4.49 Total pollutant discharge to local waterbodies

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Total pollutant discharge to local waterbodies	**Water Management**
Description and justification	In the EU, all waterbodies are classified by quality status based on guidelines set in the Water Framework Directive (WFD), Directive 2000/60/EC (European Parliament, Council of the European Union, 2000). The WFD outlines biological, physico-chemical and hydromorphological quality elements. Comparison of measured water quality parameters for a given waterbody with standard values outlined in the WFD allows classification of the status of a waterbody from high to bad. Parameters taken into account include a large number of variables including, e.g., plankton counts, aquatic flora, invertebrates, hydrological continuity and conditions, thermal conditions, oxygen conditions, salinity, nutrient conditions and prevalence of priority pollutants and other specific pollutants. Many of these parameters are waterbody specific and the determination of stress caused by a pollution source depends on the type and size of the waterbody (European Parliament, Council of the European Union, 2000).
Definition	Water quality status according to WFD as determined by pollutant discharge monitoring
Strengths and weaknesses	+ Persistent quality monitoring of the receiving waterbody is a good way of following the environmental impacts of the pollutant discharges of urban communities, but they depend heavily on the condition and size of the receiving waterbody and the whole catchment area - Selecting proper sampling procedures as well as measured variables to capture a representative figure of the pollution discharge loading is challenging
Measurement procedure and tool	Pollutant discharge is estimated by taking samples from urban runoff from the target area and comparing the time series of the selected parameters. First, sampling sites are selected to represent the catchment urban area in question as comprehensively as possible. Ideally, sampling sites can be streams, ditches or runoff sewers collecting from a large catchment area in the urban area of interest, but not yet

	mixing with a larger waterbody. A sampling schedule is determined and followed. Ideally, continuous automatic aggregate samplers are used with flowmeters, providing the most reliable estimates of parameter yearly aggregates. Alternate sampling method is systematic sampling in which samples are taken with identical time steps (e.g., every 2 months) regardless of conditions, like rainfall, traffic or temperature. All non-continuous sampling procedures inflict bias into results, and will only capture a fraction of the actual runoff quality, which makes results invariably noisy. On-site measurements, sampling and laboratory analysis are to be performed by personnel and in premises with experience in water sampling and analysis using standardized methods, chemicals and equipment. For technical details, please refer to standard methods or equivalent methods available at the laboratory performing the analysis. As the details of each urban environment and NBS can differ substantially, and as parameters described here are often only indicative of water quality, potential change in pollution discharge is presented in a Likert-type scale:

1	Several of the parameters indicate significantly worse water quality, or more than half of the parameters indicate somewhat worse water quality
2	One of the parameters indicate significantly worse water quality, or some of the parameters indicate somewhat worse water quality
3	The parameters indicate no change in the water quality
4	One of the parameters indicate significantly better water quality, or some of the parameters indicate somewhat better water quality
5	Several of the parameters indicate significantly better water quality, or more than half of the parameters indicate somewhat better water quality

Scale of measurement	District scale
Data source	
Required data	Measurement data of the parameters
Data input type	Qualitative and quantitative
Data collection frequency	Daily, weekly, monthly or annually
Level of expertise required	Low to high
Synergies with other indicators	Synergies with the other water quality indicators in the *Water management* indicator group

Connection with SDGs	SDG 13 Climate action, SDG 14 Life below water
Opportunities for participatory data collection	Participatory data collection possible under supervision
Additional information	
References	Allen Burton, G., Jr., & Pitt, R.E. (2010). *Stormwater Effects Handbook. A Toolbox for watershed Managers, Scientists, and Engineers*. Boca Raton, FL: Lewis Publishers, CRC Press. European Parliament, Council of the European Union. (2000). *EU Water Framework Directive: Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 Establishing a Framework for Community Action in the Field of Water Policy*. Retrieved from http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02000L0060-20140101 United States Environmental Protection Agency (US EPA). (2017). *Water Quality Standards Handbook: Chapter 3: Water Quality Criteria*. EPA-823-B-17-001. Washington, D.C.: EPA Office of Water, Office of Science and Technology. Retrieved from https://www.epa.gov/sites/production/files/2014-10/documents/handbook-chapter3.pdf Zumdahl, S.S., & DeCoste, D.J. (2012). *Chemical Principles*. Seventh Edition. Boston, MA: Cengage Learning.

4.50 Water Quality: basic physical parameters

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Water Quality: Basic physical parameters	**Water Management**
Description and justification	Indicators of Effects on Water Quality sub-criterion will assess the effects of project scenarios on water quality, in terms of physical, microbiological, biological and chemical parameters.
Definition	Physical parameters of water, together with chemical and microbiological properties, determine the water quality. Main quality characteristics of natural waters include