P9_TA(2024)0204

Soil Monitoring and Resilience (Soil Monitoring Directive)

European Parliament legislative resolution of 10 April 2024 on the proposal for a directive of the European Parliament and of the Council on Soil Monitoring and Resilience (Soil Monitoring Law) (COM(2023)0416 – C9-0234/2023 – 2023/0232(COD))

(Ordinary legislative procedure: first reading)

(C/2025/1312)

The European Parliament,

— having regard to the Commission proposal to Parliament and the Council (COM(2023)0416),

— having regard to Article 294(2) and Article 192(1) of the Treaty on the Functioning of the European Union, pursuant to which the Commission submitted the proposal to Parliament (C9-0234/2023),

— having regard to Article 294(3) of the Treaty on the Functioning of the European Union,

— having regard to the reasoned opinion submitted, within the framework of Protocol No 2 on the application of the principles of subsidiarity and proportionality, by the Netherlands Senate and the Netherlands House of Representatives asserting that the draft legislative act does not comply with the principle of subsidiarity,

— having regard to the opinion of the European Economic and Social Committee of 25 October 2023 ([1]),

— after consulting the Committee of the Regions,

— having regard to Rule 59 of its Rules of Procedure,

— having regard to the opinion of the Committee on Agriculture and Rural Development,

— having regard to the report of the Committee on the Environment, Public Health and Food Safety (A9-0138/2024),

1. Adopts its position at first reading hereinafter set out;

2. Calls on the Commission to refer the matter to Parliament again if it replaces, substantially amends or intends to substantially amend its proposal;

3. Instructs its President to forward its position to the Council, the Commission and the national parliaments.

([1]) OJ C, C/2024/887, 6.2.2024, ELI: http://data.europa.eu/eli/C/2024/887/oj.

P9_TC1-COD(2023)0232

Position of the European Parliament adopted at first reading on 10 April 2024 with a view to the adoption of Directive (EU) 2024/… of the European Parliament and of the Council on Soil Monitoring and Resilience (Soil Monitoring Law)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 192(1) thereof,

Having regard to the proposal from the European Commission,

After transmission of the draft legislative act to the national parliaments,

Having regard to the opinion of the European Economic and Social Committee ([1]),

Having regard to the opinion of the Committee of the Regions ([2]),

Acting in accordance with the ordinary legislative procedure,

Whereas:

(1) Soil is a vital, limited, non-renewable and irreplaceable resource that is crucial for the economy, the environment and the society.

(2) Healthy soils are in good chemical, biological and physical condition so that they can provide ecosystem services that are vital to humans and the environment, such as safe, nutritious and sufficient food, biomass, clean water, nutrients cycling, carbon storage and a habitat for biodiversity. ***Soil is essential to ensuring food security.*** However, ***it is estimated that*** 60 to 70 % of the soils in the Union are deteriorated and continue to deteriorate. **[Am. 1]**

(3) Soil degradation is costing the Union several tens of billion euro every year. Soil health is impacting the provision of ecosystem services that have an important economic return. ~~Sustainable management and regeneration of soils therefore~~***Its improvement*** makes sound economic sense and can significantly increase the price and value of the land in the Union. ***Moreover, it can take up to 1 000 years to produce just 1 centimetre of top soil, while the degradation process and complete loss of soil can happen rapidly.*** **[Am. 2]**

(4) The European Green Deal ([3]) has set out an ambitious roadmap to transform the Union into a fair and prosperous society, with a modern, resource-efficient and competitive economy, aiming to protect, conserve and enhance the Union's natural capital, and to protect the health and well-being of citizens. As part of the European Green Deal, the Commission has adopted the EU Biodiversity Strategy for 2030 ([4]), the Farm to Fork Strategy ([5]), the Zero Pollution Action Plan ([6]), the EU Climate Adaptation Strategy ([7]) and the EU Soil Strategy for 2030 ([8]).

([1]) OJ C,, p..
([2]) OJ C,, p..
([3]) Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, The European Green Deal COM(2019) 640 final.
([4]) Communication from the Commission to the European Parliament, the Council the European Economic and Social Committee and the Committee of the Regions, EU Biodiversity Strategy for 2030, Bringing nature back into our lives COM(2020) 380 final.
([5]) Communication from the Commission to the European Parliament, the Council the European Economic and Social Committee and the Committee of the Regions, A Farm to Fork Strategy for a fair, healthy and environmentally-friendly food system COM(2020) 381 final.
([6]) 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.
([7]) Communication from the Commission to the European Parliament, the Council, the European, Economic and Social Committee and the Committee of the Regions, Forging a climate-resilient Europe - the new EU Strategy on Adaptation to Climate Change COM(2021) 82 final.
([8]) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, EU Soil Strategy for 2030 Reaping the benefits of healthy soils for people, food, nature and climate COM(2021) 699 final.

(5) The Union is committed to the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs) ([9]). Healthy soils contribute directly to the achievement of several SDGs, in particular SDG 2 (zero hunger), SDG 3 (good health and well-being), SDG 6 (clean water and sanitation), SDG 11 (sustainable cities and communities), SDG 12 (responsible consumption and production), SDG 13 (climate action) and SDG 15 (life on land). SDG 15.3 aims to combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world by 2030.

(6) The Union and its Member States, as parties to the Convention on Biological Diversity, approved by Council Decision 93/626/EEC ([10]), agreed at the 15th Conference of the Parties on the 'Kunming-Montreal Global Biodiversity Framework' (GBF) ([11]) which comprises several action-oriented global targets for 2030 of relevance for soil health. Nature's contributions to people, including soil health, should be restored, maintained and enhanced.

(7) The Union and its Member States, as Parties to the UN Convention to Combat Desertification (UNCCD), approved by Council Decision 98/216/EC ([12]), have committed to combat desertification and mitigate the effects of drought in affected countries. Thirteen Member States ([13]) have declared themselves as parties affected by desertification under the UNCDD.

(8) In the context of United Nations Framework Convention on Climate Change (UNFCCC) land and soil is considered simultaneously as a source and a sink of carbon. The Union and Member States as parties have committed to promote sustainable management, conservation and enhancement of carbon sinks and reservoirs.

(9) The EU Biodiversity Strategy for 2030 states that it is essential to step up efforts to protect soil fertility, reduce soil erosion and increase soil organic matter by adopting sustainable soil management practices. It also states that significant progress is needed on identifying contaminated soil sites, restoring degraded soils, defining the conditions for good ecological status of soils, introducing restoration objectives, and improving the monitoring of soil health.

(10) The EU Soil Strategy for 2030 sets the long-term vision that by 2050, all EU soil ecosystems are in healthy condition and are thus more resilient. As a key solution, healthy soils contribute to address the EU's goals of achieving climate neutrality and becoming resilient to climate change, developing a clean and circular (bio)economy, reversing biodiversity loss, safeguarding human health, halting desertification and reversing land degradation.

(11) Funding is vital to enable a transition to healthy soils. The Multiannual Financial Framework presents several funding opportunities available for the protection, sustainable management and regeneration of soils. A 'Soil Deal for Europe' is one of the five EU missions of the Horizon Europe programme and is specifically dedicated to promoting soil health. The Soil Mission is a key instrument for the implementation of this Directive. It aims to lead the transition to healthy soils through funding an ambitious research and innovation programme, establishing a network of 100 living labs and lighthouses in rural and urban areas, advancing the development of a harmonized soil monitoring framework and increasing the awareness of the importance of soil. Other Union programmes that present objectives contributing to healthy soils are the Common Agricultural Policy, the Cohesion Policy funds, the Programme for Environment and Climate Action, the Horizon Europe work programme, the Technical Support Instrument, the Recovery and Resilience Facility and InvestEU. ***As the goal to have all soils within the Union in healthy status is of common interest, there is a need to increase the mobilisation of resources to support the uptake of sustainable soil management and regenerative practices, including through provision of support from the European Investment Bank via de-risking mechanisms. The Commission should assess the overall financial needs and gaps and if needed put in place for the post-2027 period additional financial resources under the Multiannual Financial Framework and adopt measures to ensure policy coherence in relation to the objectives of this Directive.*** **[Am. 3]**

([9]) https://sdgs.un.org/goals

([10]) Council Decision of 25 October 1993 concerning the conclusion of the Convention on Biological Diversity (93/626/EEC) (OJ L 309, 13.12.1993, p. 1).

([11]) Decision adopted by the Conference of the Parties to the Convention on Biological Diversity on 19 December 2022, 15/4. Kunming-Montreal Global Biodiversity Framework.

([12]) Council Decision of 9 March 1998 on the conclusion, on behalf of the European Community, of the United Nations Convention to combat desertification in countries seriously affected by drought and/or desertification, particularly in Africa (OJ L 83, 19.3.1998, p. 1).

([13]) Bulgaria, Croatia, Cyprus, Greece, Hungary, Italy, Latvia, Malta, Portugal, Romania, Slovakia, Slovenia, Spain.

(12) The Soil Strategy for 2030 announced that the Commission would table a legislative proposal on soil health to enable the objectives of the Soil Strategy and to achieve good soil health across the EU by 2050. In its resolution of 28 April 2021 on soil protection ([14]), the European Parliament emphasised the importance of protecting soil and promoting healthy soils in the Union, bearing in mind that the degradation continues, despite the limited and uneven action being taken in some Member States. The European Parliament called on the Commission to design a Union wide common legal framework, with full respect for the subsidiarity principle, for the protection and sustainable use of soil, addressing all major soil threats. ***Importantly, the European Parliament underlined the risks stemming from the absence of a level playing field between Member States and their different protection regimes for soil to the functioning of the internal market and the strong potential to stimulate fair competition in the private sector, develop innovative solutions and know-how and strengthen the export of technologies outside the Union.*** **[Am. 4]**

(13) In its conclusions of 23 October 2020 ([15]), the Council supported the Commission in stepping up efforts to better protect soils and soil biodiversity, as a non-renewable resource of vital importance.

(14) Regulation (EU) 2021/1119 of the European Parliament and of the Council ([16]) sets out a binding objective of climate neutrality in the Union by 2050 and negative emissions thereafter, and of prioritising swift and predictable emission reductions and, at the same time, enhancing removals by natural sinks. Sustainable soil management results in increased carbon sequestration and in most cases in co-benefits for ecosystems and biodiversity. The Commission's Communication on Sustainable Carbon Cycles ([17]) underlined the need for clear and transparent identification of the activities that unambiguously remove carbon from the atmosphere such as the development of a EU framework for the certification of carbon removals from natural ecosystems including soils. Moreover, the revised Regulation on Land Use, Land Use Change and Forestry not only places soil carbon central to the achievement of targets on the pathway to a climate neutral Europe, but also calls for Member States to prepare a system for the monitoring of soil carbon stocks, using, inter alia, the land use/cover area frame statistical survey (LUCAS) dataset.

(15) The Commission's Communication on adaptation to climate change ([18]) underlined that using nature-based solutions inland, including the restoration of the sponge-like function of soils, will boost the supply of clean and fresh water, reduce the impacts of flooding and alleviate the impacts of droughts. It is important to maximise the capacity of soils to retain and purify water and reduce pollution.

(16) The Zero Pollution Action Plan adopted by the Commission sets out the vision for 2050 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.

(17) The Commission's Communication on safeguarding food security and reinforcing the resilience of food systems ([19]) stressed that food sustainability is fundamental for food security. Healthy soils make the Union food system more resilient by providing the basis for nutritious and sufficient food.

(18) It is ~~necessary~~***vital*** to set ***appropriate*** measures for ***Union-wide harmonised*** monitoring and ~~assessing~~***assessment of*** soil health, managing soils sustainably and tackling contaminated sites to achieve healthy soils by 2050, to maintain them in healthy condition and meet the Union's objectives on climate and biodiversity, to prevent and respond to droughts and natural disasters, to protect human health and to ensure food security and safety. **[Am. 5]**

([14]) European Parliament resolution of 28 April 2021 on soil protection (2021/2548(RSP)).

([15]) Council Conclusions on Biodiversity - the need for urgent action, 12210/20.

([16]) 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') (OJ L 243, 9.7.2021, p. 1).

([17]) Communication from the European Commission to the European Parliament and to the Council Sustainable Carbon Cycles COM (2021) 800.

([18]) Communication from the European Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Forging a climate-resilient Europe - the new EU Strategy on Adaptation to Climate Change COM (2021)82 final.

([19]) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Safeguarding food security and reinforcing the resilience of food systems, COM (2022) 133 final.

(19) Soils host more than 25 % of all biodiversity and are the second largest carbon pool of the planet. Due to their ability to capture and store carbon, healthy soils contribute to the achievement of the Union's objectives on climate change***. Soil biodiversity encompasses micro-organisms, including bacteria, fungi, protozoa and nematodes, as well as larger organisms such as earthworms, insects, and plant roots, which collectively contribute to the ecological and functional diversity of soil ecosystems***. Healthy soils also provide a favourable habitat for organisms to thrive and are crucial for enhancing biodiversity and the stability of ecosystems. Biodiversity below and above ground are intimately connected and interact through mutualistic relationships (e.g. mycorrhizal fungi that connect plant roots). **[Am. 6]**

(19a) Soil organic matter is crucial for the provision of soil ecosystem services and functions, by reducing soil degradation, erosion and compaction, while increasing the buffering, water holding and cation exchange capacity of the soil and soil organic carbon, which ultimately could increase crop yields. Additionally, soil organic matter positively affects soil biodiversity and could increase the carbon sequestered in soils, thereby contributing to climate change mitigation. **[Am. 7]**

(20) Floods, wildfires and extreme weather events are natural disaster risks of the highest concern across Europe. The concern for droughts and water scarcity is rapidly increasing across the Union. In 2020, 24 Member States considered droughts and water scarcity to be key emerging or climate related disaster risks, compared to only 11 Member States in 2015. Healthy soils are instrumental for the resilience to droughts and natural disasters. Practices that enhance water retention and nutrient availability in soils, soil structure, soil biodiversity and carbon sequestration, increase the resilience of ecosystems, plants and crops to withstand and recover from drought, natural disasters, heatwaves and extreme weather events which will become more frequent in the future due to climate change. In turn, without proper soil management, drought and natural disasters cause soil degradation and make soils unhealthy. Improvement of soil health helps to mitigate the economic losses and fatalities associated with climate-related extremes, which amounted to approximately 560 billion EUR and more than 182 000 casualties in the Union between 1980 and 2021.

(21) Soil health contributes directly to human health and well-being. Healthy soils provide safe and nutritious food, and have the ability to filter contaminants, hence preserving drinking water quality. Soil contamination can harm human health through ingestion, inhalation or dermal contact. Human exposure to the healthy soil microbial community is beneficial to develop the immune system and resistance against certain diseases and allergies. Healthy soils support the growth of trees, flowers, and grasses, and create green infrastructure that offers aesthetic value, well-being, and quality of life.

(21a) Per- and polyfluoroalkyl substances (PFAS) have been frequently observed to contaminate groundwater, surface water as well as soil. They can alter soil properties and structures, with some of the reported effects including a decrease in soil respiration and water stable aggregates, and an increase in soil pH. **[Am. 8]**

(22) Soil degradation impacts fertility, yields, pest resistance and nutritional food quality. Since 95 % of our food is directly or indirectly produced on soils and the global population continues to increase, it is key that this finite natural resource remains healthy to ensure food security in the long-term and secure the productivity and profitability of Union agriculture. Sustainable soil management practices***, including those set out by the common agricultural policy,*** maintain or enhance soil health and contribute to the sustainability and resilience of the food system. ***Reducing nutrient losses and pesticide residues are essential in this respect.*** **[Am. 9]**

(23) The long-term objective of the Directive is to achieve healthy soils ***across the Union*** by 2050. As an intermediate step, in light of the limited knowledge about the condition of soils and about the effectiveness and costs of the measures to regenerate their health, the directive takes a staged approach. In the first stage the focus will be on setting up the soil monitoring framework and assessing the situation of soils throughout the EU. ~~It also includes requirements to lay down measures to manage soils sustainably and regenerate unhealthy soils once their condition is established, but without imposing an obligation to achieve~~***Member States should define sustainable soil management practices taking into account the non-binding principles set in Annex III to this Directive. The Member States are given the flexibility to decide on the concrete practices to be implemented, when appropriate, reflecting local conditions and its feasibility, in order to facilitate achieving*** healthy soils by 2050 ~~neither intermediate targets~~. This proportionate approach will allow sustainable soil management and regeneration of ~~unhealthy~~ soils ***that are not healthy*** to be well prepared, incentivised and set in motion. In a second stage, as soon as the results of the first assessment of soils and trends analysis are available, the Commission will take stock of the progress towards the 2050 objective and the experience thereof, and will propose a review of the directive if necessary to ~~accelerate progress towards 2050~~***meet the 2050 goal***. **[Am. 10]**

(24) Addressing the pressures on soils and identifying the appropriate measures to maintain or regenerate soil health requires that the variety of soil types, the specific local and climatic conditions and the land use or the land cover is taken into account. It is therefore appropriate that Member States establish soil districts ***that are capable of adequately reflecting pedoclimatic conditions and soil variety on their whole territory***. Soil districts should constitute the basic governance units to manage soils and to take measures to comply with the requirements laid down in this Directive, in particular with regard to the monitoring and assessment of soil health~~. The number, geographic extent and boundaries of soil districts for each Member State should be determined in order to facilitate the implementation of Regulation (UE)./.. of the European Parliament and of the Council [+]~~. There should be a minimum number of soil districts in each Member State taking into account the size of the Member State. This minimum number of soil districts for each Member State shall correspond to the number of NUTS 1 territorial units established in Regulation (EC) No 1059/2003 of the European Parliament and of the Council ([20]). ***Member States can decide to set up their soil districts according to their number of NUTS 2 territorial units in order to better reflect their local conditions and the competences of their national authorities.*** **[Am. 11]**

(24a) Soil districts are the most appropriate level for adopting programmes of measures and, where necessary, intermediate targets, including via local soil district plans, taking into account local conditions and the views of local stakeholders, to ensure that the respective soils improve their classification. As it takes more time to restore critically degraded soils, a sufficient timeline of up to 10 years should be given to ensure that their ecological classification improves. Soils registered as contaminated that are covered by specific management and mitigation plans could be subject to a different timeline. **[Am. 12]**

(25) In order to ensure an appropriate governance on soils, Member States should be required to appoint a competent authority for each soil district. Member States should be allowed to appoint any additional competent authority at appropriate level including at national or regional level***, including across territories of Member States***. ***In order to minimise costs, Member States should primarily appoint authorities that are already set up. One authority could be responsible for several areas, which could improve consistency in the implementation of this Directive. In the event that Member States change the allocation of competences among competent authorities, they should communicate those changes to the Commission to keep the information up to date.*** **[Am. 13]**

(26) In order to have a common definition of healthy soil condition, there is a need to define a minimum common set of measurable criteria, which, if not respected leads to a critical loss in the soil's capacity to function as a vital living system and to provide ecosystem services. Such criteria should reflect and be based on the existing level of soil science.

