



Council of the  
European Union

Brussels, 19 March 2024  
(OR. en)

7612/24

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**Interinstitutional File:  
2023/0232(COD)**

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**LIMITE**

**ENV 276  
CLIMA 108  
AGRI 201  
FORETS 81  
RECH 114  
TRANS 147  
CODEC 769**

**NOTE**

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From:	General Secretariat of the Council
To:	Delegations
No. prev. doc.:	16859/23
No. Cion doc.:	11566/23 + ADD 1
Subject:	Proposal for a Directive of the European Parliament and of the Council on Soil Monitoring and Resilience (Soil Monitoring Law) - Revised Presidency compromise text

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With a view to the meeting of the Working Party on the Environment on 20 March 2024, delegations will find in the Annex a Presidency compromise text on the above Commission proposal.

Changes to the Commission proposal are set out in **bold**, while ~~strikethrough~~ indicates deletions. Modifications to the previous document (16859/23) are marked in **bold underlined** and ~~strikethrough underlined~~

**Proposal for a  
Directive of the European Parliament and of the Council on Soil Monitoring and Resilience  
(Soil Monitoring Law)**

(Text with EEA relevance)

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<sup>1</sup>,

Having regard to the opinion of the Committee of the Regions<sup>2</sup>,

Acting in accordance with the ordinary legislative procedure,

Whereas:

- (1) Soil is a vital, limited **resource, and considered** non-renewable and irreplaceable **at human time scale** 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. However, 60 to 70 % of the soils in the Union are ~~deteriorated~~ **degraded** and continue to deteriorate.

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<sup>1</sup> OJ C , , p. .

<sup>2</sup> OJ C , , p. .

**(2b) Soils also provide services such as acting as a physical platform for infrastructures and human activities, as a source of raw materials, or constituting an archive of geological, geomorphological and archaeological heritage. While these services are often considered soil ecosystem services, they do not necessarily need a functional ecosystem to be provided and are often – especially in the case of platform for infrastructure and source of raw material – incompatible with the other soil ecosystem services as these inherently entail a degradation of the soil. They are also often the most prevalent uses of a soil, causing a significant loss of the aforementioned vital ecosystem services, and contributing to the degradation of the soils. As such, it is important to find a balance between these two types of soil ecosystem services.**

**(2c) Soil degradation affects ecosystem services provided by soils, with negative impacts to human health and the environment, and can cover different aspects related to physical degradation such as soil sealing and soil artificialisation in general, soil erosion, soil compaction and reduction of soil water retention and infiltration, to chemical or biological degradation such as excess and depletion of nutrients, acidification, salinisation and soil contamination, loss of soil organic carbon, soil biodiversity and soil biological activity.**

(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 makes sound economic sense and can significantly increase the price and value of the land in the Union.

- (4) The European Green Deal<sup>3</sup> 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<sup>4</sup>, the Farm to Fork Strategy<sup>5</sup>, the Zero Pollution Action Plan<sup>6</sup>, the EU Climate Adaptation Strategy<sup>7</sup> and the EU Soil Strategy for 2030<sup>8</sup>.
- (5) The Union is committed to the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs)<sup>9</sup>. 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.

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<sup>3</sup> 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.

<sup>4</sup> 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.

<sup>5</sup> 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.

<sup>6</sup> 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.

<sup>7</sup> 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.

<sup>8</sup> 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.

<sup>9</sup> <https://sdgs.un.org/goals>

- (6) The Union and its Member States, as parties to the Convention on Biological Diversity, approved by Council Decision 93/626/EEC<sup>10</sup>, agreed at the 15<sup>th</sup> Conference of the Parties on the “Kunming-Montreal Global Biodiversity Framework” (GBF)<sup>11</sup> 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<sup>12</sup>, have committed to combat desertification and mitigate the effects of drought in affected countries. Thirteen Member States<sup>13</sup> have declared themselves as parties affected by desertification under the UNCCD.
- (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.

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<sup>10</sup> 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).

<sup>11</sup> 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.

<sup>12</sup> 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).

<sup>13</sup> Bulgaria, Croatia, Cyprus, Greece, Hungary, Italy, Latvia, Malta, Portugal, Romania, Slovakia, Slovenia, Spain.

- (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 **EU** 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.

- (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<sup>14</sup>, 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.
- (13) In its conclusions of 23 October 2020<sup>15</sup>, 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<sup>16</sup> 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<sup>17</sup> 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.

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<sup>14</sup> European Parliament resolution of 28 April 2021 on soil protection (2021/2548(RSP)).

<sup>15</sup> Council Conclusions on Biodiversity - the need for urgent action, 12210/20.

<sup>16</sup> 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).

<sup>17</sup> Communication from the European Commission to the European Parliament and to the Council Sustainable Carbon Cycles COM (2021) 800.

- (15) The Commission’s Communication on adaptation to climate change<sup>18</sup> 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<sup>19</sup> 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 to set measures for monitoring and assessing 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.

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<sup>18</sup> 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.

<sup>19</sup> 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. 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).
- (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.

- (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 maintain or enhance soil health and contribute to the sustainability and resilience of the food system.
- (23) The **aspirational** long-term objective of the Directive is to achieve healthy soils 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, and assess and manage the risks of contaminated sites~~ once their condition is established, **as well as assess and manage the risks of contaminated sites**. **However, it does not impose** ~~but without imposing~~ an obligation to achieve healthy soils by 2050 ~~neither~~ intermediate targets. This proportionate approach will allow sustainable soil management and regeneration of unhealthy soils 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 ~~d~~**D**irective if necessary to accelerate progress towards 2050.

