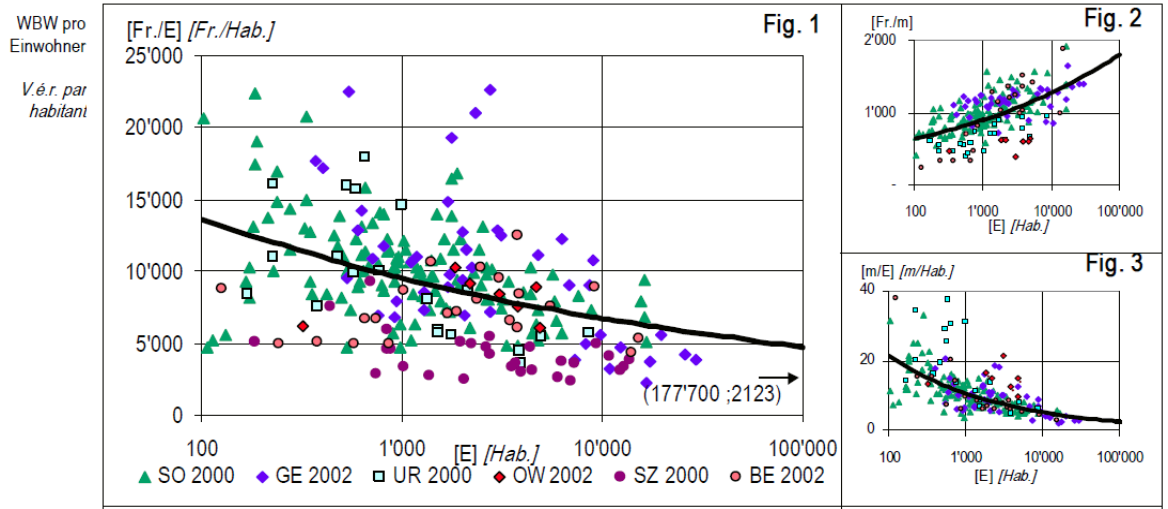


Fig. 1 Wiederbeschaffungswert der kommunalen Kanalisationsnetze pro Einwohner in Funktion der Anzahl Einwohner in der Gemeinde - *Valeur économique de remplacement des réseaux d'assainissement communaux par