(27) In order to ~~describe soil degradation it is necessary to establish~~***provide for a common framework and to allow for comparability of data, the Commission should by means of delegated acts, adopt a methodology for determining threshold values for*** soil descriptors ~~that can be measured or estimated. Even if there is significant variability between soil types,~~***for each soil ecological status. It is important that this methodology take into account the most recent scientific evidence and provide for means to account for different*** climatic conditions and ~~land uses, the current scientific knowledge allows to set criteria at Union level for some of those soil descriptors. However,~~ ***types of soil. Using this methodology*** Member States should ~~be able to adapt the criteria for some of these soil descriptors based on specific national or local conditions and define the criteria for other~~***identify draft threshold values for*** soil descriptors for ~~which common criteria at EU~~***each soil ecological status taking into consideration climate conditions, the type of soil, type of land area and scientific evidence and submit them to the Commission. In order to ensure a*** level ~~cannot be established at this stage. For those descriptors for~~***playing field among Member States and to avoid Member States adopting threshold values*** which ~~clear criteria that would distinguish between healthy and unhealthy condition cannot be identified now, only monitoring and assessment are~~***allow similar soil to be categorised in a very different manner, thereby affecting the efforts*** required~~. This will facilitate the development of such criteria in future~~ ***to improve its soil ecological status, the Commission should assess the draft threshold values and their scientific justification. The Commission should be able to ask Member States for additional information or revision of their draft threshold values. The Commission should approve the threshold values, provided that its observations have been adequately taken into account.*** **[Am. 14]**

(+) ~~OP please insert in the text the number of the Regulation on the carbon removal certification contained in document COM(2022) 672 final and insert the number, date, title and OJ reference of that Directive in the footnote.~~

([20]) Regulation (EC) No 1059/2003 of the European Parliament and of the Council of 26 May 2003 on the establishment of a common classification of territorial units for statistics (NUTS) (OJ L 154, 21.6.2003, p. 1).

(27a) An integrated view on the assessment of soil health that goes beyond solely looking at degradation factors and provides a clear path for its improvement is necessary. The overall assessment of soil ecological status should, therefore, be categorised according to five classes from 'high soil ecological status', 'good ecological status', 'moderate', 'degraded soils' to 'critically degraded soils', taking into consideration, inter alia, the presence of degradation factors and soil functions. **[Am. 15]**

(27b) To respect the autonomy of the Member States that are willing to implement more comprehensive monitoring systems, Member States should be able to choose among 3 monitoring tiers. Tier 1 provides a minimum set of soil descriptors. In Tier 2, 20 % of the sampling points are determined according to the LUCAS programme and double sampled for continuous monitoring and the establishment of transfer functions, while the remaining 80 % of the sampling points are determined by the Member State, also for continuous monitoring and following the criteria set in the annexes to this Directive. In Tiers 1 and 2, 20 % of sampling points are dedicated to targeted monitoring, allowing Member States to expand risk-based assessments, conduct investigations, or target areas of particular interest. The establishment of a tiered approach increases the number of soil descriptors assessed but also the level of autonomy that Member States have in determining the thresholds associated to the ecological status of soils. The main goal of such a tiered approach is to allow all Member States to implement their monitoring systems and take advantage of any current national systems that already monitor soils. Tier 2 will allow gaps to be filled in the scope and extent of the soil descriptors considered. In Tier 3, the number of soil descriptors is expanded further to refine particular aspects of the soil monitoring systems. **[Am. 16]**

~~(28) In order to create incentives, Member States should set up mechanisms to recognize the efforts of landowners and land managers to maintain the soil in healthy condition, including in the form of soil health certification complementary to the Union regulatory framework for carbon removals, and supporting the implementation of the renewable energy sustainability criteria set out in article 29 of Directive (EU) 2018/2001 of the European Parliament and of the Council ([21]). The Commission should facilitate soil health certification by inter alia exchanging information and promoting best practices, raising awareness and assessing feasibility of developing recognition of certification schemes at Union level. Synergies between different certification schemes should be exploited as much as possible to reduce administrative burden for those applying for relevant certifications.~~ **[Am. 17]**

(29) Some soils have special characteristics either because they are atypical by nature and constitute rare habitats for biodiversity or unique landscapes or because they have been heavily modified by humans. Those characteristics should be taken into account in the context of the definition of healthy soils and the requirements to achieve healthy soil condition.

(30) Soil is a limited resource subject to an ever-growing competition for different uses. Land take is a process often driven by economic development needs, that transforms natural and semi-natural areas (including agricultural and forestry land, gardens and parks) into artificial land development, using soil as a platform for constructions and infrastructure, as a direct source of raw material or as archive for historic patrimony. This transformation may cause the loss, often irreversibly, of the capacity of soils to provide other ecosystem services (provision of food and biomass, water and nutrients cycling, basis for biodiversity and carbon storage). In particular, land take often affects the most fertile agricultural soils, putting food security in jeopardy. Sealed soil also exposes human settlements to higher flood peaks and more intense heat island effects. Therefore, it is necessary to monitor land take and soil sealing and their effects on soil's capacity to provide ecosystem services. It is also appropriate to lay down certain principles to mitigate the impacts of land take ~~as part of~~***complementing*** sustainable soil management. **[Am. 18]**

(31) The assessment of soil health based on the monitoring network should be accurate while at the same time keeping the costs of such monitoring at reasonable level. It is therefore appropriate to lay down criteria for sampling points that are representative of the soil condition under different soil types, climatic conditions and land use. The grid of sampling points should be determined by using geostatistical methods and be sufficiently dense to provide an estimation of the area of healthy soils, at national level, within an uncertainty of not more than 5 %. This value is commonly considered to provide a statistically sound estimation and reasonable assurance that the objective has been achieved. ***It is important that the soil monitoring methodology and framework include harmonised sampling criteria, including sampling depth.*** **[Am. 19]**

([21]) ~~Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast) (OJ L 328, 21.12.2018, p. 82).~~

(31a) Soil archives preserve a snapshot of soils from a specific time and location, allowing Member States to use one sample for various purposes and to streamline field sampling activities, thus reducing the long-term costs of in-situ monitoring. In addition, soil archives enable researchers to re-evaluate soils of the past in the context of the present for an improved understanding of long-term soil change, or for other research purposes, including medical research. It is therefore imperative that the Commission, including services such as the Joint Research Centre (JRC), together with the Member States and the European Soil Observatory, ensure that the samples, DNA extracts and raw data taken for the compliance with Union and national environmental law are well preserved in physical archives and that the samples and raw data of those archives remain available for further research and innovation. **[Am. 20]**

(32) ***As a complement to existing national inventories,*** the Commission should assist and support Member States' monitoring of soil health by continuing to carry out and enhancing regular in-situ soil sampling and related soil measurements (LUCAS soil) as part of the Land Use/Cover Area frame statistical Survey (LUCAS) Programme. For that purpose, the LUCAS Programme ~~shall~~***should*** be enhanced and upgraded to fully align it with the specific quality requirements ***and all the descriptors*** to be met for the purpose of this Directive. In order to alleviate the burden, Member States should be allowed to take into account the soil health data surveyed under the enhanced LUCAS soil. ***LUCAS soil will sample and analyse at least 20 % of the size of national samples, thereby contributing to the monitoring carried out by Member States. The analysis by LUCAS is essential to allowing Member States to calculate and calibrate valid transfer functions in order to allow them to continue using alternative monitoring design in accordance with Tier 2. The Commission should, at the request of a Member State, provide further assistance with up to 50 % of the sampling during the first national monitoring round.*** The Member States thus supported should take the necessary legal arrangements to ensure that the Commission can carry out such in-situ soil sampling, including on privately owned fields, ***with the agreement of the owners,*** and in compliance with applicable national or Union legislation. **[Am. 21]**

(33) The Commission is developing remote sensing services in the context of Copernicus as a user-driven programme, hereby also supporting Member States. In order to increase the timeliness and effectiveness of soil health monitoring, and where relevant, Member States should use remote sensing data including outputs from the Copernicus services for monitoring relevant soil descriptors and for assessing soil health. The Commission and the European Environment Agency should support exploring and developing soil remote sensing products, to assist the Member States in monitoring the relevant soil descriptors. ***The Commission and Member States should further support the use of reliable and available digital technologies, such as electronic databases, geographic information systems, automated image identification or e-DNA, to improve knowledge sharing and transparency with regard to soil health and to reduce the costs of soil measurements and monitoring.*** **[Am. 22]**

(34) Building on and upgrading the existing EU soil observatory, the Commission should establish a digital soil health data portal that should be compatible with the EU Data Strategy ([22]) and the EU data spaces and which should be a hub providing access to soil data coming from various sources. ***The soil health data should be made publicly available in a format that can be used by the research community, landowners and managers, advisors working within the farm advisory system and the public, ensuring compliance with Union law on the protection of personal data.*** That portal should primarily include ~~all the~~***relevant*** data collected by the Member States and the Commission as required by this Directive ***and serve as a platform for the establishment of a Sustainable Soil Management Toolbox that will provide up-to-date context-specific information about sustainable soil management practices based on different soil type, land use and climatic conditions***. It should also be possible to integrate in the portal, on a voluntary basis, other relevant soil data collected by Member States or any other party (and in particular data resulting from projects under Horizon Europe and the Mission 'A Soil Deal for Europe'), provided that those data meet certain requirements as regards format and specifications. Those requirements should be specified by the Commission by way of implementing acts. ***Member States and the Commission should ensure that research institutions have easy and free access to all data at their request.*** **[Am. 23]**

([22]) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on a European strategy for data, COM(2020)66 final.

(35) It is also necessary to improve the harmonization of soil monitoring systems used in the Member States and exploit the synergies between Union and national monitoring systems ***and make full use of already existing harmonised monitoring tools such as LUCAS*** in order to have more comparable data across the Union. ***Moreover, harmonisation of monitoring systems in Member States would help to scale up investments in advanced soil monitoring techniques and technologies.*** **[Am. 24]**

~~(36) In order to make the widest possible use of soil health data generated by the monitoring carried out under this Directive, Member States should be required to facilitate the access to such data for relevant stakeholders such as farmers, foresters, land owners and local authorities.~~ **[Am. 25]**

(37) To maintain or enhance soil health, soils need to be managed sustainably. Sustainable soil management will enable the long-term provision of soil services, including improved air and water quality and food security. It is therefore appropriate to lay down ***non-binding*** sustainable soil management principles to guide soil management practices. **[Am. 26]**

(38) Economic instruments, including those under the common agricultural policy (CAP) that provide support to farmers, have a crucial role in the transition to the sustainable management of agricultural soils and, to a lesser extent, forest soils. The CAP aims to support soil health through the implementation of conditionality, eco-schemes and rural development measures. Financial support for farmers and foresters who apply sustainable soil management practices can also be generated by the private sector. Voluntary sustainability labels in the food, wood, bio-based, and energy industry, for example, established by private stakeholders, can take into account the ~~sustainable soil management principles set out in~~***contributions to improve soil health in accordance with*** this Directive. This can enable food, wood, and other biomass producers that follow those principles in their production to reflect these in the value of their products. Additional funding for a network of real-life sites for testing, demonstrating and upscaling of solutions, including on carbon farming, will be provided through the Soil Mission's living labs and lighthouses. Without prejudice to the polluter pays principle, support and advice should be provided by Member States to help landowners and land users affected by action taken under this Directive taking into account, in particular, the needs and limited capacities of small and medium sized enterprises. **[Am. 27]**

(39) Pursuant to Regulation (EU) 2021/2115 of the European Parliament and of the Council ([23]), Member States have to describe in their CAP Strategic Plans how the environmental and climate architecture of those Plans is meant to contribute to the achievement of, and be consistent with, the long-term national targets set out in, or deriving from, the legislative acts listed in Annex XIII to that Regulation.

(39a) Good agricultural and environmental conditions (GAECs) 5, 6 and 7 as set out in Regulation (EU) 2021/2115 include standards to improve tillage management to reduce the risk of soil degradation and erosion, including by consideration of the slope gradient and minimum land management reflecting site specific conditions to limit erosion, minimum soil cover to avoid bare soil, protection of soils in periods that are most sensitive as well as crop rotation on arable land. In addition, GAEC 1 on protection of permanent pasture and GAEC 2 on protecting wetlands and peatlands and soils high in organic matter, are relevant for soil protection. **[Am. 28]**

(40) ~~In order to ensure that the best sustainable soil management practices are implemented,~~ Member States should be required to closely monitor the impact of soil management practices and adjust practices and recommendations as necessary, taking into account new knowledge from research and innovation. Valuable contributions are expected in this respect from the Horizon Europe Mission 'A Soil Deal for Europe' and in particular its living labs and activities to support soil monitoring, soil education and citizen engagement. **[Am. 29]**

(41) Regeneration brings degraded soils back to healthy condition. When defining soil regeneration measures, Member States should be required to take into account the outcome of the soil health assessment and to adapt those regeneration measures to the specific characteristics of the situation, the type, the use and the condition of the soil and the local, climatic and environmental conditions.

([23]) Regulation (EU) 2021/2115 of the European Parliament and of the Council of 2 December 2021 establishing rules on support for strategic plans to be drawn up by Member States under the common agricultural policy (CAP Strategic Plans) and financed by the European Agricultural Guarantee Fund (EAGF) and by the European Agricultural Fund for Rural Development (EAFRD) and repealing Regulations (EU) No 1305/2013 and (EU) No 1307/2013 (OJ L 435, 6.12.2021, p. 1).

(42) To ensure synergies between the different measures adopted under other Union legislation that may have an impact on soil health, and the measures that are to be put in place to sustainably manage and regenerate soils in the Union, Member States should ensure that the sustainable soil management and regeneration practices are coherent with the national restoration plans adopted in accordance with Regulation (UE) …/… of the European Parliament and of the Council ([24])+; ***the national biodiversity strategies and action plans established in accordance with Article 6 of the United Nations Convention on Biological Diversity,*** the strategic plans to be drawn up by Member States under the Common Agricultural Policy in accordance with Regulation (EU) 2021/2115, the codes of good agricultural practices and the action programmes for designated vulnerable zones adopted in accordance with Council Directive 91/676/EEC ([25]), the conservation measures and prioritized action framework established for Natura 2000 sites in accordance with Council Directive 92/43/EEC ([26]), the measures for achieving good ecological and chemical status of water bodies included in river basin management plans prepared in accordance with Directive 2000/60/EC of the European Parliament and of the Council ([27]), the flood risk management measures established in accordance with Directive 2007/60/EC of the European Parliament and of the Council ([28]), the drought management plans promoted in the Union Strategy on Adaptation to Climate Change ([29]), the national action programmes established in accordance with Article 10 of the United Nations Convention to Combat Desertification, targets set out under Regulation (EU) 2018/841 of the European Parliament and of the Council ([30]) and Regulation (EU) 2018/842 of the European Parliament and of the Council ([31]), the integrated national energy and climate plans established in accordance with Regulation (EU) 2018/1999 of the European Parliament and of the Council ([32]), the national air pollution control programmes prepared under Directive (EU) 2016/2284 of the European Parliament and of the Council ([33]), risk assessments and disaster risk management planning established in accordance with Decision No 1313/2013/EU of the European Parliament and of the Council ([34]), and national action plans established in accordance with ~~Regulation (UE) …/…~~***Directive 2009/128/EC*** of the European Parliament and of the Council ~~([35])~~. Sustainable soil management and regeneration practices should be, as far as possible, integrated within these programmes, plans and measures to the extent that they contribute to the achievement of their objectives. Consequently, relevant indicators and data, such as soil-related result indicators under the CAP Regulation and statistical data on agricultural input and output reported under Regulation (EU) 2022/2379 of the European Parliament and of the Council ([36]), should be accessible to the competent authorities responsible for sustainable soil management and regeneration practices and soil health assessment in order to cross-link these data and indicators and thus enable the most accurate possible assessment of the effectiveness of the measures chosen. **[Am. 30]**

([24]) OP: please insert please insert in the text the number of Regulation on nature restoration contained in document COM(2022) 304 and insert the number, date, title and OJ reference of that Regulation in the footnote Regulation (UE) …/… of the European Parliament and of the Council on nature restoration

([25]) Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources (OJ L 375, 31.12.1991, p. 1).

([26]) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (OJ L 206, 22.7.1992, p. 7).

([27]) 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, pp. 1-73).

([28]) Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks (OJ L 288, 6.11.2007, p. 27).