(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 **units for the monitoring and assessment of soil health. Soil units should however be under the management of** Soil districts should constitute **appropriate** the basic governance **structures** ~~units~~ **enabling Member States to ensure that the monitoring and assessment are properly undertaken, and that sustainable management** ~~of~~ soils and to take measures **are** carried out to comply with the requirements laid down in this Directive. **Soil districts reflects these administrative structures, while their geographical extent is made up of several soil units**, 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<sup>+</sup>. ~~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<sup>20</sup>.~~

**(24a) To design the sample survey for the soil monitoring, the Member States will need to take into account their soil districts and soil units. In order to ensure sufficient level of harmonisation between Member States the minimum criteria to define soil units should be defined at European level . To delineate the soil units, Member States should therefore take into account at least the soil districts, the land use and, the soil types. In addition, climatic and environmental conditions can be taken into account. For the land-use data, the categories should be aligned with LULUCF regulation. More detailed information at the national or subnational level could be used, when available.**

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<sup>+</sup> 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~~ **Regulation** in the footnote.

<sup>20</sup> ~~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).~~

**In order to ensure consistency between this Directive and the Regulation (EU) 2018/841 of the European Parliament and of the Council<sup>21</sup>, the land-use categories defined in the IPCC Guidelines should apply in this context.**

- (25) In order to ensure an appropriate governance on soils, Member States should be required to appoint a **the one or more** competent authorities<sup>ies</sup> for each soil district. Member States should be allowed to appoint any additional competent authority at **the** appropriate level<sup>s</sup>, including at national or ~~regional~~ **subnational** level.
- (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 **common** soil descriptors that can be measured or estimated. Even if there is significant variability between soil types, climatic conditions and land uses, the current scientific knowledge allows to set criteria at Union level for some of those soil descriptors. However, 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 soil descriptors for which common criteria at EU level cannot be established at this stage. For those descriptors for which clear criteria that would distinguish between healthy and unhealthy condition cannot be identified now, only monitoring and assessment are required. This will facilitate the development of such criteria in future.

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<sup>21</sup> **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).**

**(27a) In order to make a clear distinction between the aspirational long-term objective of the proposal and the operational aspects of implementing sustainable soil management practices, the criteria for healthy soil condition of the soil descriptors are split into non-binding sustainable target values and operational trigger values. The non-binding sustainable target values reflect the long-term aspirational objective of the proposal and do not impose an obligation to act. These target values reflect, based on the current scientific knowledge, the ideal situation where the capacity of soils to provide ecosystem services will not decrease and no significant harm will occur to human health or the environment. However, bearing in mind the need for efficiency and the limited resources available, measures to achieve good soil health need to be prioritized and implemented gradually. Therefore, operational trigger values are needed. These values set in motion appropriate measures to maintain or regenerate soil health. For each aspect of soil degradation, one or several proportional and feasible trigger values are set. This enables a stepwise implementation of measures ranging from vigilance and awareness raising over sustainable management to regeneration practices. Setting the trigger values at Member State level ensures that local conditions and practices and current policies can be fully taken into account.**

~~(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<sup>22</sup>. 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.~~

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<sup>22</sup> 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).

(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.

**(29a) Similarly to the aspirational long-term objective to achieve healthy soils by 2050, and in view of contributing to that objective, the Directive also aims to adopt a staged approach on the issue of land take with the aspirational long-term aim being to contribute to the No Net Land Take objective. To contribute to this long-term goal, it is important to assess the various processes of land take, and aim to reduce and mitigate their impact on soil health and ecosystem services.**

**This Directive thus aims to set up a monitoring framework for the more visible aspects of land take: soil sealing and soil destruction, using already available tools at EU level through the Copernicus products, optionally complemented with national remote sensing data and inventories. The aim is to be as cost-effective and pragmatic as possible at this stage, with the goal of having a harmonised understanding, and to initiate first considerations at the national level, based on sound data.**

(30) Soil is a limited resource subject to an ever-growing competition for different uses. Land take **is a process which causes a modification of land use and of the characteristics of the soil. It can be seen as an overarching concept that can be subdivided into multiple indicators. First, an indicator of land use change from natural and semi-natural land uses towards settlement areas. Second, an indicator of the artificialisation of soils caused by the durable alteration of the soil components and characteristics, resulting in a loss of the capacity of soils to provide ecosystem services.**

**This last indicator of land take, soil artificialisation, can be further divided into three main processes: soil sealing, soil destruction, and other types of soil artificialisation. Soil sealing can be equated to a covering of the soils with artificial materials, impermeable or (semi-)permeable, often combined with a destruction of soils. Buildings and roads are an example of impermeable soil sealing. Train tracks with associated permeable materials are a type of semi-permeable soil sealing.**

Soil destruction is the destruction of the surface layer of the soil and sometimes the subsoil. It can be seen most predominantly during construction works, mining, quarrying, and more insidiously in examples such as waste disposal and dumping grounds.

Finally, there are other, less visible types of soil artificialisation, which could be for example the intentional stabilisation and compaction of soil, the modification of layers of soil or subsoil with the inclusion of artificial materials or the partial covering of soil with composite materials.

Soil artificialisation is as such a type of soil degradation which can be one of the most impactful on soil health, as it can lead up to a complete loss of soil through soil destruction and the total loss of soil functions, reducing the services provided by soil to a platform for infrastructure and a source of raw materials. The most visible and impactful sub-types of soil artificialisation – soil sealing and destruction – are however also the easiest to monitor, and are as such the main focus of the monitoring in this Directive.

**(30a) Among the land take indicators, the growth of settlement areas** is a process often driven by economic development needs, ~~that transforms~~**which entails a land use change from** natural and semi-natural areas (including **protected forests, natural grasslands, peatlands, agricultural and forestry land, gardens and parks**) ~~into artificial land~~**to settlement area, for example as part of urban** development.