habitant en fonction du nombre d'habitants de la commune*

Fig. 2 dito pro Laufmeter Kanalisation - *idem par mètre de canalisation*

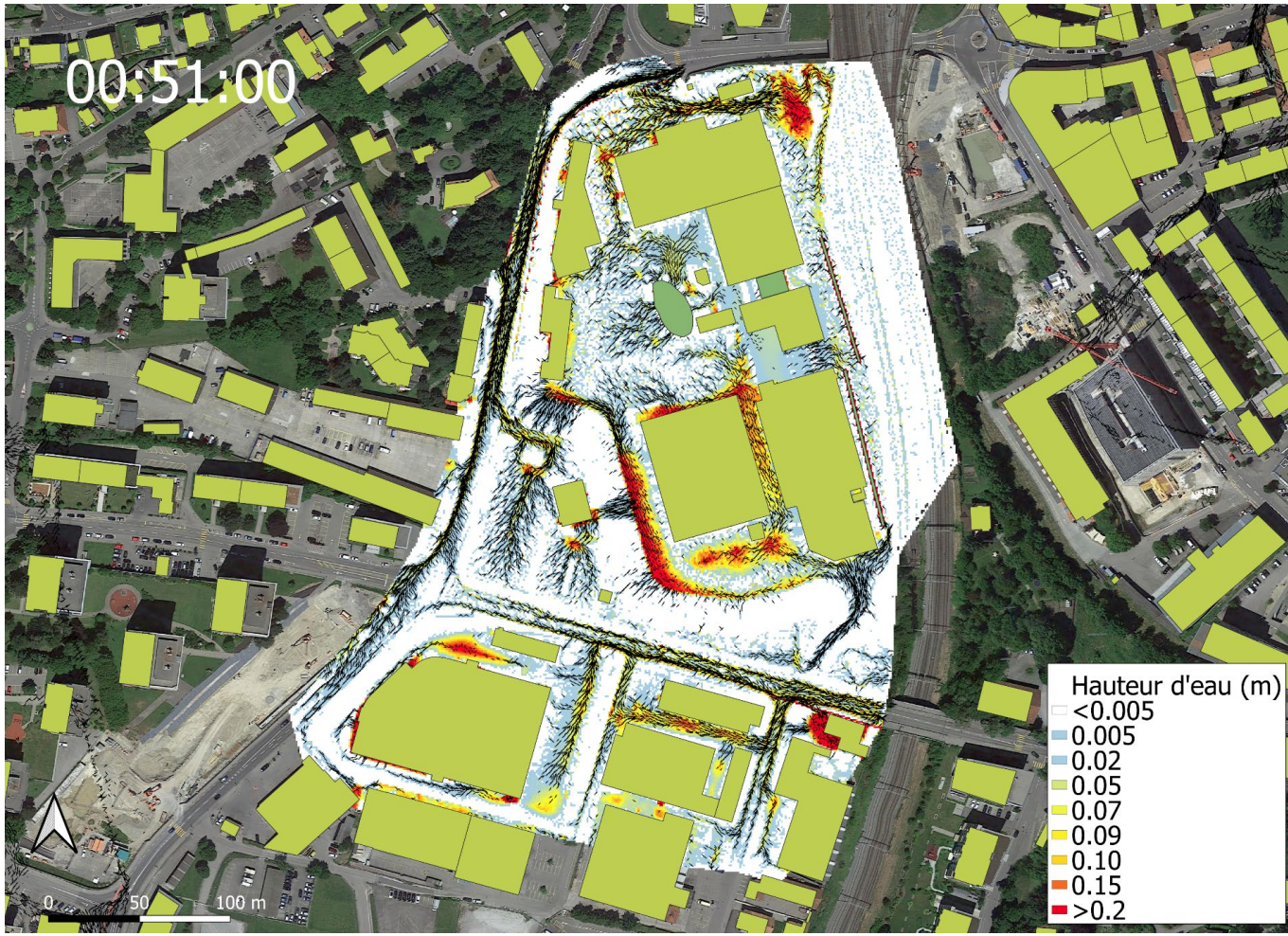
Fig. 3 Kanallänge pro Einwohner - *longueur des canalisations par habitant*