([29]) Communication from the European Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Forging a climate-resilient Europe - the new EU Strategy on Adaptation to Climate Change COM(2021)82 final.

([30]) Regulation (EU) 2018/841 of the European Parliament and of the Council of 30 May 2018 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework, and amending Regulation (EU) No 525/2013 and Decision No 529/2013/EU (OJ L 156, 19.6.2018, p. 1).

([31]) Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on 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 (OJ L 156, 19.6.2018, p. 26).

([32]) Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council (OJ L 328, 21.12.2018, p. 1).

([33]) Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC (OJ L 344, 17.12.2016, p. 1).

([34]) Decision No 1313/2013/EU of the European Parliament and of the Council of 17 December 2013 on a Union Civil Protection Mechanism (OJ L 347, 20.12.2013, p. 924).

([35]) ~~OP: please insert in the text the number of the Regulation on the sustainable use of plant protection products and amending Regulation (EU) 2021/2115 contained in document COM(2022)305 and insert the number, date, title and OJ reference of that Directive in the footnote~~

([36]) Regulation (EU) 2022/2379 on statistics on agricultural input and output.

(43) Contaminated sites are the legacy of decades of industrial activity in the EU and may lead to risks for human ***and animal*** health and the environment now and in the future. ***Building on existing knowledge,*** it is therefore necessary ~~first~~ to identify and investigate potentially contaminated sites and then, in case of confirmed contamination, to assess the risks and take measures to address ~~unacceptable risks~~***them***. Soil investigation may prove that a potentially contaminated site is in fact not contaminated. In that case, the site should no longer be labelled by the Member State as potentially contaminated, unless contamination is suspected based on new evidence. **[Am. 31]**

(44) To identify potentially contaminated sites, Member States should collect evidence among others through historical research, past industrial incidents and accidents, environmental permits***, health surveys*** and notifications by the public or authorities. **[Am. 32]**

(45) In order to ensure that soil investigations on potentially contaminated sites are carried out timely and effectively***, as requested in the European Parliament's resolution of 28 April 2021 on soil protection***, Member States should, in addition to the obligation to lay down the deadline by which those investigations should be carried out, be required to lay down specific events that also trigger such investigation. Such triggering events may include the request or review of an environmental or building permit or an authorisation required pursuant to Union legislation or national legislation, soil excavation activities, land use changes or land or real estate transactions. Soil investigations may follow different stages, such as a desk study, site visit, preliminary or exploratory investigation, more detailed or descriptive investigation, and field or laboratory testing. Baseline reports and monitoring measures implemented in accordance with Directive 2010/75/EU of the European Parliament and of the Council ([37]) could also qualify as soil investigation where appropriate. **[Am. 33]**

(46) Flexibility for the management of potentially contaminated sites and contaminated sites is needed to take account of costs, benefits and local specificities. Member States should therefore ~~at least~~ adopt a risk-based approach for managing potentially contaminated sites and contaminated sites, taking into account the difference between these two categories, and which allows to allocate resources taking account of the specific environmental, economic and social context. Decisions should be taken ***in cooperation with local health practitioners, health authorities and the scientific community,*** based on the nature and extent of potential risks for human health and the environment resulting from exposure to soil contaminants (e.g. exposure of vulnerable populations such as pregnant women, persons with disabilities, elderly people and children)***, including exposure, and cumulative effects on human health, soil ecosystems and associated ecosystem services***. The cost-benefit analysis of undertaking remediation should be ~~positive~~***balanced, taking into account the advantages for future generations***. The optimum remediation solution should be sustainable and selected through a balanced decision-making process that takes account of the environmental, economic and social impacts. The management of potentially contaminated sites and contaminated sites should respect the polluter-pays, precautionary and proportionality principles. Member States should lay down the specific methodology for determining the site-specific risks of contaminated sites. Member States should also define what constitutes an unacceptable risk from a contaminated site based on scientific knowledge, the precautionary principle, ~~local specificities~~***the opinion of health authorities and practitioners***, and current and future land use. In order to reduce the risks of contaminated sites to an acceptable level for human ***and animal*** health and the environment, Member States should take adequate risk reduction measures***, while prioritising in- or ex-situ*** including remediation. It should be possible to qualify measures taken under other Union legislation as risk reduction measures under this Directive when those measures effectively reduce risks posed by contaminated sites. **[Am. 34]**

(46a) Land take mitigation principles should facilitate the Union's food security while taking into account sustainable housing, essential infrastructure and renewable energy projects. **[Am. 35]**

(47) Measures taken pursuant to this Directive should also take account of other EU policy objectives, such as the objectives pursued by [Regulation (EU) xxxx/xxxx ([38])] that aim at ensuring secure and sustainable supply of critical raw materials for Europe's industry.

([37]) Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (OJ L 334, 17.12.2010, p. 17.

([38]) OP: please insert in the text the number of the Regulation establishing a framework for ensuring a secure and sustainable supply of critical raw materials and amending Regulations (EU) 168/2013, (EU) 2018/858, 2018/1724 and (EU) 2019/1020 contained in document COM(2023)160 and insert the number, date, title and OJ reference of that Directive in the footnote.

(48) Transparency is an essential component of soil policy and ensures public accountability and awareness, fair market conditions and the monitoring of progress. Therefore, Member States should set up and maintain a national register of contaminated sites and potentially contaminated sites which contains site-specific information that should be made publicly accessible in an online georeferenced spatial database. The register should contain the information that is necessary for the public to be informed on the existence and on the management of potentially contaminated sites and contaminated sites. Because the presence of soil contamination is not yet confirmed but only suspected on potentially contaminated sites, the difference between contaminated sites and potentially contaminated sites has to be communicated and explained well to the public to avoid raising unnecessary concern.

(48a) In order to protect soils from pollution by emerging chemicals that have the potential to cause significant risks to human and animal health and to contaminate surrounding air, surface waters, groundwater, and subsequently oceans, policy mechanisms to detect and assess such substances of emerging concern should be established. In that regard, an approach that allows monitoring and analysis of those substances or groups of substances via watch lists, as is already the case for surface water and groundwater, should be developed for soil contamination. The substances or groups of substances to be placed on the watch list should be selected from amongst those substances for which the information available indicates that they could pose a significant risk at Union level to, or via, the soil environment, and for which the monitoring data are insufficient. The number of such substances or groups of substances to be monitored and analysed under the watch lists should not be limited. **[Am. 37]**

(48b) Substances such as persistent organic pollutants, materials and particles, including microplastics or nanoplastics, pose a clear risk to soil health, but also to essential activities such as the development of agriculture. Their presence in soils can have implications for soil fertility, thereby compromising the health and healthy development of crops. It is therefore essential that this Directive provide for a framework for both substances and materials to be included in the monitoring of soil contaminants, and for the establishment of environmental quality standards and a set of measures to prevent and remediate soil contamination from known and emerging threats, where appropriate. **[Am. 38]**

(49) Article 19(1) of the Treaty on European Union (TEU) requires Member States to provide remedies sufficient to ensure effective judicial protection in the fields covered by Union law. In addition, in accordance with the Convention on access to information, public participation in decision-making and access to justice in environmental matters ([39]) (Aarhus Convention), members of the public concerned should have access to justice in order to contribute to the protection of the right to live in an environment which is adequate for personal health and well-being.

(50) Directive (EU) 2019/1024 of the European Parliament and of the Council ([40]) mandates the release of public sector data in free and open formats. The overall objective is to continue the strengthening of the EU's data economy by increasing the amount of ***interoperable*** public sector data available for re-use, ensuring fair competition and easy access to public sector information, and enhancing cross-border innovation based on data~~. The main principle is that government data should be open by default and design~~. Directive 2003/4/EC of the European Parliament and of the Council ([41]) is aimed at guaranteeing the right of access to environmental information in the Member States in line with the Aarhus Convention. The Aarhus Convention and Directive 2003/4/EC encompass broad obligations related both to making environmental information available upon request and actively disseminating such information. Directive 2007/2/EC of the European Parliament and of the Council ([42]) is also of broad scope, covering the sharing of spatial information, including data sets on different environmental topics. It is important that provisions of this Directive related to access to information and data-sharing arrangements complement those Directives and do not create a separate legal regime. Therefore, the provisions of this Directive regarding information to the public and information on monitoring of implementation should be without prejudice to Directives (EU) 2019/1024, 2003/4/EC and 2007/2/EC. **[Am. 39]**

([39]) Convention on access to information, public participation in decision-making and access to justice in environmental matters – Declaration, (OJ L 124, 17.5.2005).

([40]) Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open data and the re-use of public sector information (OJ L 172, 26.6.2019, p. 56).

([41]) Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on public access to environmental information and repealing Council Directive 90/313/EEC (OJ L 41, 14.2.2003, p. 26).

([42]) Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) (OJ L 108, 25.4.2007, p. 1).

(51) In order to ensure the necessary adaptation of the rules on soil health monitoring, ~~sustainable soil management~~***assessment*** and management of contaminated sites, the power to adopt acts in accordance with Article 290 of the Treaty on the Functioning of the European Union should be delegated to the Commission in respect of amending ***or supplementing*** this Directive ***to adopt a methodology for determining threshold values for soil descriptors to be established by Member States, and*** to adapt to technical and scientific progress the methodologies for monitoring soil health~~, the list of sustainable soil management principles~~, the indicative list of risk reduction measures, the phases and requirements for the site-specific risk assessment and ~~the content~~***establishment*** of the ~~register of contaminated and potentially~~***minimum tolerable values in relation to the definition of an unacceptable risk for health and the environment resulting from*** contaminated sites. It is of particular importance that the Commission carries out appropriate consultations during its preparatory work, including at expert level, and that those consultations be conducted in accordance with the principles laid down in the Interinstitutional Agreement on Better Law-Making of 13 April 2016 ([43]). In particular, to ensure equal participation in the preparation of delegated acts, the European Parliament and the Council receive all documents at the same time as Member States' experts, and their experts systematically have access to meetings of Commission expert groups dealing with the preparation of delegated acts. **[Am. 40]**

(52) In order to ensure uniform conditions for the implementation of this Directive, implementing powers should be conferred on the Commission in order to set out the format, structure and detailed arrangements for reporting data and information electronically to the Commission. Those powers should be exercised in accordance with Regulation (EU) No 182/2011 of the European Parliament and the Council ([44]).

(53) The Commission should carry out an evidence-based evaluation and, where relevant, a revision of this Directive, 6 years after its entry into force on the basis of the results of the soil health assessment. The evaluation should assess in particular the ~~need to set more specific requirements to make sure unhealthy soils are regenerated and the objective~~***gap and measures needed*** to achieve healthy soils by 2050 ~~is achieved~~. The evaluation should also assess the need to adapt the definition of healthy soils to scientific and technical progress by adding provisions on certain descriptors or criteria based on new scientific evidence relating to the protection of soils or on the grounds of a problem specific to a Member State arising from new environmental or climatic circumstances. Pursuant to paragraph 22 of the Interinstitutional Agreement on Better Law-Making, that evaluation should be based on the criteria of efficiency, effectiveness, relevance, coherence and EU value added and should provide the basis for impact assessments of possible further measures. **[Am. 41]**

(54) Coordinated measures by all Member States are necessary to achieve the vision to have all soils healthy by 2050 and to secure the provision of ecosystem services by soils across the Union in the long-term. Individual actions of Member States have proven to be insufficient since the soil degradation is continuing and even deteriorating. Since the objectives of this Directive cannot be sufficiently achieved by the Member States but can rather, by reason of the scale and effects of the action, be better achieved at Union level, the Union may adopt measures, in accordance with the principle of subsidiarity as set out in Article 5 TEU. In accordance with the principle of proportionality as set out in that Article, this Directive does not go beyond what is necessary in order to achieve those objectives.

(55) In accordance with the Joint Political Declaration of 28 September 2011 of Member States and the Commission on explanatory documents ([45]), Member States have undertaken to accompany, in justified cases, the notification of their transposition measures with one or more documents explaining the relationship between the components of a directive and the corresponding parts of national transposition instruments. With regard to this Directive, the legislator considers the transmission of such documents to be justified.

(55a) This Directive is aimed at meeting the long-term objective of healthy soil in the Union by 2050 based on a coherent framework for soil monitoring and improvement of its health. Given its nature as a directive, in accordance with Article 288 of the Treaty on the Functioning of the European Union, this Directive is binding as to the result to be achieved in the Member States to whom it is addressed, while leaving national authorities the

([43]) Interinstitutional Agreement between the European Parliament, the Council of the European Union and the European Commission on Better Law-Making of 13 April 2016 (OJ L 123, 12.5.2016, p. 1).

([44]) Regulation (EU) No 182/2011 of the European Parliament and of the Council of 16 February 2011 laying down the rules and general principles concerning mechanisms for control by the Member States of the Commission's exercise of implementing powers (OJ L 55, 28.2.2011, p. 13).

([45]) OJ C 369, 17.12.2011, p. 14.

power to choose the form and methods to achieve the result. It will therefore be up to Member States to devise their own laws on how to reach the goals laid down in this Directive. The proposed instrument of a directive leaves much flexibility to the Member States to identify the best measures for them and to adapt the approach to local conditions. This is crucial to take account of the regional and local specificities as regards soil variability, land use, climatological conditions and socio-economic aspects. The nature of the instrument implies that principles laid down in this Directive do not entail direct obligations on individuals. **[Am. 42]**

HAVE ADOPTED THIS DIRECTIVE:

Chapter I

General provisions

Article 1

Objective and Subject matter

1. The objective of the Directive is to put in place a ***clear,*** solid ~~and~~***,*** coherent ***and flexible framework for*** soil monitoring ~~framework~~***and assessment*** for all soils across the EU ~~and~~***in order*** to continuously improve soil health in the Union with the view to achieve healthy soils by 2050 and maintain soils in healthy condition~~,~~ ***and prevent their deterioration*** so that they can supply multiple ecosystem services at a scale sufficient to meet environmental, societal and economic needs, prevent and mitigate the impacts of climate change and biodiversity loss, increase the resilience against natural disasters and for food security and that soil contamination is reduced to levels no longer considered harmful to human health and the environment.

This Directive, therefore, establishes a framework within which Member States are required to put in place measures that are technically feasible and based on a cost-benefit analysis, with a view to achieving healthy soils by 2050. **[Am. 43]**

1a. This Directive contributes to fulfilling international and Union-level commitments, objectives and goals, including those contained in:

(a) the Kunming-Montreal Global Biodiversity Framework;

(b) the Paris Agreement;

(c) the UN Convention to Combat Desertification (UNCCD);

(d) the 7th EU Environment Action Programme (Decision No 1386/2013/EU);

(e) the 8th EU Environment Action Programme (Decision (EU) 2022/591);

(f) the Roadmap to a Resource Efficient Europe (COM/2011/0571). **[Am. 44]**

2. This Directive lays down measures on:

(a) monitoring***, maintaining, improving, rehabilitating and assessing*** ~~and assessment of~~ soil health***, based on its ecological status***; **[Am. 45]**

(b) sustainable soil management;

(c) contaminated sites.

Article 2

Scope

This Directive applies to all soils in the territory of Member States.

Article 3

Definitions

For the purposes of this Directive, the following definitions shall apply:

(1) 'soil' means the top layer of the Earth's crust situated between the bedrock and the land surface, which is composed of mineral particles, organic matter, water, air and living organisms***, excluding raw material deposits***; **[Ams. 217 and 266]**

(1a) 'soil ecological status' means the ecological quality of a soil evaluated according to the soil's diversity, biological and functional activity, habitat and the presence of degradation factors, and determined according to the following classification:

(a) 'high soil ecological status' refers to soils with high biological and functional activity;

(b) 'good ecological status' refers to soils in an overall good ecological status but that show evidence of slight adverse impacts from one or multiple degradation factors;

(c) 'moderate ecological status' refers to soils with evidence of slight adverse impacts from degradation factors;

(d) 'degraded soils' refers to soils with clear evidence of adverse impacts from one degradation factor; and

(e) 'critically degraded soils' refers to soils with clear evidence of adverse impacts from more than one degradation factor; **[Am. 46]**

(1b) 'soil ecological functions' means the set of interrelated processes and interactions within the soil ecosystem that sustain life, support and are the result of soil biodiversity and maintain the overall health and productivity of terrestrial environments, such as nutrient cycling, organic matter decomposition, soil structure formation, water filtration and purification, carbon sequestration, and the provision of habitats and resources for a diverse range of organisms; **[Am. 47]**

(2) 'ecosystem' means a dynamic complex of plant, animal, and micro-organism communities and their non-living environment interacting as a functional unit;

(3) 'ecosystem services' means ***direct and*** indirect contributions of ecosystems to the ***wellbeing of society as a whole, and*** economic, social, cultural***, environmental*** and other benefits that people derive from those ecosystems; **[Am. 48]**

(3a) 'soil biodiversity' means the variation in soil life, from genes to communities, and the ecological complexes of which they are part, that is complexes ranging from soil micro-habitats to landscapes; **[Am. 49]**

(4) 'soil health' means the physical, chemical***, functional*** and biological condition of the soil determining its capacity to function as a vital living system and to provide ecosystem services***, taking land use into account***; **[Am. 50]**

(5) 'sustainable soil management' means soil management practices that ***aim to*** maintain or enhance the ***soil*** ecosystem services ~~provided by the soil without impairing the functions enabling those services, or being detrimental to other properties of the environment~~***taking into account the socio-economic effects***; **[Am. 247]**

(6) 'soil management practices' mean practices that impact the physical, chemical or biological qualities of a soil;

(7) 'managed soils' means soils where soil management practices are carried out;

(8) 'soil district' means the part of the territory of a Member State ***or several Member States***, as delimited by that Member State ***or those Member States*** in accordance with this Directive; **[Am. 52]**

(9) 'soil health assessment' means the evaluation of the health of the soil based on the measurement or estimation of soil descriptors;