**Settlement areas, as described in the revised Regulation on Land Use, Land Use Change and Forestry, includes all developed land -- i.e. residential, transportation, commercial, and production (commercial, manufacturing) infrastructure of any size, unless they are already included under other land-use categories. It also includes soils, herbaceous perennial vegetation such as turf grass and garden plants, trees in rural settlements, homestead gardens and urban areas.**

**In particular, this aspect of land take often affects the most fertile agricultural soils, putting food security in jeopardy, by “taking” them for settlement use instead. This change of land use is often, but not always, a precursor to some other aspects of land take, in particular to soil sealing, and as such is important to monitor in order to anticipate at least part of the process of soil sealing. It is also important to note that settlements are not always fully sealed. On the contrary, a significant amount of urban area still retains important amounts of unsealed soils, sometimes even higher than 50% of their surface. This indicator of land take alone thus is not sufficient to fully monitor the issue, as it does not differentiate between sealed and unsealed soils, and invisibilises the green areas within settlement areas, making their monitoring and sustainable management more difficult.**

**(30b) Unsealed soils in settlement areas, and in densely populated urban areas in particular, are as important to monitor and manage sustainably as any other soils, as they still provide ecosystem services that are vital in maintaining a good quality of life within urban areas. These densely populated areas combine and concentrate a wide array of environmental issues in a comparatively smaller surface area. These issues can go from a higher rate of contaminated sites due to past industries, to higher risk of flooding because of soil sealing, to a higher prevalence of heat islands and a more limited access to green areas essential for mental and physical wellbeing. Soil ecosystem services provided by healthy soils in urban area can as such have a very strong positive impact on a great quantity of people by tackling those specific issues and their importance should not be minimised. Those green spaces, both public and private, also contribute to the blue-green network and biodiversity, and are a key element for other environmental policies. This is also in line with Article 8 of Regulation .../...<sup>23</sup>+ on the restoration of urban ecosystems, which reflects the need for Member States to maintain and increase the surface of urban green spaces.**

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<sup>23</sup> + OP : please insert in the text the number of Regulation on nature restoration contained in document COM(2022) 304

**(30c) On the other hand, soil sealing and destruction, as part of the soil artificialisation process of land take, are different from settlement growth, as they do not focus on a land use change, but rather on a concrete and measurable change in the soil cover and soil characteristics. In soil sealing, the using soil is for example modified and reduced to serving as a platform for constructions and infrastructure, including buildings, roads, parkings, and other mineral surfaces. Soil destruction might be caused when the soil is used as a direct source of raw material such as minerals and lignite, during mining or quarrying activities, during construction works or as part of soil sealing. ~~or as archive for historic patrimony such as archeological sites or national monuments.~~ It can also be found in dumping grounds.** These ~~is~~ transformations 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~~ **soil sealing is often affects done on the most fertile agricultural soils, putting contributing further to the disruption of** food security ~~in jeopardy~~. Sealed soil also exposes human settlements to higher flood peaks and more intense heat island effects. **In addition, sealed and destroyed soils are the easiest of the soil artificialisation aspects to monitor through remote sensing and machine learning, making their monitoring easier.** Therefore, **sealed and destroyed soils were selected** it is necessary to **be monitored** land take and soil sealing and **together with** their effects on soil's capacity to provide ecosystem services.

**(30d) Regarding the soil sealing and destruction aspect of land take when it comes to the specific case of renewable energies, it has to be assessed on a case by case basis. For example, solar parks could either be considered as soil sealing or not, depending on what is done with the soil at their base. If the soil can still sustain an ecosystem, then it is not considered soil sealing. Inventories of this type of areas can be intersected with the remote sensing maps of soil sealing to remove these areas from the map as needed. In the case of train tracks, as they are considered soil sealing, the goal would be to minimise the impact of this soil sealing, both in the surface sealed, but also on the surrounding soils, for example during the construction works.**

**(30e) The principle of the reduction of the impact is essential when it comes to soil sealing and destruction in general. Indeed, it is vital to find a balance between the needed economical and demographic growth, and the provision of ecosystem services. As such, it is also appropriate to lay down certain principles to mitigate the impacts of land take soil sealing and destruction as part of sustainable soil management. Those principles are effort-based and not result-based in the context of this Directive, and should be sufficiently general to cover a large set of good practices aimed at minimizing and compensating offsetting the loss of soil's capacity to provide ecosystem services, and based on the avoid, reduce, compensate principle of circularity. These can cover a wide array of practices such as minimising soil sealing, ~~unde~~-sealing and renaturating previously sealed soils, rational densification of urbanised areas while safeguarding green spaces – including urban green spaces – and natural terrains, revitalisation of brownfields, priviledging time-limited land take and performing land rehabilitation upon the termination of the land.**

**It should be noted that, to be as sustainable as possible in the application of these principles, the offsetting measures, depending on the ecosystem service to be offset, might need to be geographically as close as possible to the source of the loss of ecosystem service. Indeed, a collateral issue to this kind of principles if applied wrongly, can be the displacement – sometimes very far away – of green and high value ecosystem areas away from the sealed places, with a complete concentration of soil sealing and destruction in the affected areas.**

(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.

**It is also appropriate to consider the specific situation of the Union's outermost regions, as listed in Article 349 of the Treaty on the Functioning of the European Union (TFEU), which provides for specific measures to support those regions. Therefore, Member States should be able to adapt, when necessary, the monitoring and assessment of soil health obligations to their outermost region's specific characteristics.**

The grid of sampling points should be determined by using geostatistical methods, **be based on the soil units** and be sufficiently dense to provide an estimation of the area of **healthy degraded** 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. **The design of the sample survey should be using the best available information on soil properties distribution, including, but not limited to information resulting from previous national or subnational surveys, relevant measurements from soil managers and measurements under the LUCAS programme and ICP Forest Program. Data obtained from sampling points taken during soil investigations at contaminated sites may be used for the assessment of soil health criteria provided they are not linked to the contaminating activity.**

- (32) 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, **and subject to the agreement of Member States**, the LUCAS Programme **shall** be enhanced and upgraded to fully align it with the specific quality requirements 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. 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, and in compliance with applicable national or Union legislation.
- (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 soil indicators of soil sealing and destruction**, 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 **and indicators**.

