Reuse potential of drainage water from construction sites

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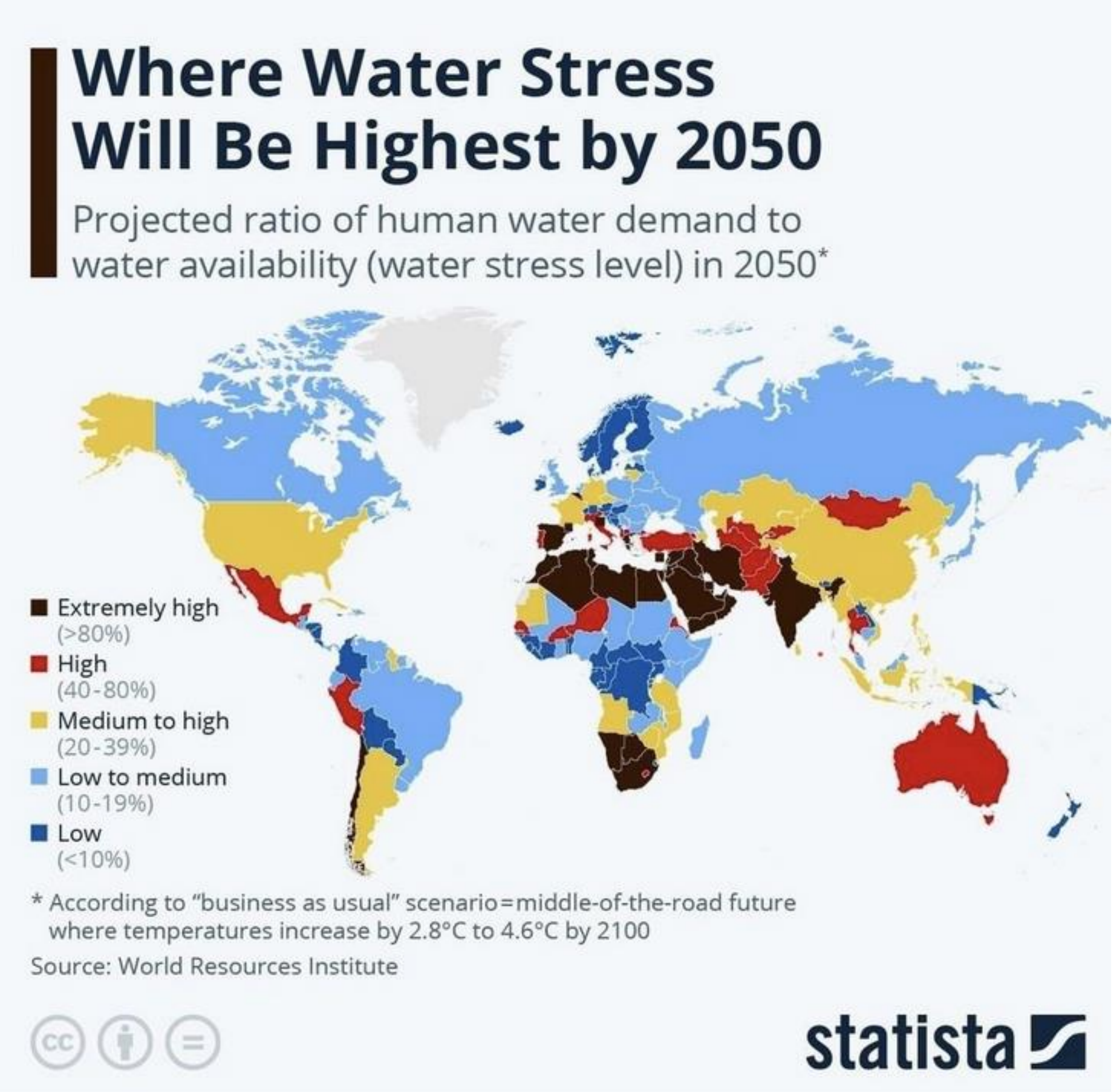
Inleiding

Waterschaarste is een escalerend probleem, dat versneld wordt door de klimaatverandering, vooral in dichtbevolkte gebieden zoals Vlaanderen, België.