(10) 'contaminated site' means a delineated area of one or several plots with confirmed presence of soil contamination caused by ~~point-source anthropogenic activities~~***the presence of a substance or material in the soil in a concentration that may be harmful to health or the environment***; **[Am. 53]**

(11) 'soil descriptor' means a parameter describing a physical, chemical, or biological characteristic of soil health;

(12) 'land' means the surface of the Earth that is not covered by water;

(13) 'land cover' means the physical and biological cover of the earth's surface;

(14) 'natural land' means an area where human activity has not substantially modified an area's primary ecological functions and species composition;

(15) 'semi-natural land' means an area where ecological assemblages have been substantially modified in their composition, balance or function by human activities, but maintain potentially high value in terms of biodiversity and the ecosystem services it provides;

(16) 'artificial land' means land used as a platform for constructions and infrastructure or as a direct source of raw material or as archive for historic patrimony at the expense of the capacity of soils to provide other ecosystem services;

(17) 'land take' means the conversion of natural and semi-natural land into artificial land;

(17a) 'soil sealing' means the covering of land with impermeable material, particularly in the context of using land as a platform for buildings and infrastructure; **[Am. 54]**

(17b) 'de-sealing of soil' means the re-conversion of land that no longer performs its natural soil functions, such as infiltration, percolation and hydrological functionality, into functional soil; **[Am. 55]**

(18) 'transfer function' means a mathematical rule that allows to convert the value of a measurement, performed using a methodology different from a reference methodology, into the value that would be obtained by performing the soil measurement using the reference methodology;

(19) 'public concerned' means the public affected or likely to be affected by soil degradation, or having an interest in the decision-making procedures related to the implementation of the obligations under this Directive, including ***citizens,*** land owners***, managers*** and ~~land~~ users, as well as non-governmental organisations promoting the protection of human ***or animal*** health or the environment and meeting any requirements under national law. **[Am. 56]**

(19a) 'public' means one or more natural or legal persons and, in accordance with national law or practice, associations, organisations or groups comprising such persons; **[Am. 57]**

(20) 'soil contamination' means the presence of a ~~chemical or~~ substance ***or material*** in the soil in a concentration that may ~~be~~***lead, directly or indirectly, to*** harmful ~~to~~***effects on*** human ***or animal*** health or the environment; **[Am. 58]**

(21) 'contaminant' means a substance liable to cause soil contamination;

(22) 'regeneration' means an intentional activity aimed at reversing soil from degraded to healthy condition;

(23) 'risk' means the possibility of harmful effects to human ***or animal*** health or the environment resulting from exposure to soil contamination; **[Am. 59]**

(24) 'soil investigation' means a process to assess the presence and concentration of contaminants in the soil which is usually performed in different stages;

(25) 'geographically explicit' means information referenced and stored in a manner that permits it to be mapped and localised with specific precision and accuracy;

(26) 'soil remediation' means a regeneration action that reduces, isolates or immobilizes contaminant concentrations in the soil ***below a toxicity threshold for which significant dangers for organisms in contact with that soil can be excluded, with the aim of improving the ecological status***. **[Am. 60]**

Article 4

Soil districts

1. Member States shall***, in consultation with local, regional and cross-regional authorities,*** establish soil districts***, based on, where appropriate, existing administrative units*** throughout their ***own*** territory ***and in cross-border territories together with neighbouring Member States***. **[Am. 61]**

~~The number of soil districts for each Member State shall as a minimum correspond to the number of NUTS 1 territorial units established under Regulation (EC) No 1059/2003.~~ **[Am. 221/rev1]**

2. When establishing the geographic extent of soil districts, Member States may take into account existing ***land use, governance structures and*** administrative units and shall ~~seek~~***prioritise*** homogeneity within each soil district regarding the following parameters: **[Am. 63]**

(a) soil type as defined in the World Reference Base for Soil Resources ([46]);

(b) climatic conditions;

(c) environmental zone as described in Alterra Report 2281 ([47]);

(d) land use or land cover as used in the Land Use/Cover Area frame statistical Survey (LUCAS) programme;

(da) river basin districts pursuant to Directive 2000/60/EC and water bodies used for abstraction of water intended for human consumption as defined in Directive (EU) 2020/2184; **[Am. 64]**

(db) the existence of remote archipelagic regions with islands scattered between them, with each island corresponding to a soil district; **[Am. 224/rev1]**

(dc) use of Copernicus for the soil districts' delimitation. **[Am. 226/rev1]**

2a. Member States shall, where appropriate, ensure that soil districts of neighbouring Member States in which there are transboundary effects on soil, comparable land use across borders or similar values for the parameters referred to in paragraph 2, points (a) to (d), cooperate with each other to exchange best practices. Member States shall also ensure that a coherent approach is taken by soil districts across borders. **[Am. 65]**

2b. The Commission shall support Member States in ensuring that their soil districts cooperate on a cross-border basis and shall facilitate harmonisation of monitoring systems, transfer functions, monitoring design and classification of ecological status at the level of the soil descriptors listed in Annex I. **[Am. 66]**

Article 5

Competent authorities

Member States shall designate the competent authorities responsible at an appropriate level for carrying out the duties laid down in this Directive***, taking into account existing administrative divisions and responsibilities, including in the case of cross-border soil districts***. **[Am. 68]**

Member States shall designate one competent authority for each soil district established in accordance with Article 4. ***Member States may designate one competent authority for several soil districts.*** **[Am. 69]**

Member States shall communicate to the Commission the list of competent authorities referred to in paragraphs 1 and 2 of this Article in accordance with Article 18(3), point (b). The Commission shall maintain an updated list of the competent authorities on its website. **[Am. 70]**

Chapter II

Monitoring and assessment of soil health

Article 6

Soil health and land take monitoring framework

1. Member States shall establish a monitoring framework based on the soil districts established in accordance with Article 4(1), to ensure that regular and accurate monitoring of soil health is carried out in accordance with this Article and Annexes I and II***, and is complementary to the assessment approach established by Directive 2000/60/EC***. **[Am. 71]**

([46]) https://www.fao.org/soils-portal/data-hub/soil-classification/world-reference-base/en/

([47]) M.J. Metzger, A.D. Shkaruba, R.H.G. Jongman and R.G.H. Bunce, Descriptions of the European Environmental Zones and Strata, Alterra Report 2281 ISSN 1566-7197.

2. Member States shall monitor soil health and land take in each soil district. ***Member States shall make use of the expertise of national research institutes, existing national monitoring systems and available data. The monitoring activities carried out by the Member States shall not result in a financial burden for the land managers.*** **[Am. 72]**

3. The monitoring framework shall be based on the following:

(a) the soil descriptors and soil health criteria referred to in Article 7;

(b) the soil sampling points ***and sampling depth*** to be determined in accordance with Article 8(2); **[Am. 73]**

(c) the soil measurement carried out by the Commission in accordance with paragraph 4 of this Article, if any;

(d) ~~the~~***scientifically robust*** remote sensing data and products referred to in paragraph 5 of this Article, if any; **[Am. 74]**

(e) the land take and soil sealing indicators referred to in Article 7(1).

~~4. The Commission shall, subject to agreement from Member States concerned, carry out regular soil measurements on soil samples taken in-situ, based on the relevant descriptors and methodologies referred to in Articles 7 and 8, to support Member States' monitoring of soil health. Where a Member State provides agreement in accordance with this paragraph, it shall ensure that the Commission can carry out such in-situ soil sampling.~~ **[Am. 227/rev1]**

4a. The Commission shall ensure that the first soil measurement referred to in paragraph 4 is performed by... [OP: please insert the date = three years from the entry into force of this Directive].

The Commission shall contribute to the monitoring carried out by Member States by providing sampling and analysing of at least 20 % of the size of national samples.

The Commission shall, at the request of a Member State, provide further assistance with up to 50 % of the sampling during the first national monitoring round. **[Am. 76]**

5. The Commission and the European Environment Agency (EEA) shall leverage existing space-based data and products delivered under the Copernicus component of the EU Space Programme established by Regulation (EU) 2021/696 to explore and develop soil remote sensing products, to support the Member States in monitoring the relevant soil descriptors.

6. The Commission and the EEA shall, on the basis of existing data and within two years of the entry into force of this Directive, establish a digital soil health data portal that shall provide access in georeferenced spatial format***, in line with Regulation (EC) No 223/2009 of the European Parliament and of the Council*** [48]***,*** to at least the available soil health data resulting from: **[Am. 77]**

(a) the soil measurements referred to in Article 8(2);

(b) the soil measurements referred to in paragraph 4 of this Article;

(c) the relevant soil remote sensing data and products referred to in paragraph 5 of this Article.

6a. The soil monitoring framework referred to in paragraphs 3 to 6 shall build on existing monitoring frameworks at Union and national level, including data from the LUCAS Soil Observatory. **[Am. 78]**

7. The digital soil health data portal referred to in paragraph 6 may also provide access to other soil health related data than the data referred to in that paragraph if those data were shared or collected in accordance with the formats or methods established by the Commission pursuant to paragraph 8.

7a. The digital soil health data portal shall include the Sustainable Soil Management Toolbox referred to in Article 10a. **[Am. 79]**

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[48] ***Regulation (EC) No 223/2009 of the European Parliament and of the Council of 11 March 2009 on European statistics and repealing Regulation (EC, Euratom) No 1101/2008 of the European Parliament and of the Council on the transmission of data subject to statistical confidentiality to the Statistical Office of the European Communities, Council Regulation (EC) No 322/97 on Community Statistics, and Council Decision 89/382/EEC, Euratom establishing a Committee on the Statistical Programmes of the European Communities (OJ L 087 31.3.2009, p. 164).***

8. The Commission shall adopt implementing acts to establish formats or methods for sharing or collecting the data referred to in paragraph 7 or for integrating those data in the digital soil health data portal***, ensuring compliance with Union law on the protection of personal data***. Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 21. **[Am. 80]**

8a. The Commission shall provide to Member States the necessary capacity building, assistance and consulting services and support their monitoring initiatives, multilateral harmonisation of regulations, methods and archives, and thereby close existing data gaps and workflow bottlenecks by sharing common expertise. To that end, the Commission shall build on existing mechanisms, including the Soil BON initiative. **[Am. 81]**

Article 6a

Efficient use and preservation of soil samples

1. The Commission, together with Member States and the European Soil Observatory, shall put in place measures to ensure that the physical archives of soils, DNA extracts and the digital archive of raw data, at both Union and national level, remain available for further research and innovation. The Commission and Member States shall ensure that samples are stored in a manner appropriate to their long-term sustainable use.

2. By... [OP: please insert the date = 12 months from the date of entry into force of this Directive], the Commission shall provide guidelines with protocols of reference to use soil samples in the most cost-efficient way. **[Am. 82]**

Article 7

Soil descriptors, criteria for ~~healthy soil condition, and~~***soil ecological status***, land take and soil sealing indicators **[Am. 83]**

1. When monitoring and assessing soil ~~health~~, Member States ~~shall~~***may*** apply the soil descriptors ~~and soil health criteria~~***that best illustrate the soil characteristics of each soil type at national level*** listed in Annex I. **[Am. 228]**

When monitoring land take, Member States shall apply the land take and soil sealing indicators referred to in Annex I.

2. Member States ~~may adapt the soil descriptors and~~***shall select the adequate tier for*** the soil ~~health criteria referred to in part A of Annex I,~~***monitoring design for which they qualify*** in accordance with the ~~specifications referred to in the second and third columns~~***conditions of Annex I, and shall ensure that they include at least all soil descriptors*** in Part A of Annex I. **[Am. 85]**

3. Member States shall determine the organic contaminants for the soil descriptor related to soil contamination referred to in part ~~B~~**A** of Annex I. **[Am. 86]**

~~4. Member States shall set soil health criteria for the soil descriptors listed in part B of Annex I in accordance with the provisions set out in the third column in part B of Annex I.~~ **[Am. 87]**

5. Member States may set additional soil descriptors and land take indicators, including but not limited to the ~~optional~~ descriptors and indicators listed in part ~~C and~~ D of Annex I, for monitoring purposes ~~('additional soil descriptors' and 'additional land take indicators')~~. **[Am. 88]**

6. Member States shall inform the Commission when soil descriptors, land take indicators and soil health criteria are set or adapted in accordance with paragraphs 2 to 5 of this Article ***and with Article 9***. **[Am. 89]**

Article 8

Measurements and methodologies

1. Member States shall determine sampling points by applying the methodology set out in ~~part A of~~ Annex ~~II~~***I according to the selected tier for soil monitoring design, taking into account risk assessments based on existing monitoring systems***. **[Am. 90]**

2. Member States shall carry out soil measurements by taking soil samples at the sampling points referred to in paragraph 1 and collect, process and analyse data in order to determine the following:

(a) the values of the soil descriptors ***according to the selected tier for soil monitoring design*** as set in Annex I; **[Am. 91]**

(b) where relevant, the values of the additional soil descriptors;

(c) the values of the land take and soil sealing indicators listed in part D of Annex I.

3. Member States shall apply the following:

(a) the methodologies for determining or estimating the values of the soil descriptors set out in ~~part B of~~ Annex II; **[Am. 92]**

(b) the minimum methodological criteria for determining the values of the land take and soil sealing indicators set out in part C of Annex II;

(c) any requirements laid down by the Commission in accordance with paragraph 6.

Member States may apply other methodologies than the ones listed in the first subparagraph, points (a) and (b), provided that validated transfer functions are available ***or may be estimated by comparing data taken at national level with in-situ monitoring coordinated by the Commission***, as required in Annex II, part B, fourth column. **[Am. 93]**

4. Member States shall ensure that the first soil measurements are performed at the latest by… (OP: please insert the date = ~~4~~***3*** years after date of entry into force of the Directive). **[Am. 94]**

5. Member States shall ensure that new soil measurements are performed at least every ~~5~~***6*** years ***or earlier, whenever soil status modification is suspected. Member States shall also facilitate in-situ soil monitoring coordinated by the Commission.***

Member States shall ensure that the value of the land take and soil sealing indicators are updated at least every ~~year~~***two years***. **[Am. 95]**

6. The Commission is empowered to adopt delegated acts in accordance with Article 20 to amend Annex II in order to adapt the reference methodologies mentioned in it to scientific and technical progress~~, in particular where values of soil descriptors can be determined by remote sensing referred to in Article 6(5)~~. **[Am. 96]**

Article 9

Assessment of the soil health

1. Member States shall assess the soil health in all their soil districts based on the data collected in the context of the monitoring referred to in Articles 6, 7 and 8 for each of the soil descriptors referred to in ~~Parts A and B of~~ Annex I ***according to the selected tier for soil monitoring design, while taking into account the historical and natural circumstances of the soil***. **[Am. 97]**

For the assessment of the soil ecological status, Member States shall also take into account the data collected in the context of soil investigations referred to in Article 14. **[Am. 98]**

Member States shall ensure that ~~soil health~~ assessments ***of soil ecological status*** are performed at least every ~~5~~***6*** years and that the first ~~soil health~~ assessment is performed by … (OP: please insert the date = 5 years after date of entry into force of the Directive)***, accompanied by reports on relative improvement, trends, progress or regression***. **[Am. 99]**

2. A soil is considered healthy in accordance with this Directive where the ~~following cumulative conditions are fulfilled:~~ ***soil is classified either with good or high ecological status.***

~~(a) the values for all soil descriptors listed in part A of Annex I meet the criteria laid down therein and, where applicable, adapted in accordance with Article 7;~~

~~(b) the values for all soil descriptors listed in part B of Annex I meet the criteria set in accordance with Article 7 ('healthy soil').~~ **[Am. 100]**

~~By way of derogation from the first subparagraph the assessment of soils within a land area listed in the fourth column of Annex I, shall not take into account the values set out in the third column for that land area.~~ **[Am. 101]**

~~Soil is unhealthy where at least one of the criteria referred to in subparagraph 1 is not met ('unhealthy soil').~~ **[Am. 102]**

3. Member States shall analyse the values for the soil descriptors listed in ~~part~~***parts A, B and*** C of Annex I***, according to the selected tier for soil monitoring design,*** and assess whether there is a critical loss of ***soil biodiversity and*** ecosystem services, taking into account the relevant data and available scientific knowledge. **[Am. 103]**

Member States shall analyse the values of land take and soil sealing indicators listed in part D of Annex I and assess their impact on the loss of ecosystem services and on the objectives and targets established under Regulation (EU) 2018/841.