Fig. 4 Wiederbeschaffungswert pro E pro m2 entwässerte Fläche - *Valeur économique de remplacement par habitant par rapport à la surface assainie exprimée en m²*

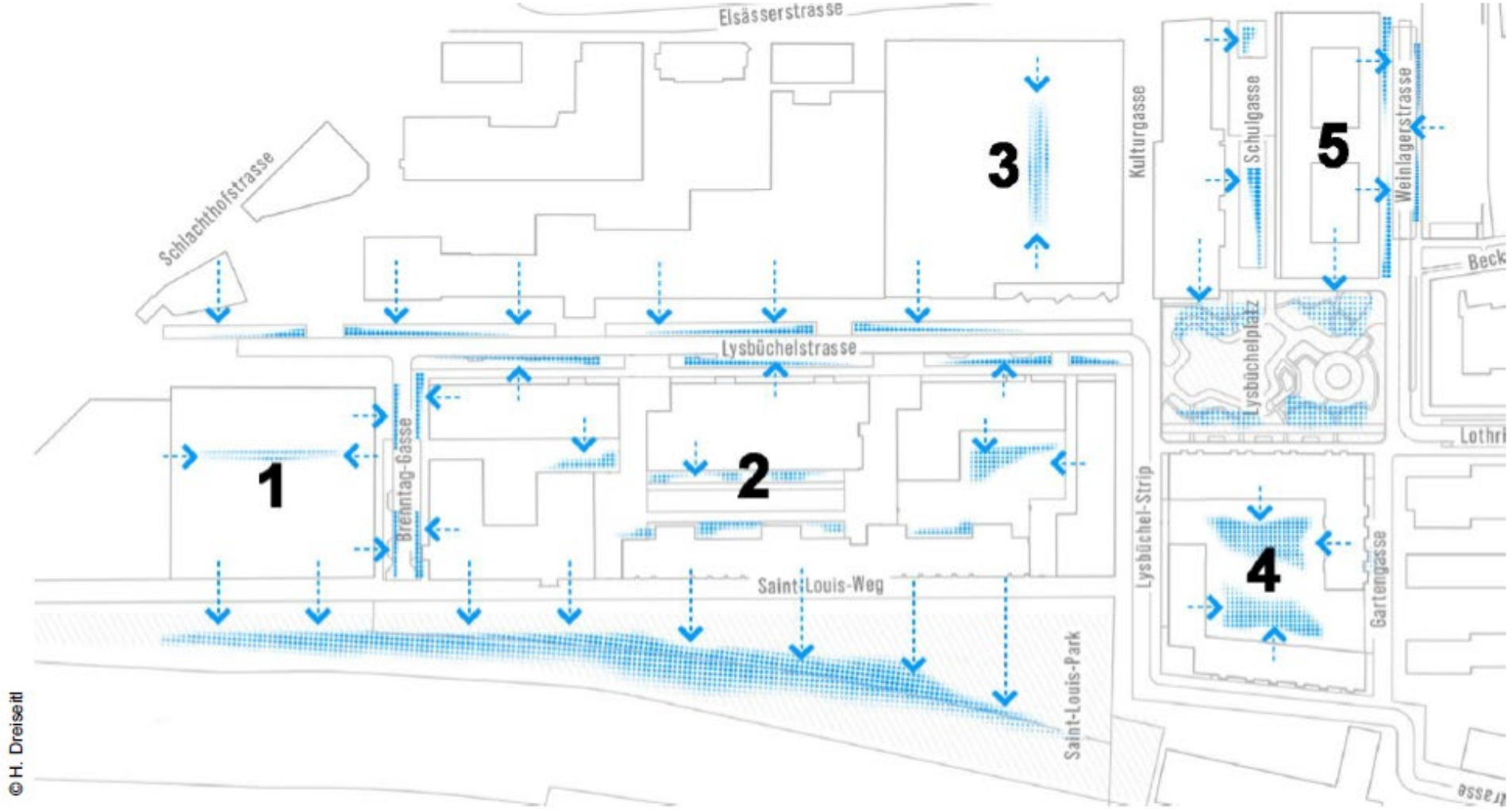
https://www.bafu.admin.ch/bafu/fr/home/themes/eaux/publications/publications-eaux/couts-de-l-assainissement.html

