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SENTINEL VEGETATION • DOCUMENT 1/2 — PFAS in Wild Vegetation

Supporting scientific and technical document • 9 November 2026 • Criteria undergoing validation

1. Objective and project decisions

Evaluate PFAS in leaves of vegetation already growing within the candidate TDE area as an integrated biological indicator of exposure. No dedicated sentinel gardens are established. Species selection and sampling arrangements will be specified when the general protocol is finalised.

Decision: no single acceptance or exclusion threshold for leaves of different species. Results are interpreted using European scientific literature, individual compound profiles, plant species, ecological conditions and consistency with water and earthworm findings. Routine TDE soil monitoring does not include PFAS.

2. European quantitative evidence

Study / environment	Species or matrix	Findings	Weight basis
Austria, 2025; two national parks	Wild plants	PFBA geometric mean ~0.60 µg/kg; PFOS ~0.060 µg/kg; individual maxima: PFBA ~15, PFOA ~0.50, PFOS ~0.40 µg/kg	Dry weight
Germany, 2023; contaminated site	White willow; black poplar; black alder	Σ23 PFAS ranges: 0–1,800; 6.7–32; 0–13 µg/kg, respectively	Not specified in abstract: check full paper
Sweden, 2017; fire-training site	Birch; spruce; fern; ground elder; bird cherry	Maximum Σ26 PFAS: 97; 94; 6.9; 23; 21 µg/kg, respectively	Fresh weight

Do not directly compare sums of 23 or 26 PFAS with individual PFOS/PFOA or with the sum of four food-related PFAS. Likewise, do not compare fresh and dry weight without measuring moisture. Concentrations at contaminated sites are not background values.

3. Scientific interpretation

• Species differ in water demand, root architecture, translocation and foliar processes: willow cannot be directly compared with oak or hazel.

• Short-chain PFAS are often relatively prominent in plant tissues; leaf profiles may reflect available water more closely than bulk soil.

• The Austrian national park data indicate widespread PFAS occurrence even in protected settings; a detection does not automatically indicate high local pressure.

• Keep individual analyte concentrations and their LOQs: ΣPFAS depends on the analytical panel and the treatment of non-quantified results.

• Leaf concentrations characterise a biological matrix and are not equivalent to EU maximum levels for eggs, fish or other foodstuffs.

4. TDE assessment principle

Concentrations below LOQ: favourable evidence within the method's sensitivity. Quantified detections: comparison with studies of comparable species and matrices. Anomalous findings: integrated assessment with water, earthworms and environmental setting, with analytical confirmation where necessary before an adverse conclusion. This matrix alone never triggers automatic exclusion.

5. Outstanding issues

Representative species, sampled plant part, expression basis, PFAS panel, required LOQs and criteria for comparing studies must be specified in the operational sampling plan. The assessment framework remains subject to validation.

References and verified sources

1. Weinbauer H., Mann O., Hornek-Gausterer R. (2025). Impact of per- and polyfluoroalkyl substances (PFAS) in wild plants, soil and water in two Austrian national parks. Science of the Total Environment 999, 180346. https://doi.org/10.1016/j.scitotenv.2025.180346

2. Würth A., Mechler M., Menberg K., et al. (2023). Phytoscreening for Per- and Polyfluoroalkyl Substances at a Contaminated Site in Germany. Environmental Science & Technology 57, 4122–4132. https://doi.org/10.1021/acs.est.2c04519

3. Gobelius L., Lewis J., Ahrens L. (2017). Plant Uptake of Per- and Polyfluoroalkyl Substances at a Contaminated Fire Training Facility to Evaluate the Phytoremediation Potential of Various Plant Species. Environmental Science & Technology 51, 12602–12610. https://doi.org/10.1021/acs.est.7b02926

4. Groffen T., Prinsen E., Devos Stoffels O.-A., et al. (2023). PFAS accumulation in several terrestrial plant and invertebrate species reveals species-specific differences. Environmental Science and Pollution Research 30, 23820–23835. https://doi.org/10.1007/s11356-022-23799-8

Threshold coordination. The water PFAS thresholds (Σ20: <20 / 20–50 / >50 ng/L) and the TFA criterion (µg/L) are not transferable to leaves. Foliar PFAS assessment remains species-specific and integrated with water and earthworms, without a new general threshold.