4. Based on the assessment of soil health carried out in accordance with this Article, the competent authority shall, where relevant in coordination with local, regional, national authorities, identify, in each soil district, the areas ~~which present unhealthy soils~~***of soil that are not of high soil ecological status or good ecological status*** and inform the public in accordance with Article 19. **[Am. 104]**

4a. The Commission shall adopt delegated acts by 31 December 2026 in accordance with Article 20 to supplement this Regulation by establishing a methodology for determining threshold values for soil descriptors in Annex I for each soil ecological status. The methodology shall take into consideration the most recent scientific evidence and account for different climatic conditions and type of soils. **[Am. 105]**

4b. By 30 June 2028, Member States shall submit to the Commission draft threshold values for soil descriptors in Annex I, taking into consideration climate conditions, the type of soil and type of land area, together with the scientific justification and evidence on which they based their choices. **[Am. 106]**

4c. Within 6 months of the date of the submission of the draft threshold values referred to in paragraph 4b, the Commission shall make observations on the draft threshold values, assessing the scientific justification and ensuring a level playing field within the internal market. Upon request from the Commission, Member States shall provide to the Commission all necessary additional information and, where appropriate, revise the proposed threshold values. **[Am. 107]**

4d. Provided that any observations made by the Commission in accordance with paragraph 4c have been adequately taken into account, the Commission shall, by means of implementing acts, approve threshold values no later than 31 December 2029. **[Am. 108]**

4e. When applying a Tier 2 for soil monitoring design, Member States may benefit from variation of up to 20 % in comparison to the threshold values set in accordance with paragraph 4d. **[Am. 110]**

~~5. Member States shall set up a mechanism for a voluntary soil health certification for land owners and managers pursuant to the conditions in paragraph 2 of this Article.~~ **[Am. 111]**

~~The Commission may adopt implementing acts to harmonise the format of soil health certification. Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 21.~~ **[Am. 112]**

6. Member States shall communicate soil health data and assessment referred to in Articles 6 to 9 to the relevant land owners and land managers ~~upon their request~~***and make them available free of charge***, in particular to support the development of the advice referred to in Article 10(3). ***Member States shall ensure that research institutions have easy and continuous access to samples, DNA extracts and raw data free of charge.*** **[Am. 113]**

Chapter III

Sustainable soil management

Article 10

Sustainable soil management

~~1. From (OP: please insert the date = 4 years after date of entry into force of the Directive), Member States shall take at least the following measures, taking into account the type, use and condition of soil:~~

~~(a) defining sustainable soil management practices respecting the sustainable soil management principles listed in Annex III to be gradually implemented on all managed soils and, on the basis of the outcome of the soil assessments carried out in accordance with Article 9, regeneration practices to be gradually implemented on the unhealthy soils in the Member States;~~

~~(b) defining soil management practices and other practices affecting negatively the soil health to be avoided by soil managers.~~

~~When defining the practices and measures referred to in this paragraph, Member States shall take into account the programmes, plans, targets and measures listed in Annex IV as well as the latest existing scientific knowledge including results coming out of the Horizon Europe Mission a Soil Deal for Europe.~~

~~Member States shall identify synergies with the programmes, plans and measures set out in Annex IV. The soil health monitoring data, the results of the soil health assessments, the analysis referred to in Article 9 and the sustainable soil management measures shall inform the development of the programmes, plans and measures set out in Annex IV.~~

~~Member States shall ensure that the process of elaboration of the practices referred to in the first subparagraph is open, inclusive and effective and that the public concerned, in particular landowners and managers, are involved and are given early and effective opportunities to participate in their elaboration.~~ **[Am. 248]**

2. Member States shall ensure easy ***and equal*** access to impartial and independent advice on sustainable soil management, training activities and capacity building for soil managers, landowners***, land managers*** and relevant authorities***, in all their soil districts***. **[Ams. 120 and 249]**

Member States shall also take the following measures:

(a) promoting awareness on the medium- and long-term multiple benefits of sustainable soil management and the need to manage soils in a sustainable manner;

(b) promoting research***, innovation, citizens science and encourage*** ~~and~~ implementation of ~~holistic~~***sustainable*** soil management concepts; **[Ams. 121 and 250]**

(c) making available a regularly updated mapping of available funding instruments and activities to support the implementation of sustainable soil management***, and other activities to support the implementation of this Directive, including research and citizen science***. **[Am. 122]**

~~3. Member States shall regularly assess the effectiveness of the measures taken in accordance with this Article and, where relevant, review and revise those measures, taking into account the soil health monitoring and assessment referred to in Articles 6 to 9.~~ **[Am. 251]**

~~4. The Commission is empowered to adopt delegated acts in accordance with Article 20 to amend Annex III in order to adapt the sustainable soil management principles to take into account scientific and technical progress.~~ **[Ams. 123 and 252]**

4a. The Commission shall, upon request, assist and provide guidance to Member States regarding the development of specific measures linked to the sustainable soil management principles listed in Annex III. **[Am. 124]**

Article 10a

Sustainable Soil Management Toolbox

1. In order to support the implementation of this Directive, the Commission shall establish a sustainable soil management toolbox that provides soil managers with practical information on the use of sustainable soil management practices, which includes information provided by the Member States.

2. The toolbox shall contain:

(a) recommendations and examples of best practices from the Member States' competent authorities which monitor the impact of soil management practices, and information about the impact of such practices on various ecosystem services and soil threats;

(b) the context-specific information related to combinations of soil type, land use and climatic conditions;

(c) new knowledge from research and innovation, including from the Horizon Europe mission 'A Soil Deal for Europe';

(d) other relevant information collected by the Commission or provided to the Commission by the Member States.

3. The toolbox shall be publicly available free of charge, and be included in the digital soil health data portal established in accordance with Article 6(6).

The Commission shall actively update and take all appropriate measures to promote the content of the toolbox to land managers. **[Am. 125]**

Article 11

Land take mitigation ~~principles~~ **[Am. 126]**

In case of land take, Member States shall ~~ensure that~~***consider*** the following ~~principles are respected in case of land take~~***actions, while taking into account local specificities and socio-economic impacts***: **[Am. 127]**

(a) ~~avoid or reduce~~***avoiding or reducing*** as much as technically***, socially*** and economically possible the loss of the capacity of the soil to provide multiple ecosystem ***and other*** services, including ***agriculture,*** food production~~,~~ ***and sustainable forest management*** by: **[Ams. 128 and 254]**

(i) reducing the area affected by the land take ~~to the extent~~***as much as*** possible ~~and~~***;*** **[Am. 129]**

(ii) ~~selecting~~***prioritising*** areas where the loss of ecosystem services would be minimized ~~and~~***;*** **[Am. 130]**

(iii) performing the land take in a way that ~~minimizes the negative impact on soil~~***is aligned with sustainable development, including preserving soil fertility, biodiversity, water permeability, filtration and retention to the extent possible***; **[Am. 131]**

(b) ~~compensate~~***if possible, compensating*** as much as possible the loss of soil capacity to provide multiple ecosystem services***; such compensation, where applicable, may take place on an aggregated level or cross border between Member States if the soil district has the same characteristics as an adjacent soil district in a neighbouring Member State or a cross-border soil district***. **[Am. 132]**

(ba) adopting measures to ensure fair compensation of landowners in case of land take; **[Am. 133]**

(bb) putting in place measures to prevent or limit land take, including mapping of abandoned brownfield and industrial sites and incentives to restore and reuse abandoned areas with sealed soils. **[Am. 134]**

Chapter IV

Contaminated sites

Article 12

Risk-based approach

1. Member States shall manage ***and reduce*** the risks for human ***and animal*** health and the environment of potentially contaminated sites and contaminated sites, and keep them to acceptable levels ***considering the intended use of the soil***, taking account of the environmental, social and economic impacts of the soil contamination and of the risk reduction measures taken pursuant to Article 15 paragraph 4. **[Am. 135]**

2. By … (OP: please insert the date =4 years after the date of entry into force of the Directive) Member States shall establish a risk-based approach for the following:

(a) the identification of potentially contaminated sites in accordance with Article 13;

(b) the investigation of potentially contaminated sites in accordance with Article 14;

(c) the management of contaminated sites in accordance with Article 15.

3. The requirement laid down in paragraph 2 is without prejudice to more stringent requirements arising from Union or national legislation.

4. The public ~~concerned~~ shall be given early and effective opportunities: **[Am. 136]**

(a) to participate in the establishment and concrete application of the risk-based approach as defined in this Article***, the identification of potentially contaminated sites in accordance with Article 13, the investigation of potentially contaminated sites in accordance with Article 14 and the assessment and management of contaminated sites in accordance with Article 15, when all options are still available***; **[Am. 137]**

(b) to provide information ***and evidence*** relevant for the ~~identification of potentially contaminated sites in accordance with Article 13, the investigation of potentially contaminated sites in accordance with Article 14 and the management of contaminated sites in accordance with Article 15~~***activities referred to in point (a) at any time, such as human biomonitoring or environmental monitoring data***; **[Am. 138]**

(c) to request correction of information contained in the register for contaminated sites and potentially contaminated sites in accordance with Article 16.

4a. For the purposes of paragraph 4, Member States shall ensure that the public is informed in a timely, adequate and effective manner, including by public notices and electronic media, of all relevant information. **[Am. 139]**

4b. Member States shall take due account of the information submitted in accordance with paragraph 4 when implementing the provisions of this Chapter and in relation to the soil descriptors for soil contamination listed in Annex I. **[Am. 140]**

4c. Where the evidence shows wide dispersive soil pollution or exposure to the substance or mixture concerned via soil, the competent authority shall initiate a risk management process. Where the evidence shows a lack of information on the risk to human or animal health or the environment posed by a hazardous substance or mixture present in the soil, the competent authority shall investigate further with a view to taking risk management measures in line with the precautionary principle, where necessary. **[Am. 141]**

4d. Member States shall promptly inform the public of any decision or measure taken pursuant to paragraphs 4 and 4c and of the reasons and considerations upon which the decision or measure is based, including an explanation of how the information was taken into account. **[Am. 142]**

Article 13

Identification of potentially contaminated sites

1. Member States shall systematically and actively identify all sites where a soil contamination is suspected based on evidence collected through all ~~available~~***appropriate*** means***, including citizens' input and set procedures*** ('potentially contaminated sites'). **[Am. 143]**

2. When identifying the potentially contaminated sites Member States shall take into account the following criteria:

(a) operation of an active or inactive potentially contaminating risk activity;

(b) operation of an activity referred to in Annex I to Directive 2010/75/EU;

(c) operation of an establishment referred to in Directive 2012/18/EU of the European Parliament and of the Council ([49]);

~~(d) operation of an activity referred to in Annex III to Directive 2004/35/CE of the European Parliament and of the Council ([50]);~~ **[Am. 144]**

(e) occurrence of a potentially contaminating accident, calamity, disaster, incident or spill;

(f) any other event liable to cause soil contamination;

(fa) any areas used for the abstraction of drinking water; **[Am. 145]**

(g) any information resulting from the soil health monitoring carried out in accordance with Articles 6, 7 and 8~~.~~***;***

(ga) occurrence of any disease that is presumed to be linked to exposure to contamination via the soil; **[Am. 146]**

(gb) any information provided by the public or Member State authorities. **[Am. 147]**

For the purpose of the first subparagraph point (a), Member States shall lay down a list of potentially contaminating risk activities. Those activities may be further classified according to their risk to cause soil contamination based on scientific evidence.

3. Member States shall ensure that all potentially contaminated sites are identified by (OP: please insert date = 7 years after date of entry into force of the Directive) and are duly recorded in the register referred to in Article 16 by that date.

Article 14

Investigation of potentially contaminated sites

1. Member States shall ensure that all potentially contaminated sites identified in accordance with Article 13 are subject to soil investigation ***according to order of priority***. **[Am. 148]**

2. Member States shall lay down the rules concerning the deadline, content, form and the prioritisation of the soil investigations***, taking into account environmental, social and economic aspects***. Those rules shall be established in accordance with the risk-based approach referred to in Article 12 and the list of potentially contaminating risk activities referred to in Article 13(2), second subparagraph. **[Am. 149]**

Potentially contaminated sites located in areas used for the abstraction of water for human consumption shall be prioritised for soil investigation. **[Am. 150]**

Member States may consider baseline reports and monitoring measures implemented in accordance with the Directive 2010/75/EU as soil investigation where appropriate.

3. Member States shall also establish specific events that trigger an investigation before the deadline set in accordance with paragraph 2.

([49]) Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC (OJ L 197, 24.7.2012, p. 1).

([50]) ~~Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage (OJ L 143, 30.4.2004, p. 56)~~

Article 15

Risk assessment and management of contaminated sites

1. Member States shall lay down the specific methodology for determining the site-specific risks of contaminated sites. Such methodology shall be based on the phases and requirements for site-specific risk assessment listed in Annex VI.

2. Member States shall define what constitutes an unacceptable risk for human ***and animal*** health and the environment resulting from contaminated sites by taking into account existing scientific knowledge, the ***opinion of health professionals and health authorities, the*** precautionary principle, local specificities, and current and future land use. **[Am. 151]**

3. For each contaminated site identified pursuant to Article 14 or by any other means, the responsible competent authority shall carry out a site-specific assessment for the current and planned land uses to determine whether the contaminated site poses unacceptable risks for human ***and animal*** health or the environment. **[Am. 152]**

3a. Where appropriate, Member States may consider assessments which have been implemented in accordance with Directive 2010/75/EU, 2011/92/EU or 2012/18/EU as sufficient. **[Am. 153]**

4. On the basis of the outcome of the assessment referred to in paragraph 3, the responsible competent authority shall ~~tak~~***ensure that*** the appropriate measures ***are taken*** to bring the risks to an acceptable level for human health and the environment ('risk reduction measures'). **[Am. 154]**

5. The risk reduction measures ~~may consist of~~***shall be based on*** the measures referred to in Annex V. When deciding on the appropriate risk reduction measures, the competent authority shall take into consideration the costs, benefits, effectiveness, durability, and technical feasibility of available risk reduction measures ***in the short and long term***. ***Member States shall always aim for prevention and soil decontamination.*** **[Am. 155]**

Risk reduction measures affecting surrounding water bodies used for abstraction of water intended for human consumption shall comply with the acceptable risk standards set out in Directive (EU) 2020/2184. **[Am. 156]**

5a. The Commission is empowered to adopt delegated acts in accordance with Article 20 to supplement this Directive by establishing maximum tolerable values in relation to the definition of an unacceptable risk for health and the environment resulting from contaminated sites as referred to in paragraph 2. **[Am. 157]**

6. The Commission is empowered to adopt delegated acts in accordance with Article 20 to amend Annexes V and VI to adapt the list of risk reduction measures and the requirements for site-specific risk assessment to scientific and technical progress.

Article 16

Register

1. By … (OP: please insert date = 4 years after entry into force of the Directive), Member States shall, in accordance with paragraph 2, draw up a register of contaminated sites and potentially contaminated sites.

2. The register shall contain the information set out in Annex VII.

3. The register shall be managed by the responsible competent authority and shall be regularly kept under review and up to date.

4. Member States shall make public***, accessible in a user-friendly manner and free of charge*** the register and information referred to in paragraphs 1 and 2. Disclosure of any information may be refused or restricted by the competent authority where the conditions laid down in Article 4 of Directive 2003/4/EC of the European Parliament and of the Council ([51]) are fulfilled. **[Am. 158]**

The register shall be made available in an online georeferenced spatial database.

([51]) Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on public access to environmental information and repealing Council Directive 90/313/EEC (OJ L 41, 14.2.2003, p. 26).

5. The Commission shall ***by... [OP: please insert date = 1 year from the entry into force of this Directive]*** adopt implementing acts establishing the format of the register. Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 21. **[Am. 159]**

Chapter V

Financing, information to the public and reporting by Member States

Article 17

Union ***and Member States'*** financing **[Am. 160]**

1. Given the priority inherently attached to the establishment of soil monitoring and sustainable management and regeneration of soils, ***by... [OP: please insert date = 12 months from the entry into force of this Directive], the Commission shall submit a report to the European Parliament and to the Council evaluating the financial resources available at Union level for*** the implementation of this Directive ~~shall be supported by existing Union financial programmes in accordance with their applicable rules and conditions~~. **[Am. 161]**

The Commission shall assess any gap between the available Union funding and funding needs for supporting Member States in the implementation of this Directive, paying specific attention to environmental monitoring needs, including LUCAS soil. **[Am. 162]**

Additional financial resources shall be put in place for the post-2027 period in order to promote the sustainable management of soils, their permanent regeneration and monitoring activities. **[Am. 163]**

1a. When implementing this Directive, Member States shall make use of financial resources from appropriate sources, including Union, national, regional and local funds, to finance actions with a focus on soil protection, sustainable management and regeneration. **[Am. 164]**

1b. The Commission shall monitor the capacity of Member States to absorb Union funds related to soil protection, sustainable management and regeneration. The Commission shall provide training and technical support to increase the absorption capacity of the Member States. **[Am. 165]**

1c. Member States and the Commission, in collaboration with the European Investment Bank, shall improve and facilitate the use of innovative financing mechanisms and promote the mobilisation of private capital for actions necessary to achieve the objectives of this Directive. **[Am. 166]**

1d. Member States and the Commission shall observe the 'do no significant harm' principle within the meaning of Article 17 of Regulation (EU) 2020/852 for the implementation of this Directive. **[Am. 167]**

Article 18

Reporting by Member States

1. Member States shall electronically report the following data and information to the Commission and to the EEA ***at least*** every ~~5~~**6** years: **[Am. 168]**

(a) the data and results of the soil health monitoring and assessment carried out in accordance with Articles 6 to 9;

(b) ***the supporting data, metadata and*** a trend analysis of the soil health for the descriptors listed in parts A, B, and C of Annex I***, according to the selected tier for soil monitoring design*** and for the land take and soil sealing indicators listed in part D of Annex I in accordance with Article 9***, including the extended descriptors indicated by individual Member States***; **[Am. 169]**

(c) a summary of the progress on:

  (i) implementing sustainable soil management principles in accordance with Article 10;

  (ii) the registration, identification, investigation, and management of contaminated sites in accordance with Articles 12 to 16;

(d) the data and information contained in the register referred to in Article 16.

The first reports shall be submitted by … (OP: please insert date = ~~5~~**6** years ~~and 6 months~~ after entry into force of the Directive). **[Am. 171]**

2. Member States shall ensure that the Commission and the EEA have permanent access to the information and data referred to in paragraph 1.

3. Member States shall provide the Commission with online access to the following:

(a) an up-to-date list and spatial data of their soil districts referred to in Article 4 by … (OP: please insert the date = ~~2 years and 3~~***12*** months after date of entry into force of the Directive) ***and, where available, their respective soil district plans***; **[Am. 172]**

(b) an up-to-date list of the competent authorities referred to in Article 5 by … (OP: please insert the date = ~~2 years and 3~~***12*** months after date of entry into force of the Directive); **[Am. 173]**

(c) the measures and sustainable soil management practices referred to in Article 10 by… (OP: please insert the date = 4 years and 3 months after date of entry into force of the Directive);

(ca) the measurements of the soil descriptors at the level of the sampling point. **[Am. 174]**

4. The Commission is empowered to adopt implementing acts establishing the format and the modalities for submitting the information referred to paragraph 1 of this Article. Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 21.