Sizing of blue infrastructures – 7. Surfaces to consider

- Which surface needs to be connected?
- Permeable/impermeable surfaces ?
- Possible future expansions?
- How to calculate: LIDAR data, aerial photos. A few centimeters make a big difference in runoff !
- 2D modeling related to runoff hazard ?

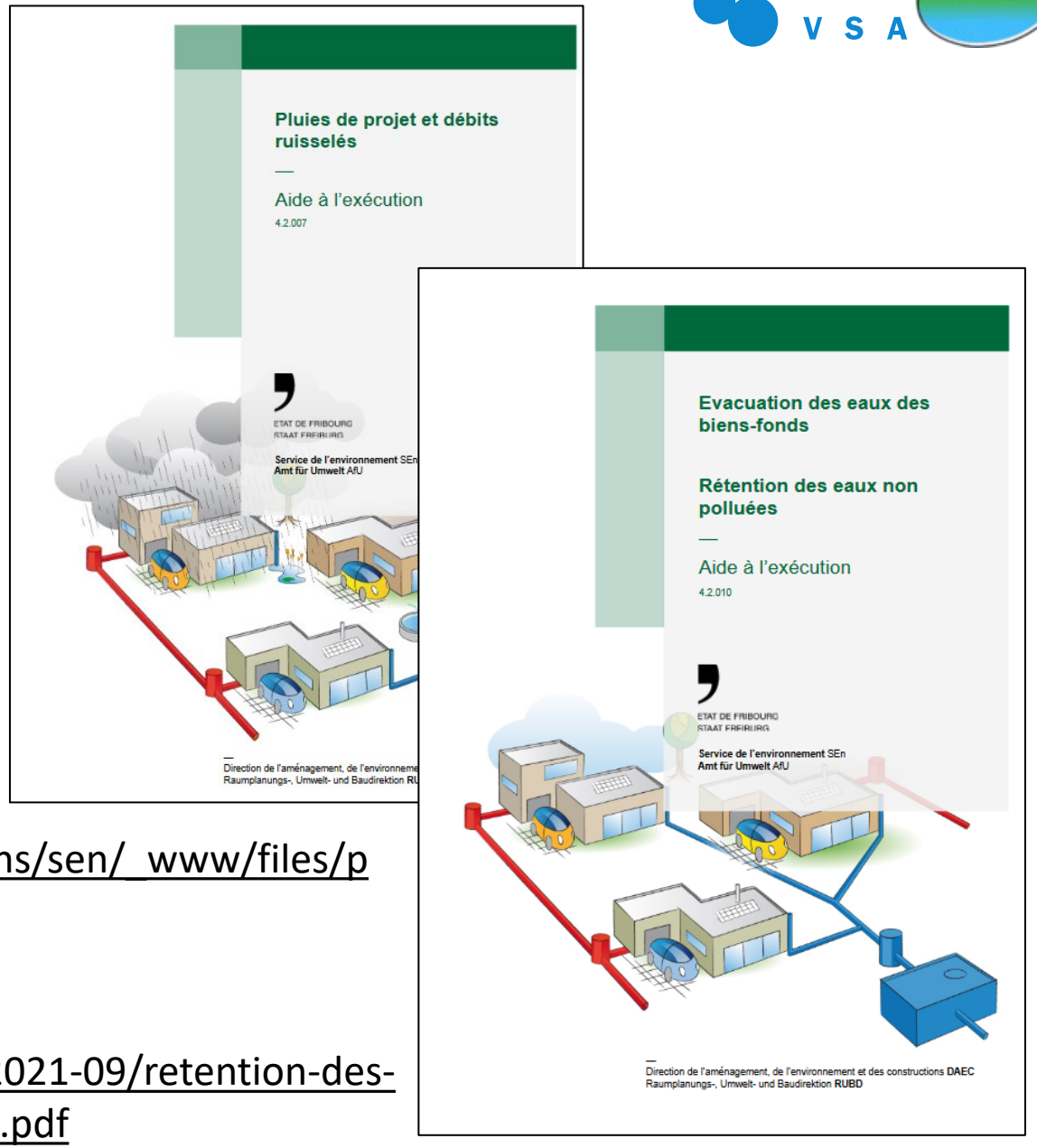


Sizing of blue infrastructures – 7. Surfaces to consider



Sizing of blue infrastructures – 8. Design rainfall

- Return time to consider? 5, 10-year ? (PGEE)
- 8 mm of rain for each event?
- Example of sizing based on the indications of the Canton of Fribourg



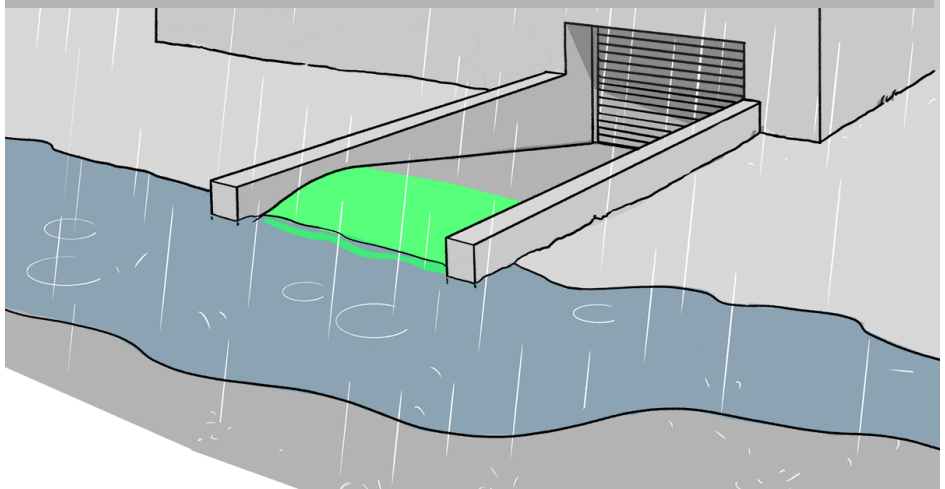
https://www.fr.ch/sites/default/files/contens/sen/_www/files/pdf66/pluies_projet_debits_ruisseles_fr.pdf

https://www.fr.ch/sites/default/files/2021-09/retention-des-eaux-non-polluees--aide-a-l-execution.pdf