- (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<sup>24</sup> and the EU data spaces and which should be a hub providing access to soil data coming from various sources, **in the aggregated form**. That portal should primarily include all the data collected by the Member States and the Commission as required by this Directive. 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.
- (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 in order to have more comparable data across the Union. **In this respect it is very important to ensure the quality and comparability of soil measurements through the application of quality management systems.**

**(35a) In order to ensure the protection of 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.**

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<sup>24</sup> 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.

- (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, **in the aggregated form**, for relevant stakeholders such as farmers, foresters, land owners and local authorities. **Besides, soil health data made available pursuant to this Directive can be used for monitoring of soil-related aspects in other Union legislation, where relevant.**
- (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 sustainable soil management principles to guide soil management practices.

- (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 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.
- (39) Pursuant to Regulation (EU) 2021/2115 of the European Parliament and of the Council<sup>25</sup>, 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.

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<sup>25</sup> 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).

(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.

**(40a) In order to support the Member States in the sustainable management of soil contamination other than anthropogenic point-source contamination already dealt with the management of contaminated sites, and to stimulate harmonisation in this respect, the European Commission with the support of the EEA should establish guidelines.**

(41) Regeneration **and renaturation** 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. **In the case of renaturation, and in the context of this Directive, it goes beyond regeneration in that it also covers the reconstruction of soils following soil sealing or destruction, and is also a way of countering soil artificialisation in the broad sense, by recovering more natural components and processes for a soil that was artificialised. The end goal is to get as close as possible to the natural functioning of the soil and its optimal ecosystem services provision.**

(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<sup>26</sup>; 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<sup>27</sup>, the conservation measures and prioritized action framework established for Natura 2000 sites in accordance with Council Directive 92/43/EEC<sup>28</sup>, 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<sup>29</sup>, the flood risk management measures established in accordance with Directive 2007/60/EC of the European Parliament and of the Council<sup>30</sup>, the drought management plans promoted in the Union Strategy on Adaptation to Climate Change<sup>31</sup>, 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<sup>32</sup> and

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<sup>26</sup> OP : 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~~

<sup>27</sup> 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).

<sup>28</sup> 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).

<sup>29</sup> 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).

<sup>30</sup> 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).

<sup>31</sup> 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.

<sup>32</sup> 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).

Regulation (EU) 2018/842 of the European Parliament and of the Council<sup>33</sup>, the integrated national energy and climate plans established in accordance with Regulation (EU) 2018/1999 of the European Parliament and of the Council<sup>34</sup>, the national air pollution control programmes prepared under Directive (EU) 2016/2284 of the European Parliament and of the Council<sup>35</sup>, risk assessments and disaster risk management planning established in accordance with Decision No 1313/2013/EU of the European Parliament and of the Council<sup>36</sup>, ~~the~~ and national action plans established in accordance with Regulation (UE) .../... of the European Parliament and of the Council<sup>37</sup>, **and the national actions plans adopted in accordance with Article 4 of Directive 2009/128/EC of the European Parliament and of the Council**<sup>38</sup>. 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<sup>39</sup>, should be accessible to the competent authorities responsible for sustainable soil management and regeneration practices and soil health assessment in

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<sup>33</sup> 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).

<sup>34</sup> 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).

<sup>35</sup> 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).

<sup>36</sup> 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).

<sup>37</sup> + 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

<sup>38</sup> **Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides (OJ L 309 24.11.2009, p. 71).**

<sup>39</sup> Regulation (EU) 2022/2379 on statistics on agricultural input and output.

order to cross-link these data and indicators and thus enable the most accurate possible assessment of the effectiveness of the measures chosen.

- (43) Contaminated sites are the legacy of decades of activities such as industrial or military activity in the EU and may lead to risks for human health and the environment now and in the future. It is therefore necessary first to identify and investigate potentially contaminated sites and then, in case of confirmed contamination, to assess the risks of the contaminated site and take measures to address unacceptable risks. **In this context, it is essential to also consider the impact of contaminated sites on ~~other~~ environmental media or matrices other than only soil, such as groundwater or surface water.** 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. **As the number of potentially contaminated sites and contaminated sites may be very large and the level of risk a contaminated site poses may vary from very low to very high, it is logical to follow a risk-based and stepwise approach to identify and investigate potentially contaminated sites and to manage contaminated sites. Such approach can allow prioritisation by Member States. In this prioritisation, Member States can take into account the potential risk a suspected or confirmed contamination poses, as well as economical or social context. The evaluation of potential risk used in such prioritisation is much more generic than the site-specific risk assessment that is carried out when investigating a contaminated site.**
- (44) To identify potentially contaminated sites, Member States should collect evidence among others through historical research exploring information on, ~~past~~ industrial activities, incidents and accidents using old maps, archives, press articles, environmental permits and notifications by the public or authorities. **Member States should decide on a list of potentially contaminating activities and have the possibility to prioritise certain potentially contaminated sites that are most likely to pose a potential risk to human health or the environment, based on the type of activity, size of the potential contamination, indication of immediate risk or other relevant information. As the number of potentially contaminated sites may evolve through time, a first identification should be completed within a defined timeframe, based on the existing evidence, whilst the rest should be identified through a systematic approach.**

(45) In order to ensure that soil investigations on potentially contaminated sites are carried out timely and effectively, Member States should, in addition to the obligation to lay down the ~~deadline~~ **timeframe** 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 **preliminary** desk study, **site-specific historic study to collect information about past industrial activities, incidents or accidents**, site visit, preliminary or exploratory investigation, more detailed or descriptive investigation, ~~and~~ field or laboratory testing, **and may include a site-specific assessment of the risks for the contamination poses to human health and the environment. In case soil contamination is found, the soil investigation should underpin the characterisation of the contamination and its environmental context and provide basic information for the site-specific risk assessment and the eventual design of the risk reduction measures.** Baseline reports and monitoring measures implemented in accordance with Directive 2010/75/EU of the European Parliament and of the Council<sup>40</sup> could also qualify as soil investigation where appropriate.