Article 19

Information to the public

1. Member States shall make ~~public~~ the data generated by the monitoring carried out under Article 8 and the ~~assessment~~***assessments*** carried out under Article 9 ***and Article 10(3)*** of this Directive accessible to the public, in accordance with the provisions under Article 11 of Directive 2007/2/EC of the European Parliament and of the Council ([52]) for geographically explicit data and Article 5 of Directive (EU) 2019/1024 for other data. **[Am. 175]**

2. The Commission shall ensure that ***relevant*** soil health data made accessible through the digital soil health data portal referred to in Article 6 is available to the public ***only with the express permission of the landowner and land manager, in an aggregated and anonymised form,*** in accordance with Regulation (EU) 2018/1725 of the European Parliament and of theCouncil ([53]) and Regulation (EC) No 1367/2006 of the European Parliament and of the Council ([54]). **[Am. 231]**

3. Member States shall ensure that the ***relevant*** information referred to in Article 18 of this Directive is available and accessible to the public ***only with the express permission of the landowner and land manager, in an aggregated and anonymised form,*** in accordance with Directive 2003/4/EC, Directive 2007/2/EC and Directive (EU) 2019/1024 of the Parliament and of the Council ([55]). **[Am. 232]**

4. Disclosure of any information required under this Directive may be refused or restricted where the conditions laid down in Article 4 of Directive 2003/4/EC are fulfilled.

4a. Member States shall adopt measures to ensure that soil related information collected through the implementation of this Directive is made available to the potential buyer or potential tenant of the relevant land plot. **[Am. 176]**

([52]) Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) (OJ L 108, 25.4.2007, p. 1).

([53]) Regulation (EU) 2018/1725 of the European Parliament and of the Council of 23 October 2018 on the protection of natural persons with regard to the processing of personal data by the Union institutions, bodies, offices and agencies and on the free movement of such data, and repealing Regulation (EC) No 45/2001 and Decision No 1247/2002/EC (OJ L 295, 21.11.2018, p. 39).

([54]) Regulation (EC) No 1367/2006 of the European Parliament and of the Council of 6 September 2006 on the application of the provisions of the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters to Community institutions and bodies (OJ L 264, 25.9.2006, p. 13).

([55]) Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open data and the re-use of public sector information (OJ L 172, 26.6.2019, p. 56).

Chapter VI

Delegation and Committee procedure

Article 20

Exercise of the delegation

1. The power to adopt delegated acts is conferred on the Commission subject to the conditions laid down in this Article.

2. The power to adopt delegated acts referred to in Articles 8, ~~10, 15 and 16~~***9 and 15*** shall be conferred on the Commission for an indeterminate period of time from the date of entry into force of this Directive. **[Am. 177]**

3. The delegation of power referred to in Articles 8, ~~10, 15 and 16~~***9 and 15*** may be revoked at any time by the European Parliament or by the Council. A decision to revoke shall put an end to the delegation of the power specified in that decision. It shall take effect the day following the publication of the decision in the *Official Journal of the European Union* or at a later date specified therein. It shall not affect the validity of any delegated acts already in force. **[Am. 178]**

4. Before adopting a delegated act, the Commission shall consult experts designated by each Member State in accordance with the principles laid down in the Interinstitutional Agreement of 13 April 2016 on Better Law-Making.

5. As soon as it adopts a delegated act, the Commission shall notify it simultaneously to the European Parliament and to the Council.

6. A delegated act adopted pursuant to Articles 8, ~~10, 15 and 16~~***9 and 15*** shall enter into force only if no objection has been expressed either by the European Parliament or the Council within a period of two months of notification of that act to the European Parliament and the Council or if, before the expiry of that period, the European Parliament and the Council have both informed the Commission that they will not object. That period shall be extended by two months at the initiative of the European Parliament or of the Council. **[Am. 179]**

Article 21

Committee

1. The Commission shall be assisted by a committee. That committee shall be a committee within the meaning of Regulation (EU) No 182/2011.

2. Where reference is made to this paragraph, Article 5 of Regulation (EU) No 182/2011 shall apply.

Chapter VII

Final provisions

Article 22

Access to justice

Member States shall ensure that members of the public, in accordance with national law, that have a sufficient interest or that maintain the impairment of a right, have access to a review procedure before a court of law, or an independent and impartial body established by law, to challenge the substantive or procedural legality of the assessment of soil health, the measures taken pursuant to this Directive and any failures to act of the competent authorities.

Member States shall determine what constitutes a sufficient interest and impairment of a right, consistently with the objective of providing the public with wide access to justice~~. For the purposes of paragraph 1, any non-governmental organisation promoting environmental protection and meeting any requirements under national law~~ ***in line with Article 9 of the Aarhus Convention. The recognition of standing*** shall ***not be conditional on the member of the public concerned having played a role during a participatory phase of the decision-making procedures under this Directive***~~be deemed to have rights capable of being impaired and their interest shall be deemed sufficient~~. **[Am. 180]**

Review procedures referred to in paragraph 1 shall be fair, equitable, timely and free of charge or not prohibitively expensive, and shall provide adequate and effective remedies, including injunctive relief where necessary.

Member States shall ensure that practical information is made available to the public on access to the administrative and judicial review procedures referred to in this Article.

~~*Article 23*~~

~~Penalties~~

~~1. Without prejudice to the obligations of Member States under Directive 2008/99/EC of the European Parliament and of the Council, Member States shall lay down the rules on penalties applicable to violations by natural and legal persons, of the national provisions adopted pursuant to this Directive and shall ensure that those rules are implemented. The penalties provided for shall be effective, proportionate and dissuasive.~~

~~2. The penalties referred to in paragraph 1 shall include fines proportionate to the turnover of the legal person or to the income of the natural person having committed the violation. The level of the fines shall be calculated in such a way as to make sure that they effectively deprive the person responsible for the violation of the economic benefits derived from that violation. In the case of a violation committed by a legal person, such fines shall be proportionate to the legal person's annual turnover in the Member State concerned, taking account, inter alia, the specificities of small and medium-sized enterprises (SMEs).~~

~~3. Member States shall ensure that the penalties established pursuant to this Article give due regard to the following, as applicable:~~

~~(a) the nature, gravity, and extent of the violation;~~

~~(b) the intentional or negligent character of the violation;~~

~~(c) the population or the environment affected by the violation, bearing in mind the impact of the infringement on the objective of achieving a high level of protection of human health and the environment.~~

~~4. Member States shall without undue delay notify the Commission of the rules and measures referred to in paragraph 1 and of any subsequent amendments affecting them.~~ **[Am. 234]**

Article 24

Evaluation and review

1. By (OP:please insert the date = 6 years after the date of entry into force of the Directive), the Commission shall carry out an evaluation of this Directive to assess the progress towards its objectives and the need to amend its provisions in order to ~~set more specific~~***adapt the*** requirements ***laid down in this Directive*** to ensure ~~that unhealthy soils are regenerated and that~~***continuous progress towards*** all soils ~~will be~~***being*** healthy by 2050. This evaluation shall take into account, inter alia, the following elements: **[Am. 186]**

(a) the experience gained through the implementation of this Directive;

(b) the data and information referred to in Article 18;

(c) relevant scientific and analytical data, including results from research projects funded by the Union ***and by Member States***; **[Am. 187]**

(d) an analysis of the gap ~~towards achieving~~***and measures needed to achieve*** healthy soils by 2050; **[Am. 188]**

(e) an analysis of the possible need to adapt to scientific and technical progress the provisions of this Directive in particular regarding the following items:

(i) the definition of healthy soils;

(ii) the establishment of criteria for soil descriptors listed in ~~part C of~~ annex I; **[Am. 189]**

(iii) the addition of new soil descriptors for monitoring purposes~~.~~ ***or the adjustment of existing soil descriptors and criteria in Annex I;*** **[Am. 190]**

(ea) an analysis of the monitoring designs provided for and threshold values set by Member States under this Directive; **[Am. 191]**

(eb) the socioeconomic impact of this Directive. **[Am. 192]**

2. The Commission shall present a report on the main findings of the evaluation referred to in paragraph 1 to the European Parliament, the Council, the European Economic and Social Committee, and the Committee of the Regions***, accompanied, where appropriate, by a legislative proposal.*** **[Am. 193]**

2a. From... [OP: please insert the date = eight years from the date of entry into force of this Directive] and every five years thereafter, the Commission shall report to the European Parliament and to the Council on the implementation of this Directive including the measures necessary to comply with this Directive taken by Member States. The report shall include an overall assessment of the progress made towards achieving healthy soils. **[Am. 194]**

2b. By... [OP: please insert the date = 6 years from the date of entry into force of the Directive], the Commission shall assess, as part of the assessment referred to in paragraph 1, the information collected in Member States regarding the occurrence, dispersion and values of soil contaminants, with a view to establishing a list of priority substances, followed by a watch list on soil contaminants, where appropriate. **[Am. 195]**

Article 24a

European Union Soil Observatory (EUSO) Forum

The Commission shall, through the EUSO Forum, facilitate the cooperation at regular intervals between stakeholders, including Member States' competent authorities at all relevant levels, industry, civil society, and the scientific community. The EUSO Forum shall facilitate the coordinated implementation of Union law and policies related to soil health monitoring and the improvement of soil health, inter alia by exchange of experience and good practices, including on sustainable soil management and regeneration practices, as well as exchange of experience on soil management practices to be avoided. **[Am. 196]**

Article 25

Transposition

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive by … [OP please insert date = 2 years after date of entry into force of the Directive]. They shall forthwith communicate to the Commission the text of those provisions.

When Member States adopt those provisions, they shall contain a reference to this Directive or be accompanied by such a reference on the occasion of their official publication. Member States shall determine how such reference is to be made.

2. Member States shall communicate to the Commission the text of the main provisions of national law which they adopt in the field covered by this Directive.

Article 26

Entry into force

This Directive shall enter into force on the twentieth day following that of its publication in the *Official Journal of the European Union*.

Article 27

Addressees

This Directive is addressed to the Member States.

Done at …,

For the European Parliament	*For the Council*
The President	*The President*

ANNEX I

SOIL DESCRIPTORS, CRITERIA ~~FOR HEALTHY SOIL CONDITION,~~***AND METHODS FOR THE DETERMINATION OF SOIL ECOLOGICAL STATUS,*** AND LAND TAKE AND SOIL SEALING INDICATORS **[Am. 197]**

For the purposes of this Annex, the following definitions shall apply

(1) 'reverse land take' means the conversion of artificial land into natural or semi-natural land;

(2) 'net land take' means the result of land take minus reverse land take.

~~**Aspect of soil degradation**~~	~~**Soil descriptor**~~	~~**Criteria for healthy soil condition**~~		~~**Land areas that shall be excluded from achieving the related criterion**~~
~~***Part A: soil descriptors with criteria for healthy soil condition established at Union level***~~				
~~Salinization~~	~~Electrical Conductivity (deci-Siemens per meter)~~	~~< 4 dS m^{-1} when using saturated soil paste extract (eEC) measurement method, or equivalent criterion if using another measurement method~~		~~Naturally saline land areas; Land areas directly affected by sea level rise~~
~~Soil erosion~~	~~Soil erosion rate (tonnes per hectare per year)~~	~~≤ 2 t ha^{-1} y^{-1}~~		~~Badlands and other unmanaged natural land areas, except if they represent a significant disaster risk~~
~~Loss of soil organic carbon~~	~~Soil Organic Carbon (SOC) concentration (g per kg)~~	~~- For organic soils: respect targets set for such soils at national level in accordance with Article 4.1, 4.2, 9.4 of Regulation (EU) …/… [*]~~		~~No exclusion~~
		~~- For mineral soils: SOC/Clay ratio > 1/13; Member States may apply a corrective factor where specific soil types or climatic conditions justify it, taking into account the actual SOC content in permanent grasslands.~~		~~Non- managed soils in natural land areas~~
~~Subsoil compaction~~	~~Bulk density in subsoil (upper part of B or E horizon ([1])); Member States may replace this descriptor with an equivalent parameter (g per cm^3)~~	~~Soil texture ([2])~~	~~range~~	~~Non-managed soils in natural land areas~~
		~~sand, loamy sand, sandy loam, loam~~	~~<1.80~~	
		~~Sandy clay loam, loam, clay loam, silt, silt loam~~	~~<1.75~~	
		~~silt loam, silty clay loam~~	~~<1.65~~	

~~([*]) OP: please insert in the text the number of Regulation on nature restoration contained in document COM(2022) 304~~

~~([1]) As defined in the FAO Guidelines for Soil Description, Chapter 5 (https://www.fao.org/3/a0541e/a0541e.pdf)~~

~~([2]) As defined in Arshad, M.A., B. Lowery, and B. Grossman. 1996. Physical tests for monitoring soil quality. p.123- 142. In: J.W. Doran and A.J. Jones (eds.) Methods for assessing soil quality. Soil Sci. Soc. Am. Spec. Publ. 49. SSSA, Madison, WI.~~

~~Aspect of soil degradation~~	~~Soil descriptor~~	~~Criteria for healthy soil condition~~		~~Land areas that shall be excluded from achieving the related criterion~~
		~~Sandy clay, silty clay, clay loam with 35-45 % clay~~	~~<1.58~~	
		~~Clay~~	~~<1.47~~	
		~~In case a Member State replaces the soil descriptor 'bulk density in subsoil' with an equivalent parameter, it shall adopt a criterion for healthy soil condition for the chosen soil descriptor that is equivalent to the criterion set for 'bulk density in subsoil'.~~		

Part A: Tier 1 soil monitoring design

A Member State qualifies for a Tier 1 soil monitoring design if it meets all the criteria defined in column 2 and includes all soil descriptors.

Sampling design

Reference methodology	*Criteria to meet*	*Exceptions*	*Notes*
The sample survey shall be designed from a complete sample frame containing the best available information on the distribution of soil properties, including but not limited to information resulting from previous national measurements and measurements under the LUCAS programme. ***The sampling scheme shall be a stratified random sampling.*** ***The size of the national sample shall meet the requirement of a maximum percent error (or Coefficient of Variation) of 5 % for the estimation of the area having healthy soils.*** ***The Commission sample for the survey set under Article 6(4) shall contribute to a minimum of 20 % of the size of national samples.*** ***The allocation and size of the sample shall be determined by applying the Bethel algorithm (Bethel, 1989) accounting for the required maximum estimation error.***	***(a) Stratified random sampling based on land type; stratifiers may include climatic conditions, soil type, land type, and administrative regions according to Article 4*** ***(b) The estimation of the number of samples shall be compliant with the use of the Bethel algorithm accounting for the required maximum estimation error.*** ***(c) Allow for a percentage (up to 20 % and no less than 10 %) of the sampling sites to be dedicated to targeted sampling related to investigations or risk assessment.***	***In case there is at the Member State level a sampling design that meets the criteria established for Tier 1, the reference methodology can be adapted or other design approaches proposed to the Commission provided that the implemented design provides sufficient coverage of the Member State in line with the reference methodology (including national and LUCAS samples). When adapting the reference methodology, Member States need to still comply with the in-situ design of the EC.***	

Degradation factors

Degradation factor	*Soil descriptor*	*Exceptions*	*Notes*
Soil erosion	— *Soil erosion rate (tonnes of loss soil per hectare per year (t ha^{-1} yr^{-1}))*	-	
Loss of soil organic carbon	— *Soil Organic Carbon (SOC) concentration (g of Carbon per kg (g kg^{-1}))*	-	*To be conducted for top soil (0-10cm, 10-30cm)*
Soil compaction	— *Bulk density in topsoil (g cm^{-3})*	-	*To be conducted for top soil (0-10cm, 10-30cm (optional))*
Excess nutrient content in soil	— *Available phosphorus (mg kg^{-1})* — *Total Nitrogen in soil (mg g^{-1})*	-	*To be conducted for top soil (0-10cm, 10-30cm)*
Soil contamination	— *Concentration of heavy metals in soil: As, Sb, Cd, Co, Cr (total), Cr (VI), Cu, Hg, Pb, Ni, Tl, V, Zn (µg per kg)* — *Concentration of a selection of organic contaminants established by Member States and taking into account contaminants covered by Regulation (EU) No 2019/1021 and existing concentration limits e.g. for water quality and air emissions in Union legislation especially priority substances under the Water Framework Directive and related Environmental Quality Standards (Directive 2008/105/EC) and the Groundwater (Directive 2006/118/EC) Directives* — *Plant protection product candidates for substitution and substances authorised under emergency regime, and biocides residues* — *Per- and poly-fluorinated alkyl substances (PFAS) total or sum of PFAS total*	-	*To be conducted for top soil (0-10cm, 10-30cm (optional))*

Reduction of water retention	— *Soil water holding capacity of the soil sample (% of volume of water)* — *Volume of saturated soil*	-	*To be conducted for top soil (0-10cm, 10-30cm (optional))*
Acidification	— *Soil acidity (pH H_2O)*	-	*To be conducted for top soil (0-10cm, 10-30cm (optional))*

Soil ecological functions

Ecological function	*Soil descriptor*	*Exceptions*	*Notes*
Soil aggregation	— *water-stable aggregates (%)*	-	*To be conducted for top soil (0-10cm, 10-30cm (optional))*
Soil respiration	— *Soil microbial basal respiration (µl O_2 h^{-1} g^{-1} soil dry weight)*	-	*To be conducted for top soil (0-10cm, 10-30cm (optional))*
Soil biomass	— *Soil microbial biomass carbon (Cmic µg C g^{-1} soil dry weight)*	-	*To be conducted for top soil (0-10cm, 10-30cm (optional))*