Sizing of blue infrastructures – 8. Design rainfall

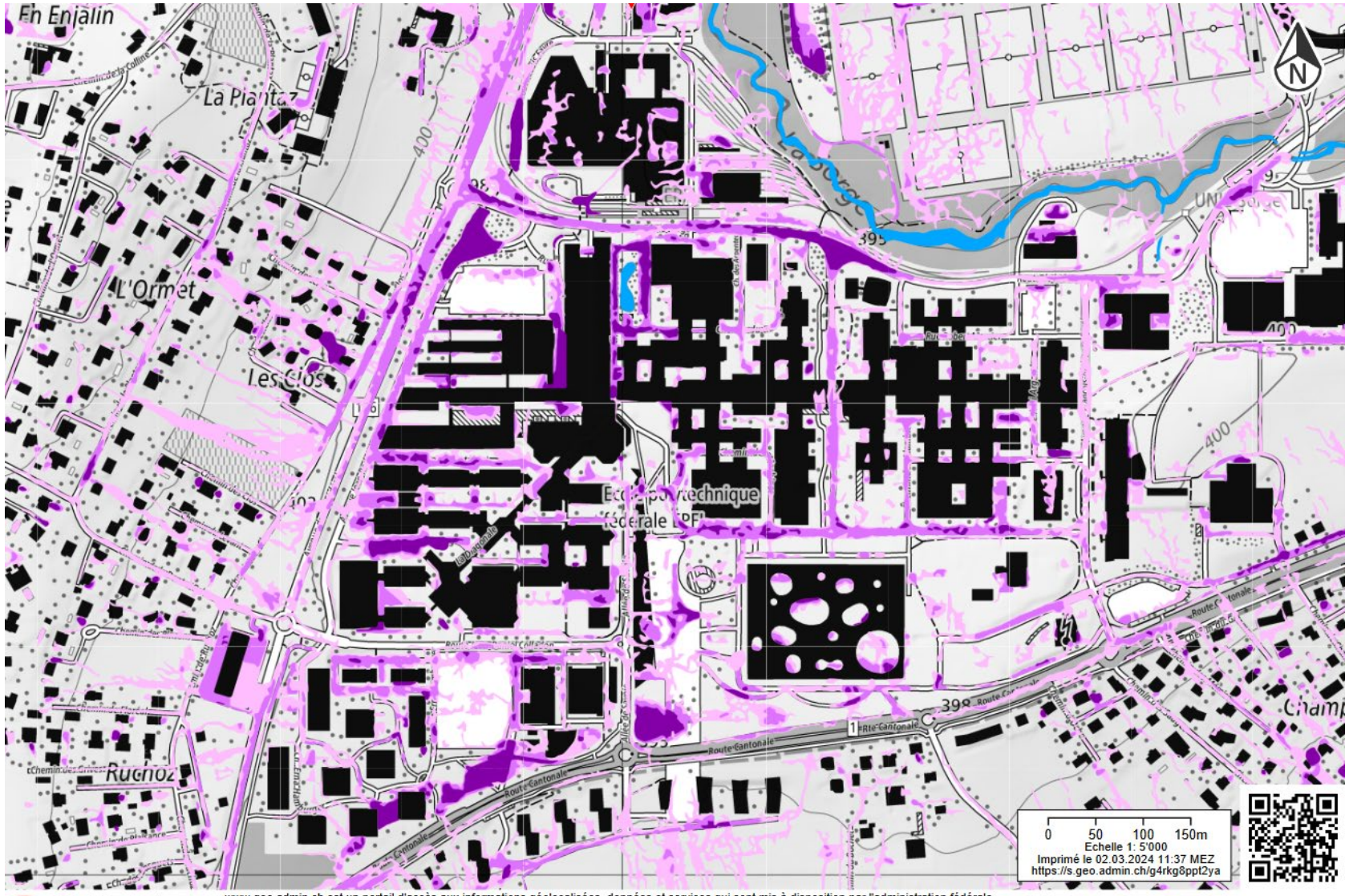
Dangerous situation

Protect entrances

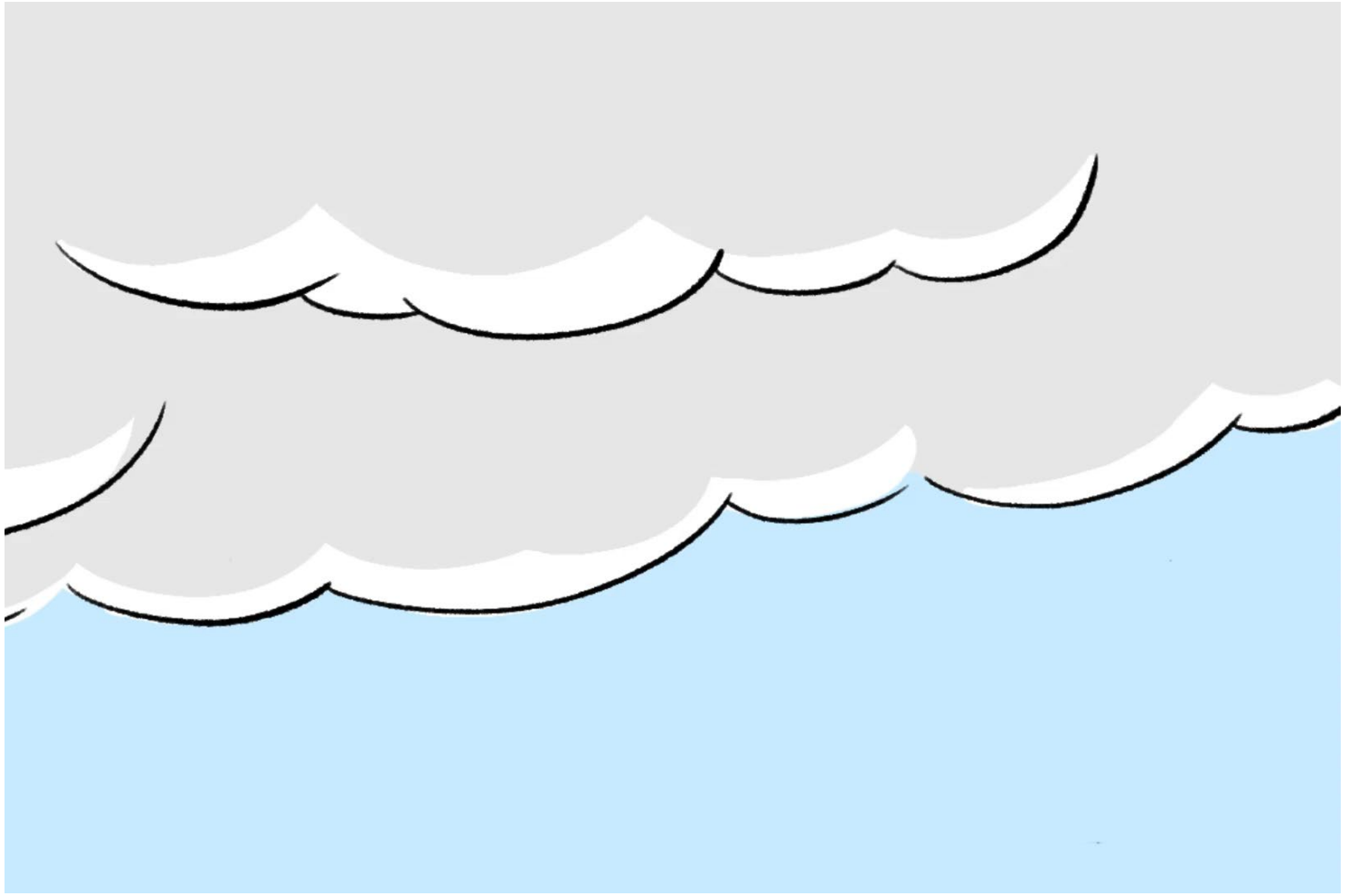


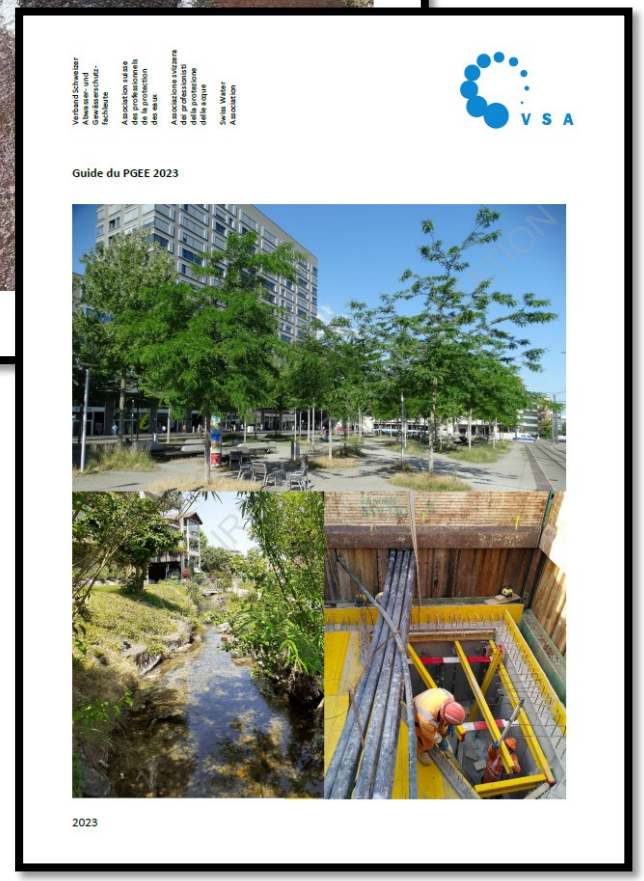
Sizing of blue infrastructures – 9. Runoff hazard

https://www.bafu.admin.ch/bafu/fr/home/themes/dangers-naturels/info-specialistes/donnees-de-base-et-utilisation-du-territoire/gefahrengrundlagen/alea-ruissellement.html



