Interreg Danube Region

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Tethys

Deliverable 3.1.1: Detailed summary of policies and external challenges considered in the assessment

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Purpose of this document

This document lists the existing environmental policies, proposals of their amendments, additional external challenges and relevant specific aspects linked to water pollution prevention, assessment and management, which will be addressed further in an in-depth assessment of the respective implications for water quality in Danube countries and at Danube Rivel Basin level.

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1 Introduction

The purpose of this document is to provide a summary of relevant European Union (EU) policy challenges and external pressures that may impact water pollution, like climate change, demographic or technological developments, and urbanisation. This evaluation should serve as a basis to an in-depth assessment of the challenges to efficient and effective management of water-borne pollution of surface water at two scales:

- the entire Danube River Basin (DRB),
- the DRB countries.

The legislation regarding water management has been recently undergoing numerous reviews and amendments, linked to the usual policy cycles and triggered by technical and scientific progress. This covers better understanding of impacts of hazardous substances (HS) in water to environment and human health and technological progress related e.g. to increased possibilities of their identification, quantification and treatment (i.e. better analytical methods, instruments and technologies).

In the EU policy, numerous policy acts (amendments, recasts) entered already or will enter in near future into force. The new Drinking Water Directive (DWD)[1] establishes stricter requirements for intended use for human consumption. New criteria on reuse of (waste)water for agricultural irrigation are also already in force with the new regulation on minimum requirements for water reuse[2]. The updated Urban Wastewater Treatment Directive (UWWTD)[3], aiming at further reduction of water pollution and improving water quality, has just been adopted. Efforts continue also in the field of regulation of industrial emissions, with tighter requirements e.g. of emission limits and favouring less harmful processes and technologies to promote cleaner water cycles and healthier environment. In addition, new Environmental Quality Standards (EQS) for 25 dangerous compounds are expected to be adopted to further prevent water pollution of surface water.

2 Goal and scope

Activity 3.1 of the Tethys project is considered as iterative and supportive to other activities in all three specific objectives (SOs) of the project, particularly the ones included in the SO3 (i.e. Future-oriented prioritisation and coordination of actions for DRB-transnational HS management), but also to SO2 (Fit-for-purpose and harmonised HS emission modelling for emerging challenges and

[1] Directive (EU) 2020/2184 of the European Parliament and of the Council of 16 December 2020 on the quality of water intended for human consumption (recast) (Text with EEA relevance), OJ L 435, 23.12.2020, p. 1–62.
[2] Regulation (EU) 2020/741 of the European Parliament and of the Council of 25 May 2020 on minimum requirements for water reuse, OJ L 177, 5.6.2020, p. 32–55.
[3] Directive (EU) 2024/3019 of the European Parliament and of the Council of 27 November 2024 concerning urban wastewater treatment (recast), PE/85/2024/REV/1, OJ L, 2024/3019, 12.12.2024.

pressures), and to certain extent to SO1 (Fit-for-purpose and harmonised data acquisition, management and assessment of HS water pollution). The activity can be divided into three steps:

- **Step 1**: Identifying the most critical changes linked to new policies and legal initiatives at the EU level, among which in:
    - EU Zero Pollution Action Plan[7],
    - new DWD[1],
    - EU UWWTD recast[3],
    - the European Commission (EC) (with subsequent changes by the European Parliament (EP) and the Council) of the proposal for a directive amending the Water Framework Directive (WFD)[4], the Groundwater Directive (GWD)[5] and the EQS Directive (EQSD)[6].
- **Step 2**: Identifying the potential impacts and implications of foreseeable external challenges and pressures for the effective achievement of the multiple objectives set by the policies, among which are:
    - climate change,
    - demographic changes,
    - technological changes.
- **Step 3:** In-depth assessment, i.e. analysing the implications of:
    - different national and institutional starting points,
    - different levels of institutional capacity and resource availability at the national level (in both EU and non-EU countries),
    - specific occurrence, pollution level, and emissions of hazardous substances,

  for a coordinated, efficient, and transnational management of HS pollution.

To give a practical example, according to the planned legislative changes pollutants such as per- and poly-fluorinated alkyl substances (PFAS), pharmaceuticals, and pesticides are proposed to be added to the list of priority substances (PS) for surface water. This means a potential obligation for the EU Member States (MSs) to monitor their presence in water and ensure that EQSs are not surpassed. New investments in infrastructure or increased resources, e.g. energy consumption may be needed. Also, the acquisition of new skills and competencies may be required. All countries have their national specificities that should be considered in the assessment, as they will influence

[4] 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, OJ L 327, 22.12.2000, p. 1–73.
[5] Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration, OJ L 372, 27.12.2006, p. 19–31.
[6]Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council, OJ L 348, 24.12.2008, p. 84–97.

their capacity to reach the national objectives, and, in consequence, contributes to the overall performance at the DRB-scale.

This content-wise part of this report consists of the following chapters:

- Chapter 3: Recent EU legislative changes in the field of water quality and pollution control
- Chapter 4: Other relevant EU legislation and broader initiatives linked to hazardous compounds
- Chapter 5: External challenges that may impact future water pollution

3 Recent EU legislative changes in the field of water quality and pollution control

WFD as the primary legislation, supported by two daughter directives regarding the quality and quantity of groundwater, GWD, and on the quality of surface water, EQSD, are currently under final revision steps. The aim of this process is to improve the rules on pollutants in water, contributing in this way to the zero-pollution objective (i.e. the Zero Pollution Action Plan[7]) set in the framework of the EU Green Deal[8]. The review also links to other initiatives of the Green Deal. Among the most important are the ones targeting prevention of pollution with micropollutants through the revised UWWTD, the reduction of pesticides uses in agriculture, and the general improvements in the EU's chemicals policy through the Chemicals Strategy for Sustainability[9]. A brief description of the most important changes in the main water-quality related legal acts is given in the following sections.

3.1 Water Framework Directive, Groundwater Directive and Environmental Quality Standards Directive

In December 2019, a Fitness Check exercise on the WFD and its daughter directives[10], carried out by the EC, concluded that, although the legislation on water is generally fit for purpose,

[7] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Pathway to a healthy planet for all EU, Action Plan: 'Towards Zero Pollution for Air, Water and Soil', COM/2021/400 final.

[8] For more details see the EC website: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en.

[9] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Chemicals Strategy for Sustainability Towards a Toxic-Free Environment, COM/2020/667 final.

[10] Commission Staff Working Document - Fitness Check of the Water Framework Directive, Groundwater Directive, Environmental Quality Standards Directive and Floods Directive: Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy, Directive 2006/118/EC of the European Parliament and of the Council on the protection of groundwater against pollution and deterioration, Directive 2008/105/EC of the European Parliament and of the Council on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council, Directive 2007/60/EC on the assessment and management of flood risks {SEC(2019) 438 final} - {SWD(2019) 440 final}.

improvements in control and reduction of chemical pollution are needed. Three main areas, where changes are required, include:

- More regular updating the list of PS and the related EQS values,
- Ensuring more targeted harmonisation between the MSs regarding the national river basin specific pollutants (RBSP) and pollutants posing a risk to groundwater, including the limit values,
- Extending the evaluation of the risk to people and the environment considering the combined effects of mixtures, and not only basing it on the presence of single compounds.

An EC proposal to revise the directives followed in October 2022[11], introducing, among other, an updated lists of pollutants in surface water and groundwater. The EP adopted its report with a range of changes to the EC proposal, developed by the Committee on the Environment, Public Health and Food Safety (ENVI), in April 2024[12]. The Council agreed its negotiating mandate on the revision of the directive in June 2024, introducing several additional changes to the EC proposal[13]. Trilogue negotiations, incorporating also the MSs, are being carried out since early 2025 and the revised legal acts are expected to be adopted by the end of 2025.

The following sections presents briefly the new or revised requirements considered most relevant for the Tethys project, as fund in the last publicly available proposal versions, mentioned above.

It is important to mention that the EC proposal sets the deadline of 18 months for transposing the proposed directive to MSs national law. The Council decided to extend this deadline by 6 additional months.

3.1.1 Priority substances in surface water

The EC proposal extends the list of PS by 23 individual substances and two substance groups, including:

- pharmaceuticals: macrolide antibiotics, estrogenic hormones, carbamazepine, diclofenac, ibuprofen),
- industrial chemical: bisphenol A,

[11] Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Directive 2000/60/EC establishing a framework for Community action in the field of water policy, Directive 2006/118/EC on the protection of groundwater against pollution and deterioration and Directive 2008/105/EC on environmental quality standards in the field of water policy, COM/2022/540 final.

[12] European Parliament legislative resolution of 24 April 2024 on the proposal for a directive of the European Parliament and of the Council amending Directive 2000/60/EC establishing a framework for Community action in the field of water policy, Directive 2006/118/EC on the protection of groundwater against pollution and deterioration and Directive 2008/105/EC on environmental quality standards in the field of water policy (COM(2022)0540 – C9-0361/2022 – 2022/0344(COD)), available online at: https://www.europarl.europa.eu/doceo/document/TA-9-2024-04-24_EN.html#title45_1, accesses February 2025.

[13] Proposal for a Directive of the European Parliament and of the Council amending Directive 2000/60/EC establishing a framework for Community action in the field of water policy, Directive 2006/118/EC on the protection of groundwater against pollution and deterioration and Directive 2008/105/EC on environmental quality standards in the field of water policy – Mandate for negotiations with the European Parliament, 2022/0344(COD), dated 19 June 2024.

- metal: silver,
- pesticides: triclosan, nicosulfuron, glyphosate, neonicotinoids, and pyrethroids,
- active substances in pesticides including their relevant metabolites, degradation and reaction products,
- 24 PFAS are also proposed to be added as a group and be subject to an EQS based on the sum of substance concentrations.

A few existing PS compounds that are considered to no longer pose an EU-wide risk should be removed, namely the pesticides: alachlor, chlorfenvinphos, simazine, and an industrial chemical: carbon tetrachloride. The PS list contains now 68 substances and substance groups.

Simultaneously, more stringent EQS values are proposed in the revised EQSD with respect to 14 compounds, while less stringent to two compounds.

The EP added several changes to the EC proposal that require additional EQS for the total of bisphenols and the total of PFAS in (the later parameter is also added for groundwater). The EQS for glyphosate and atrazine are proposed to be more stringent, while bisphenol-A should be classified as a priority hazardous substance (PHS).

The final content of the PS list is still uncertain, as there are diverging opinions between the EC, EP and the Council on which compound should finally be in this list. For instance, EC proposes for certain PFAS a threshold for the sum of 24 of them in surface water. The EP changes the proposal requiring that beside a subset of specific PFAS, "PFAS total" should also be added.

Another example are Cyclodiene pesticides, DDT and para-para-DDT, 1,2-Dichloroethane or Dichloromethane, which in the EC proposal are classified as PS, kept so in the EP version, while the Council propose to move them to Part C of Annex II listing RBSPs.

A third example are pharmaceutical active substances, which in the EC and Council proposals are only addressed as groundwater pollutants, while the EP proposes to add them ("Pharmaceutical active substances – total") to the list of PS in surface water as well.

More examples of those differences can be found between the legal act versions, but their detailed analysis exceeds the scope of the current assessment. As mentioned above, trilogue negotiations are currently carried out and the revised legal acts are expected to be adopted by the end of 2025.

3.1.2 River basin specific pollutants in surface water

The revised EC proposal integrates RBSP, i.e. substances of national concern, into the definition of "chemical status" of surface waters and takes them out from the definition of ecological status. A new annex II to the EQSD is proposed listing categories of RBSPs for which MSs are obliged to set Quality Standards (QS), the procedure to derive them and a list of EU harmonised standards. These changes should guarantee a more coordinated, consistent and transparent way to monitor and estimate the chemical status of surface wates.

It is also important to mention that the revised EC proposal includes an explicit requirement for MSs to gradually reduce pollution from RBSPs, and not only from PS, as it has been so far.

3.1.3 Assessment of mixtures

The Commission proposal aims to "improve the monitoring of chemical mixtures to better assess combination effects and take account of seasonal variations in pollutant concentrations." This assessment is, however only proposed for certain substances groups so far. For instance, the proposal envisages using this approach for assessing PFAS compounds, where the sum-EQS shall be expressed as Perfluorooctanoic acid (PFOA)-equivalents. Also, some of the polyaromatic hydrocarbons (PAHs) should be assessed this way, nevertheless anthracene, fluoranthene and naphthalene are still kept as individual entries in the PS list and separate EQS values are proposed for them.

Applying this approach is not proposed, however, regarding (xeno-)estrogens (17ß-estradiol, estrone, 17-ethinyl-estradiol, bisphenol A, octylphenol, nonylphenol), herbicides (atrazine, diuron, isoproturon, cybutryne, terbutryn) and neonicotinoid insecticides (acetamiprid, clothianidin, imidacloprid, thiacloprid, thiamethoxam)[14].

3.1.4 Estrogenic substances in surface water

The revised EC proposal requires that MSs should apply at least for two years effect-based monitoring methods for estrogenic substances with the objective of assessing the cumulative effects of such compounds in surface water. The reasoning behind this proposal is that in this way all estrogenic compounds causing similar effects could be addressed, instead of only few compounds legally regulated. The Council proposes to change this obligation and indicate that MSs are encouraged to apply voluntarily such monitoring. It also adds that the EC shall adopt respective technical guidelines (including "methods for chemical analysis of the estrogenic substances and effect-based monitoring methods, interpretation and assessment of the results and trigger values") for this monitoring 12 months after the entry of this directive into force. The monitoring should begin 18 months later and be carried out at least four times per year over the following two years. The following three estrogenic hormones: 17-Beta estradiol (E2), Estrone (E1) and 17-a Alpha-Ethinyl ethinyl estradiol (EE2), listed in Annex I to EQSD, shall also be monitored by MSs applying the conventional analytical methods in several sites, chosen to be representative to carry out a comparative analysis at various concentrations. A comparison of the results obtained with the results of conventional methods for the three compounds would allow evaluating the reliability of the effect-based screening method. The EP adds further that the EC

[14] Backhaus, T. Commentary on the EU Commission's proposal for amending the Water Framework Directive, the Groundwater Directive, and the Directive on Environmental Quality Standards. Environ Sci Eur 35, 22 (2023). https://doi.org/10.1186/s12302-023-00726-3.

shall publish a report on the reliability of the effect-based methods in anticipation of a potential establishing in the future effect-based trigger values. Once such methods are available to use also for other substances, the EC would be empowered to adopt delegated acts adding a requirement for the use of the effect-based methods, in addition to the conventional methods, to perform monitoring and evaluate the presence of the concerned substances in water bodies.

3.1.5 Priority substances in groundwater

The existing QSs for PS in groundwater exists only for nitrates, a generic one for single pesticides and for the total sum of pesticides. The revised proposal introduces five new compounds and related EU-wide QS values, namely for:

- PFAS (group of 24, as for surface water),
- pharmaceuticals: carbamazepine and sulfamethoxazole,
- non-relevant metabolites of pesticides (individual and total).
- pharmaceutical active substances (total).

In case of the pharmaceutical primidone, that would also be added to the list, MSs should consider setting national thresholds.

The Council introduces several changes to the EC proposal. For instance, since groundwater is the key source of drinking water in Europe, the Council considers it important that the requirements in the GWD should be aligned with the requirements included already in the DWD (set currently for 20 PFAS compounds). Nonetheless, it is stated that the related DWD requirements are not anymore up to date in the light of the most recent scientific developments and should be revised in the near future. Therefore, the respective QS for PFAS set in Annex I of GWD, is included as a reference to the DWD, to enable in this way that any future changes to the requirement of the DWD will automatically apply also to the GWD. The Council proposes also to establish QS for the sum of four most concerning PFAS, namely Perfluorohexane sulfonic acid (PFHxS), Perfluorooctanesulfonic acid (PFOS), PFOA and Perfluorononanoic acid (PFNA).