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<sup>40</sup> 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).

(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 **and stepwise** 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, **including on the risk-based and stepwise approach**, should be taken based on the nature and extent of potential risks for human health and the environment resulting from exposure to soil contaminants **or to contaminants that migrated to the groundwater** (e.g. exposure of vulnerable populations such as pregnant women, persons with disabilities, elderly people and children).

**(46a) Natural and anthropogenic background levels should be taken into account in the risk assessment and could also help to set remediation or management objectives. In order to support Member States in the evaluation of background levels, the European Commission with the support of the EEA should establish guidelines; those guidelines can be based on scientific international standards, such as (ISO 19258:2018).**

**(46b) The cost-benefit analysis of undertaking investigation, site-specific risk assessment or remediation should be positive. For instance, for small-scale contaminated sites detailed site-specific risk assessment may be more expensive than immediate soil remediation, or the site could be obviously and seriously contaminated that detailed site-specific risk assessment is not necessary to decide to remediate. In such cases, the number of steps in the risk-based approach can be reduced and detailed site-specific risk assessment brings little added value.** 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, and current and ~~future~~ **planned** land use.

**(46c)** In order to reduce the risks of contaminated sites to an acceptable level for human health and the environment, Member States should ~~take~~**ensure that** adequate risk reduction measures including remediation **are taken**. 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 choice of the technique or measure depends on a combination of criteria such as the nature of the contaminants, the characteristics of the soil, the volume of the contamination, the time and space available, budgetary constraints, remediation objectives, current and planned land use, potential to improve soil health, road traffic, nuisance for the neighbourhood, current operation of activities, etc. Certain remediation techniques can also negatively impact soil health (e.g. thermal desorption might remove contaminants but destroys soil organic carbon and soil biodiversity) and ~~must~~. Therefore, all the advantages and disadvantages of the remediation techniques should be taken into account and be complemented with other regeneration techniques so that the soil can again provide ecosystem services.** 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.

**(46d)** The management of potentially contaminated sites and contaminated sites should respect the polluter-pays, precautionary and proportionality principles. **Member States should aim to identify the polluter and should establish a hierarchy or decision chain of responsibility, to decide who should bear the cost of the soil investigation, risk assessment and the risk reduction measures. Member States may decide to further distinguish between historically and newly contaminated sites and to apply a more stringent approach for contamination caused after a certain pivot date. In case of contaminated sites for which no accountable party can be identified or held accountable, Member States should be able to use financial instruments and EU financial programmes in order to fulfil the obligations regarding soil investigation and remediation.**

**(46e) Soil contamination that has to be dealt with under existing relevant European legislation, such as significant pollution of soil compared to the state established in the baseline report that has to be returned to that state as formulated in Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions, or land damage that has to be remediated under 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, has to be dealt with in respect of the requirements of those regulations.**

**(46f) Soil investigations, risk assessments or risk reduction measures that have been carried out on potentially contaminated sites or contaminated sites prior to the entry into force of this Directive that meet the requirements set out in this Directive, should be deemed appropriate to fulfill the requirements set out by this Directive on such sites.**

**(46g) To promote a harmonised approach in risk assessment, the Commission should develop guidelines for the assessment of site-specific risks of contaminated sites, including common practices, methodologies and toxicological data.**

(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<sup>41</sup>] that aim at ensuring secure and sustainable supply of critical raw materials for Europe's industry.

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<sup>41</sup> + 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. **In case registers are established at subnational level, Member States should foresee a coordinated national entry point (e.g. a centralised national website with weblinks) to the different subnational registers.** 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. **Registers that exist already at the time this Directive enters into force and that meet the requirements set out in this Directive, should be deemed appropriate to fulfill the requirements set out in this Directive.**
- (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<sup>42</sup> (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.

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<sup>42</sup> Convention on access to information, public participation in decision- making and access to justice in environmental matters – Declaration, (OJ L 124, 17.5.2005).

**(49a) As clarified by the case-law of the Court of Justice<sup>43</sup>, Member States may not restrict legal standing to challenge a decision of a public authority to those members of the public concerned who participated in the preceding administrative procedure to adopt that decision. In addition, any review procedure should be fair, equitable, timely and not prohibitively expensive, and provide for adequate redress mechanisms, including injunctive relief as appropriate. Furthermore, in line with the case law of the Court of Justice<sup>44</sup> access to justice is as a minimum to be granted to the public concerned.**

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<sup>43</sup> **Case C-826/18, Judgment of the Court (First Chamber) of 14 January 2021; LB and Others v College van burgemeester en wethouders van de gemeente Echt-Susteren; paragraphs 58 and 59.**

<sup>44</sup> **Case C-237/07, Judgment of the Court (Second Chamber) of 25 July 2008; Dieter Janecek v Freistaat Bayern; paragraph 42; Case C-404/13, Judgment of the Court (Second Chamber) of 19 November 2014; Client Earth v the Secretary of State for the Environment, Food and Rural Affairs; paragraph 56; Case C-723/17, Judgment of the Court (First Chamber) of 26 June 2019; Craeynest and Others; paragraph 56; Case C-752/18, Judgment of the Court (Grand Chamber) of 19 December 2019, Deutsche Umwelthilfe eV v Freistaat Bayern, paragraph 56.**

(50) Directive (EU) 2019/1024 of the European Parliament and of the Council<sup>45</sup> 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 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<sup>46</sup> 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 2003/04 provides a restricted list of exemptions from dissemination or disclosure of environmental information, taking into account the public interest served by the dissemination, in case the dissemination or disclosure of the information would adversely affect certain interests such as public security or national defence; the confidentiality of commercial or industrial information where such confidentiality is provided for by national or Union law to protect a legitimate economic interest, including the public interest in maintaining statistical confidentiality and tax secrecy; the confidentiality of personal data and/or files relating to a natural person where that person has not consented to the disclosure of the information to the public, where such confidentiality is provided for by national or Union law.** Directive 2007/2/EC of the European Parliament and of the Council<sup>47</sup> 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.