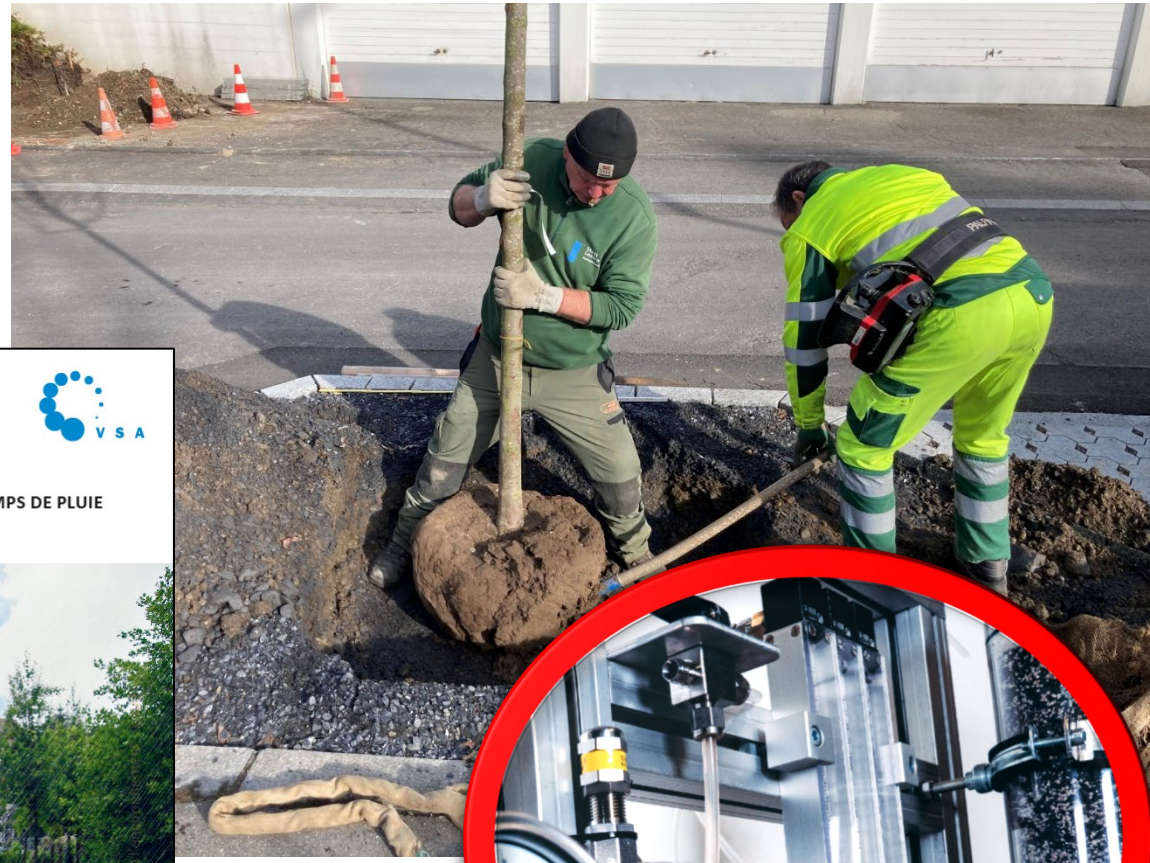
Sizing of blue infrastructures – 9. Runoff hazard





Sizing of blue infrastructures – 10. Stormwater quality, soil and underground contamniation