The Council also proposes to delete the QS for the total of the 'pharmaceutical active substances', adding a generic value for the 'individual pharmaceuticals' to be applied to any pharmaceutical posing a risk at national level, unless a more stringent threshold value has been set specifically for that compound, either at EU or national level. It also sets unified QS for 'Non-relevant pesticide metabolites' in groundwater, instead of the different ones proposed by the EC and dependant on the available knowledge on their toxicity.

Summarising, as described above, further discussions are also needed on this point to decide on the final list for groundwater pollutants to be monitored.

3.1.6 Update of lists and quality standards through delegated acts

The EC proposal introduces a change to the process of updating the pollutants lists and related standards. Instead through a co-decision process, they would be updated through delegated acts, which should streamline and speed up the process allowing for faster consideration of the newest scientific knowledge. The following should be amended in this way:

- the lists of surface water PS and groundwater pollutants and their relevant quality,
- standards,
- the list of categories of RBSP,
- and the list of groundwater pollutants for which MSs shall consider setting national threshold values.

3.1.7 Monitoring

3.1.7.1 Watch lists

Furthermore, the EC proposes to establish mandatorily watch list for groundwater pollutants, containing a maximum of five compounds or groups thereof. The first list should be created within 24 months since the entry of the revised directive into force, and the MSs would be obliged to monitor the compounds on the list once per year over the two consecutive years.

Regarding the watch list for pollutants in surface water, its update should occur 23 months after the revised directive enters into force and should be limited to maximum of 10 compounds or groups thereof. MSs would be obliged to monitor the listed compounds at least twice a year over two years, apart from compounds that are sensitive to climatic or seasonal variabilities. For them a more frequent monitoring is envisaged.

The watch lists should be updated every three years, by the EC supported by the European Chemicals Agency (ECHA) and based also on the analysis of the monitoring results provided by the MSs.

The EP proposes further changes to the EC proposal. Among them is the addition of further compounds, like the xanthates and non-relevant metabolites of pesticides to the surface water watch list, and of sulphates in both surface and groundwater watch lists. Both watch lists should also consist of a minimum of five compounds or groups of compounds, which go against the EC proposal, backed up also by the Council opinion (that asks for a maximum of five substances or groups of substances for groundwater and maximum of ten for surface water).

3.1.7.2 New methods, joint monitoring facility and aid to financing the monitoring programmes

Considering scientific and technical progress in monitoring, the directive requires that "data and services from remote sensing technologies, earth observation (Copernicus services), in-situ

sensors and devices, or citizen science data, leveraging the opportunities offered by artificial intelligence, advanced data analysis and processing" should be allowed to be used by the MSs for the evaluation of the of the status of water bodies.

New is also the proposal to set up a joint monitoring facility that could be of help for the MSs authorities responsible for monitoring. Two years after the entry into force of the revised WFD an evaluation of the MSs needs and the possible options for operating such a facility for surface and groundwater, watch lists substances and the compounds listed in Annex I of Directive GWD and in Annex I EQSD shall be carried out.

Finally, the EP adds a proposal that the EC should evaluate the possibility of introducing an extended producer responsibility (EPR) mechanism for producers that place on the EU market products containing any compounds listed in Annex I of the GWD and in Annex I of the EQSD, as well as substances of emerging concern included on the watch lists. This proposal should be evaluated within one year from the entry of the directive into force and shall aid covering the costs of monitoring.

3.2 Urban Waste Water Treatment Directive

As communicated by the EC, the review of the old UWWTD[15] has been carried out with the objective to align this legal act with several Commission initiatives in the area of environmental protection, namely, the European Green Deal, the Zero Pollution Action Plan, and the Circular Economy Plan[16]. The so-called REFIT exercise identified storm water overflows and polluted discharges from urban runoff as the main sources of pollution from urban wastewater that require action, besides the need of covering also smaller agglomerations by the provisions of the directive was identified.

In October 2022 the EC presented the proposal of the revised UWWTD[17] that contained a number of changes aiming, among others, at better removal of micropollutants. According to the EC estimates[18] the revised directive, as proposed, should by 2040:

- "save almost EUR 3 billion per year across the EU,
- reduce greenhouse gas emissions by over 60% compared to 1990,
- decrease water pollution by more than 365 thousand tonnes,
- cut microplastics emissions by 9%".

[15] Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment, OJ L 135, 30.5.1991, p. 40–52.
[16] European Commission. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions; European Commission: A new Circular Economy Action Plan For a cleaner and more competitive Europe, COM/2020/98 final.
[17] Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment, OJ L 135, 30.5.1991, p. 40–52.
[18] See the EC website: https://environment.ec.europa.eu/topics/water/urban-wastewater_en

The EP and the Council commented in autumn 2023 on the proposal and suggested several amendments. In April 2024 the agreed text was adopted by the EP, and in November 2024 it was adopted by the European Council. The revised UWWTD entered into force on January 1st, 2025, and needs to be transposed into the national law **by July 31st, 2027**.

There are five sizes of WWTPs for which certain requirements are specified:

- 1 000 – 1 999 'population equivalent' (p.e.)
- 2 000 – 9 999 p.e.
- 10 000 – 99 999 p.e.
- 100 000 – 149 999 p.e.
- 150 000 p.e. or more

Among the main goals of the revised directive are:

- collecting and treatment of wastewater from all urban areas with population of **>1000 p.e.**,
- removing more nutrients with tertiary treatment,
- removing micropollutants with quaternary treatment, that should be financed through EPR paid by industrial sectors that are mostly liable for the pollution, namely the pharmaceutical and cosmetic industries,
- transforming wastewater treatment plants into energy-neutral facilities and reducing their greenhouse gas emissions,
- establishing better storm water overflow management,
- monitoring health parameters, such anti-microbial resistance and SARS-Covid.

The objectives should be achieved among others through the following improvements:

- **by the end of 2035** all agglomerations with at least **1 000 p.e.** ('population equivalent') need to be connected to urban wastewater collecting systems equipped with secondary treatment (i.e. removing biodegradable organic matter),
- **by the end of 2039** all urban wastewater treatment plants (WWTPs) with a load of **at least 150 000 p.e.** shall be equipped with tertiary treatment (i.e. removing nutrients). The same is required by the end of 2045 for agglomerations with capacity of **at least 10 000 p.e.**,
- **by the end of 2045** all wastewater treatment plants treating a load **over 150 000 p.e.** (and for agglomerations with at least **10 000 p.e.** based on a risk assessment) need to be equipped with quaternary treatment for removal of numerous micropollutants. A prioritisation of the necessary investments should be carried out by the MSs to upgrade first those facilities where the risks for the environment and human health are the highest.
- introducing stringent monitoring rules for certain chemical pollutants, like e.g. PFAS,

- pollution from urban runoff and stormwater overflows should be better managed (integrated urban wastewater management plan for drainage areas for agglomerations **over 10 000 p.e.**),
- introducing the EPR scheme that will cover manufacturers of pharmaceuticals and cosmetics: at least 80 % of the costs of quaternary treatment, both investment and operational costs, will be covered by producers, the rest by national financing,
- a stepwise energy neutrality target for the urban wastewater treatment sector
- increasing the online public access to information for each agglomeration **of above 1 000 p.e.** and extension of the type of information.

More details regarding the currently valid requirements of the revised directive are presented in the below sections.

3.2.1 Collecting systems and calculation of the load of an agglomeration (Article 3)

MSs shall ensure that all agglomerations:

- with **at least 2 000 p.e.** are provided with collecting systems and all their sources of domestic wastewater are connected to the collecting system,
- of size **between 1 000 and 2 000 p.e.** comply with the above requirement **by end of 2035**.

Certain derogations are allowed for a maximum period of 8 or 10 years, under specified in the directive conditions:

(i) max 8 years, if less than 50 % of the referred agglomerations are provided with collecting systems; or less than 50 % of the urban wastewater load of the concerned agglomerations is collected in collecting systems.

(ii) max 10 years in case the above-mentioned shares are 25%.

(iii) longer deadlines are allowed for Bulgaria, Croatia and Romania, maximum of 12 or 14 years, respectively.

For more details of on the derogations, the underlying conditions and obligations, see Article 3 (p. 17-18) and Part A of Annex I (p. 45) of the UWWTD.

3.2.2 Individual systems (Article 4)

A derogation from the above-mentioned requirement (as presented in subchapter 3.2.1) is possible only if "the establishment of a collecting system or the connection to a collecting system is not justified because it would produce no environmental or human health benefit, is not technically feasible or would involve excessive cost".

In such a case, MSs shall ensure that "individual systems for the collection, storage and when applicable, treatment of urban wastewater are used in agglomerations of **1 000 p.e. and above**,

or part of those agglomerations". These individual systems are required to be designed, operated and maintained in a way that ensures achieving the same level of environmental and human health protection as the secondary and tertiary treatments referred in requirements described in chapters 3.2.4 and 3.2.5.

The individual systems should be registered and undergo regular inspections by MSs; or checks and control "on the basis of a risk-based approach" by respective authorities or authorised bodies.

In case **more than 2 % of the urban wastewater load** at national level is collected and/or treated from agglomerations of **≥ 2 000 p.e.** a justification for the use of individual systems shall be provided to the EC.

For more details on the requirements regarding individual systems see Article 4 (p. 18-19) of the UUWTPD.

3.2.3 Integrated urban wastewater management plans (Article 5)

The obligation to prepare an integrated urban wastewater management plan applies as follows (see Table 1).

Table 1 Obligation of preparing integrated urban wastewater management plan

WWTP size	**Measure**
p.e.	**Wastewater Management Plan needs to be prepared?**
1 000 – 1 999	In principle not
2 000 – 9 999	In principle not
10 000 – 99 999	Yes, if: • storm water overflows or urban runoff pose environmental or public health risk, • storm water overflow represents more than 2 % of the annual collected urban wastewater load of the parameters referred to in Table 1 and, where relevant, Table 2 of Annex I of the UWWTD, calculated in dry weather flow, • storm water overflow prevents the fulfilment of any of the following: (i) the requirements established under Article 5 of DWD, i.e. the QS applicable to water intended for human consumption,

	(ii) the requirements set out in Article 5(3) of Directive 2006/7/EC[19], i.e. at least 'sufficient' status of all bathing waters, (iii) the requirements set out in Article 3 of Directive EQSD, i.e. the EQS values, (iv) the environmental objectives set out in Article 4 of Directive WFD, i.e. the environmental objectives for surface waters, groundwater, and protected areas, (v) the requirements set out in Article 1 of Directive 2008/56/EC[20], i.e. measures to achieve or maintain good environmental status in the marine environment, (vi) the requirements established under Article 3 of Directive GWD, i.e. the criteria for assessing groundwater chemical status. • relevant points in separate sewers have been identified where urban runoff is expected to be polluted in such a way that its discharge into receiving waters can be considered to be a risk to the environment or human health or prevents the fulfilment of any of the requirements or environmental objectives referred to in point (c). If needed: the plan – **by end of 2039**, measures implemented + updated plan **– by end of 2045**
100 000 – 149 999	Yes, the plan – **by end of 2033**, measures set + updated plan – **by end of 2039**
150 000 or more	Yes, the plan – **by end of 2033**, measures set + updated plan – **by end of 2039**

A list of agglomerations counting **between 10 000 p.e. and 100 000 p.e.** "where, considering historic data, modelling and state-of-the-art climate projections, including seasonal variations, as the anthropogenic pressures and the assessment of impacts undertaken under the river basin

[19] Directive 2006/7/EC of the European Parliament and of the Council of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC, OJ L 64, 4.3.2006, p. 37–51.
[20] Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive), OJ L 164, 25.6.2008, p. 19–40.

management plan" risk can be identified, shall be established by the MSs not later than **by June 22nd, 2028**, and reviewed every 6 years.

The plans must contain, among others, measures targeting:

- reducing the pollution from storm water overflows to not more than 2 % of the annual collected urban wastewater load[21],
- or the possibly substantial pollution from separately collected urban runoff, e.g. from first rain events after long dry periods in areas with high population density,

and be reviewed and updated, if necessary, at least every six years.

Annex V (p. 54) to the UWWTD specifies the content of the integrated urban wastewater management plans. See also Annex 7.5 to this report for details.

3.2.4 Secondary treatment (Article 6)

Discharges from urban WWTPs treating urban wastewater from agglomerations of **at least 2 000 p.e.** shall, before being discharged into receiving waters, fulfil the following requirements set in Table 1 of the Annex I to the directive and given in below table:

Table 2 Requirements for discharges from urban wastewater treatment plants. The values for concentration or for the percentage of reduction shall apply

Parameters	Concentration	Minimum percentage of reduction in relation to the load of the influent
Biochemical oxygen demand (BOD5 at 20 °C) without nitrification*	25 mg/l O_2	70-90 40 under Article 6(4)
Chemical oxygen demand (COD)**	125 mg/l O_2	75
Total Organic Carbon**	37 mg/l O_2	75
Total suspended solids	35 mg/l O_2	90***

*The parameter can be replaced by another parameter: total organic carbon (TOC) or total oxygen demand (TOD) if a relationship can be established between BOD5 and the substitute parameter.

** Member States shall measure either the Chemical oxygen demand (COD) or the Total Organic Carbon.

*** Optional requirement

[21] The load should be calculated in dry weather flow conditions on the basis of the pollutants included in Tables 1 and 2 in Annex I of the UWWTD recast.

In case of agglomerations of **2 000 p.e. or more** and **below 10 000 p.e.** that discharge into coastal waters and have been applying appropriate treatment in accordance with the old UWWTD already since the entry into force of the revised directive, the obligation applies from **January 1st, 2038**. The same deadline is set for discharging urban wastewater into less sensitive areas (as defined under Annex II of the old directive).

Certain derogations from the deadlines are allowed for a maximum period of 8 or 10 years, under specified in the directive conditions:

(i) max 8 years, if less than 50 % of the referred agglomerations or less than 50 % of the urban wastewater load of the concerned agglomerations are subject to secondary treatment on their territory,
(ii) max 10 years in case the above-mentioned shares are 25%,
(iii) longer deadlines are allowed for Bulgaria, Croatia and Romania, maximum of 12 or 14 years, respectively.

Discharges from urban wastewater treatment plants treating urban wastewater from agglomerations of 1 000 p.e. and above but below 2 000 p.e. shall satisfy by **31 December 2035**, before being discharged into receiving waters, the relevant requirements of secondary treatment set out in Part B and Table 1 of Annex I in accordance with the methods for monitoring and evaluation of results laid down in Part C of Annex I.

Less stringent requirement may apply till **end of 2045** if urban wastewater is discharged to:

- "waters situated in high mountain regions, namely above an altitude of 1 500 m, where it is difficult to apply an effective biological treatment due to low temperatures,
- deep marine waters where such discharges of urban wastewater are from agglomerations of **below 150 000 p.e.** in less-populated outermost regions within the meaning of Article 349 TFEU in which the topography and geography of the territory makes it difficult to apply an effective biological treatment, or
- urban wastewater from small agglomerations of **1 000 p.e. and above but below 2 000 p.e.** situated in regions with a cold climate, where it is difficult to apply an effective biological treatment due to low temperatures if the average quarterly water temperature of the inlet is below 6 °C".

For more details see Part B of Annex I (p. 45) which specifies the requirements and with the methods for monitoring and evaluation of results laid down in Part C of Annex I (p. 46).