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<sup>45</sup> 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).

<sup>46</sup> 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).

<sup>47</sup> 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).

**(50a) It is also important that provisions of this Directive related to data-sharing arrangements enable Member States to reuse already existing data infrastructures established pursuant to Directives (EU) 2019/1024 and 2007/2/EC. This approach follows the once-only principle and avoids additional burden on the Member States to setup a dedicated data infrastructure under this Directive.**

(51) In order to ensure the necessary adaptation of the rules on soil health monitoring, sustainable soil management 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 this Directive 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 and, the phases and requirements for the site-specific risk assessment, and the content of the register of contaminated and potentially 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<sup>48</sup>. 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.

(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<sup>49</sup>.

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<sup>48</sup> 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).

<sup>49</sup> 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).

**(52a) Furthermore, in order to provide guidance to Member States for the implementation of this Directive, the Commission -should adopt guidelines on the establishment of sustainable target values and operational trigger values for soil descriptors; the monitoring of soil sealing and destruction; the determination of sampling points; the assessment of areas at risk of salinization; the in-situ sampling of soil descriptors; the determination or estimation of the values of the soil descriptors; the identification and the assessment of a critical loss of ecosystem services and the impact of soil sealing destruction on the loss of ecosystem services; the sustainable management of soil contamination other than anthropogenic point source contamination; the soil sealing and destruction mitigation principles; the identification of potentially contaminated sites, including information on potentially contaminated activities; as well as on the assessment of site specific risks of contaminated sites, including on common practices, methodologies and toxicological data.**

- (53) The Commission should carry out an evidence-based evaluation and, where relevant, a revision of this Directive, **7 and a half 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~~ **degraded** soils are regenerated and the objective 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.
- (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 **increasing 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<sup>50</sup>, 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.

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<sup>50</sup> OJ C 369, 17.12.2011, p. 14.

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 solid and coherent soil monitoring framework for all soils across the EU and to continuously improve soil health in the Union, **maintain soils in healthy condition and tackle all aspects of soil degradation**, with the view to achieve healthy soils by 2050, ~~and maintain soils in healthy condition and mitigate the impacts of land take on soils~~, 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.
  
2. This Directive lays down **a framework and** measures on:
  - (a) monitoring and assessment of soil health;
  - (b) sustainable soil management;
  - (c) **management of** 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 **or parent material** and the land surface, which is composed of mineral particles, organic matter, water, air and living organisms;
- (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 or** indirect contributions of ecosystems to the economic, social, cultural and other benefits that people derive from those ecosystems;
- (4) ‘soil health’ means the physical, chemical and biological condition of the soil determining its capacity to function as a vital living system and to provide ecosystem services;
- (5) ‘sustainable soil management’ means soil management practices that maintain or enhance the ecosystem services provided by the soil without impairing the **soil** functions enabling those services; or being **significantly** detrimental to other properties of the environment;
- (6) ‘soil management practices’ mean practices that impact the physical, chemical or biological **properties** ~~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, as delimited by that Member State in accordance with this Directive;
- (9) ‘soil health assessment’ means the evaluation of the health of the soil based on the measurement or estimation of soil descriptors;
- (9a) ‘soil unit’ means a spatially discrete area resulting from the intersection of categorical spatial data used as criteria for statistical homogeneity within a soil district; soil units are used for monitoring design and reporting of soil health with a given level of uncertainty;**
- (9b) ‘potentially contaminated site’ means a delineated area where soil contamination by point-source anthropogenic activities is suspected with high probability based on relevant evidence;**
- (10) ‘contaminated site’ means a delineated area ~~of one or several plots with confirmed~~ **contaminant concentrations from soil contamination caused by point-source anthropogenic activities above non-acceptable risk levels,** ~~presence of soil contamination caused by point-source anthropogenic activities;~~
- (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 **regularly** covered ~~permanently~~ by water **bodies;**
- (13) ‘land cover’ means the physical and biological cover of the earth’s surface;
- (14) **‘unsealed soil’ means an area of soil that does not fall under the definition of sealed soil, and that maintains a potential in terms of the ecosystem services it can provide** ~~‘natural land’ or means an area where human activity has not substantially modified an area’s primary ecological functions and species composition;~~

- (15) **‘soil sealing’ is a form of land take and means the destruction or covering of soils by buildings, construction and layers of completely or partly impermeable material, preventing them from delivering ecosystem services other than constituting a platform for human constructions and infrastructures** ~~‘semi-natural land’ means an area with 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) **‘sealed soil’ means an area of soil that underwent soil sealing** ~~‘artificial land’ means land used as a platform for constructions and infrastructure, buildings, other paved areas and construction sites 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) **‘soil destruction’ means the destruction of soils by mining, quarrying, landscape modelling, materials disposal or construction, preventing them from delivering ecosystem services other than raw material supply and water infiltration in subsoil** ~~‘land take’ means the conversion of natural and semi-natural land into artificial land;~~
- (17a) ‘destroyed soil’ means an area of soil that underwent soil destruction;**
- (17b) ‘de-sealing’ means the conversion of sealed soil into unsealed soil;**
- (17c) ‘renaturation’ means the regeneration or reconstruction of soil with the aim to recover soil health and the capacity of soils to provide ecosystem services;**
- (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 land owners and land users, as well as non-governmental organisations promoting the protection of human health or the environment and meeting any requirements under national law.