- Stormwater contamination level
- Presence of contaminated sites
- Potential soil pollution? (accidents)



https://vsa.ch/fr/fachbereiche-cc/assainissement-urbain/temps-de-pluie/

Sizing of blue infrastructures – 11. Appropriate sizing tool

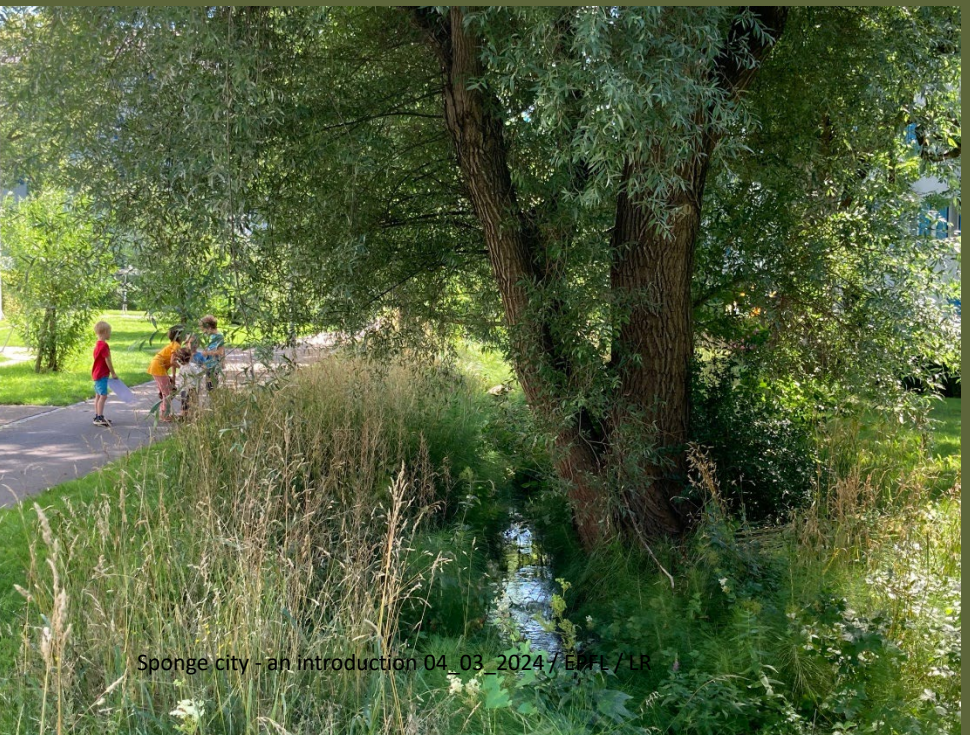
Example for ponds: CONFORTO

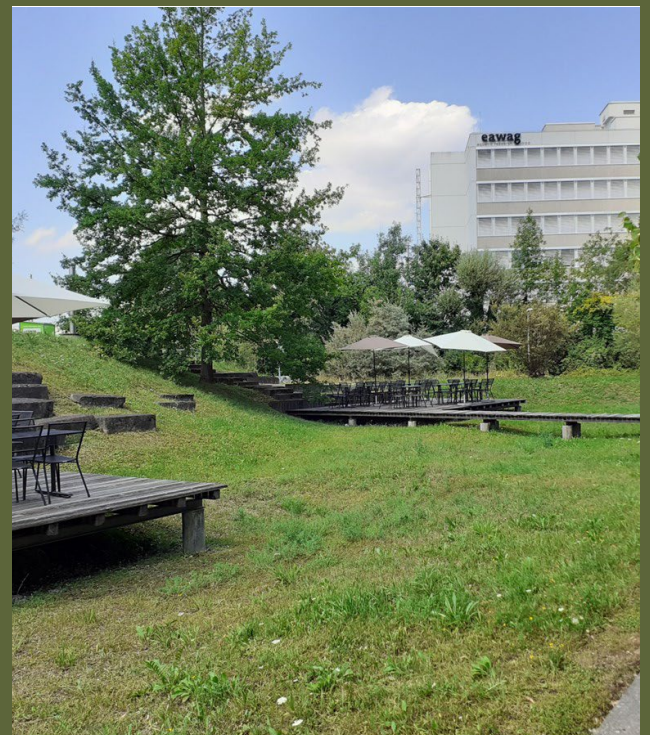
https://campus.hesge.ch/conforto/

Sizing of blue infrastructures –
12. Infrastructure maintenance and monitoring

- Who, how, frequency, costs?
- Definition of a maintenance plan as soon as the system is planned!
- Adaptations possible throughout the service life of the infrastructure
- «Le diable se cache dans les détails…»

maintenance must remain guaranteed (even for many years without surface runoff)!!





Questions?

Fotos: Stefan Hasler / Ramboll Studio Dreiseitl