3.2.5 Tertiary treatment (Article 7)

Discharges from urban WWTPs treating urban wastewater from agglomerations with a load of **10 000 – 149 999** and WWTPs **≥150000 p.e.** shall, before being discharged into receiving waters,

fulfil the following requirements set in Table 2 of the Annex I to the directive and given in below table:

Table 3 New thresholds for P and N

Parameter	**WWTP size**	**Measure**	**Concentration (mg/l)**	**Minimum percentage of reduction (%)**
	p.e.	**New threshold**		
P_{total} / N_{total}	1 000 – 1 999	In principle not		
P_{total} / N_{total}	2 000 – 9 999	In principle not		
P_{total}	10 000 – 149 999	Yes	0,7	87,5
N_{total}		Yes	10	80
P_{total}	150 000 and above	Yes	0,5	90
N_{total}		Yes	8	80

Fulfilling of this requirement is requested in a progressive manner, as detailed below:

- In case of agglomerations with **10 000 and above** the reduction/max concentration (shown in above table) should be achieved by a defined share (%) of those agglomerations, as given below:

20% by the end of **2033** → **40%** by the end of **2036** → **60%** by the end of **2039** → **100%** by the end of **2045**

- In case of WWTPS ≥150000 p.e. by indicated share (%) of WWTPs:

30% by the end of **2033** → **70%** by the end of **2036** → **100%** by the end of **2039**

Furthermore, **by the end of 2027** a list of areas, which are phosphorus- or nitrogen-sensitive, or both, shall be established by MSs, and updated every six years. This requirement does not apply if a given MS applies tertiary treatment at its entire territory. The list shall include the areas identified in Annex II.

Certain derogations are foreseen (see Article 7(4) for details).

The annual mean of the samples for each parameter (P_{total} and N_{total}) shall be calculated.

Part C of Annex I to the directive indicates the methods for monitoring and evaluation of results.

3.2.6 Quaternary treatment (Article 8)

Discharges from urban WWTPs treating urban wastewater with a load of **≥150000 p.e.** shall, before being discharged into receiving waters, fulfil the following requirements set in Table 3 of the Annex I to the directive and given in below table:

Table 4 Requirements for quaternary treatment of discharges from urban wastewater treatment plants referred to in Article 8(1) and or from urban wastewater treatment plants serving agglomerations referred to in Article 8(4) of the UWWTD

Indicators	**WWTP size**	**Measure**	**Minimum percentage of removal in relation to the load of the influent (%)**
Substances that can pollute water even at low concentrations *(see Table 5)*	**p.e.**	**Quaternary treatment**	
	1 000 – 1 999	In principle not	
	2 000 – 9 999	In principle not	
	10 000 – 99 999	Yes, if risk exists	80%
	100000 – 149 999	Yes, if risk exists	80%
	150000 or more	Yes	80%

- In case of WWTPS ≥150000 p.e. the following share (as given below) of the WWTPs shall comply with the requirement by the indicated deadline:

20% by the end of **2033** → **60%** by the end of **2036** → **100%** by the end of **2045**

The calculation of the **minimum percentage of removal** (considering the indicator substances listed in Table 5) shall be carried as follows:

- on dry weather flow for at least six substances,
- the number of substances in category 1 shall be twice the number of substances in category 2,
- if less than six substances can be measured in sufficient concentration, the competent authority shall designate other substances to calculate the minimum percentage of removal when it is necessary,

- the average of the specific percentages of removal of all single substances used in the calculation shall be used to assess whether the required threshold has been reached.

Table 5 Substances that can pollute water even at low concentrations:

Indicators	Minimum percentage of removal in relation to the load of the influent
(a) Category 1 (substances that can be very easily treated): (i) Amisulprid (CAS No 71675-85-9), (ii) Carbamazepine (CAS No 298-46-4), (iii) Citalopram (CAS No 59729-33-8), (iv) Clarithromycin (CAS No 81103-11-9), (v) Diclofenac (CAS No 15307-86-5), (vi) Hydrochlorothiazide (CAS No 58-93-5), (vii) Metoprolol (CAS No 37350-58-6), (viii) Venlafaxine (CAS No 93413-69-5); ***b) Category 2 (substances that can be easily disposed of):*** (i) Benzotriazole (CAS No 95-14-7), (ii) Candesartan (CAS No 139481-59-7), (iii) Irbesartan (CAS No 138402-11-6), (iv) mixture of 4-Methylbenzotriazole (CAS No 29878-31-7) and 5-methyl-benzotriazole (CAS No 136-85-6).	80 %

The methods of monitoring and evaluation of results are indicated in Part C of Annex I to UWWTD. The maximum number of samples which can fail to comply with the parametric values is set out in Part C and Table 4 of Annex I to the directive.

In addition, **by the end of 2030**, a list of areas needs to be established by each MS where the concentration or the accumulation of micropollutants from urban WWTPs represents a risk for the environment or human health. The list must be reviewed in 2033 and updated if considered necessary, and afterwords every six years.

The list shall include the following areas:

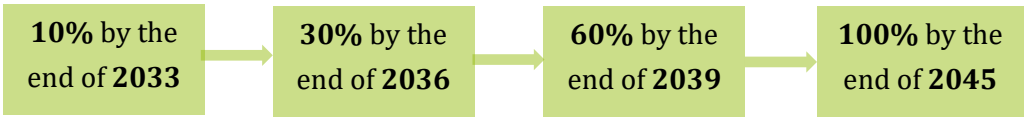
- catchment areas for abstraction points of water intended for human consumption unless the risk assessment indicates that the discharge of micropollutants from urban wastewater treatment plants does not constitute a potential risk that might cause a deterioration of the water quality to the extent that it could constitute a risk to human health,

- bathing water unless the bathing water profile indicates that the discharge of micropollutants from urban wastewater neither affects bathing waters nor impairs bathers' health,
- areas where aquaculture activities take place unless the competent national authorities are satisfied that the discharge of micropollutants from urban wastewater cannot affect the safety of the foodstuff in its finished form.

On the basis of an assessment of the risks for the environment or human health posed by the discharge of micropollutants in urban wastewater the list shall also include:

- lakes,
- rivers other water streams where the dilution ratio is below 10,
- areas where additional treatment is necessary to meet the requirements set out in WFD, GWD and EQSD,
- special areas of conservation and special protection areas which form part of the Natura 2000 ecological network,
- coastal waters, transitional waters and marine waters.

The following share of the agglomeration of **10 000 p.e. and above** on that list shall achieve the requirement by a specified below deadline is given below:



3.2.7 Extended producer responsibility (Article 9)

By end of 2028, producers who place on the market any of the products listed in Annex III, i.e.:

- medicinal products for human use,
- cosmetic products,

are covered by the requirement of the extended producer responsibility.

The directive requires that at least 80 % of the total costs for complying with the quaternary treatment requirement, i.e.:

- the investment and operational costs to remove micropollutants originating from their products and the residues thereof,
- for monitoring of micropollutants,
- for collecting and verifying data on products placed on the market; and
- any other related costs caused by exercising the responsibility

will be covered.

Certain exemptions are possible, if the producers can demonstrate the following:

- the amount of the substances contained in the products they place on the EU market is below 1 t/year, and/or
- the referred substances are rapidly biodegradable in wastewater or do not generate micropollutants in wastewater at the end of their life.

The concerned manufacturers shall be given the possibility to exercise their extended producer responsibility collectively through an organisation (Producer Responsibility Organisation – PRO) that fulfils the minimum requirements set out in Article 10 of the directive.

For more details see p. 25-27 of the UWWTD and the Article 10 Minimum requirements for producer responsibility organisations (p. 28).

3.2.8 Energy neutrality (Article 11)

The UWWTD requires the MSs to ensure that the urban WWTPs and collecting systems shall undergo a transformation to become energy neutral **by the year 2045**. The facilities shall undergo energy audits every four years, as specified below:

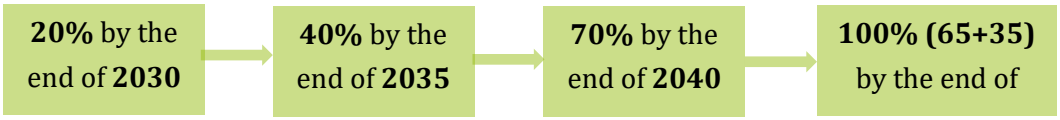
Table 6 Obligation of undergoing energy audits and contributing to the energy neutrality objective

Size of the WWTP or agglomeration (p.e.)	**Energy audits**	**Contribution to energy neutrality of a MS**
1 000 – 1 999	Not the case	
2 000 – 9 999	Not the case	
10 000 – 99 999	Yes, collection system and WWTP **by end of 2032**	Yes, collection system and WWTP
100000 and above	Yes, collection system and WWTP **by end of 2028**	Yes, collection system and WWTP

The audits shall cover:

- "identification of the potential for cost-effective measures to reduce the use of energy and enhance the use and production of renewable energy,
- with a particular focus on identifying and utilising the potential for biogas production or the recovery and use of waste heat either on-site or via a district energy system,
- while reducing GHG emissions".

At national level, the total energy from renewable sources from the plants treating a load of **≥ 10 000 p.e.** shall be reached as follows:



Purchased renewable energy from non-fossil fuel sources does not count as renewable energy generated, but certain derogations are possible.

See paragraph 3 and 4, p. 29 of UWWTD for details.

3.2.9 Discharges of non-domestic wastewater (Article 14)

The discharges of non-domestic wastewater into collecting systems and urban WWTPs require prior regulations and/or specific authorisations. These need to ensure that:

"a) the water quality requirements set out in other Union law, including Directives WFD and EQSD, are fulfilled, and that, where applicable, the quality and quantity of relevant discharges of non-domestic wastewater are monitored; in particular, that the pollutant load in the discharges from the urban wastewater treatment plant does not lead to a deterioration in the status of the receiving water body and does not prevent that water body from achieving such status, in accordance with the objectives set out in Article 4 of Directive WFD,

(b) the released polluting substances do not impede the operation of the urban wastewater treatment plant, do not damage collecting systems, urban wastewater treatment plants or associated equipment, and do not limit any capacity to recover resources, including the reuse of treated water and the recovery of nutrients or other material from urban wastewater or sludge,

(c) the released polluting substances do not harm the health of the staff working in collecting systems and urban wastewater treatment plants,

(d) the urban wastewater treatment plant is designed and equipped to abate the released polluting substances,

(e) where an urban wastewater treatment plant treats discharges from an installation holding a permit referred to in Article 4 of Directive 2010/75/EU of the European Parliament and of the Council (40), the pollutant load from the discharges of that plant does not exceed the pollutant load that would be discharged if the discharges were released directly from the installation and were compliant with the emission limit values applicable in accordance with this Directive".

In the case of prior regulations for discharges into collecting systems and urban wastewater treatment plants, it shall ensure that the operators of collecting systems and urban wastewater

treatment plants into which the non-domestic wastewater is discharged are consulted before those prior regulations are adopted.

No authorisation can be granted, or no prior regulation shall allow a discharge of non-domestic wastewater into catchment areas for abstraction points of drinking water without considering the risk assessment and risk management of the catchment areas.

Furthermore, appropriate measures shall be taken by MS competent authorities or other responsible bodies to identify, prevent and reduce as far as possible the sources of pollution in non-domestic wastewater, and, where necessary, the revocation of prior regulations and specific authorisations, referred if:

"(a) pollutants have been identified at the inlets and outlets of the urban wastewater treatment plant under the monitoring of Article 21(3),

(b) sludge arising from urban wastewater treatment is to be used in accordance with Council Directive 86/278/EEC[22],

(c) treated urban wastewater is to be reused in accordance with Regulation (EU) 2020/741[23] or to be reused for purposes other than agricultural purposes,

(d) the receiving waters are used for abstraction of water intended for human consumption as defined in Article 2, point (1), of DWD,

(e) the pollution of the non-domestic wastewater discharged into the collecting system, or the urban wastewater treatment plant poses a risk to the operation of that system or plant".

The authorisations need to be evaluated, reviewed and, if needed, adapted, et least every 10 years, especially if the characteristic of the non-domestic wastewater change significantly. Also, the regulations are required to be reviewed and updated regularly.

3.2.10 Water reuse and discharges of urban wastewater (Article 15)

In the light of the changing climate and the more frequent droughts periods and expansion of water-stressed areas, the directive aids promoting reuse of treated wastewater from all urban WWTPs for various purposes. Reuse of urban wastewater cannot endanger "the ecological flow of the receiving waters and there is no adverse effect for the environment or human health". If the application purpose is agricultural irrigation, treated wastewater shall comply with the requirements of Regulation (EU) 2020/741[24]. In this situation derogation from the requirement

[22] Council Directive 86/278/EEC of 12 June 1986 on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture, OJ L 181, 4.7.1986, p. 6–12.
[23] Regulation (EU) 2020/741 of the European Parliament and of the Council of 25 May 2020 on minimum requirements for water reuse, PE/12/2020/INIT, OJ L 177, 5.6.2020, p. 32–55.
[24] Regulation (EU) 2020/741 of the European Parliament and of the Council of 25 May 2020 on minimum requirements for water reuse, PE/12/2020/INIT, OJ L 177, 5.6.2020, p. 32–55.

of tertiary treatment under the UWWTD can be issued for the share of water destined for agricultural purposes, under certain conditions:

"(a) the nutrient content in the fraction reused does not exceed the nutrient demand of the targeted crops,

(b) there are no risks for the environment, particularly in relation to eutrophication of the waters in the same catchment area,

(c) there are no risks to human health particularly in relation to pathogenic organisms,

(d) the urban wastewater treatment plant has enough capacity to treat or store urban wastewater, in order to avoid discharges into receiving waters of urban wastewater which do not meet the requirements set out in Part B and Table 2 of Annex I in accordance with the methods for monitoring and evaluation of results laid down in Part C of Annex I".

All discharges from urban wastewater treatment plants of **1 000 p.e. and above** require prior regulations and/or specific authorisations that ensure fulfilling the requirements set in Part B of Annex I of the UWWTD. These need to be reviewed and, if needed, updated at least every ten years.

3.2.11 Risk assessment and management (Article 18)

By the **end of 2027**, a risks assessment related to the impacts of urban wastewater discharges to the environment and human health needs to be carried out and afterwards reviewed every six years in line with the timing of the review of the RBMPs. This assessment needs to consider also seasonal fluctuations and extreme events, and at least the following aspects:

(a) the quality of a water body used for the abstraction of drinking water,

(b) the quality of bathing water,

(c) the quality of a water body where aquaculture activities take place,

(d) the status of the receiving groundwater body,

(e) the status of the marine environment,

(f) the status of the receiving surface water body.

For specific conditions see paragraph 1 of the UWWTD, p 34.

In case the risks are identified, appropriate measures need to be adopted by MSs. Among them are:

(a) taking additional measures to prevent and reduce pollution from urban wastewater at source,

(b) establishing collecting systems for agglomerations of **below 1 000 p.e.**,

(c) applying secondary treatment to discharges of urban wastewater from agglomerations of **below 1 000 p.e.**,

(d) applying tertiary treatment to discharges of urban wastewater from agglomerations of **below 10 000 p.e.**,

(e) applying quaternary treatment to discharges of urban wastewater from agglomerations of **below 10 000 p.e.**, especially where urban wastewater is discharged into water bodies used for abstraction of drinking water, bathing water, water bodies where aquaculture activities take place, and where treated urban wastewater is reused for agricultural purposes,

(f) establishing integrated urban wastewater management plans for agglomerations of **below 10 000 p.e.** and adoption of measures referred to in Annex V to the directive,

(g) applying requirements for the treatment of collected urban wastewater that are more stringent than the requirements set out in Part B of Annex I.

A summary of the identified risks, together with the adopted measures shall be described in the appropriate RBMP and in the national implementation programmes. That summary shall be made available to the public.

3.2.12 Sludge and resource recovery (Article 20)

MSs shall make efforts to incentivise recovery of resources and ensure sustainable managing of sewage sludge in accordance with the waste hierarchy aimed at maximising prevention, preparing for reuse, recycling and other recovery, in particular of phosphorus and nitrogen, considering national or local valorisation options; and ensuring minimising the adverse effects on the environment and human health.

The EC is empowered to adopt delegated acts that specify "a combined minimum reuse and recycling rate for phosphorus from sludge and from urban wastewater not reused under the derogation of Article 15(1)". The "available technologies, resources and the economic viability of phosphorus recovery as well as the phosphorus content of the sludge and the level of saturation of the national market with organic phosphorus from other sources" shall also be considered while ensuring that there is safe sludge management, with no adverse impact on the environment or human health. The delegated acts shall be adopted **by beginning of 2028**.