- (20) ‘soil contamination’ means the presence of a ~~chemical or~~ substance in the soil ~~in a concentration~~ **at a level** that may be harmful to human health or the environment, **whatever the land use is;**
- (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~~ **likelihood** of harmful effects to human health or the environment resulting from exposure to soil contamination;
- (24) ‘soil investigation’ means a process **which can be performed in multiple and iterative phases** to assess the presence and ~~concentration~~ **level** of contaminants in the soil **and to characterise and delineate the extent of a contaminated site and, if relevant, to assess the site-specific risks the contaminated site poses to human health or the environment** which is usually performed in different stages;
- (25) ‘geographically explicit **data**’ 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 contaminants ~~concentrations~~ in the soil;-
- (27) ‘risk reduction measures’ mean **measures that aim to reduce the risks of contaminated sites to human health and the environment via by soil remediation or by modifying the source pathway-receptor linkage. without changing the characteristics of the contamination itself or via soil remediation;**

Article 4

**Soil districts and soil units**

1. Member States shall establish soil districts throughout their territory **based on administrative entities and their associated geographical extent.**

~~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.~~

2. **Member States shall also establish soil units, When establishing the geographic extent of soil districts, Member States may take** **ing** **into account existing administrative units and shall are encouraged to seek homogeneity within each soil district regarding the following parameters:**

- (a) **the soil districts as established in Article 4(1) soil type as defined in the World Reference Base for Soil Resources<sup>51</sup> -or soil types in well-established national soil classification systems;**
- (b) **land use categories, excluding water bodies, as referred to in Regulation (EU) 2018/841 of the Parliament and the Council<sup>52</sup> climatic conditions;**
- (c) **soil regions of the European Union and Adjacent Countries<sup>53</sup> .environmental zone as described in Alterra Report 2281<sup>54</sup>;**
- (d) ~~land use or land cover as used in the Land Use/Cover Area frame statistical Survey (LUCAS) programme or equivalent reference.~~

<sup>51</sup> ~~<https://www.fao.org/soils-portal/data-hub/soil-classification/world-reference-base/en/>~~

<sup>52</sup> ~~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~~

<sup>53</sup> ~~‘Soil Regions of the European Union and Adjacent Countries 1:5,000,000’, 2005, accessed 2024-03-07, <http://data.europa.eu/88u/dataset/ae71ffee-1ae9-4624-ae3f-f49513fe9dcb>~~

<sup>54</sup> ~~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.~~

**Member States may use more detailed equivalent data when available at the national or subnational level to establish their soil units.**

**Members States may take into account additional categorical spatial data to establish their soil units, such as climate, environmental zone as described in Alterra Report 2281<sup>55</sup>, or river basins.**

#### *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.

Member States shall designate ~~one~~ **the one or more** competent authority**ies** for each soil district established in accordance with Article 4.

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<sup>55</sup> **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.**

## Chapter II

### Monitoring and assessment of soil health

#### Article 6

##### Soil health and ~~land take~~ soil sealing and destruction monitoring framework

1. Member States shall establish a monitoring framework **at a level appropriate for the soil descriptors and soil sealing and destruction indicators and the responsible competent authority according to the requirements** ~~based on the soil districts established in accordance with Article 4(1), or based on Member State level~~ to ensure that regular, **coherent** and accurate monitoring of soil health and ~~land take~~ soil sealing and destruction is carried out in accordance with this Article and Annexes I and II.

**Member States may adapt, when necessary, their monitoring framework for their outermost regions, in order to take into account their specific characteristics.**

2. Member States shall monitor soil health **in each soil unit within a soil district** and ~~land take~~ soil sealing and destruction in each soil district.
3. The monitoring framework shall be based on the following:
  - (a) the soil descriptors and ~~soil health~~ criteria **for healthy soil condition** referred to in Article 7;
  - (b) the soil sampling points to be determined in accordance with Article 8(2);
  - (c) the soil measurement carried out by:
    - (i) Member States in accordance with existing national or sub-national soil monitoring networks and surveys, where relevant;**
    - (ii) Member States under Union and international legislation, where relevant;**

**(iii)** the Commission in accordance with ~~paragraph 4 of this~~ Article **8(2)**, if any;

**(iv) private actors, research and other parties, where relevant and available;**

(d) the remote sensing data and products referred to in paragraph 5 of this Article, if any;

(e) the ~~land take and~~ soil sealing **and destruction** 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.~~

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, **together with Member States,** soil remote sensing products, to support the Member States in monitoring the relevant soil descriptors **and indicators.**

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, **in accordance with Regulation (EU) 2018/1725 of the European Parliament and of the Council Regulation (EC) No 223/2009 of the European Parliament and of the Council of 11 March 2009 on European statistics,** provide access in georeferenced spatial format to at least the available **aggregated** soil health data, resulting from:

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

~~(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 Commission and the EEA shall ensure that the Member States are given, in an early, timely and effective manner, the opportunity to express their opinion and to request error correction, if any, before soil health data are made public through the digital soil health data portal referred to in paragraph 6. This shall also apply to any other report based on the monitoring framework established under this Directive.**

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.
8. The Commission shall adopt implementing acts to establish formats or methods for sharing or collecting the data referred to in ~~paragraph 7~~**this Article** or for integrating those data in the digital soil health data portal. Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 21.