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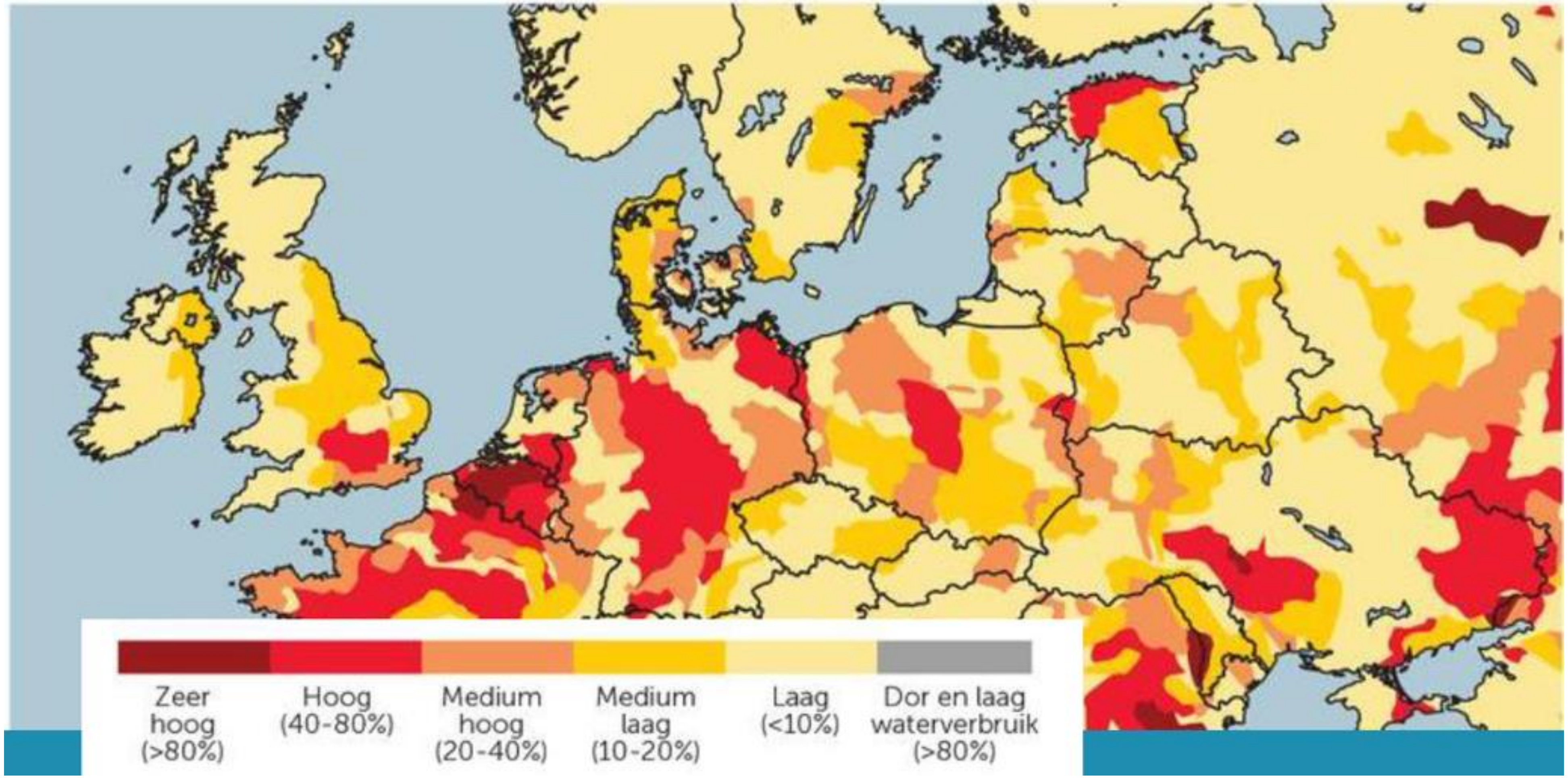
Inleiding



