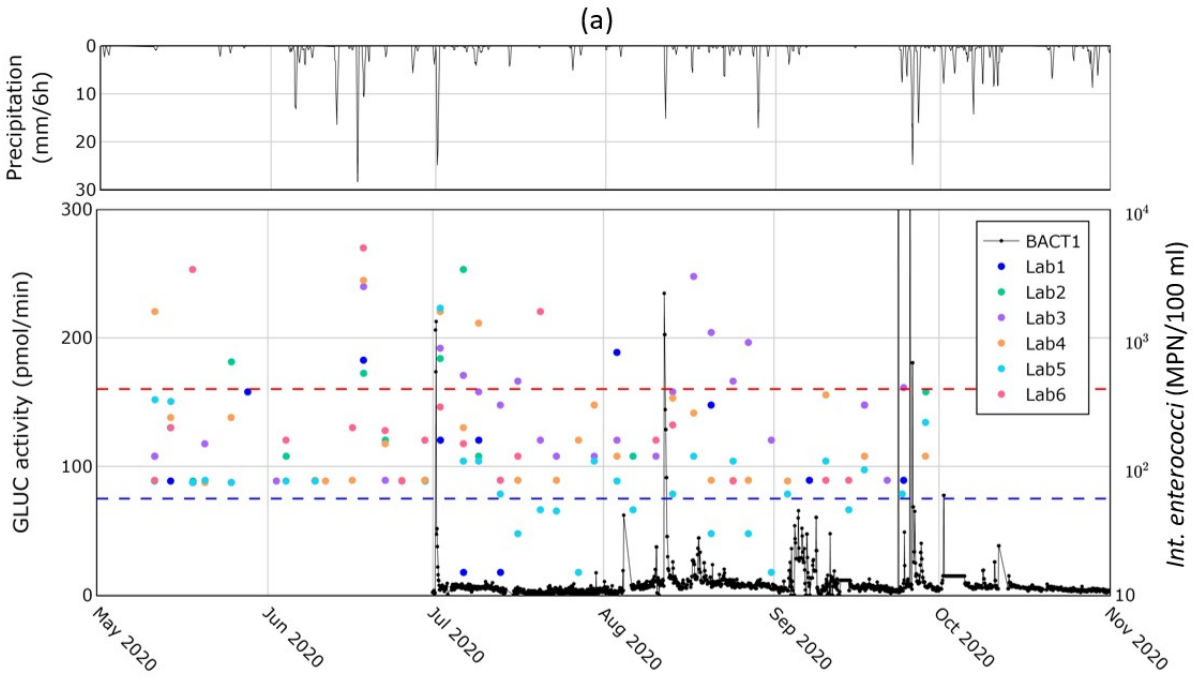
Supplementary Material: The potential of near real-time monitoring of β-D-glucuronidase activity to establish effective warning systems in urban recreational waters

1 Additional analyses

1.1 *Int. enterococci* and GLUC activity measurements

Fig. S1 shows the results for the Int. Enterococci at locations LAB 1 – LAB 6 and the BACTcontrol at location BACT 1 in 2020 (Fig. S1b) and 2021 (Fig. S1b). The hygienic limit for *int. enterococci* (400 MPN/ 100ml) is regularly exceeded during major showers. For instance, the showers of 18 June and 1 July 2020 resulted in increased bacteria concentrations at several measurement locations. It is observed, however, that various exceedances of the *int. enterococci* were generally not related to precipitation events, leading to ambiguous results. Similar results were obtained via regular sampling and laboratory analysis at location LAB 1 in 2021 (Fig. S1b). As mentioned in the main article, a direct relationship between the used enzyme (β-D-glucuronidase) in the BACTcontrol and *int. enterococci* cannot be established. The enzyme β-D-galactosidase is the suitable enzyme for coliforms.