3.2.13 Monitoring (Article 21)

The monitoring under the directive shall cover:

- loads and concentrations of the parameters listed in Part B of Annex I of the directive in discharges from urban WWTPs,

- the amounts, composition and destination of sludge,
- the quantities per year and per month of urban wastewater reused for agricultural irrigation that is subject to a derogation referred to in Article 15(1) of the directive; the nutrient content of the fraction of reused urban wastewater for agricultural irrigation and the period during which that fraction is reused compared to the monthly water and nutrient demand of the crops targeted by that reused urban wastewater.
- the GHGs, including at least CO_2, N_2O, CH_4, emitted from urban WWTPs **of 10 000 p.e. and above** by means of analysis, calculations or modelling,
- the energy used and produced by the owners of urban WWTPs treating a load of **10 000 p.e. and above**, or by the operators of such plants, regardless of whether it is used or generated on-site or off-site, as well as the energy purchased under the specified in the directive derogations,
- for agglomerations with a load **≥ 10 000 p.e.**, storm water overflows into water bodies and of discharges of urban runoff from separate systems, to estimate the concentration and loads of the parameters listed in Table 1 of Annex I to the directive, and, where relevant, in Table 2, as well as the content of microplastics and relevant pollutants.
- for agglomerations with a load **≥ 10 000 p.e.**, the concentration and loads in the urban wastewater of the following elements at the inlets and outlets of urban wastewater treatment plants:

  (a) pollutants that are likely to be found in urban wastewater listed in:

  (i) Annexes VIII and X to WFD, Annex I to EQSD, Annex I and Part B of Annex II to GWD;

  (ii) the Annex to EC Decision establishing the list of PS in water[25];

  (iii) Annex II to Regulation establishing the European Pollutant Release and Transfer Register[26];

  (iv) Annexes I and II to Directive regarding sewage sludge use in agriculture [27];

  (b) parameters listed in Part B of Annex III to DWD, where urban wastewater is discharged into a catchment area referred to in Article 8 of that Directive, under which, for per- and polyfluoroalkyl substances (PFAS),

  One or both of the parameters 'PFAS Total' and 'Sum of PFAS' can be chosen.

[25] Decision No 2455/2001/EC of the European Parliament and of the Council of 20 November 2001 establishing the list of priority substances in the field of water policy and amending Directive 2000/60/EC, OJ L 331, 15.12.2001, p. 1–5.

[26] Regulation (EC) No 166/2006 of the European Parliament and of the Council of 18 January 2006 concerning the establishment of a European Pollutant Release and Transfer Register and amending Council Directives 91/689/EEC and 96/61/EC, OJ L 33, 4.2.2006, p. 1–17.

[27] Council Directive 86/278/EEC of 12 June 1986 on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture, OJ L 181, 4.7.1986, p. 6–12.

(c) parameters listed in Annex I to Directive regarding bathing water quality (BWD)[28] where there are direct discharges from urban wastewater treatment plants into bathing water during the bathing season which might prevent compliance with that directive,

(d) the presence of microplastics.

The pollutants and parameters referred to in points (a) and (b) may be excluded from the monitoring referred to in this paragraph as long as it can be demonstrated, inter alia on the basis of monitoring results, that they are absent in urban wastewater.

- for agglomerations with a load **≥ 10 000 p.e.**, presence of microplastics in the sludge when relevant and, in particular, when it is reused in agriculture.

  Monitoring frequencies for the above-mentioned parameters are as follows:

  (a) at least two samples per year, with a maximum of 6 months between the samples, for agglomerations of **≥150 000 p.e.**,

  (b) at least one sample every two years for agglomerations of **between 10 000 p.e. and 150 000 p.e.**

  If in subsequent years monitoring results for the above-mentioned pollutants are below applicable EQSs under EQSD in three successive samples the monitoring frequencies may be halved. The frequencies should be reviewed at least once per year.

3.2.14 Information on monitoring of implementation (Article 22)

MSs are obliged by the directive to set up certain data sets, with support of the European Environment Agency (EEA), namely:

- **By the end of 2028** (and updated annually):
  - information, as detailed in sub-chapter 3.2.13, including the parameters referred to in the abovementioned point (a), and the results of the tests with regard to the pass/fail criteria established in Part C of Annex I of the UWWT,
  - percentage of urban wastewater which is collected and treated in accordance with Article 3,
  - information on the use of individual systems to collect and/or treat more than 2 % of the urban wastewater load at national level from agglomerations of **2 000 p.e. and above** and on the percentage of the urban wastewater load from those agglomeration which is treated in individual systems,
  - the number of samples collected, and the number of samples taken that have failed.

[28] Directive 2006/7/EC of the European Parliament and of the Council of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC, OJ L 64, 4.3.2006, p. 37–51.

- **By January 12th, 2029** (and updated every 6 years): information on measures taken to improve access to sanitation, including information on the share of their population that has access to sanitation in agglomerations of 10 000 p.e. and above.
- **By end of 2030** (and updated annually, unless specified differently below):
    - information on greenhouse gases (GHG) emissions with a breakdown between different gases and on the total energy used and renewable energy produced by each urban wastewater treatment plant **of 10 000 p.e. and above** as well as a calculation of the percentage of achievement of the targets set,
    - the percentage of energy purchased from non-fossil fuel sources and, when available accompanied by a breakdown of the different types of non-fossil fuel energy source used, where the derogation is used,
    - information on measures taken to achieve an indicative non-binding objective that storm water overflow represents a small percentage that cannot be more than 2 % of the annual collected urban wastewater load calculated in dry weather conditions,
    - monitoring results of urban wastewater surveillance,
    - the list of areas identified as sensitive to eutrophication; to be updated every 6 years,
    - the list of areas identified as areas where the concentration or the accumulation of micropollutants represents a risk for the environment or human; to be updated every 6 years,
    - where they use biomedia, the type of biomedia used and a short description of the measures taken by urban wastewater treatment plants using biomedia to avoid spills into the environment; to be updated every 5 years,
    - the monitoring results regarding the quantities per year and per month of urban wastewater reused for agricultural irrigation that is subject to a derogation referred, the nutrient content of the fraction of reused urban wastewater for agricultural irrigation and the period during which that fraction is reused compared to the monthly water and nutrient demand of the crops targeted by that reused urban wastewater; with a comparison of the monthly water and nutrient demand of the crops targeted by the reused fraction of treated urban wastewater.

3.2.15 National implementation programme (Article 23)

A national implementation programme for the provisions of this directive needs to be established by the MSs **by the beginning of 2028** and include:

- “an assessment of the level of implementation of Articles 3 to 8 (see sub-chapters 3.2.1-3.2.6 of this guidance),

- the identification and planning of investments required to implement this directive for each agglomeration, including an indicative financial estimation and when available an estimation of the financial contribution from the producer responsibility organisations established in accordance with Article 10, and a prioritisation of those investments related to the size of the agglomeration and the level of environmental impact of discharges of untreated urban wastewater and related risks for the environment or human health,
- an estimate of investments needed to renew, upgrade or replace existing urban wastewater infrastructure, including collecting systems, based on depreciation rates, and technical and operational conditions, with the aim of preventing possible leakage, infiltration and misconnected inflow into the collecting systems, and using, where appropriate, digital instruments,
- the identification, or at least an indication, of potential sources of public financing, when needed to complement user charges,
- any information required under Articles 6(3) and 7(4) where applicable" (i.e. the specific derogations from the requirement of secondary and tertiary treatment)".

These national implementation programmes shall be submitted to the EC by the MSs, and updated at least every 6 years, with exception of these MSs that can demonstrate, on the basis of the monitoring results (Article 21), that they comply with Articles 3 to 8.

3.3 Other EU legislation and initiatives related to UWWTD recast

In the frame of the Impact Assessment of the UWWTD[29], other initiatives with certain targets linking to the recast UWWTD or addressing the issues of relevance for the implementation of the directive were indicated. They are briefly described below.

3.3.1 Sewage Sludge Directive

The Sewage Sludge Directive[30] is aimed to safeguard that both, i.e. surface and groundwater, are not harmed by the use of sludge in agriculture. It limits, thus, the content of certain compounds, mainly heavy metals, but not only, for sewage sludge that can be used for agricultural purposes.

[29] Commission Staff Working Document, Impact Assessment accompanying the document: Proposal for a Directive of the European Parliament and of the Council concerning urban wastewater treatment (recast), SWD(2022) 541 final.
[30] Council Directive 86/278/EEC of 12 June 1986 on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture, OJ L 181, 4.7.1986, p. 6–12.

3.3.2 Common Agricultural Policy (CAP), Sustainable use of Plant Protection Products Regulation, Integrated Pest Management (IPM),

The new CAP 2023-2027[31] as the major EU legal framework and financial programme to support farmers and rural stakeholders provides a huge opportunity for the MSs to make a significant contribution to the ambitions of the European Green Deal[8] and its Farm to Fork Strategy[32] and Biodiversity Strategy[33]. One of the key elements of the new CAP is the green architecture, a combination of obligatory measures linked to conditionality and direct payments and voluntary actions going beyond mandatory requirements and compensated by financial support. MSs are in the position of developing tailor-made CAP Strategic Plans according to their national needs to improve the competitiveness of agriculture, ensure stable food supply, safeguard the livelihood of farmers and maintain rural landscapes and socio-economic conditions while tackle climate change impacts and support the sustainable management of natural resources. With respect to chemical pollution, CAP Strategic Plans include various measures to reduce diffuse pollution and enhance water retention either linked to compliance with environmental standards or supported by voluntary eco-schemes and agri-environment and climate actions.

One of the objectives of CAP is the promotion of sustainable use of pesticides in agriculture of the EU countries. The proposal for a revision of the Directive 2009/128/EC[34], called the Sustainable Pesticide Use Directive (SUD), was issued by the EC in July 2022 as a proposal of a regulation (SUR)[35]. It was aimed at substantial reduction of the risks and impacts of pesticides on the environment and human health, among other through promoting Integrated Pest Management (IPM)[36] and encouraging application of non-chemical alternatives. The regulation supported meeting the objective of the previously mentioned EU Green Deal, Farm to Fork Strategy, and Biodiversity Strategy that were to result in 50% reduction of pesticide use by the year 2030. It stipulated augmented monitoring of the use of pesticides and harmonization of management practices among the EU MSs.

Due to political disagreement around the proposed legislation, influenced by strong opposition from the side of the related industry lobbies, and the negative vote of the parliament on the heavily amended directive text, the EC announced that the proposal would be withdrawn, the decision on which was published in May 2024 in the EU Official Journal.

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[31] For more information have a look at the EC website: https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cap-2023-27_en.
[32] For more information have a look at the EC website: https://food.ec.europa.eu/horizontal-topics/farm-fork-strategy_en.
[33] For more information have a look at the EC website: https://environment.ec.europa.eu/strategy/biodiversity-strategy-2030_en.
[34] Directive 2009/128/EC of the European Parliament and of the Council establishing a framework for Community action to achieve the sustainable use of pesticides, OJ L 309, 24.11.2009, p. 71–86.
[35] Proposal for a Regulation of the European Parliament and of the Council on the sustainable use of plant protection products and amending Regulation (EU) 2021/2115, COM/2022/305 final
[36] For more information have a look at the EC website: https://food.ec.europa.eu/plants/pesticides/sustainable-use-pesticides/integrated-pest-management-ipm_en.

3.3.3 Industrial and Livestock Rearing Emissions Directive

The revised Industrial Emission Directive 2024/1785 (IED 2.0)[37] is the EU key legal instrument to combat emissions to air, water and land, as well as to counteract waste generation from large industrial plants and intensive livestock farms. It also aims to control non-domestic wastewater from large installations that are connected to the urban wastewater collection system.

The revised legal act, which entered into force in August 2024, introduces, among others, stricter emission values and expands the scope of the emissions to be controlled. It also includes now a following clause: "Member States shall ensure that permits are granted further to consultation of all relevant authorities with a responsibility regarding compliance with Union environmental legislation, including with environmental quality standards".

This last requirement is very reasonable, nevertheless, the tools are not yet fully available to achieve this. As the shortcomings have been identified, the work in the direction of overcoming them is being carried out. As an example, an emission inventory is needed to identify which compounds are responsible for the bad status of water bodies. BAT-AELs already appear as a form of emission limit value, but tools are necessary to connect the emissions to status assessment.

There is an extensive number of additional legislative acts regarding the EU climate and energy policy. In the following section only a few, considered of major relevance in the frame of Tethys, are very briefly mentioned, as a more extensive analysis goes beyond the scope of the project.

3.3.4 Energy Efficiency Directive and Renewable Energy Directive

The revised Energy Efficiency Directive (EED)[38] requires reduction of energy consumption by MSs by 2030 by 9% (when compared to the consumption in the year 2020), 1.7% annual reduction is envisaged for the public sector. The revised Renewable Energy Directive (RED)[39] stipulates 40% of mandatory share of renewable sources in the EUs gross energy consumption till the year 2030.

[37] Directive (EU) 2024/1785 of the European Parliament and of the Council of 24 April 2024 amending Directive 2010/75/EU of the European Parliament and of the Council on industrial emissions (integrated pollution prevention and control) and Council Directive 1999/31/EC on the landfill of waste, PE/87/2023/REV/1, OJ L, 2024/1785.
[38] Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency and amending Regulation (EU) 2023/955 (recast), OJ L 231, 20.9.2023, p. 1–111.
[39] Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652, OJ L, 2023/2413, 31.10.2023.

3.3.5 European Climate Law, Effort Sharing Regulation, "Fit for 55" package, and RePower EU

The European Climate Law (ECL)[40] is a piece of EU legislation that aims to ensure reaching the objective of climate neutrality in the EU by 2050. Together with the Effort Sharing Regulation (ESR) [41] they belong to the set of measures targeted at achieving 55% reduction of GHG emissions by 2030 (in comparison with the level in the year 1990), as envisaged in the EU Green Deal[8]. ESR contains mandatory targets for greenhouse gas emissions. It refers to the sectors not covered by the EU Emission Trading Scheme, including wastewater treatment plants. In 2021 the 'Fit for 55' package[42] was proposed as a response to the requisite of the ECL regarding reducing the EU net greenhouse gas emissions. After the Russia's invasion of Ukraine and in the need of ensuring better energy security for Europe, the REPowerEU plan[43] was drafted with more stringent requirements on renewable energy and energy efficiency, concerning among other higher production targets for biogas.

3.3.6 Nature Restoration Law

The Nature Restoration Law (NRL)[44], adopted in 2024, targets among others, expanding green areas in cities and, so, also the cities' capacity to absorb rainwater. In this manner, in case of intense rain events lower amounts of "less clean" rainwater will be mixed with untreated one in the urban collection systems and directed to the environment, in this way acting as a preventive measure towards better water quality.

3.3.7 Initiatives on microplastics

So far, no specific legal act regulates comprehensively the production and use of microplastics, and their release to the environment, but the importance of this topic is recognised and addressed in several EU legal acts[45]. Among the main objectives regarding microplastics linked to wastewater treatment, the reduction of their diffuse pollution to urban wastewater (because of

[40] Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law'), PE/27/2021/REV/1, OJ L 243, 9.7.2021, p. 1–17.
[41] Regulation (EU) 2018/842 - Binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013; with later amendment through Regulation (EU) 2023/857 - Amending Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030.
[42] For more details, see the EC website: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/delivering-european-green-deal_en
[43] For more details, see the EC website: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/repowereu-affordable-secure-and-sustainable-energy-europe_en.
[44] Regulation (EU) 2024/1991 of the European Parliament and of the Council of 24 June 2024 on nature restoration and amending Regulation (EU) 2022/869, PE/74/2023/REV/1, OJ L, 2024/1991, 29.7.2024
[45] Among them there are: Marine Strategy Framework Directive, Fertilising Products Regulation, REACH restriction proposal (addressing intentionally added microplastics), Plastics strategy, Waste Framework Directive, Urban Waste Water Treatment Directive, Sewage Sludge Directive, Industrial Emissions Directive, or Regulation on tyre labelling.

abrasion from tyres or release from textiles) and better elimination of residual microplastics in collection systems are topics of high relevance.