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Inleiding

63 miljoen m³ bemalingwater/jaar wordt in Vlaanderen voornamelijk in de riolering gepompt

Inleiding

- 2021-2022: werven moesten bemalingswater ter beschikking stellen aan omwonenden, boeren en gemeentelijke groendiensten
- Containers van 1 m^3 tot 40 m^3 met kranen zodat omwonenden het in emmers en containers kunnen afnemen voor huishoudelijke doeleinden
- Slechts kleine hoeveelheden water werden afgetapt en dan vooral in zeer droge perioden
- Advies om regenwatertanks te vullen voor regenwatergebruik in gebouwen met grondwater

Figure 1 Tanks for the storage of drained groundwater ($1m^3$ on the left and $40m^3$ on the right)

Onderzoeksopzet

- **55 monsters** op 33 bouwplaatsen
- **regenwater** werd gebruikt als referentie
- bemonstering: schepstaal
- getest op fysicochemische en **microbiologische parameters**
- gegevens verwerkt met Graphpad Prism
outliers = 1,5x interkwartielbereik

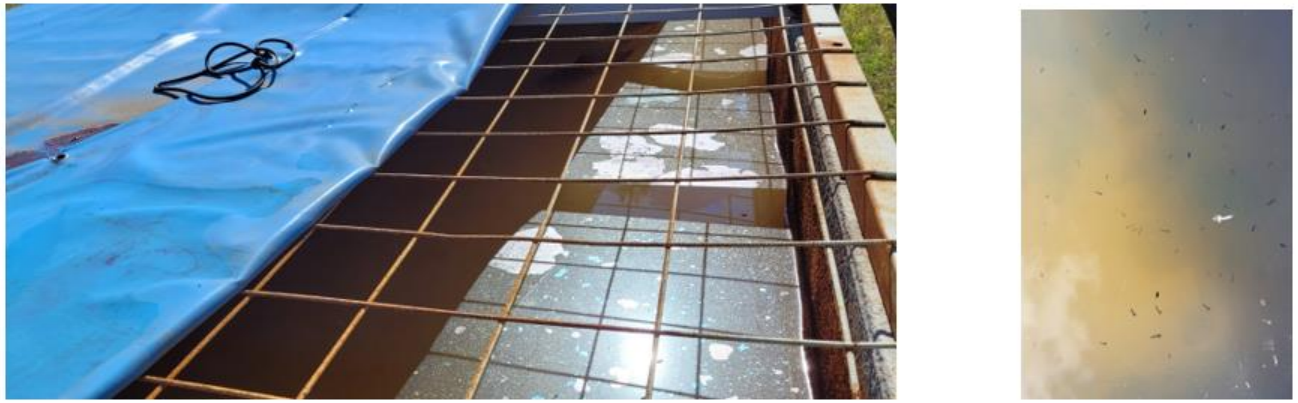

Figure 2 Visual representation of water quality during sampling (oil and iron contamination on the left – larvae on the right)

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Waterkwaliteitsparameters

Table 1 Physicochemical parameters analysed

Parameter	Description
Temperature	/
Acidity (pH)	A common water quality parameter in both standards and regulations
Conductivity	A general indicator of the water's load with dissolved ions/salts. Less loaded waters have a low conductivity, while polluted waters have a high conductivity
Fe (dissolved)	/
Chemical Oxygen Demand (COD)	Measures the amount of oxygen required to chemically degrade the oxidizable material in wastewater, thus serving as an indicator of water pollution levels
Suspended solids	Non-dissolved solid particles, includes both floating and settleable substances. Water purification aims to reduce the content of suspended solids, as they contribute to the turbidity of the water and its visual "cleanliness"