Soil biodiversity

Soil biodiversity feature	*Soil descriptor*	*Exceptions*	*Notes*
Taxonomic diversity	— *Diversity of soil organisms through (presence counts per taxonomic group) based on metabarcoding targeting the 16S and 18S rRNA gene regions and using the Internal transcribed spacer region (ITS) in particular for Fungi (additionally, other markers like COI for soil fauna can be considered)*	-	*To be conducted for top soil (0-10cm, 10-30cm (optional))*
Population abundance	— *Total abundances of bacteria and archaea (using 16S rRNA gene region copies)* — *Total abundances of fungi (using 18S rRNA gene region copies)* — *Total number and proportion of pathogenic fungi*	-	*To be conducted for top soil (0-10cm, 10-30cm (optional))*

	— ***Total nematode abundance per functional group based on morphology (bacterial feeders, fungal feeders, root feeders, omnivores, predators)***		

Soil habitat

Soil habitat feature	***Soil descriptor***	***Exceptions***	
Soil structure	— ***Size class proportions (sand, silt, clay)*** — ***Proportion of coarse materials (>2mm)***	*-*	***To be conducted for top soil (0-10cm, 10-30cm)***

[Am. 198]

~~***Part B: soil descriptors with criteria for healthy soil condition established at Member States level***~~

~~Excess nutrient content in soil~~	~~Extractable phosphorus (mg per kg)~~	~~< 'maximum value'; The 'maximum value' shall be laid down by the Member State within the range 30-50 mg kg^{-1}~~	~~No exclusion~~
~~Soil contamination~~	~~- concentration of heavy metals in soil: As, Sb, Cd, Co, Cr (total), Cr (VI), Cu, Hg, Pb, Ni, Tl, V, Zn (µg per kg)~~ ~~- concentration of a selection of organic contaminants established by Member States and taking into account existing concentration limits e.g. for water quality and air emissions in Union legislation~~	~~Reasonable assurance, obtained from soil point sampling, identification and investigation of contaminated sites and any other relevant information, that no unacceptable risk for human health and the environment from soil contamination exists. Habitats with naturally high concentration of heavy metals that are included in Annex I of Council Directive 92/43/EEC ([3]) shall remain protected.~~	~~No exclusion~~

([3]) ~~Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (OJ L 206, 22.7.1992, p. 7).~~

~~Reduction of soil capacity to retain water~~	~~Soil water holding capacity of the soil sample (% of volume of water / volume of saturated soil)~~	~~The estimated value for the total water holding capacity of a soil district by river basin or subbasin is above the minimal threshold. The minimal threshold shall be set (in tonnes) by the Member State at soil district and river basin or subbasin level at such a value that the impacts of floodings following intense rain events or of periods of low soil moisture due to drought events are mitigated.~~	~~No exclusion~~

Part B: Tier 2 soil monitoring design

A Member State qualifies for a Tier 2 soil monitoring design if:

— ***it cumulatively includes all the soil descriptors for Tier 1 and the criteria defined in column 2 for the sampling design in Part B and includes at least 50 % of the soil descriptors in Part B, or,***

— ***cumulatively meets the criteria for soil sampling design of Tier 1 and includes all the soil descriptors in Parts A and B.***

Sampling design

Reference methodology	*Criteria to meet*	*Exceptions*	*Notes*
Stratified systematic sampling using a spatial grid to ensure a homogeneous coverage of the Member State territory for all land types. Auxiliary information such as environmental zones or soil types can also be used to further refine the sampling design. When available, Member States shall coordinate allocation of sampling points with other existing monitoring programmes such as national vegetation and forest inventories. The same applies to other types of censuses like the agricultural census to allow for a better data collection regarding management practices and an optimization of costs. The allocation and size of the sample shall be determined by scientifically established methods for the applied sampling design, such as those referenced to in Bethel (1989) for stratified random sampling.	***(a) Ensure the homogeneous coverage of the Member State territory for all land types (e.g., by implementing a systematic stratifier (e.g., a continuous grid) as part of the sampling design.*** ***(b) Stratified random sampling based on land type; stratifiers may include climatic conditions, soil type, land type, and administrative regions according to Art. 4*** ***(c) The estimation of the overall minimum number of samples shall follow the procedure in Tier 1.*** ***(d) Allow for 20 % of the sampling sites to be dedicated to targeted sampling related to investigations or risk assessment.***	-	***It is recommended that the design and implementation of the soil monitoring system includes multiple stakeholders and, when needed, international border agreements, to ensure that cost effective measures are considered and that available expertise is taken in consideration.***

Degradation factors

Degradation factor	*Soil descriptor*	*Exceptions*	*Notes*
Salinisation	— *Electrical Conductivity (Siemens per meter (S m^{-1}))*	*-*	*To be conducted for top soil (0-10cm, 10-30cm (optional))*
Land take	— *Soil sealing (as percentage of land sealed by any type of man-made infrastructures per 100m2)*	*-*	*As reference, the sampling site should be considered the centroid of this assessment*
Soil contamination	— *Pharmaceutical and veterinary products*	*-*	
Soil compaction	— *Bulk density in subsoil; Member States may replace this descriptor with an equivalent parameter (g per cm^3)*	*Non-managed soils in natural land areas*	*To be conducted for sub soil (30-50, 50-100cm)*

Soil ecological functions

Ecological function	*Soil descriptor*	*Exceptions*	
Nutrient cycling	— *nitrogen mineralisation,* — *nitrogen availability*	*-*	*To be conducted for top soil (0-10cm, 10-30cm (optional))*
Soil aggregation	— *water stable fraction-coarse matter*	*-*	*To be conducted for top soil (0-10cm, 10-30cm (optional))*
Enzymatic activity	— *Enzymatic activity potential for acid phosphatase (EC 3.13.2)* — *Enzymatic activity potential for N-acetylglucosaminidase (EC 3.2.1.50)* — *Enzymatic activity potential for xylosidase (EC 3.2.1.37)* — *Enzymatic activity potential for cellobiohydrolase (EC 3.2.1.91)* — *Enzymatic activity potential for β-glucosidase (EC 3.2.1.21)*	*-*	*To be conducted for top soil (0-10cm, 10-30cm (optional))*
Soil biomass	— *Microbial biomass as indicated by marker fatty acids (biomass per microbial functional group; ng FAME g^{-1} soil dry weight)*	*-*	*To be conducted for top soil (0-10cm, 10-30cm (optional))*

Soil biodiversity

Soil biodiversity feature	***Soil descriptor***	***Exceptions***	***Notes***
Taxonomic diversity	— ***Diversity (richness) of soil animals per group based on morphological methods and may also include image identification (Nematodes (for nematodes, classification should be done at least to family level) and Earthworms (for earthworms, classification should be done down to species level))*** — ***Metagenome-based soil biodiversity taxonomic counts per taxonomic group***	-	***To be conducted for top soil (0-10cm, 10-30cm (optional))***
Population abundance	— ***Total abundances of fungi (using the Internal transcribed spacer region (ITS))***	-	***To be conducted for top soil (0-10cm, 10-30cm (optional))***

Soil habitat

Soil habitat feature	***Soil descriptor***	***Exceptions***	***Notes***

[Am. 199]

~~***Part C: soil descriptors without criteria***~~

~~**Aspect of soil degradation**~~	~~**Soil descriptor**~~
~~Excess nutrient content in soil~~	~~Nitrogen in soil (mg g^{-1})~~
~~Acidification~~	~~Soil acidity (pH)~~
~~Topsoil compaction~~	~~Bulk density in topsoil (A-horizon ([4])) (g cm^{-3})~~
~~Loss of soil biodiversity~~	~~Soil basal respiration ((mm^3 O_2 g^{-1} hr^{-1}) in dry soil~~ ~~Member States may also select other optional soil descriptors for biodiversity such as:~~ ~~- metabarcoding of bacteria, fungi, protists and animals;~~ ~~- abundance and diversity of nematodes;~~ ~~- microbial biomass;~~ ~~- abundance and diversity of earthworms (in cropland);~~ ~~- invasive alien species and plant pests~~

Part C: Tier 3 soil monitoring design

A Member State qualifies for a Tier 3 soil monitoring design if it meets Tier 2 conditions and includes at least 50 % of the soil descriptors in Part C.

Degradation factors

Degradation factor	***Soil descriptor***	***Exceptions***	***Notes***
Soil contamination	— ***Concentration of microplastics and nanoplastics***	-	***To be conducted for top soil (0-10cm, 10-30cm (optional))***

([4]) ~~As defined in the FAO Guidelines for Soil Description, Chapter 5 (https://www.fao.org/3/a0541e/a0541e.pdf)~~

Soil ecological functions			
Ecological function	***Soil descriptor***	***Exceptions***	***Notes***
Soil biomass	— ***Soil animal biomass (per taxonomic group (Nematodes and Earthworms); mg fresh (for Nematodes)/dry (for Earthworms) weight per g of dry soil)*** — ***Root biomass (mg dry weight per g soil dry weight)***	-	***To be conducted for top soil (0-10cm, 10-30cm (optional))***
Community traits of roots	— ***Total nitrogen present in roots*** — ***Root length density*** — ***Mean root diameter*** — ***Variation in root diameter*** — ***Root dry matter content***	-	***To be conducted for top soil (0-10cm, 10-30cm (optional))***
Soil biodiversity			
Soil biodiversity feature	***Soil descriptor***	***Exceptions***	***Notes***
Taxonomic diversity	— ***Diversity (richness) of soil animals per group (Collembola and mites)*** — ***Presence of invasive alien species*** — ***Diversity of viruses using metagenomic approaches***	-	***To be conducted for top soil (0-10cm, 10-30cm (optional))***
Population abundance	— ***Total abundance of soil animals per taxa (for Nematodes and Earthworms)***	-	***To be conducted for top soil (0-10cm, 10-30cm (optional))***
Soil habitat			
Soil habitat feature	***Soil descriptor***	***Exceptions***	***Notes***

[Am. 200]

Part D: land take and soil sealing indicators	
Aspect of soil degradation	**Land take and soil sealing indicators**
Land take and soil sealing	Total artificial land (km² and % of Member State surface) Land take, Reverse land take Net land take (average per year–- in km² and % of Member State surface) Soil sealing (total km² and % of Member State surface) Member States may also measure other related optional indicators such as: — land fragmentation — land recycling rate — land taken for commercial activities, logistic hubs, renewable energies, surfaces such as airports, roads, mines — consequences of land take such as quantification of loss of ecosystem services, change in floods intensity

ANNEX II

METHODOLOGIES

~~Part A: Methodology for determining sampling points~~

~~**Activity**~~	~~**Minimum criteria for methodology**~~
~~Determination of soil sampling points (sample survey)~~	~~The sample survey shall be designed from a complete sample frame containing the best available information on the soil properties distribution, including but not limited to information resulting from previous national measurements and measurements under the LUCAS programme.~~ ~~The sampling scheme shall be a stratified random sampling optimized on the soil health descriptors.~~ ~~The size of the national sample shall meet the requirement of a maximum percent error (or Coefficient of Variation) of 5 % for the estimation of the area having healthy soils.~~ ~~The Commission sample for the survey set under Art 6(4) may contribute to a maximum of 20 % of the size of national samples.~~ ~~The allocation and size of the sample shall be determined by applying the Bethel algorithm (Bethel, 1989) ([1]) accounting for the required maximum estimation error.~~

Part A: General methods so sample soil biodiversity and soil ecological functions

Activity	***Reference criteria for methodology***
Soil ecological monitoring	***The aim shall be to use a simple soil sampling protocol that can standardise soil ecological sampling across Member States and that is applicable to all Tier 1 and Tier 2 ecological soil descriptors (soil ecological functions, soil biodiversity and soil habitat descriptors) with the exception of soil fauna descriptors.*** ***Following the sampling protocol adopted for SoilBON, considering a homogeneous square area of 30x30 meters, establish nine subsamples matching the corners of the squares, its centre, and the intermediate points. Using a metal soil corer or similar, extract the soil with a volume of 5 cm diameter and 10 cm depth. Soil depth can be increased to 30 cm, but the first (up to 10 cm) and second layer should be separated.***
Soil fauna monitoring	***For earthworms: hand sorting using protocols according to the sampling protocol laid out in Briones et al. 2020.*** ***For nematodes: following the criteria established in the standard SoilBON sampling protocol.*** ***For Collembola and mites: following the protocols established in Potapov et al. 2022.***
Other point-based soil descriptors	***Member States shall use the LUCAS Soil methodology as a reference for soil sampling.***

[Am. 201]

([1]) ~~Bethel, J. 1989. 'Sample Allocation in Multivariate Surveys.' Survey Methodology 15: 47–57.~~

Part B: Methodology for determining or estimating the values of soil descriptors

When a reference methodology is set, either the reference methodology is used or another methodology, provided that it is available in the scientific literature or publicly available and a validated transfer function is available.

Soil descriptor	**Reference methodology**	**Minimum methodological criteria**	**Validated transfer function required (if using a methodology different from the reference methodology [2])?**
Soil texture (clay, silt and sand content needed for the determination of other descriptors and related ranges)	Preferred method: ISO 11277:1998 Determination of particle size distribution in mineral soil material – Method by sieving and sedimentation Alternative method: ISO13320:2009 Particle size analysis – Laser diffraction methods		YES
Electrical Conductivity	Option 1: saturated soil paste extract (eEC) measurement method (FAO SOP: GLOSOLAN-SOP-08 [3]) Option 2: ISO 11265:1994 Determination of The Specific Electrical Conductivity;		YES
Soil erosion rate		Soil erosion rate estimation shall take into account all actions taken to mitigate or compensate the erosion risk, including post-fire mitigation measures. Soil erosion rate estimation shall include all relevant erosion processes such as erosion by water, wind, harvest and tillage. Soil erosion by water shall be assessed by considering the following factors: - soil characteristics (e.g. erodibility, soil crusting, soil roughness), - climate (e.g. rainfall erosivity – intensity and duration, considering relevant climate change projections for a given area), - topography (e.g. slope steepness and length),	N/A

[2] The methodologies different from the reference methodology shall either be available in the scientific literature or publicly available.
[3] https://www.fao.org/3/cb3355en/cb3355en.pdf

Soil descriptor	Reference methodology	Minimum methodological criteria	Validated transfer function required (if using a methodology different from the reference methodology [2])?
		- vegetation cover, crop type, land use and management practices to control or reduce erosion, - management practices (e.g. cover crops, reduced tillage, mulching, etc.), - burned areas. Soil erosion by wind shall be assessed by considering the following factors: - soil characteristics (e.g. erodibility), - climate (e.g. soil moisture, wind speed, evaporation), - vegetation (e.g. crop type), - management practices to control or reduce erosion (e.g. wind breaks).	
Soil Organic Carbon (SOC)	ISO 10694:1995 Determination of organic and total carbon after dry combustion		YES
Bulk density in subsoil (B horizon [4]) or equivalent [5] parameter chosen by Member States	ISO 11272:2017 for determination of dry bulk density In case an equivalent parameter is chosen, the methodology shall be either a European or International standard when available; if such standard is not available, the methodology chosen shall either be available in the scientific literature or publicly available.		YES
Extractable phosphorus	ISO 11263:1994 for spectrometric determination of phosphorus soluble in sodium hydrogen carbonate solution (P-Olsen)		YES
- Concentration of heavy metals in soil: As, Sb, Cd, Co, Cr (total), Cr (VI), Cu, Hg, Pb, Ni, Tl, V, Zn - Concentration of a selection of organic contaminants defined by Member States and taking into account existing EU legislation (e.g. on water quality or pesticides)	Potential environmental available content of heavy metals in soils based on ISO 17586:2016 using dilute nitric acid.	Use European or International standards when available; if such standard is not available, the methodology chosen shall either be available in the scientific literature or publicly available	YES N/A

[2] The methodologies different from the reference methodology shall either be available in the scientific literature or publicly available.
[4] As defined in the FAO Guidelines for Soil Description, Chapter 5 (https://www.fao.org/3/a0541e/a0541e.pdf)
[5] Equivalent according to the EEA report: Soil monitoring in Europe – Indicators and thresholds for soil health assessments — European Environment Agency (europa.eu)

Soil descriptor	Reference methodology	Minimum methodological criteria	Validated transfer function required (if using a methodology different from the reference methodology [2])?
Soil water holding capacity	Methodology to determine the value for one sample point: Option 1: LABORATORY: ISO 11274:2019 for determination of the water-retention characteristic. Option 2: ESTIMATION: apply methodology described in the scientific article 'New generation of hydraulic pedotransfer functions for Europe' [6] based on texture (or particle size distribution) and soil organic carbon.	Minimum criteria for estimating the total soil water holding capacity of a soil district on a river basin or sub-basin scale: - for the area of land not taken estimate the total value of soil water holding capacity - for the area of land taken, consider setting the water holding capacity of impervious areas to zero, attributing proportionately intermediate values to semi-impervious and other artificial areas.	YES (for point value)
Nitrogen in soil	ISO 11261:1995 for determination of total soil nitrogen using a modified Kjeldahl method		YES
Soil acidity	ISO 10390:2005 for determination of pH in H2O and CaCl2 extract (pH-H2O and pH-CaCl2)		YES
Bulk density in 'topsoil' (A-horizon [7])	ISO 11272:2017 for determination of dry bulk density		YES
Soil basal respiration Member States may also select optional soil biodiversity descriptors such as: -Metabarcoding [8] of bacteria, fungi, protists and animals; - Abundance and diversity of nematodes; - Microbial biomass; - Abundance and diversity of earthworms (in cropland)	Follow indications described in the scientific article 'Microbial biomass and activities in soil as affected by frozen and cold storage' [9]	Use European or international standards when available; if such standard is not available, the methodology chosen shall either be available in the scientific literature or publicly available.	YES For other soil biodiversity descriptors: N/A