3.4 Drinking Water Directive recast

The DWD 98/83/EC[46] was evaluated by the Commission, in a response to the EU Citizens' Initiative 'Right2Water'[47]. Following, an EU-wide public consultation and a Regulatory Fitness and Performance (REFIT) evaluation, the recast[48] was adopted and entered into force in January 2021. MSs were obliged to transpose its provision into their national laws and comply with them **by January 2023**, unless specified differently in some cases.

The recast Drinking Water Directive introduces among others:

- updated water QS,
- focus on pollutants of concern, such as endocrine disruptors and PFAS,
- risk-based approach favouring pollution reduction at source.

It introduces also an obligation for the MSs to set up datasets of the water quality and keep them updated on annual basis. Data sets linked to the risk assessment and to measures taken by the MSs also needs to be collected, with a review at every six years, and updated where necessary.

3.4.1 Parameters to be monitored

Several chemical parameters or parameter groups are added based on the recommendations of the World Health Organization (WHO)[49], namely:

- bisphenol A,
- chlorate, chlorite,
- haloacetic acids,
- microcystin,
- PFAS Total and/or Sum of PFAS
- and uranium.

In addition, existing limits for lead, chromium, selenium and antinomy have been amended. By 12 January 2026, MSs need to ensure appropriate measures to comply with the directive requirements for those compounds.

[46] Directive 98/83/EC Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption, OJ L 330, 5.12.1998, p. 32 (with later amendments).
[47] For more information have a look at the website: https://right2water.eu/.
[48] Directive (EU) 2020/2184 of the European Parliament and of the Council of 16 December 2020 on the quality of water intended for human consumption (recast) (Text with EEA relevance), OJ L 435, 23.12.2020, p. 1–62.
[49] Drinking Water Parameter Cooperation Project, Support to the revision of Annex I Council Directive 98/83/EC on the Quality of Water Intended for Human Consumption (Drinking Water Directive), Recommendations, WHO 2017.

Bisphenol A, with a health-based parametric value of 2,5 µg/l, shall be considered as benchmark for evaluating the occurrence of endocrine-disrupting compounds.

With regards to PFAS compounds, thresholds for *PFAS Total* and *Sum of PFAS (i.e. PFAS 20)*, as given in below table have been set.

Table 7 DWD requirements for PFAS

Parameter	Parametric value	Unit	Notes
PFAS Total	0,50	µg/l	'PFAS Total' means the totality of per- and polyfluoroalkyl substances. This parametric value shall only apply once technical guidelines for monitoring this parameter are developed in accordance with Article 13(7). Member States may then decide to use either one or both of the parameters 'PFAS Total' or 'Sum of PFAS'.
Sum of PFAS	0,10	µg/l	'Sum of PFAS' means the sum of per- and polyfluoroalkyl substances considered a concern as regards water intended for human consumption listed in point 3 of Part B of Annex III. This is a subset of 'PFAS Total' substances that contain a perfluoroalkyl moiety with three or more carbons (i.e. –CnF2n–, n ≥ 3) or a perfluoroalkylether moiety with two or more carbons (i.e. –CnF2nOCmF2m–, n and m ≥ 1)

The sum of PFAS is defined as follows: "The following substances shall be analysed based on the technical guidelines developed in accordance with Article 13(7):

— Perfluorobutanoic acid (PFBA)
— Perfluoropentanoic acid (PFPA)
— Perfluorohexanoic acid (PFHxA)
— Perfluoroheptanoic acid (PFHpA)
— Perfluorooctanoic acid (PFOA)
— Perfluorononanoic acid (PFNA)
— Perfluorodecanoic acid (PFDA)
— Perfluoroundecanoic acid (PFUnDA)
— Perfluorododecanoic acid (PFDoDA)
— Perfluorotridecanoic acid (PFTrDA)
— Perfluorobutane sulfonic acid (PFBS)

— Perfluoropentane sulfonic acid (PFPS)
— Perfluorohexane sulfonic acid (PFHxS)
— Perfluoroheptane sulfonic acid (PFHpS)
— Perfluorooctane sulfonic acid (PFOS)
— Perfluorononane sulfonic acid (PFNS)
— Perfluorodecane sulfonic acid (PFDS)
— Perfluoroundecane sulfonic acid
— Perfluorododecane sulfonic acid
— Perfluorotridecane sulfonic acid

The directive specifies that the Sum of PFAS "shall be monitored when the risk assessment and risk management of the catchment areas for abstraction points conclude that those substances are likely to be present in a concerned water supply".

Technical guidelines for monitoring were published in August 2024 with the Commission Notice C/2024/4910 "Technical guidance on analytical methods for the monitoring of per- and polyfluorinated alkyl substances (PFAS) in water intended for human consumption"[50]. The parameter 'Sum of PFAS' can be analytically measured, while for the 'PFAS Total' the guideline recommends three proxy methods. MSs can decide to use either one or both of the parameters.

3.4.2 Drinking water watch list

The DWD introduced also for the first time in January 2022 through a Commission implementing decision[51] a "Watch list". The list shall include substances and compounds of concern for water intended for human consumption due to potential health impacts, and provide a guidance value for each of them, as well as a method of analysis that should not be too expensive.

Nonylphenol and Beta-estradiol are included in this first watch list, as recommended by EFSA[52], due to their endocrine-disrupting properties and the risk to human health. The WHO provided recommendations on the guidance values of 300 ng/l for nonylphenol and 1 ng/l for 17-beta-estradiol in drinking water.

3.4.3 Risk-based approach

The risk-based approach throughout the supply chain "from the catchment area, abstraction, treatment, storage and distribution of water to the point of compliance" has also been introduced

[50] Commission Notice – Technical guidelines regarding methods of analysis for monitoring of per- and polyfluoroalkyl substances (PFAS) in water intended for human consumption, C/2024/5414, OJ C, C/2024/4910, 7.8.2024.
[51] Commission Implementing Decision (EU) 2022/679 of 19 January 2022 establishing a watch list of substances and compounds of concern for water intended for human consumption as provided for in Directive (EU) 2020/2184 of the European Parliament and of the Council, OJ L 124, 27.4.2022, p. 41–43.
[52] EFSA (2015): Scientific Opinion on the risks to public health related to the presence of bisphenol A (BPA) in foodstuffs: Executive summary. EFSA Journal 13 (1), 621.

in the revised directive. It applies at three levels, namely watershed of the water source, water supply system, and internal household system.

MSs are requested “to pay particular attention in their risk assessment to microplastics and endocrine-disrupting compounds” like nonylphenol and beta-estradiol. The directive states that “where necessary, water suppliers shall monitor and, carry out treatment for those parameters”.

3.4.4 Regulation on water reuse

Due to various environmental concerns linked to pressures on water resources, in particular water scarcity, reuse of water is gaining more and more importance, especially in the context of agricultural needs. For this reason, the Regulation (EU) 2020/741 on minimum requirements for water reuse[53] sets minimum requirements for monitoring water quality and risk management to ensure safe use of reclaimed water. It covers treated urban wastewater to be reused safely for irrigation. The reclamation of water can be achieved by integrating it into an urban wastewater treatment plant or through a dedicated reclamation plant. A risk management plan needs to be established when reclaimed water should be produced, supplied and used. In the meantime, the EC promote studies and good practice sharing to extend the water reuse to the waste waters from industries.

4 Other relevant EU legislation and broader initiatives linked to hazardous compounds

4.1 Zero Pollution Action Plan and European Green Deal

The EU Action Plan "Towards a Zero Pollution for Air, Water and Soil"[7], adopted in 2021, is one of the key elements of the European Green Deal[8]. Its vision for 2050 is called: “A Healthy Planet for All”, which means that “Air, water and soil pollution is reduced to levels no longer considered harmful to health and natural ecosystems and that respect the boundaries our planet can cope with, thus creating a toxic-free environment”.

The plan contains an Annex I with a long list of actions (and related implementation timetable), that aim to jointly contribute to the wider mission of the European Green Deal[8]. Among the vital points, of relevance for Tethys, and addressed in the plan is the reduction of water and soil pollution from microplastics and pharmaceuticals, as well as promotion of agricultural techniques, in which the use of chemical pesticides is reduced or even avoided (e.g. in sensitive areas).

[53] Regulation (EU) 2020/741 of the European Parliament and of the Council of 25 May 2020 on minimum requirements for water reuse, OJ L 177, 5.6.2020, p. 32–55.

4.2 REACH

The Regulation on the registration, evaluation, authorisation and restriction of chemicals (REACH)[54] is the key EU law addressing risks to human health and the environment resulting from placing numerous chemicals on the EU market. It requires that intrinsic properties of chemical substances are identified, notified and that protective measure against identified risks are put in place. REACH introduces manufacturers and importers responsibility to collect information on the chemicals properties and to register it in a database of ECHA. The regulation is currently undergoing revision process and stricter requirements are expected.

The German Environmental Agency carried out an extensive literature review of studies published in the years 2000 to 2019 regarding the water pollutants[55]. The research covered substances detected in wastewater treatment plant effluent (WTPE), surface water (SW), bank filtrate (BF), groundwater (GW), raw water (RW) and drinking water (DW). Out of nearly 1290 compounds detected in the research studies analysed, nearly 40% (over 500 compounds) were registered under REACH. For these substances a PMT/vPvM[56] assessment was carried out. The results obtained showed that 110 compounds (i.e. 22 %) were classified as PMT/vPvM, in the case of surface drinking water it was even 30%. The authors highlighted also the fact that every second compound contaminating drinking water is registered under REACH, while every fourth meets the new Classification, Labelling and Packaging (CLP) Regulation[57] hazard classes PMT and vPvM. It is important to mention that the share of REACH registered compounds classified as PMT/vPvM according to CLP criteria is only 1.9 %. If we look in more detail at the results, we can see that (although the authors encountered data gaps to have ultimate results in the PMT/vPvM assessment), compounds registered in REACH and encountered in drinking water media commonly meets the PMT/vPvM criteria. This is the case for:

- 39% of compounds found in RW (49 out of 125),
- 38 % in GW (63 out of 165),
- 37% in DW (69 out of 186).

[54] Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC.

[55] Arp Hans Peter H., Hale Sarah, Neumann Michael, PMT/vPvM assessment of REACH registered Substances Detected in Wastewater Treatment Plant Effluent, Freshwater Resources and Drinking Water, Umweltbundesamt, Report No. (UBA-FB) FB001082/ENG, 2023, available online at: https://www.umweltbundesamt.de/publikationen/pmtvpvm-assessment-of-reach-registered-substances, accessed 12.12.2024.

[56] PMT - Persistent, Mobile and Toxic, vPvM – very Persistent and very Mobile.

[57] Regulation (EU) 2024/2865 of the European Parliament and of the Council of 23 October 2024 amending Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures, PE/108/2023/REV/1, OJ L, 2024/2865, 20.11.2024.

This study shows that REACH is a valuable source of information with regard to water pollution. In their conclusions, the authors encouraged the water authorities and regulators to immediate react on the 110 REACH registered PMT/vPvM substances detected in DW relevant media.

4.3 Pharmaceutical Strategy and One Health

In 2019, as required by Article 8(c) of the amended EQSD, the Commission adopted a communication on a strategic approach to pharmaceuticals in the environment[58]. It identifies actions in six areas that could help to reduce the potential risk from pharmaceuticals in the environment. The areas cover all stages of the lifecycle of pharmaceuticals, from design and production through usage to disposal and waste management. There are actions to, for example: raise awareness and promote prudent use, incentivise 'green design', reduce emissions from manufacturing, improve risk assessment, reduce waste, assess the feasibility of upgrading selected urban wastewater treatment plants to reduce the presence of pharmaceuticals in effluent, and gather more monitoring data.

The Europe's Pharmaceutical Strategy[59], published one year later, even though focused mainly on ensuring safe access to affordable medicines, mentions also sustainability of the pharmaceutical industry, as one of the objectives it strives to. The more environmentally sustainable medicines should be promoted in the EU. Furthermore, the environmental risk should be reduced, the pollution from pharmaceutical residues addressed and greener manufacturing, use and disposal of medicines promoted. All these actions, if successfully implemented in the future, would also favour reduced pollution of water with pharmaceuticals and their metabolites.

Linked to the strategy is the One Health approach[60]. It is defined as an "integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals, and ecosystems". It also addresses the subject of the pharmaceuticals in the environment and the problem of antimicrobial resistance, but also of environmental pollution in general. The interrelations between the human health, animal and plant health, and the wider environment are recognised and should be addressed in connection. For this reason, cooperation among different sectors and disciplines is highlighted in the approach as indispensable to address challenges of the future, among them the environmental deterioration and linked risks, such as the insufficient water quality.

[58] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, European Union Strategic Approach to Pharmaceuticals in the Environment, COM/2019/128 final.
[59] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Pharmaceutical Strategy for Europe, COM/2020/761 final.
[60] For more information have a look at the EC website: https://health.ec.europa.eu/one-health/overview_en.

4.4 Chemicals Strategy for sustainability and Safe and sustainable by design criteria

In the year 2020, the EC published the so-called Chemicals Strategy for Sustainability[61] that has two main objectives: 1) to better protect EU citizens and the environment, and 2) to encourage innovation for safe and sustainable chemicals.

Among the actions foreseen in the strategy, removing most harmful chemicals from the market is very relevant, such as PFAS compounds. Also providing incentives for companies to produce safer and more sustainable chemicals is considered important, as well as establishing the "one substance one assessment" approach[62], to ensure more harmonisation in the treatment of various harmful compounds among the EU legislation.

At the end of the year 2022, EC announced in a Commission Recommendation[63] the 'safe and sustainable by design' framework (SSbD) as a voluntary approach that should bring more innovation into production of chemicals and materials. In particular, the idea behind is to guide the innovation towards industrial transition to greener and more sustainable economy. The production and use of harmful compounds, especially the substances of high concern should be minimised and with time, ceased. The changes should help reducing negative human health, climate and environmental impacts from all stages of the chemicals' life cycle.

The assessment of chemicals, which covers hazard evaluation, assessment of workers exposure, exposure in use phase and in the end-of-life stage, using the developed SSbD framework can assist development of new chemicals and materials. The assessment can be carried out either on newly developed chemicals and materials, or on the existing ones, with the aim to improve sustainability and safety. One of the applications of the proposed framework is to look for alternatives that can substitute undesired compounds currently in use and so released to the environment, like the PFAS compounds.

Both, the Chemicals strategy and the SSbD framework aim to contribute to achievement of lower environmental pollution with undesired compounds in the future.

5 External challenges that may impact future water pollution

The preamble to the UWWTD[3] states that "As a result of precipitation such as rain, snow or meltwater, storm water overflows and urban runoff, represent a sizeable remaining source of pollution discharged into the environment. Those emissions are expected to increase due to the combined effects of urbanisation and progressive change of the rain regime linked with climate

[61] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Chemicals Strategy for Sustainability, Towards a Toxic-Free Environment, COM(2020) 667 final.
[62] For more information have a look at the EC website: https://ec.europa.eu/commission/presscorner/detail/en/ip_23_6413.
[63] Commission Recommendation (EU) 2022/2510 of 8 December 2022 establishing a European assessment framework for 'safe and sustainable by design' chemicals and materials, C/2022/8854, OJ L 325, 20.12.2022, p. 179–205.

change. Urban wastewater management infrastructures are therefore particularly vulnerable to climate change".

This statement highlights why it is indispensable to consider climate change impacts when planning future measures to managing water pollution and safeguarding water quality. And for this reason, climate change impacts need to be necessarily incorporated into the risk and scenario analysis to be performed in the Tethys project.