Waterkwaliteitsparameters

Table 2 Microbiological parameters analysed

Parameter	Description	Issues Caused
Total Plate Count	Overview of all bacteria present in the water that can grow in the presence of oxygen at a temperature of 22°C	General indication of bacteriological contamination of water
Coliforms	Group of bacteria that can survive and grow in water	General indicator of water hygiene
E. Coli and Enterococci	Indicators of water contamination by faecal matter	Potentially pathogenic strains of bacteria may be present
Sulfate Reducing Bacteria (SRB)	Bacteria that produce H_2S, slime formation and can initiate Bacterial Corrosion	Odor problems, damage to infrastructure and equipment
Ion Related Bacteria (IRB)	Bacteria that can initiate bacterial corrosion, discolour water, increase turbidity and cause blockages in pipes	Discoloration of water, increased turbidity, blockages in pipes, damage to infrastructure and equipment
Legionella	Bacterium commonly found in natural and man-made aquatic environments	Health risk when concentrations are above 1000 cfu/L and water becomes aerosolized

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Resultaten en discussie

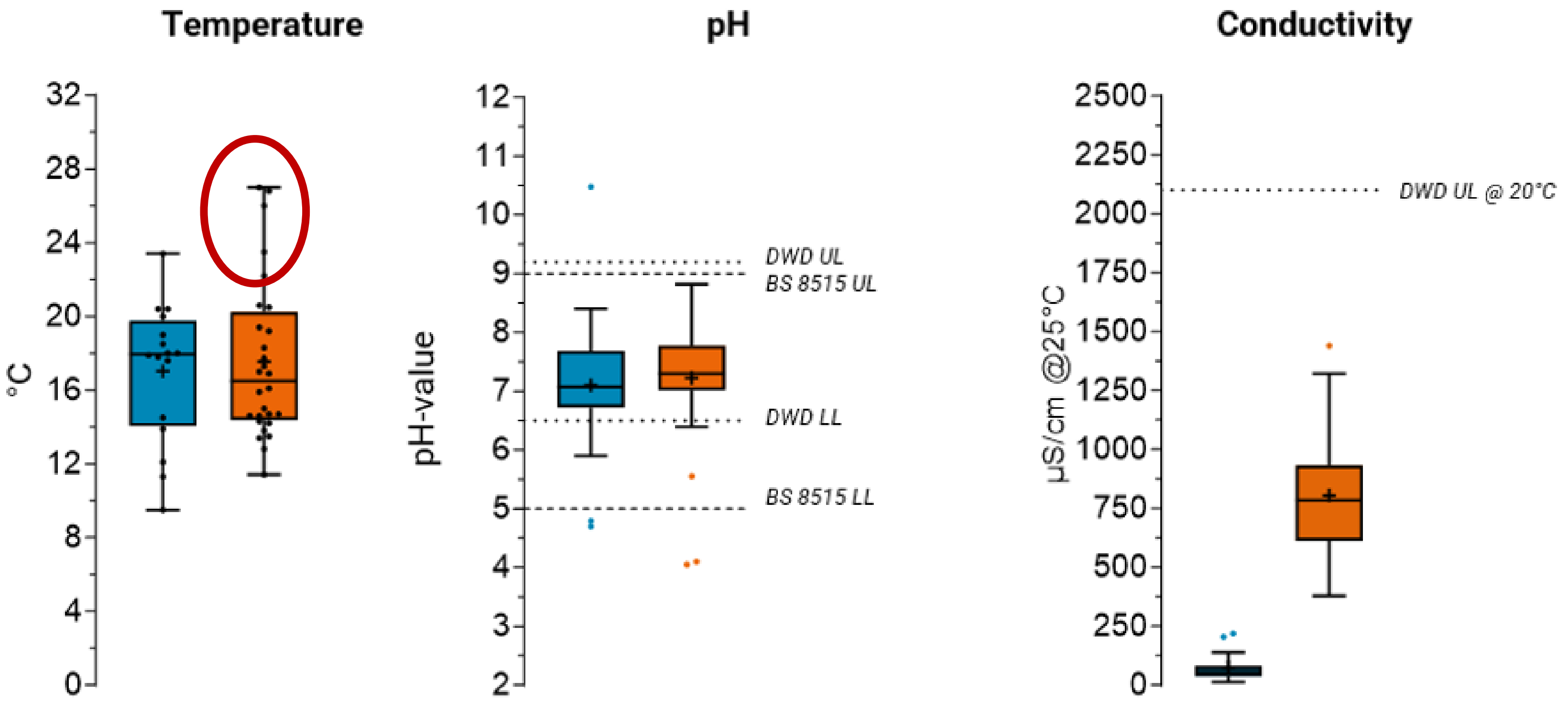


Figure 3 Results of the physiochemical analysis (part 1) of: rainwater (blue) and drainage water (orange) samples. The central black line corresponds to the mean of the dataset. The dotted lines represent the lower (LL) and upper limit (UL) values mentioned in the Drinking Water Directive (DWD) [3] informative annex of the standard EN 16941-2 [4] (referring to BS8515-2:2011).

Resultaten en discussie

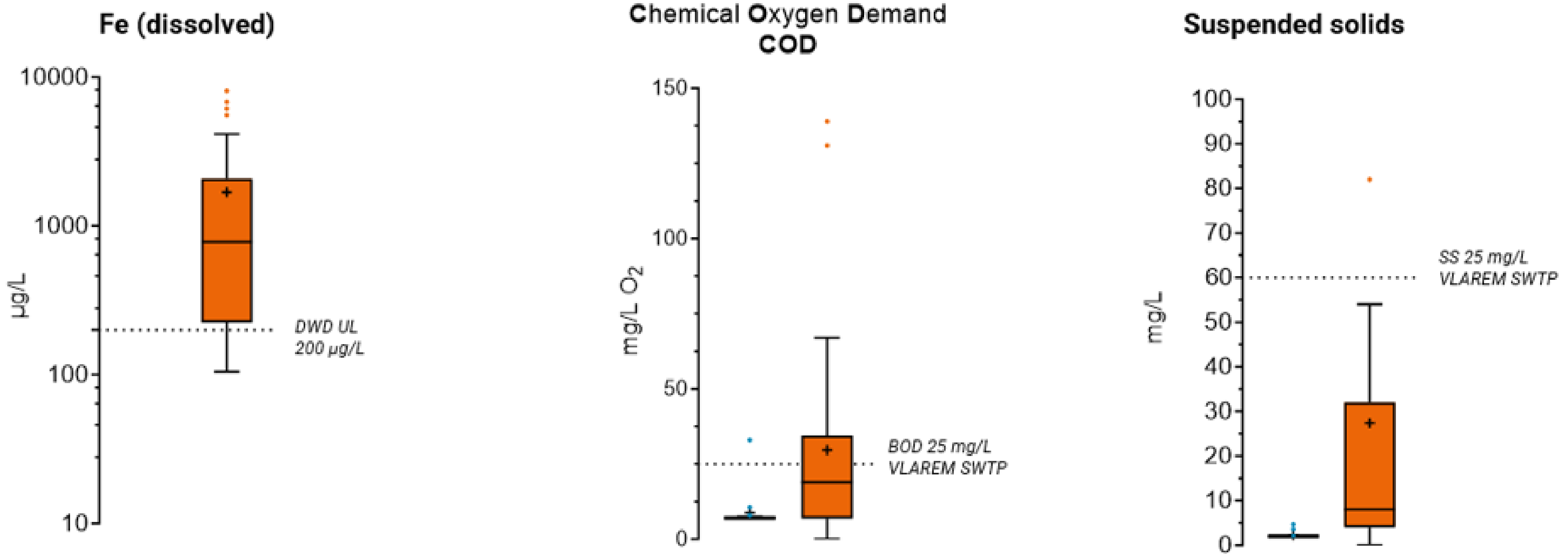


Figure 4 Results of the physiochemical analysis (part 2) of: rainwater (blue) and drainage water (orange) samples. The central black line corresponds to the mean of the dataset. The dotted lines upper limit (UL) values mentioned in the Drinking Water Directive [2] and the VLAREM – legislation for the effluent of small waste water plants (SWTP) [5].