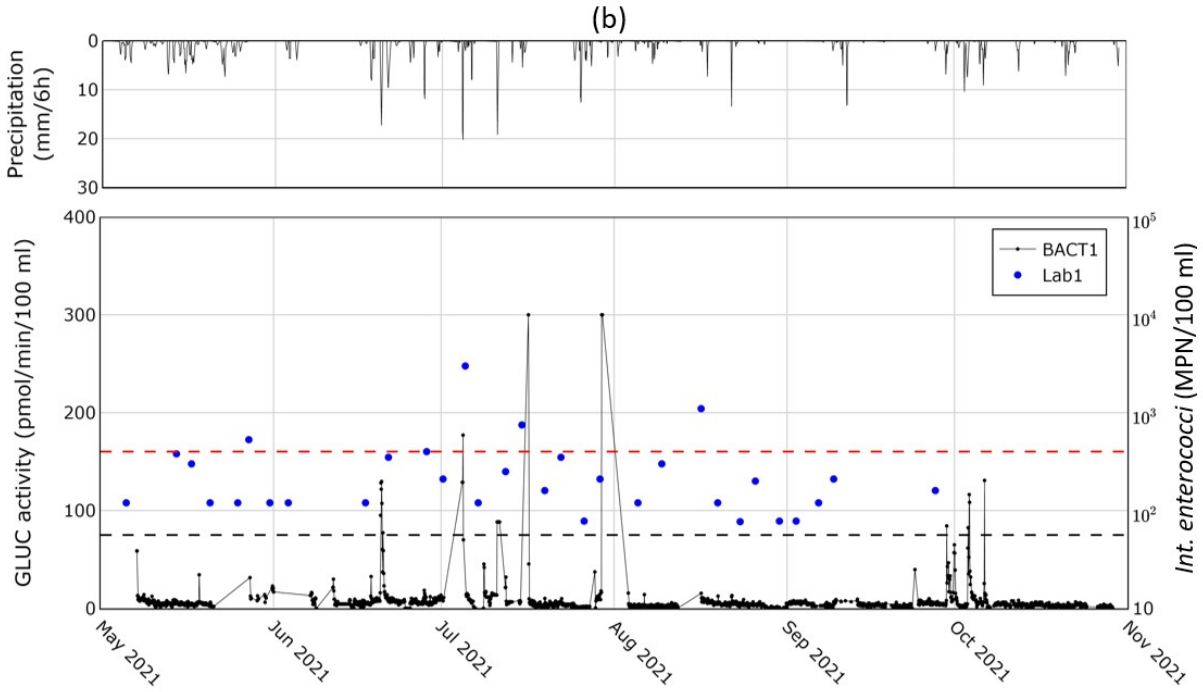


Figure S1. GLUC activity recorded by the BACTcontrol and measured *int. enterococci* colonies at all locations in 2020, b) GLUC activity recorded by the BACTcontrol and measured *int. enterococci* colonies at location LAB 1 in 2021. The graphs include the 6-hour sum of precipitation via radar measurements. The red and black dashed lines show the established hygienic limit values for *E. coli* and GLUC activity, respectively.

1.2 General water quality parameters

Additional water quality parameters were analyzed in order to explore the water quality of the canals in Breda during warmer periods, in which lower quality is expected. Fig. S2 shows the results of transparency and Chlorophyll-a content for the months of July and August 2020. The results reveal a deterioration of water quality in mid-August 2020 which explains the variability in the BACTcontrol measurements observed at the same period. This variability was used in this research to set the hygienic limit for the BACTcontrol in the specific water system (75 pmol/ min/ 100ml).

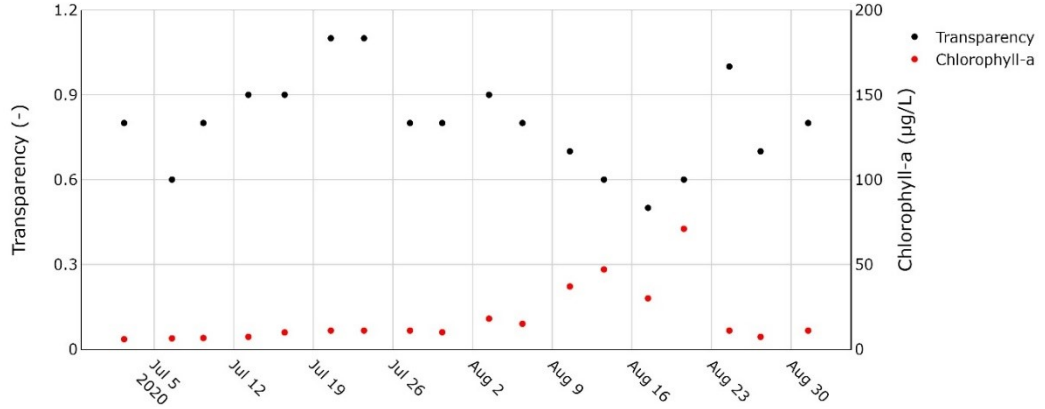


Figure S2. Measurements of transparency (left axis) and Chlorophyll-a (right axis) at location LAB 1 during summer in 2020.