The above written is confirmed by Bunke et al. (2019)[64] who carried out an extensive review of scientific reports and studies published in the last years (33 studies in total) regarding scenarios of future developments (of demographic, social, climate-change related or technological nature) and their potential consequences on water contamination. They focused on the mid-term changes that are expected within the next 2-3 decades. In the extensive paper the authors place a hypothesis that "the existing scenarios on developments in society may provide useful indications on future pollutants". For this reason, the study is considered of high relevance for the Tethys project and its results are brought closed below and in particular in sub-chapters 5.1-5.4, to indicate the external challenges to water quality and pollution management in the future. Further work on these aspects will be carried out in Tethys in the frame of Activity 3.3 Risk assessment & scenario analysis.

Bunke et al. (2019) identified seven types of societal scenario-based analyses:

- Scenarios for mid- and long-term developments in society, caused by multiple drivers,
- Predictions for water use and water cycle,
- Predictions for industrial chemicals and hazardous waste,
- Developments due to climate change,
- Developments due to demographic change,
- Developments due to technological and/or economic changes,
- Predictions for food production and nutrients.

The following general observations were made:

- Certain developments are linked directly to consumption and the related emission of specific compounds.
- Developments associated with impacts of climate change have much more complex consequences, especially if we want to understand future pollution in quantitative terms.
- Technological developments also have an element of uncertainty. Even though alternatives for hazardous compounds are constantly sought, substitutions result in sometimes equally or even more problematic "alternatives" (a so called "regretful substitution").

[64] Bunke, D., Moritz, S., Brack, W. et al. Developments in society and implications for emerging pollutants in the aquatic environment. Environment Sciences Europe 31, 32 (2019). https://doi.org/10.1186/s12302-019-0213-1.

The authors highlight the importance of monitoring societal developments to select appropriate strategies that aim emission reduction and prevention. They also developed recommendations on how to manage in the future river basins' pollution with new/emerging compounds.
The most important aspects identified by Bunke et al. (2019) encompass:

- Climate change,
- Future trends in water consumption and availability of water resources,
- Demographic changes in European and global population growth, as well as urbanisation,
- Economic changes,
- Technological changes, e.g. developing new chemicals,
- Substitution of problematic chemicals due to regulatory changes.

The authors looked also at which of those can be expected to (mostly negatively) impact water pollution and quality. In the below sections a more detailed description of the single aspects and the linked consequences is given.

5.1 Climate change and linked extreme events

The Intergovernmental Panel on Climate Change (IPCC) publishes at regular intervals emission scenarios. Looking at the consequences of the climate change, among the most concerning ones that will affect water quality are more frequent droughts, floods, and water scarcity in general. Climate change will impact pollutants transport, transfer between various environmental compartments and compounds transformation. Precipitation changes influence the dilution volumes and, consequently, also concentrations of hazardous compounds in water. Intensity of heavy rain events is also of relevance for the concentration variability. Another aspect worth consideration is water temperature.
Climate change will also impact human health, e.g. through illnesses incidence, and the related increased drugs consumption can further negatively impact water quality.
Some more details on specific aspects are provided below:

- ***Water scarcity and droughts*** – influence negatively river flow regime and the chemical quality of water systems; droughts will cause higher concentrations of hazardous compounds in water, while the dilution capacity will decrease. Further, water shortage means also higher need of reusing reclaimed water, e.g. in agriculture, which has consequence on the river pollution from agricultural land.
- ***Torrential rainfalls and floods*** – extreme rain events generate high runoff and erosion rates, affect river flows and possibly increase sediment mobilisation and redeposition. Floodings of landfills or extruded arable land (containing immobilised pesticides) are another contributor to increased pollutants input into surface waters but can also contaminate agricultural land and floodplains and can enter the human food chain (both through plants and animals).

- ***Elevated water temperatures*** – increased water temperature in combination with lower water levels in rivers can have multiple negative consequences. Firstly, the already mentioned higher pollutants concentration, secondly, need for increased water reuse for various purposes. Further, the environmental fate of chemicals and their toxicity, influenced by their bioaccumulation, degradability, and mobility features can be altered, similarly their biotransformation into metabolites, some of which can be even more hazardous than their precursors. Higher water temperature is also a stress factor to water flora and fauna.
- ***Environmental behaviour and fate of chemicals*** – as mentioned above, climate change can impact behaviour and environmental fate of pollutants. Several factors plays a role here, like the UV radiation that impacts photodegradation, but also air-surface exchange, wet-dry deposition or reaction rates, e.g. oxidation, photolysis, biodegradation.
- ***Incidence of diseases and drug consumption –*** negative consequences are also expected regarding human health. Higher incidence of illnesses linked to cardiovascular, respiratory and nervous systems is expected to result in higher consumption of numerous medicines, many of which will be emitted to the environment and needs to be treated in wastewater. A similar trend is expected regarding the increased spread of pathogenic and invertebrates' vectors (e.g. viruses).

5.2 Demographic change in Europe and worldwide

Bunke et al. (2019) analysed also the demographic development in Europe. It is in general expected that in the coming three decades the population size will remain relatively constant, while the age structure will change. Higher share of elderly people is expected to result in higher pharmaceuticals consumption, both in domestic and hospital/elderly homes sphere, and thus in increasing release of the drugs and their metabolites into the environment.

If we look at the world population, it is prognosticated to rise to 9.7 billion people in 2050, with highest contribution from the African, South American and Asian countries. There the share of younger people is, in general, higher than in Europe, but single countries would need to be looked at to foresee the pollutants release to the environment. Nevertheless, higher world population means higher consumption, of both agricultural and non-food products, that production and end-of-life management is linked to pollution, unless the technological developments can (at least partially) counteract this trend. Though the last issue is still very far from being effectively dealt with in most parts of the world.

5.3 Urbanization

Urbanisation trend was the next important facto the researchers looked at. At present approximately half of the world population lives in cities, while fifty years ago it was less than 40%. The urbanisation trend is expected to continue, reaching two thirds of the overall world

population by the year 2030. Urbanisation is linked to ground sealing that blocks percolation of rainwater and snowmelt through soil, contributing to higher incidence and intensity of floods, which are then linked to increased problems with local environmental pollution (that refers to pesticides, pharmaceuticals and many other industrial chemicals). Higher urbanisation requires proper wastewater and waste management to additionally counteract environmental contamination with emerging contaminants.

5.4 Technological changes

Technological developments are among the changes that are difficult to predict, and even more their consequences. On the one hand they can bring innovation, resource- and energy efficiency and safer alternatives to hazardous compounds, counteracting the environmental pollution. On the other hand, chemical and toxicological properties of newly developed compounds are sometimes difficult to predict, and it takes decades till some effects to the environment and human health become evident and scientifically proved. PFAS are a good example. Considered initially a great development, after decades or their widespread use, they became of the greatest challenges to both the human and environmental health.

Bunke et al. (2019) identified in their review two main drivers to technological changes:

- Substitution of problematic substances due to regulatory processes,
- Technological developments with new uses of chemicals.

Regulation plays a vital role in the process of enforcing changes in chemicals production and use. Nevertheless, due to the specifics of the regulatory processes they are not fast and usually cover only a limited number of compounds. In addition, due to previously mentioned difficulties in forecasting adverse effects, bans or restrictions result sometimes in so called “regrettable substitutions” or at least with substitutes of not always preferable toxicological profile.

There are recent developments at the EU level that go more towards proactive (though voluntary) initiatives (e.g. SSbD) and addressing groups of substances, rather than specific compounds approach, which aims to counteract partially the previously mentioned lengthy regulatory processes. Nevertheless, the number of newly produced compounds with only partially known properties is rapidly growing and the regulatory actions can always only be a part of the bigger solution to ensure chemical and environmental safety.

On the other hand, we have industrial innovations in products and materials, where hazardous substances are substituted due to several reasons:

- Substituting rare or expensive compounds and materials,
- Looking for better performing materials,
- Replacing compounds known or suspected to be hazardous to the environment and/or human health.

The last point, though having the improvement of the environment in mind, has again the risk of substituting the well-known/investigated compounds with alternatives that not always occur to be preferable, or can result in other (often unexpected) environmental or human health consequences.

6 Next steps – In-depth assessment

There are many factors that can constitute potential barriers to effective implementation of the ambitious EU legislation regarding water pollution that have been identified in the frame of the preliminary discussions carried for the needs of this report but have not been analysed so far more in detail. They have been summarised in a separate document titled "Guidance for an in-depth assessment" and will be discussed further with all involved in the Tethys project parties and with the identified experts and authorities.

In the next phase of the project, understanding of the national starting points, particular strengths and weaknesses will be in focus. Identifying the barriers and challenges for single MSs and for the entire DRB will be in the core of the in-depth assessment. The identified most relevant legislative changes and the external pressures will be analysed in the context of the broadly understood "national capacities" and the current state-of-the art, while the results of this evaluation will be compiled in the Final Report of the *Activity 3.1 Integrated evaluation of new policies and external challenges in the field of HS water pollution, their interplay and implications for the Danube countries and for the DRB as a whole*.

7 Annexes

7.1 Selected legal definitions from WFD, EQSD and GWD (still under discussion)

'**Good surface water chemical status**' means the chemical status required to meet the environmental objectives for surface waters set out in Article 4(1), point (a), of this Directive, that is the chemical status achieved by a body of surface water in which concentrations of pollutants do not exceed the following: the environmental quality standards for PS listed in Part A of Annex I to Directive 2008/105/EC of the European Parliament and of the Council* and , the environmental quality standards for river basin specific pollutants set in accordance with Article 8(2), point (c), and Article 8d(1) of that 16 (4a) of this Directive or Article 8d(1) of Directive 2008/105/EC, and if available, standardised effect based trigger values. ';

'**Priority substances**' mean substances listed in Part A of Annex I to Directive 2008/105/EC, that are substances which present a significant risk to or via the aquatic environment and are prioritized in acordance with Article 16(2) in a high proportion of Member States.';

(c) the following points (30a), and (30b), (35b) and (43) are inserted:

'**Priority hazardous substances**' mean priority substances which are identified as 'hazardous' in accordance with article 16(3), marked as 'hazardous' on the basis that they are recognised in scientific reports, in relevant Union legislation, or in relevant international agreements, as being toxic, persistent and liable to bio-accumulate or as giving rise to an equivalent level of concern, where this concern is relevant to the aquatic environment.

'River basin specific pollutants' mean pollutants that are not or no longer identified as priority substances but which Member States have identified, on the basis of the assessment of pressures and impacts on surface water bodies carried out in accordance with Annex II to this Directive, as being discharged in significant quantities in the water bodies of the River Basin District and posing a significant risk to or via the aquatic environment within their territory.

'**Effect-based Trigger value**' means a threshold for the effects of a pollutant or group of pollutants in water, sediment or biota, where those effects are measured by an appropriate and scientifically validated effect-based monitoring method, above which adverse effects on human health or the environment from that pollutant or group of pollutants in water, sediment or biota, could occur.

'**Deterioration of the status of a body of water**' means the lowering of the status of at least one of the quality elements, within the meaning of Annex V to this Directive, by one class, even if that lowering does not result in a fall in the classification of the body of water as a whole. However, if a quality element is already at the lowest class, any further deterioration of that element constitutes a deterioration of the status of the body of water.';

7.2 EQSs for Priority Substances in surface water (still under discussion)

Table 8 Environmental Quality Standards for priority substances in surface waters

N°	Name of substance	Category of substances	CAS number (1)	EU number (2)	AA-EQS (3) Inland surface waters (4) [µg/l]	AA-EQS (3) Other surface waters [µg/l]	MAC-EQS (5) Inland surface waters (4) [µg/l]	MAC-EQS (5) Other surface waters [µg/l]	EQS Biota (6) [µg/kg wet weight] or EQS Sediment [µg /kg dry weight] where so indicated	Identified as a priority hazardous substance	Identified as an Ubiquitous Persistent, Bioaccumulative and Toxic (uPBT) substance	Identified as a substance that tends to accumulate in sediment and/or biota
1	The substance Alachlor has been moved to Part C of Annex II											
2	Anthracene(31)	Industrial substances	120-12-7	204-371-1			0,1	0,1		X		X
3	The substance Atrazine has been moved to Part C of Annex II											
4	The substance Benzene has been moved to Part C of Annex II											
5	Brominated diphenylethers (33)	Industrial substances	not applicable	not applicable			0,14 (7)	0,14 (7)	0,00028 (7)	X (8)	X	X
6	Cadmium and its compounds (depending on water hardness classes) (9)	Metals	7440-43-9	231-152-8	<0,08 (Class 1) 0,08 (Class 2) 0,09 (Class 3) 0,15 (Class 4) 0,25 (Class 5)	0,2	< 0,45 (Class 1) 0,45 (Class 2) 0,6 (Class 3) 0,9 (Class 4) 1,5 (Class 5)	< 0,45 (Class 1) 0,45 (Class 2) 0,6 (Class 3) 0,9 (Class 4) 1,5 (Class 5)		X		X
6a	The substance Carbon tetrachloride has been moved to Part C of Annex II											
7	C10-13 Chloroalkanes (10)	Industrial substances	85535-84-8	287-476-5	0,4	0,4	1,4	1,4		X		X
8	The substance Chlorfenvinphos has been moved to Part C of Annex II											
9	Chlorpyrifos (Chlorpyrifos-ethyl)	Organophosphate pesticides	2921-88-2	220-864-4	$4,6 \times 10^{-4}$	$4,6 \times 10^{-5}$	0,0026	$5,2 \times 10^{-4}$		X		X
9a	The substance Cyclodiene pesticides has been moved to Part C of Annex II											
9b	The substances DDT and para-para-DDT have been moved to Part C of Annex II											
10	The substance 1,2-Dichloroethane has been moved to Part C of Annex II											
11	The substance Dichloromethane has been moved to Part C of Annex II											
12	Di(2-ethylhexyl)-	Industrial	117-81-7	204-211-	1,3	1,3	not	not		X		X

	phthalate (DEHP)	substances		0			applicable	applicable				
13	Diuron	Herbicides	330-54-1	206-354-4	0,049	0,0049	0,27	0,054				
14	Endosulfan	Organochlorine pesticides	115-29-7	204-079-4	0,005	0,0005	0,01	0,004		X		
15	Fluoranthene	Industrial substances	206-44-0	205-912-4	$7{,}62 \times 10^{-4}$	$7{,}62 \times 10^{-4}$	0,12	0,012	6,1	X	X	X
16	Hexachlorobenzene	Organochlorine pesticides	118-74-1	204-273-9			0,5	0,05	1 sw fish[32] 8 fw fish [32]	X		X
17	Hexachlorobutadiene	Industrial substances (solvents)	87-68-3	201-765-5			0,6	0,06	21	X		X
18	Hexachlorocyclohexane	Insecticides	608-73-1	210-168-9	0,02	0,002	0,04	0,02		X		X
19	The substance Isoproturon has been moved to Part C of Annex II											
20	Lead and its compounds	Metals	7439-92-1	231-100-4	1,2 [12]	1,3	14	14		X		X
21	Mercury and its compounds	Metals	7439-97-6	231-106-7			0,07	0,07	11	X	X	X
22	Naphthalene	Industrial substances	91-20-3	202-049-5	2	2	130	130				
23	Nickel and its compounds	Metals	7440-02-0	231-111-4	2 [12]	3,1	8,2	8,2				
24	Nonylphenols [14] (4-Nonylphenol)	Industrial substances	84852-15-3	284-325-5	0,037	0,0018	2,1	1,17		X		
25	Octylphenols [15] ((4-(1,1',3,3'-tetramethylbutyl)-phenol))	Industrial substances	140-66-9	205-426-2	0,1	0,01	not applicable	not applicable		X		
26	Pentachlorobenzene	Industrial substances	608-93-5	210-172-0	0,007	0,0007	not applicable	not applicable		X		X
27	Pentachlorophenol	Organochlorine pesticides	87-86-5	201-778-6	0,4	0,4	1	1		X		
28	Polyaromatic hydrocarbons (PAHs) (16) [33]	Combustion products	not applicable	not applicable	not applicable	not applicable	not applicable	not applicable	um of Benzo(a) pyrene equivalents 0,6 [17]	X	X	X
	Benzo(a)pyrene		50-32-8	200-028-5			0,5	0,05	0,6			
	Benzo(b)fluoranthene		205-99-2	205-911-9			0,017	0,017	see footnote 17			
	Benzo(k)fluoranthene		207-08-9	205-916-			0,017	0,017	see			