Resultaten en discussie

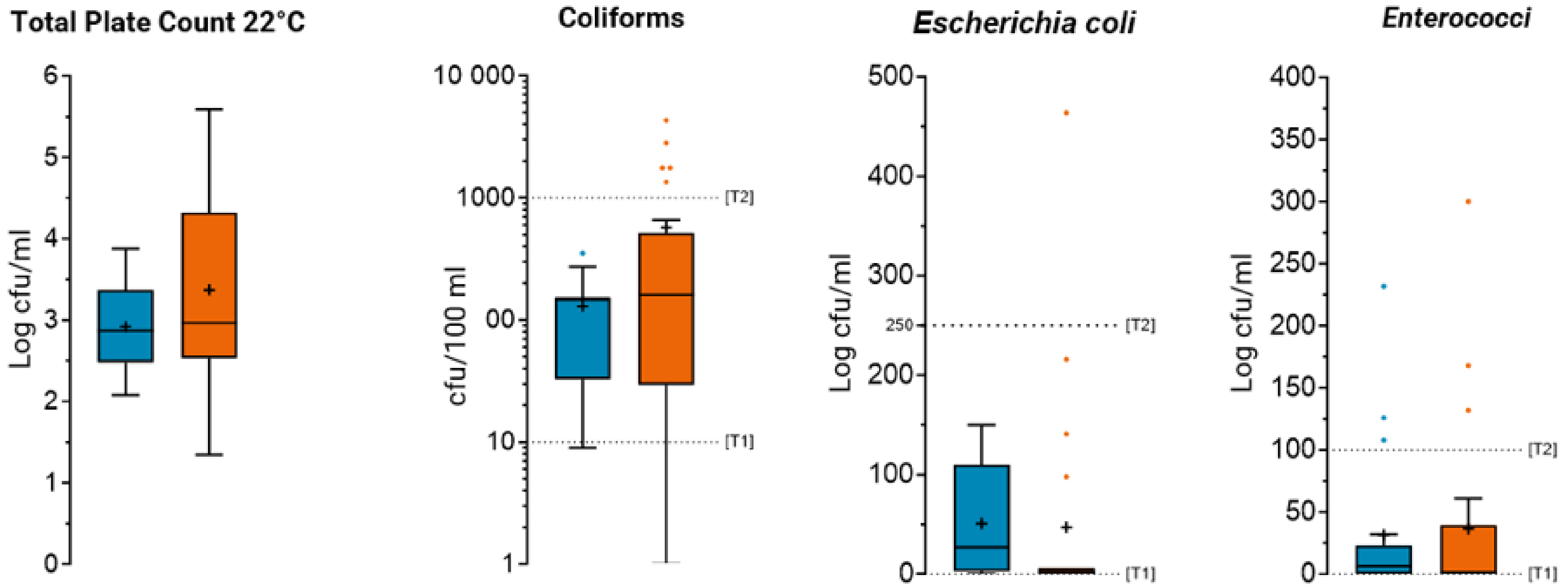
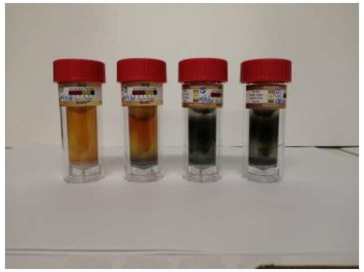
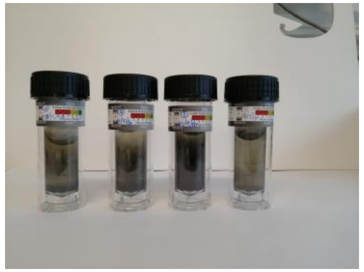


Figure 5 Results of the microbiological analysis (part 1) of: rainwater (blue and drainage water (orange) samples. The central black line corresponds to the mean of the dataset. T1 an T2 indicate the threshold values mentioned in the informative annex of the standard NBN EN 16941-2 for spray (T1: pressure washing, garden sprinkler, car wash) and non-spray (T2: toilet flushing, garden watering, laundry) applications.