[2] The methodologies different from the reference methodology shall either be available in the scientific literature or publicly available.
[6]
[7] As defined in the FAO Guidelines for Soil Description, Chapter 5 (https://www.fao.org/3/a0541e/a0541e.pdf)
[8] Sequencing of DNA barcodes for measuring taxonomical and functional diversity of archaea, bacteria, fungi and other eukaryotes as was done for LUCAS Soil Biodiversity based on https://doi.org/10.1111/ejss.13299
[9] https://www.sciencedirect.com/science/article/abs/pii/S0038071797001259

Soil descriptor	*Reference methodology*	*Minimum methodological criteria*	*Validated transfer function required (if using a methodology different from the reference methodology)*
Soil texture (clay, silt and sand content – needed for the determination of other descriptors and related ranges)	***Preferred method: ISO 11277:1998 Determination of particle size distribution in mineral soil material – Method by sieving and sedimentation Alternative method: ISO13320:2009 Particle size analysis – Laser diffraction methods***		**YES**
Electrical Conductivity	***Option 1: saturated soil paste extract (eEC) measurement method (FAO SOP: GLOSOLAN-SOP-08*** [10]***) Option 2: ISO 11265:1994 Determination of The Specific Electrical Conductivity;***		**YES**
Soil erosion rate		***Soil erosion rate estimation shall take into account all actions taken to mitigate or compensate the erosion risk, including post-fire mitigation measures.*** ***Soil erosion rate estimation shall include all relevant erosion processes such as erosion by water, wind, harvest and tillage.*** ***Soil erosion by water shall be assessed by considering the following factors:*** — ***soil characteristics (e.g. erodibility, soil crusting, soil roughness),*** — ***climate (e.g. rainfall erosivity – intensity and duration, considering relevant climate change projections for a given area),*** — ***topography (e.g. slope steepness and length),*** — ***vegetation cover, crop and forest type, land use and management practices to control or reduce erosion,*** — ***management practices (e.g. cover crops, reduced tillage, mulching, etc.),*** — ***burned areas.***	**N/A**

[10] ***https://www.fao.org/3/cb3355en/cb3355en.pdf***

Soil descriptor	*Reference methodology*	*Minimum methodological criteria*	*Validated transfer function required (if using a methodology different from the reference methodology)*
		Soil erosion by wind shall be assessed by considering the following factors: — ***soil characteristics (e.g. erodibility),*** — ***climate (e.g. soil moisture, wind speed, evaporation),*** — ***vegetation (e.g. crop type),*** — ***management practices to control or reduce erosion (e.g. wind breaks),*** — ***burned areas***	
Soil Organic Carbon (SOC)	***ISO 10694:1995 Determination of organic and total carbon after dry combustion***		***YES***
Bulk density in subsoil or equivalent [11] ***parameter chosen by Member States***	***ISO 11272:2017 for determination of dry bulk density*** ***In case an equivalent parameter is chosen, the methodology shall be either a European or International standard when available; if such standard is not available, the methodology chosen shall either be available in the scientific literature or publicly available.***		***YES***
Extractable phosphorus	***ISO 11263:1994 for spectrometric determination of phosphorus soluble in sodium hydrogen carbonate solution (P-Olsen)***		***YES***
— ***Concentration of heavy metals in soil: As, Sb, Cd, Co, Cr (total), Cr (VI), Cu, Hg, Pb, Ni, Tl, V, Zn***	***Potential environmental available content of heavy metals in soils based on ISO 17586:2016 using dilute nitric acid.***	***Use European or International standards when available; if such standard is not available, the methodology chosen shall either be available in the scientific literature or publicly available***	***YES*** ***N/A***

[11] ***Equivalent according to the EEA report: Soil monitoring in Europe – Indicators and thresholds for soil health assessments — European Environment Agency (europa.eu)***

Soil descriptor	*Reference methodology*	*Minimum methodological criteria*	*Validated transfer function required (if using a methodology different from the reference methodology)*
— *Concentration of a selection of organic contaminants defined by Member States and taking into account existing EU legislation (e.g. on water quality or pesticides)* — *Pesticide and biocides residues, veterinary products* — *PFAS*			
Soil water-holding capacity	*Methodology to determine the value for one sample point: Option 1: LABORATORY: ISO 11274:2019 for determination of the water-retention characteristic. Option 2: ESTIMATION: apply methodology described in the scientific article 'New generation of hydraulic pedotransfer functions for Europe' based on texture (or particle size distribution) and soil organic carbon.*	*Minimum criteria for estimating the total soil water-holding capacity of a soil district on a river basin or sub-basin scale:* — *for the area of land not taken estimate the total value of soil water holding capacity* — *for the area of land taken, consider setting the water-holding capacity of impervious areas to zero, attributing proportionately intermediate values to semi-impervious and other artificial areas.*	**YES**
Nitrogen in soil	*ISO 11261:1995 for determination of total soil nitrogen using a modified Kjeldahl method*		**YES**
Soil acidity	*ISO 10390:2005 for determination of pH in H2O and CaCl2 extract (pH-H2O and pH-CaCl2)*		**YES**
Bulk density in 'topsoil'	*ISO 11272:2017 for determination of dry bulk density*		**YES**

Soil descriptor	*Reference methodology*	*Minimum methodological criteria*	*Validated transfer function required (if using a methodology different from the reference methodology)*
Nutrient cycling	***For nitrogen mineralization, air-dried soil samples are re-wetted to reach 80 % of their water holding capacity and incubated in the laboratory for 14 days at 30°C. The potential net N mineralization rate is estimated as the difference between initial and final inorganic N. The availability of soil nutrients is calculated using root simulators, available N and P is determined by using a colorimetric determination based on the reaction with ammonium molybdate.***		***YES***
Soil aggregation	***These soil descriptors are reported as water-stable soil aggregates assessed by determining the resistance of soil aggregates against water as a disintegrating force, by applying an approach modified from Kemper and Rosenau (1986). The resulting index represents the percentage of water-stable aggregates with a diameter smaller than 4 mm. Additionally, debris (i.e., coarse matter) will be separated from the water-stable fraction to correctly determine the water-stable aggregates (WSA) fraction of the sample: % WSA=(water stable fraction-coarse matter)/(4 g-coarse matter).***		***YES***
Enzymatic activity	***Follow the indications described in Zeiss et al., 2022***		***YES***
Soil respiration	***Follow indications described in the scientific article 'Microbial biomass and activities in soil as affected by frozen and cold storage'*** [12]		***YES***

[12] ***https://www.sciencedirect.com/science/article/abs/pii/S0038071797001259***

Soil descriptor	*Reference methodology*	*Minimum methodological criteria*	*Validated transfer function required (if using a methodology different from the reference methodology)*
Litter decomposition		***Use European or international standards when available; if such standard is not available, the methodology chosen shall either be available in the scientific literature or publicly available.***	**N/A**
Soil biomass	***Follow the indications described in Guerra et al., 2021, Briones et al. 2020, and Potapov et al. 2022***		**YES**
Community traits of roots	***Follow the indications described in Guerra et al., 2021***		**YES**
Taxonomic diversity	***Follow the indications described in Guerra et al., 2021***		**YES**
Population abundance	***Follow the indications described in Guerra et al., 2021***		**YES**
Intraspecific genetic diversity	***Follow the indications described in Guerra et al., 2021***		**YES**
Soil structure	***Granulometric analysis is performed on sieved soil (Ø < 2 mm), after the destruction of the organic matter with H2O2. The dispersion is carried out with a solution of hexametaphosphate/sodium carbonate and stirred for 16 hours. The granulometric fractions considered are those recommended by the International Union of Soil Science (Atterberg Scale), which are coarse sand (2 > Ø > 0.2 mm), fine sand (0.2 > Ø > 0.02 mm), silt (0.02 > Ø > 0.002 mm) and clay (Ø < 0.002 mm). The coarse sand fraction is determined by sieving, the silt and clay fractions are determined by sedimentation and pipetting using a Robinson pipette and the fine sand by sedimentation and decantation. Sedimentation times are calculated using the Stokes Law.***		**YES**

[Am. 202]

Part C: minimum methodological criteria for determining the values of land take and soil sealing indicators

— For land take, reverse land take and net land take, the methodologies used should comply with the definitions set in Article 3 and Annex I.

— Soil sealing shall be expressed as a percentage of sealed area per total area.

— The methodologies chosen shall either be available in the scientific literature or publicly available.

~~Annex III~~

~~SUSTAINABLE SOIL MANAGEMENT PRINCIPLES~~

~~The following principles shall apply:~~

~~(a) avoid leaving soil bare by establishing and maintaining vegetative soil cover, especially during environmentally sensitive periods;~~

~~(b) minimise physical soil disturbance;~~

~~(c) avoid inputs or release of substances into soil that may harm human health or the environment, or degrade soil health;~~

~~(d) ensure that machinery use is adapted to the strength of the soil, and that the number and frequency of operations on soils are limited so that they do not compromise soil health;~~

~~(e) when fertilization is applied, ensure adaptation to the needs of the plant and trees at the given location and in the given period, and to the condition of soil and prioritize circular solutions that enrich the organic content;~~

~~(f) in case of irrigation, maximise efficiency of irrigation systems and irrigation management and ensure that when recycled wastewater is used, the water quality meets the requirements set out in Annex I of Regulation (EU) 2020/741 of the European Parliament and of the Council~~ [1] ~~and when water from other sources is used, it does not degrade soil health;~~

~~(g) ensure soil protection by the creation and maintenance of adequate landscape features at the landscape level;~~ [2]

~~(h) use site-adapted species in the cultivation of crops, plants or trees where this can prevent soil degradation or contribute to improving soil health, also taking into consideration the adaptation to climate change;~~

~~(i) ensure optimised water levels in organic soils so that the structure and composition of such soils are not negatively affected;~~ [3]

~~(j) in the case of crop cultivation, ensure crop rotation and crop diversity, taking into consideration different crop families, root systems, water and nutrient needs, and integrated pest management;~~

~~(k) adapt livestock movement and grazing time, taking into consideration animal types and stocking density, so that soil health is not compromised and the soil's capacity to provide forage is not reduced;~~

~~(l) in case of known disproportionate loss of one or several functions that substantially reduce the soils capacity to provide ecosystem services, apply targeted measures to regenerate those soil functions.~~ **[Am. 260]**

~~(1) 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).~~

~~(2) This principle does not apply to forest soils~~

~~(3) This principle does not apply to urban soils~~

Annex IV

PROGRAMMES, PLANS, TARGETS AND MEASURES REFERRED TO IN ARTICLE 10

The following indicative list of programmes, plans, targets and measures shall be taken into account: **[Am. 214]**

(1) The national restoration plans prepared in accordance with Regulation …/… ([1])+.

(2) The strategic plans to be drawn up by Member States under the Common Agricultural Policy in accordance with Regulation (EU) 2021/2115.

(3) The Code of Good Agricultural Practice and the action programmes for designated vulnerable zones adopted in accordance with Directive 91/676/EEC.

(4) The conservation measures and prioritized action framework established for Natura 2000 sites in accordance with Directive 92/43/EEC.

(5) The measures for achieving good ecological and chemical status of surface water bodies and good chemical and quantitative status of groundwater bodies included in river basin management plans prepared in accordance with Directive 2000/60/EC.

(6) The flood risk management measures included in the flood risk management plans prepared in accordance with Directive 2007/60/EC.

(7) The drought management plans referred to in the Union Strategy on Adaptation to Climate Change.

(8) The national action programmes established in accordance with the United Nations Convention to Combat Desertification.

(8a) The national biodiversity strategies and action plans established in accordance with Article 6 of the United Nations Convention on Biological Diversity. **[Am. 215]**

(9) The targets set out under Regulation (EU) 2018/841.

(10) The targets set out under Regulation (EU) 2018/842.

(11) The national air pollution control programmes prepared under Directive (EU) 2016/2284 and the monitoring data about air pollution impacts on ecosystems reported under that Directive.

(12) The integrated national energy and climate plan established in accordance with Regulation (EU) 2018/1999.

(13) The risk assessments and disaster risk management planning in accordance with Decision No 1313/2013/EU.

(14) The national actions plans adopted in accordance with Article ~~8 of Regulation …/…~~ ([2])***+4 of Directive 2009/128/EC***. **[Am. 216]**

([1]) + OP: please insert in the text the number of Regulation on nature restoration contained in document COM(2022) 304

([2]) ~~+ OP: please insert in the text the number of Regulation of the European Parliament and of the Council the sustainable use of plant protection products and amending Regulation (EU) 2021/2115 contained in document COM(2022)305~~

Annex V

INDICATIVE LIST OF RISK REDUCTION MEASURES

(1) Remediation techniques for in- or ex-situ remediation:

(a) Physical remediation techniques:

(a) Vapor extraction, air sparging;

(b) Heat treatment, steam injection, thermal desorption, vitrification;

(c) Soil washing and flushing;

(d) Electrokinetic extraction;

(e) Liquid layer removal;

(f) Dig and dump.

(b) Biological remediation techniques:

(a) Stimulation of aerobic or anaerobic degradation: bioremediation, biostimulation, bioaugmentation, bioventing, biosparging;

(b) Phytoextraction, phytovolatilization, phytodegradation;

(c) Composting, soil amendments, landfarming, and bioreactor systems;

(d) Biofiltration, biotreatment wetlands, and biobeds;

(e) Natural attenuation.

(c) Chemical remediation techniques:

(a) Chemical oxidation;

(b) Chemical reduction and reduction-oxidation (redox) reactions;

(c) Pump and treat of groundwater.

(d) Remediation techniques for isolation, containment and monitoring:

(a) Surface capping, reactive barriers, encapsulation;

(b) Chemical stabilization, solidification and immobilization;

(c) Geo-hydrological isolation and containment;

(d) Phyto-stabilisation;

(e) Control and aftercare through monitoring wells.

(2) Risk reduction measures other than remediation:

(a) Restriction on the cultivation and consumption of crops and vegetables;

(b) Restriction on the consumption of eggs;

(c) Restriction on the access of pets or husbandry;

(d) Restriction on the extraction or use of groundwater for drinking, personal hygiene or industrial purposes;

(e) Restriction on the demolition, de-sealing, or construction on the site;

(f) Restriction on the access on or in the neighbourhood of the site (e.g. through fencing);

(g) Restriction on land use or land use changes;

(h) Restriction on digging, drilling or excavation;

(i) Restriction to avoid contact with soil, dust or indoor air and apply precautions to protect human health (e.g. respirators, gloves, wet cleaning, etc.).

(3) Best available techniques referred to in Directive 2010/75/EU.

(4) Measures taken by competent authorities and industrial operators following a major accident, in accordance with Directive 2012/18/EU.

Annex VI

PHASES AND REQUIREMENTS FOR SITE-SPECIFIC RISK ASSESSMENT

1. Characterization of the contamination requires identifying the contaminants present at the site and determining their source, concentration, chemical form, and distribution in the soil and groundwater. The presence and concentration of contaminants is determined through soil sampling and investigation.

2. Exposure assessment identifies the path by which soil contaminants may reach receptors. Exposure pathways may include inhalation, ingestion, dermal contact, plant uptake, migration to groundwater or others. This information is combined with the frequency and duration of exposure and receptor characteristics such as age, gender, and health status to estimate the contaminant uptake. The source-pathway-receptor linkages are summarized in a graphic, schematic and simplified representation: the conceptual site model.

3. Toxicity or hazard assessment involves the evaluation of the potential health and environmental effects of the contaminants, based on the dose and duration of exposure. The toxicology or hazard assessment takes into account the inherent toxicity of the contaminants and the susceptibility of different populations, such as animals, micro-organisms, plants, children, pregnant women, elderly, etc. The toxicological information is used to estimate reference doses or concentrations, which are used for the risk characterization.

4. Risk characterization requires integrating the information from the previous steps to estimate the magnitude and probability of adverse effects of the contaminated site for human health and the environment, including from migration of the contamination to other environmental media. The risk characterization helps to prioritize the need for risk reduction and remediation measures. It can also help to define remediation or management objectives for a site, e.g. to achieve maximum acceptable limits or site-specific risk-based screening values.

Annex VII

CONTENT OF REGISTER OF POTENTIALLY CONTAMINATED SITES AND CONTAMINATED SITES

The design and presentation of the data in the register shall enable the public to track progress in the management of potentially contaminated sites and contaminated sites. The register shall contain and present the following information at site level for the known potentially contaminated sites, contaminated sites, contaminated sites requiring further action, and contaminated sites where action was taken or is being taken:

(a) coordinates, address or cadastral parcel(s) of the site in accordance with Directives (EU) 2019/1024 and 2007/2/EC;

(b) year of inclusion in the register;

(c) contaminating or potentially contaminating risk activities that have taken or are taking place on the site;

(d) management status of the site;

(e) conclusion on the presence or absence, concentration, type and risk of the contamination (or residual contamination after remediation) where information on those elements is already available from the soil investigations and risk assessment referred to in Articles 14 and 15;

(f) next actions and management steps required and referred to in Articles 14 and 15, including their timeline.

The register may also contain the following information at site level for the known potentially contaminated sites, contaminated sites, contaminated sites requiring further action, and contaminated sites where action was taken or is being taken, where available:

(a) information on environmental permits issued for the site, including the start and end year of the activity;

(b) current and planned land use;

(c) results of soil investigation and remediation reports such as concentrations and contours of the contamination, conceptual site model, risk assessment methodology, techniques used or planned, effectiveness and cost estimates of risk reduction measures.