				6					footnote 17			
	Benzo(g,h,i)perylene		191-24-2	205-883-8			$8,2 \times 10^{-3}$	$8,2 \times 10^{-4}$	see footnote 17			
	Indeno(1,2,3-cd)pyrene		193-39-5	205-893-2			not	not	see footnote 17			
	Chrysene		218-01-9	205-923-4			0,07	0,007	see footnote 17			
	Benzo(a)anthracene		56-55-3	200-280-6			0,1	0,01	see footnote 17			
	Dibenz(a,h)anthracene		53-70-3	200-181-8			0,014	0,0014	see footnote 17			
	Fluoranthene	206-44-0	205-912-4				0,12	0,012	see footnote 17			
29	The Substance Simazine has been moved to Part C of Annex II											
29a	Tetrachloroethylene	Industrial substances	127-18-4	204-825-9	10	10	not applicable	not applicable				
29b	Trichloroethylene	Industrial substances	79-01-6	201-167-4	10	10	not applicable	not applicable				
30	Tributyltin compounds (18) (Tributyltin-cation)	Biocides	36643-28-4	not applicable	0,0002	0,0002	0,0015	0,0015	1,6(19)	X	X	X
31	The substance Trichlorobenzenes has been moved to Part C of Annex II											
32	Trichloromethane	Industrial substances	67-66-3	200-663-8	2,5	2,5	not applicable	not applicable				
33	Trifluralin	Herbicides	1582-09-8	216-428-8	0,03	0,03	not applicable	not applicable		X		
34	Dicofol	Organochlorine pesticides	115-32-2	204-082-0	$[4,45 \times 10^{-3}]$	$[0,185 \times 10^{-3}]$	not applicable (20)	not applicable (20)	111_{fw} fish(32) $4,6_{sw}$ fish(32)	X		X
35	Perfluorooctane sulfonic acid and its derivatives (PFOS)	Industrial substances	1763-23-1	217-179-8	Covered by substance group 65 (Per- and polyfluoroalkyl substances (PFAS) – sum of 24)							
36	Quinoxyfen	Plant protection products	124495-18-7	not applicable	0,15	0,015	2,7	0,54		X		X
37	Dioxins and dioxin-	Industrial	not			not	not	not	Sum of			

	like compounds[21] [33]	byproducts	applicable			applicable	applicable	applicable	PCDDs+ PCDFs+ PCB-DLs equivalents $3,5 \times 10^{-5}$ [22]			
38	Aclonifen[31]	Herbicides	74070-46-5	277-704-1			0,12	0,012				
39	Bifenox	Herbicides	42576-02-3	255-894-7	0,012	0,0012	0,04	0,004				
40	Cybutryne	Biocides	28159-98-0	248-872-3	0,0025	0,0025	0,016	0,016				
41	Cypermethrin[23][33]	Pyrethroid pesticides	52315-07-8	257-842-9	3×10^{-5}	3×10^{-6}	6×10^{-4}	6×10^{-5}				X
42	Dichlorvos	Organophosphate pesticides	62-73-7	200-547-7	6×10^{-4}	6×10^{-5}	7×10^{-4}	7×10^{-5}				
43	Hexabromocyclododecane (HBCDD)[24] [33]	Industrial substances	See footnote 24	See footnote 24	$4,6 \times 10^{-4}$	2×10^{-5}	0,5	0,05	90 $_{\text{fw fish}}$[32] 3,5 $_{\text{sw fish}}$[32]	X	X	X
44	Heptachlor and heptachlor epoxide	Organochlorine pesticides	76-44-8 / 1024-57-3	200-962-3/ 213-831-0	$1,7 \times 10^{-7}$	$1,7 \times 10^{-7}$	3×10^{-4}	3×10^{-5}	0,013	X	X	X
45	Terbutryn	Herbicides	886-50-0	212-950-5	0,065	0,0065	0,34	0,034				
46	17 alpha-ethinylestradiol (EE2)	Pharmaceuticals (Estrogenic hormones)	57-63-6	200-342-2	$1,7 \times 10^{-5}$	$1,6 \times 10^{-6}$	not derived	not derived				
47	17 beta-estradiol (E2)	Pharmaceuticals (Estrogenic hormones)	50-28-2	200-023-8	0,00018	9×10^{-6}	not derived	not derived				
48	Acetamiprid	Neonicotinoid pesticides	135410-20-7 / 160430-64-8	603-921-1	0,037	0,0037	0,16	0,016				
49	Azithromycin	Pharmaceuticals (Macrolide antibiotics)	83905-01-5	617-500-5	0,019	0,0019	0,18	0,018				X

50	Bifenthrin	Pyrethroid pesticides	82657-04-3	617-373-6	$9,5 \times 10^{-5}$	$9,5 \times 10^{-6}$	0,011	0,001				X
51	Bisphenol-A (BPA)	Industrial substances	80-05-7	201-245-8	$1,7\times 10^{-4}$	$1,7\times 10^{-4}$	130	51	0,025	X		
52	Carbamazepine	Pharmaceuticals	298-46-4	206-062-7	2,5	0,25	$1,6 \times 10^{3}$	160				
53	Clarithromycin[31]	Pharmaceuticals (Macrolide antibiotics)	81103-11-9	658-034-2	0,13	0,013	0,13	0,013				X
54	Clothianidin	Neonicotinoid pesticides	210880-92-5	433-460-1	0,01	0,001	0,34	0,034				
55	Deltamethrin	Pyrethroid pesticides	52918-63-5	258-256-6	$1,7 \times 10^{-6}$	$1,7 \times 10^{-7}$	$1,7 \times 10^{-5}$	$3,4 \times 10^{-6}$				X
56	Diclofenac	Pharmaceuticals	15307-86-5 / 15307-79-6	239-348-5 / 239-346-4	0,04	0,004	250	25				X
57	Erythromycin	Pharmaceuticals (Macrolide antibiotics)	114-07-8	204-040-1	0,5	0,05	1	0,1				X
58	Esfenvalerate	Pyrethroid pesticides	66230-04-4	613-911-9	$1,7 \times 10^{-5}$	$1,7 \times 10^{-6}$	0,0085	0,00085				X
59	Estrone (E1)	Pharmaceuticals (Estrogenic hormones)	53-16-7	200-164-5	$3,6 \times 10^{-4}$	$1,8 \times 10^{-5}$	not derived	not derived				
60	Glyphosate	Herbicides	1071-83-6	213-997-4	0,1 [25] 86,7 [26]	8,67	not applicable [25] 398,6[26]	39,86				
61	Ibuprofen	Pharmaceuticals	15687-27-1	239-784-6	0,22	0,022						X
62	Imidacloprid	Neonicotinoid pesticides	138261-41-3 / 105827-78-9	428-040-8	0,0068	$6,8 \times 10^{-4}$	0,057	0,0057				

63	Nicosulfuron	Herbicides	111991-09-4	601-148-4	0,0087	$8,7 \times 10^{-4}$	0,23	0,023				
64	Permethrin	Pyrethroid pesticides	52645-53-1	258-067-9	$2,7\times 10^{-4}$	2.7×10^{-5}	0,0025	$2,5 \times 10^{-4}$				X
65	Per- and polyflouroalkyl substances (PFAS) – sum of 24[27] [33]	Industrial substances	not applicable	not applicable	Sum of PFOA equivalents 0,0044[28]	Sum of PFOA equivalents 0,0044[28]	not applicable	not applicable	Sum of PFOA equivalents 0,077[28]	X	X	X
66	Silver	Metals	7440-22-4	231-131-3	0,01	0,006 (10‰ salinity) 0,17 (30‰ salinity)	0,022	not derived				
67	Thiacloprid	Neonicotinoid pesticides	111988-49-9	601-147-9	0,01	0,001	0,05	0,005				
68	Thiamethoxam	Neonicotinoid pesticides	153719-23-4	428-650-4	0,04	0,004	0,77	0,077				
69	Triclosan[31]	Biocides	3380-34-5	222-182-2	0,02	0,002	0,02	0,002				
~~70~~	~~Total of active substances in pesticides, including their relevant metabolites, degradation and reaction products~~[29]	~~Plant protection products and biocides~~			~~0,5~~[30]	~~0,5~~[30]						

(1) CAS: Chemical Abstracts Service.

(2) EU number: European Inventory of Existing Commercial Substances (EINECS) or European List of Notified Chemical Substances (ELINCS).

(3) This parameter is the EQS expressed as an annual average value (AA-EQS). Unless otherwise specified, it applies to the total concentration of all substances and isomers.

(4) Inland surface waters encompass rivers and lakes and related artificial or heavily modified water bodies.

(5) This parameter is the EQS expressed as a maximum allowable concentration (MAC EQS). Where the MAC EQS are marked as "not applicable", the AA EQS values are considered protective against short-term pollution peaks in continuous discharges since they are significantly lower than the values derived on the basis of acute toxicity.

(6) If an EQS biota or sediment is given, it, rather than the water EQS, shall be applied, without prejudice to the provision in Article 3(3) of this Directive allowing an alternative biota taxon, or another matrix, to be monitored instead, as long as the EQS applied provides an equivalent level of protection. Unless otherwise indicated, the biota EQS relate to fish. For substances numbered 15 (Fluoranthene), 28 (PAHs),

and 51 (Bisphenol-A) the biota EQS refers to crustaceans and molluscs. For the purpose of assessing chemical status, monitoring of Fluoranthene , PAHs and Bisphenol-A in fish is not appropriate. For substance number 37 (Dioxins and dioxin-like compounds), the biota EQS relates to fish, crustaceans and molluscs, in line with Commission Regulation (EU) No 1259/2011* Annex Section 5.3.

(7) For the group of priority substances covered by brominated diphenylethers (No 5), the EQS refer to the sum of the concentrations of congener numbers 28, 47, 99, 100, 153 and 154.

(8) Tetra, Penta, Hexa, Hepta, Octa and Decabromodiphenylether (CAS numbers 40088-47-9, 32534-81-9, 36483-60-0, 68928-80-3, 32536-52-0, 1163-19-5, respectively).

(9) For Cadmium and its compounds (No 6) the EQS values vary depending on the hardness of the water as specified in five class categories (Class 1: <40 mg CaCO3/l, Class 2: 40 to <50 mg CaCO3/l, Class 3: 50 to <100 mg CaCO3/l, Class 4: 100 to <200 mg CaCO3/l and Class 5: ≥200 mg CaCO3/l).

(10) No indicative parameter is provided for this group of substances. The indicative parameter(s) must be defined through the analytical method.

(12) These EQS refer to bioavailable concentrations of the substances.

(14) Nonylphenol (CAS 25154-52-3, EU 246-672-0) including isomers 4-nonylphenol (CAS 104-40-5, EU 203-199-4) and 4-nonylphenol (branched) (CAS 84852-15-3, EU 284-325-5).

(15) Octylphenol (CAS 1806-26-4, EU 217-302-5) including isomer 4-(1,1',3,3'-tetramethylbutyl)-phenol (CAS 140-66-9, EU 205-426-2).

(16) Benzo(a)pyrene (CAS 50-32-8) (RPF 1), benzo(b)fluoranthene (CAS 205-99-2) (RPF 0,1), benzo(k)fluoranthene (CAS 207-08-9) (RPF 0,1), benzo(g,h,i)perylene (CAS 191-24-2) (RPF 0), indeno(1,2,3-cd)pyrene (CAS 193-39-5) (RPF 0,1), chrysene (CAS 218-01-9) (RPF 0,01), benzo(a)anthracene (CAS 56-55-3) (RPF 0,1), dibenz(a,h)anthracene (CAS 53-70-3) (RPF 1) and fluoranthene (CAS 206-44-0) (RPF 0,01). Fluoranthene also appears separately in row 15. The PAHs anthracene and naphthalene are listed only separately because no RPF is available.

(17) For the group of polyaromatic hydrocarbons (PAHs) (No 28), the biota EQS refers to the sum of the concentrations of eight of the nine PAHs listed in footnote 16 expressed as benzo(a)pyrene equivalents based on the carcinogenic potencies of the substances relative to that of benzo(a)pyrene, i.e. the RPFs in footnote 16. Benzo(g,h,i)perylene does not need to be measured in biota for the purposes of determining compliance with the overall EQS biota. The biota EQS for fluoranthene in row 15 must also be complied with.

(18) Tributyltin compounds including tributyltin-cation (CAS 36643-28-4).

(19) Sediment EQS

(20) There is insufficient information available to set a MAC-EQS for these substances.

(21) This refers to the following compounds: 7 polychlorinated dibenzo-p-dioxins (PCDDs): 2,3,7,8-T4CDD (CAS 1746-01-6, EU 217-122-7), 1,2,3,7,8-P5CDD (CAS 40321-76-4), 1,2,3,4,7,8-H6CDD (CAS 39227-28-6), 1,2,3,6,7,8-H6CDD (CAS 57653-85-7), 1,2,3,7,8,9-H6CDD (CAS 19408-74-3), 1,2,3,4,6,7,8-H7CDD (CAS 35822-46-9), 1,2,3,4,6,7,8,9-O8CDD (CAS 3268-87-9) 10 polychlorinated dibenzofurans (PCDFs): 2,3,7,8-T4CDF (CAS 51207-31-9), 1,2,3,7,8-P5CDF (CAS 57117-41-6), 2,3,4,7,8-P5CDF (CAS 57117-31-4), 1,2,3,4,7,8- H6CDF (CAS 70648-26-9), 1,2,3,6,7,8-H6CDF (CAS 57117-44-9), 1,2,3,7,8,9-H6CDF (CAS 72918-21-9), 2,3,4,6,7,8-H6CDF (CAS 60851-34-5), 1,2,3,4,6,7,8-H7CDF (CAS 67562-39-4), 1,2,3,4,7,8,9-H7CDF (CAS 55673-89-7), 1,2,3,4,6,7,8,9-O8CDF (CAS 39001-02-0) 12 dioxin-like polychlorinated biphenyls (PCB-DLs): 3,3',4,4'-T4CB (PCB 77, CAS 32598-13-3), 3,3',4',5-T4CB (PCB 81, CAS 70362-50-4), 2,3,3',4,4'-P5CB (PCB 105, CAS 32598-14-4), 2,3,4,4',5-P5CB (PCB 114, CAS 74472-37-0), 2,3',4,4',5-P5CB (PCB 118, CAS 31508-00-6), 2,3',4,4',5'-P5CB (PCB 123, CAS 65510-44-3), 3,3',4,4',5- P5CB (PCB 126, CAS 57465-28-8), 2,3,3',4,4',5-H6CB (PCB 156, CAS 38380-08-4), 2,3,3',4,4',5'-H6CB (PCB 157, CAS 69782-90-7), 2,3',4,4',5,5'-H6CB (PCB 167, CAS 52663-72-6), 3,3',4,4',5,5'-H6CB (PCB 169, CAS 32774-16-6), 2,3,3',4,4',5,5'-H7CB (PCB 189, CAS 39635-31-9).

(22) For the group of Dioxins and dioxin-like compounds (No 37), the biota EQS refers to the sum of the concentrations of the substances listed in footnote 20 21 expressed as toxic equivalents based on the World Health Organisation 2005 Toxic Equivalence Factors.

(23) CAS 52315-07-8 refers to an isomer mixture of cypermethrin, alpha-cypermethrin (CAS 67375-30-8, EU 257-842-9), beta-cypermethrin (CAS 65731-84-2, EU 265-898-0), theta-cypermethrin (CAS 71691-59-1) and zeta-cypermethrin (CAS 1315501-18-8 52315-07-8, EU 257-842-9).