Resultaten en discussie





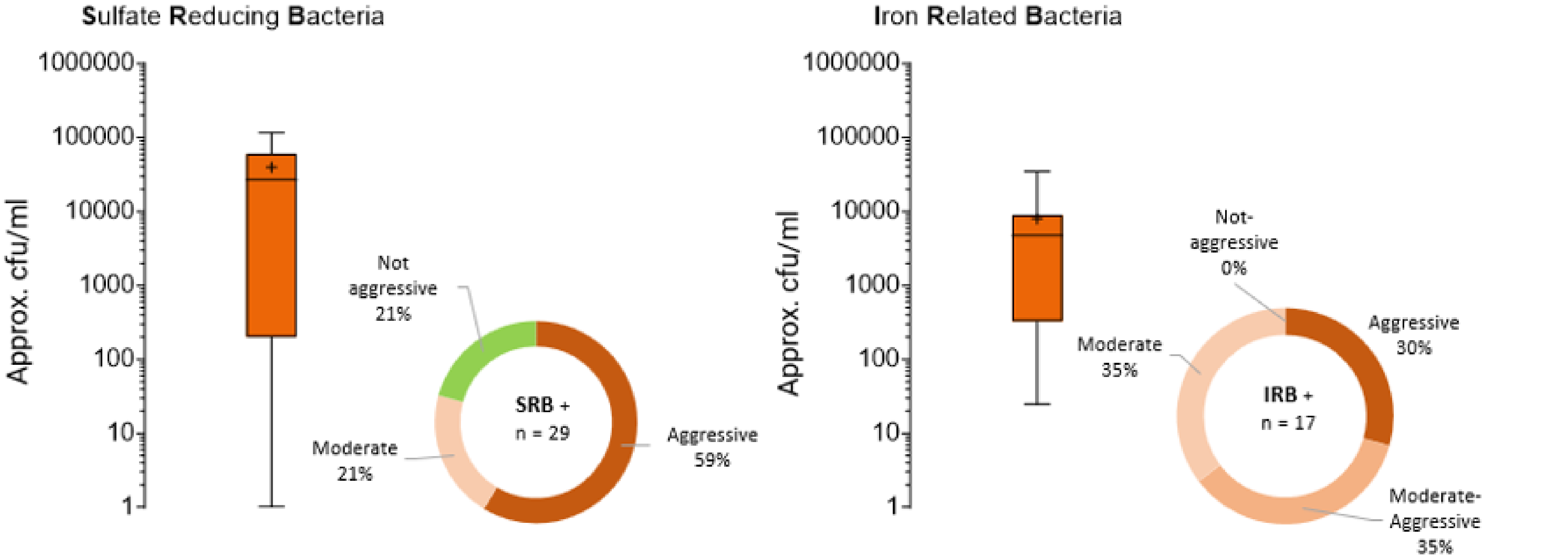


Figure 6 Results of the microbiological analysis (part 2) of: rainwater (blue and drainage water (orange) samples. The central black line corresponds to the mean of the dataset. The classification of the results (not-aggressive, moderate, aggressive) are given at the right of both graphs.

Conclusie

- Hergebruik van bemalingswater van bouwplaatsen kan aanzienlijk bijdragen aan duurzaam waterbeheer, maar er is meer onderzoek nodig naar de nodige waterbehandeling en mogelijke toepassingen.

- **Gebruik in residentiële sanitaire installaties** (bijv. het vullen van regenwatertanks) zonder behandeling wordt **afgeraden**

- Andere maatregelen om de hoeveelheid belaingswater te verminderen zijn relevanter (peilgestuurde bemalingen, ...)

Bedankt voor uw aandacht

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