(24) This refers to 1,3,5,7,9,11-Hexabromocyclododecane (CAS 25637-99-4, EU 247-148-4), 1,2,5,6,9,10- Hexabromocyclododecane (CAS 3194-55-6, EU 221-695-9), α-Hexabromocyclododecane (CAS 134237-50-6), β-Hexabromocyclododecane (CAS 134237-51-7) and γ- Hexabromocyclododecane (CAS 134237-52-8).

(25) For freshwater used for the abstraction and preparation of drinking water.

(26) For freshwater not used for the abstraction and preparation of drinking water.

(27) This refers to the following compounds, listed with their CAS number, EU number and Relative Potency Factor (RPF): Perfluorooctanoic acid (PFOA) (CAS 335-67-1, EU 206-397-9) (RPF 1), Perfluorooctane sulfonic acid (PFOS) (CAS 1763-23-1, EU 217-179-8) (RPF 2), Perfluorohexane sulfonic acid (PFHxS) (CAS 355-46-4, EU 206-587-1) (RPF 0,6), Perfluorononanoic acid (PFNA) (CAS 375-95-1, EU 206-801-3) (RPF 10), Perfluorobutane sulfonic acid (PFBS) (CAS 375-73-5, EU 206-793-1) (RPF 0,001), Perfluorohexanoic acid (PFHxA) (CAS 307-24-4, EU 206-196-6) (RPF 0,01), Perfluorobutanoic acid (PFBA) (CAS 375-22-4, EU 206-786-3) (RPF 0,05), Perfluoropentanoic acid (PFPeA) (CAS 2706-90-3, EU 220-300-7) (RPF 0,03), Perfluoropentane sulfonic acid (PFPeS) (CAS 2706-91-4, EU 220-301-2) (RPF 0,3005), Perfluorodecanoic acid (PFDA) (CAS 335-76-2, EU 206-400-3) (RPF 7), Perfluorododecanoic acid (PFDoDA or PFDoA) (CAS 307-55-1, EU 206-203-2) (RPF 3), Perfluoroundecanoic acid (PFUnDA or PFUnA) (CAS 2058-94-8, EU 218-165-4) (RPF 4), Perfluoroheptanoic acid (PFHpA) (CAS 375-85-9, EU 206-798-9) (RPF 0,505), Perfluorotridecanoic acid (PFTrDA) (CAS 72629-94-8, EU 276-745-2) (RPF 1,65), Perfluoroheptane sulfonic acid (PFHpS) (CAS 375-92-8, EU 206-800-8) (RPF 1,3), Perfluorodecane sulfonic acid (PFDS) (CAS 335-77-3, EU 206-401-9) (RPF 2), Perfluorotetradecanoic acid (PFTeDA) (CAS 376-06-7, EU 206-803-4) (RPF 0,3), Perfluorohexadecanoic acid (PFHxDA) (CAS 67905-19-5, EU 267-638-1) (RPF 0,02), Perfluorooctadecanoic acid (PFODA) (CAS 16517-11-6, EU 240-582-5) (RPF 0,02), 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propionic acid (HFPO-DA) (CAS 13252-13-6) (RPF 0,06), 2,2,3-trifluoro-3-(1,1,2,2,3,3-hexafluoro-3-(trifluoromethoxy)propoxy)propanoaic acid (CAS 919005-14-4) (RPF 0,03), 2- (Perfluorohexyl)ethyl alcohol (6:2 FTOH) (CAS 647-42-7, EU 211-477-1) (RPF 0,02), 2-(Perfluorooctyl)ethanol (8:2 FTOH) (CAS 678-39-7, EU 211-648-0) (RPF 0,04) and 2,2-difluoro-2-((2,2,4,5-tetrafluoro-5-(trifluoromethoxy)-1,3-dioxolan-4-yl)oxy)acetic acid (C6O4) (CAS 1190931-41-9) (RPF 0,06)

(28) For the group of PFAS (No 65), the EQS refer to the sum of the concentrations of the 24 PFAS listed in footnote 27, expressed as PFOA-equivalents based on the potencies of the substances relative to that of PFOA, i.e. the RPFs in footnote 27. The critical EQS is the biota EQS (relating to fish consumption) and must therefore be complied with. The AA-EQS are not equivalently protective.

(31) For this substance, no AA-EQS is given because compliance with the corresponding MAC EQS should provide sufficient protection from chronic exposure.

(32) 'fw fish' indicates the EQSbiota for freshwater fish monitored in inland waters ; 'sw fish' indicates the EQSbiota for saltwater fish monitored in other surface waters

(33) The minimum performance criteria for the limit of quantification, as laid down in Directive 2009/90/EC, should be applied to each individual substance within a given group of substances when the best available analytical techniques applied in the member state allow it

7.3 Harmonised EQSs for river basin specific pollutants

Table 9 Harmonised Environmental Quality Standards for river basin specific pollutants

N°	Name of substance	Category of substances	CAS number (1)	EU number (2)	AA-EQS (3) Inland surface waters (4) [µg/l]	AA-EQS (3) Other surface waters [µg/l]	MAC-EQS (5) Inland surface waters(4) [µg/l]	MAC-EQS (5) Other surface waters [µg/l]	EQS Biota (6 or EQS Sediment where so indicated [µg /kg dry weight
1	Alachlor(7)	Pesticides	15972-60-8	240-110-8	0,3	0,3	0,7	0,7	- -
2	Carbon tetrachloride(7)	Industrial substances	56-23-5	200-262-8	12	12	not applicable	not applicable	- -
3	Chlorfenvinphos(7)	Pesticides	470-90-6	207-432-0	0,1	0,1	0,3	0,3	- -
4	Simazine(7)	Pesticides	122-34-9	204-535-2	1	1	4	4	- -
5	Atrazine(7)	Herbicides	1912-24-9	217-617-8	0,6	0,6	2,0	2,0	
6	Benzene(7)	Industrial substances	71-43-2	200-753-7	10	8	50	50	
7	Cyclodiene pesticides: Aldrin Dieldrin Endrin Isodrin(7)	Organochlorine pesticides	309-00-2 60-57-1 72-20-8 465-73-6	206-215-8 200-484-5 200-775-7 207-366-2	Σ = 0,01	Σ = 0,005	not applicable	not applicable	
8	DDT total (7) (8)	Organochlorine pesticides	not applicable	not applicable	0,025	0,025	not applicable	not applicable	
9	para-para-DDT(7) (8)		50-29-3	200-024-3	0,01	0,01	not applicable	not applicable	
10	1,2-Dichloroethane(7)	Industrial substances	107-06-2	203-458-1	10	10	not applicable	not applicable	
11	Dichloromethane(7)	Industrial substances	75-09-2	200-838-9	20	20	not applicable	not applicable	
12	12 Isoproturon(7)	Herbicides	34123-59-6	251-835-4	0,3	0,3	1,0	1,0	
13	Trichlorobenzenes(7)	Industrial substances (solvents)	12002-48-1	234-413-4	0,4	0,4	not applicable	not applicable	

1) CAS: Chemical Abstracts Service.

(2) EU number: European Inventory of Existing Commercial Substances (EINECS) or European List of Notified Chemical Substances (ELINCS).

(3) This parameter is the EQS expressed as an annual average value (AA-EQS). Unless otherwise specified, it applies to the total concentration of all substances and isomers.

(4) Inland surface waters encompass rivers and lakes and related artificial or heavily modified water bodies.

(5) This parameter is the EQS expressed as a maximum allowable concentration (MAC EQS). Where the MAC EQS are marked as "not applicable", the AA EQS values are considered protective against short-term pollution peaks in continuous discharges since they are significantly lower than the values derived on the basis of acute toxicity.

(6) If a biota EQS is given, it, rather than the water EQS, shall be applied, without prejudice to the provision in Article 3(3) of this Directive allowing an alternative biota taxon, or another matrix, to be monitored instead, as long as the EQS applied provides an equivalent level of protection. Unless otherwise indicated, the biota EQS relate to fish.

(7) Substance previously listed as a priority substance in Annex X to Directive 2000/60/EC or Annex I to Directive 2008/105/EC.'.

(8) DDT total comprises the sum of the isomers 1,1,1 trichloro 2,2 bis (p chlorophenyl) ethane (CAS 50 29 3, EU 200 024 3); 1,1,1 trichloro 2 (o chlorophenyl) 2 (p chlorophenyl) ethane (CAS 789 02 6, EU 212 332 5); 1,1-dichloro 2,2 bis (p chlorophenyl) ethylene (CAS 72 55 9, EU 200 784 6); and 1,1 dichloro 2,2 bis (p chlorophenyl) ethane (CAS 72 54 8, EU 200 783 0)

7.4 Groundwater QSs

Table 10 Groundwater Quality Standards

Nº	Name of substance	Category of substances	CAS number(1)	EU number(2)	Quality Standard(3) [µg/l unless otherwise indicated
1	Nitrates	Nutrients	not applicable	not applicable	50 mg/l
2	Active substances in pesticides, including their relevant metabolites, degradation and reaction products(4)	Pesticides	not applicable	not applicable	0,1 (individual) 0,5 (total)(5)
3	PFAS				
3.1	Sum of PFAS	Industrial substances			The parametric value as defined in Annex I part B of Directive 2020/2184/EC
3.2	Sum of 4 PFAS(6.2)	Industrial substances	See table note 6.2	See table note 6.2	0,0044
4	Carbamazepine	Pharmaceuticals	298-46-4	not applicable	2,5(13)
5	Sulfamethoxazole	Pharmaceuticals	723-46-6	not applicable	0,1(13)
6	Primidone	Pharmaceuticals	125-33-7		(2,5)(13)
7	Non-relevant metabolites of pesticides (nrMs)	Pesticides	not applicable	not applicable	(individual) (total)(12)
8	Trichloro-ethylene and Tetrachloro Ethylene (sum of two)	Industrial substances	79-01-6 and 127-18-4	201-167-4 and 204-825-9	10 (total)(14)

(1) CAS: Chemical Abstracts Service.

(2) EU number: European Inventory of Existing Commercial Substances (EINECS) or European List of Notified Chemical Substances (ELINCS).

(3) This parameter is the QS expressed as an annual average value. Unless otherwise specified, it applies to the total concentration of all substances and isomers.

(4) 'Pesticides' means plant protection products and biocidal products referred to in Article 2 of Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and in Article 3 of Regulation (EU) No 528/2012 of the European Parliament and of the Council of 22 May 2012 concerning the making available on the market and use of biocidal products, respectively. A pesticide metabolite shall be deemed relevant if there is reason

to consider that it has intrinsic properties comparable to those of the parent substance in terms of its pesticide target activity or that either itself or its transformation products generate a health risk for consumers and environment. An exhaustive list of metabolites of pesticide substances specifying if they are relevant or not is made available by the Commission in accordance with article 4, paragraph 2a, of this Directive. Member States shall monitor, from this list, the active pesticide substances present in the products currently or previously used in their territory.(5)

(6.1) This refers to the PFAS listed in point 3, Part B of Annex III to Directive (EU) 2020/2184.

(6.2) This refers to the following compounds, listed with their CAS number: (355-46-4) Perfluorohexane sulfonic acid (PFHxS); (1763-23-1) Perfluorooctanesulfonic acid (PFOS); (335-67-1); Perfluorooctanoic acid (PFOA); (375-95-1) Perfluorononanoic acid (PFNA); (68259-12-1). For the sum of 4 PFAS, the CAS numbers listed refer only to the protoned form of the individual PFAS but the sum applies to the total concentration of the dissolved substances including protoned and deprotoned forms and their isomers linear and branched.

(12) 'Total' means the sum of all individual nrMs in each data category detected and quantified in the monitoring procedure, which should cover at least the nrMs listed in accordance with paragraph 2a of Article 4.

(13) When a reliable methodology is available, Member States shall assess the presence of groundwater ecosystems in their groundwater bodies and set, if necessary following a risk assessment, a stricter threshold value for this product in line with article 3 (1b) - in order to preserve these ecosystems.

(14) 'Total' means the sum of concentrations of Trichloroethylene and Tetrachloroethylene

Table 11 Groundwater Repository of harmonised threshold values for synthetic substances in groundwater pollutants of national, regional or local concern

Nº	Name of substance	Category of substances	CAS number(1)	EU number(2)	Quality Standard(3) [µg/l unless otherwise indicated
1	Individual pharmaceutical active substances (4)	Pharmaceuticals			2,5 (5)

(1) CAS: Chemical Abstracts Service.

(2) EU number: European Inventory of Existing Commercial Substances (EINECS) or European List of Notified Chemical Substances (ELINCS).

(4) Pharmaceutical active substances as defined in directive 2001/83/EC and regulation (EU) 2019/6

(5) Member States shall apply this threshold value unless a stricter standard or threshold value has been specifically set for the substance concerned at Union or national level. When a reliable methodology is available, Member States shall assess, the presence of groundwater ecosystems in their groundwater bodies and set, if necessary following a risk assessment, a stricter threshold value for this product in line with article 3 (1b) - in order to preserve these ecosystems.

7.5 ANNEX V to the revised UWWTD – Content of the Integrated Urban Wastewater Management Plans

An analysis of the initial situation of the drainage area of the agglomeration concerned, including at least the following:

(a) a detailed description of the network of collecting systems, the urban wastewater and urban runoff storage and conducting capacities of that network and the existing urban wastewater treatment capacities in case of rainfall,

(b) for combined sewers, a dynamic analysis of the flows of urban wastewater in case of rainfall, based on monitoring data or the use of hydrological, hydraulic and water quality models that take into account state-of-the-art climate projections and including an estimate of the pollution loads of the parameters referred to in Table 1 and, where relevant, Table 2 of Annex I as well as microplastics and relevant pollutants released into receiving waters in case of rainfall;

(c) for separate sewers, a detailed description of the monitoring requirements at relevant points of separate systems where discharges of urban runoff are expected to be polluted as identified under Article 5(2), point (d), to identify relevant and feasible measures as required in point 3 of this Annex.

Objectives for the reduction of pollution from storm water overflows, including the following:

(a) an indicative non-binding objective that storm water overflow represents a small percentage that cannot be more than 2 % of the annual collected urban wastewater load calculated in dry weather conditions; this indicative non-binding objective shall be met by:

  (i) **31 December 2039** for all agglomerations of **100 000 p.e. and above**,

  (ii) **31 December 2045** for agglomerations of **10 000 p.e. and above** referred to in Article 5,

(b) the progressive reduction of macroplastics.

The measures to be taken to achieve the objectives referred to in point 2 in accordance with the deadlines set in that point accompanied with a timeline for the implementation of the measures and a distinction between measures already in place and to be taken. It shall also contain a clear identification of the actors involved and their responsibilities in the implementation of the integrated urban wastewater management plan.

When assessing which measures to be taken under point 3, MSs shall ensure that their competent authorities consider at least the following:

(a) preventive measures aimed at avoiding the entry of unpolluted rain waters into collecting systems, including measures promoting natural water retention or rainwater harvesting, and measures aimed at increasing green and blue spaces in urban areas in order to reduce storm water overflows or limiting impermeable surfaces in the agglomerations,

(b) measures to better manage and optimise the use of existing infrastructure, including collecting systems, storage volumes and urban wastewater treatment plants, with the aim

of ensuring that releases of untreated urban wastewater or polluted urban runoff into receiving waters are minimised,

where necessary to achieve the objectives referred to in point 2, additional mitigation measures including the adaptation of the infrastructure for the collection, storage and treatment of urban wastewater, such as connecting newly built urban areas to separate sewers, where relevant, or the creation of new infrastructure with priority given to green and blue infrastructure such as vegetated ditches, treatment wetlands and storage ponds designed in order to support biodiversity. Where relevant, water reuse shall be considered in the context of the development of the integrated urban wastewater management plans referred to in Article 5.