#### *Article 7*

#### **Soil descriptors, criteria for healthy soil condition, and ~~land take and~~ soil sealing and destruction indicators**

1. When monitoring and assessing soil health, Member States shall apply the soil descriptors ~~and soil health criteria~~ listed in Annex I, **Part A, B and C as relevant.**

When monitoring ~~land take~~**soil sealing and destruction**, Member States shall apply the ~~land take and~~ soil sealing **and destruction** indicators ~~referred to~~**listed** in Annex I, **Part D.**

2. **When assessing soil health, Member States shall use criteria for healthy soil condition. The criteria for healthy soil condition shall consist of:**
  - (a) non-binding sustainable target values listed in Annex I, Part A and B;**
  - (b) operational trigger values.**

**Member States shall set one or more operational trigger values for each soil descriptor of Part A and B of Annex I, reflecting soil degradation levels which allow measures to be identified in accordance with Article 9(4) of this Directive and taking into account, where relevant, the indicative watch list referred to paragraph 5a.**

**Within (OP: please insert date = 2 years after date of entry into force of the Directive), the Commission shall establish guidelines on setting sustainable target values and operational trigger values for soil descriptors of Part A, B and, when possible, Part C of Annex I which are at the basis of the assessment of soil health. Member States may adapt the soil descriptors and the soil health criteria referred to in part A of Annex I, in accordance with the specifications referred to in the second and third columns in part A of Annex I.**

3. Member States shall determine the organic contaminants for the soil descriptor related to soil contamination referred to in ~~P~~part B of Annex I, **taking into account the indicative watch list referred to in paragraph 5a.**
4. Member States shall set ~~soil health criteria~~ **the non-binding sustainable target values** for the soil descriptors listed in ~~P~~part B of Annex I in accordance with the provisions set out in the third column in ~~P~~part B of Annex I.
5. Member States may set additional soil descriptors and ~~land take and~~ **soil sealing and destruction** indicators, ~~including but not limited to the optional descriptors and indicators that are not listed in part C and D of Annex I, for monitoring purposes (‘additional soil descriptors’ and ‘additional land take indicators’).~~

**5a. Within (OP: please insert date = 18 months after date of entry into force of the Directive), the Commission shall establish an indicative watch list of soil contaminants, having a high potential to affect soil health, human health or the environment, and shall update the list according to the latest scientific knowledge. Member States may adapt their soil contamination descriptor accordingly.**

**5b. Within (OP: please insert date = 2 years after date of entry into force of the Directive), the Commission shall establish guidelines that can be used as a basis for the monitoring of soil sealing and destruction, including for urban areas.**

6. Member States shall inform the Commission when soil descriptors, ~~land take~~ **soil sealing and destruction** indicators and ~~soil health~~ **criteria for healthy soil condition** are set or adapted in accordance with paragraphs 2 to 5 of this Article.

#### *Article 8*

#### **Measurements and methodologies**

1. Member States shall determine sampling points by applying the methodology set out in ~~Part~~ **A.1** of Annex II.

**1a. The Commission shall support Member States by providing relevant maps of soil descriptors, the initial starting sample and the relevant data linked to sampling points collected under previous European soil surveys that Member States are required to use for the implementation of the methodology set out in Part A.1 of Annex II.**

**Within (OP: please insert date = 3 years after date of entry into force of the Directive), the Commission shall establish guidelines to detail the methodology to determine sampling points in accordance with Part A.1 of Annex II.**

**1b. After determination of their sampling points and prior to their sampling survey, Member States shall notify the Commission of their potential needs for support in terms of field sampling, soil analyses and other needs related to the sampling survey.**

**1c. The Commission shall assess the needs of Member States and establish, in coordination with Member States, the level of support.**

**1d. Member States shall adapt their sampling survey accordingly. In case of support, the practical organisation between the Commission and the Member State is covered by written agreement. If the need of support from the Commission is confirmed for the field survey, Member States shall ensure that the Commission can carry out such in-situ soil sampling.**

2. Member States **and, if support in terms of field sampling was confirmed according to the paragraph 1d of this Article, the Commission** shall carry out soil measurements by taking soil samples at the sampling points referred to in paragraph 1 and collect, process and analyse data **as relevant** in order to determine the following:

- (a) the values of the soil descriptors **listed as set** in Annex I;
- (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.~~

**Member States are exempted from taking soil samples from sealed soils.**

**In relation to the soil descriptor salinisation listed in Annex I, Member States may exclude the areas not at risk of salinisation from the measurement of electrical conductivity and shall inform the Commission thereof.**

**Within (OP: please insert date = 3 years after date of entry into force of the Directive), the Commission shall establish guidelines for the assessment of areas at risk of salinisation.**

**The in-situ soil sampling shall be conducted in accordance with the principles defined in Part A.2 of Annex II. Within (OP: please insert date = 18 months after date of entry into force of the Directive), the Commission shall establish guidelines that address minimum requirements for in-situ soil sampling of soil descriptors.**

**Members States may use additional data pursuant to article 6, paragraph 3 (c) in their processing and analysis provided that these data were collected in the same period as the sampling survey and comply with methodologies referred to in Annex II Part A.2 and Part B.**

**2a. Member States shall collect, process and analyse data in order to determine the values of the soil sealing and destruction 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 ~~P~~part B of Annex II;
- (b) the minimum methodological criteria for determining the values of the ~~land take and~~ soil sealing **and destruction** indicators set out in ~~P~~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 **made** available, as required in Annex II, ~~P~~part B, fourth column.

**Within (OP: please insert date = 3 years after date of entry into force of the Directive), the Commission shall establish guidelines on the methodologies for determining or estimating the values of the soil descriptors set out in Part B of Annex II.**

**Member States and, if relevant, the Commission shall ensure that laboratories, or parties contracted by laboratories, performing the soil measurements apply quality management system practices in accordance with EN ISO/IEC-17025 or other equivalent standards accepted at international level, and have access to suitably qualified staff with adequate training and to the infrastructure, equipment and products necessary to carry out soil measurements.**

**Member States and, if relevant, the Commission shall ensure that laboratories, or parties contracted by laboratories, performing the soil measurements demonstrate their competences in analysing relevant measurands by:**

- (a) participation in proficiency testing programmes covering the methods of analysis at levels of concentrations that are representative of soil monitoring programmes;**

**(b) analysis of available reference materials that are representative of collected samples which contain appropriate levels of concentrations.**

4. Member States **and, if support was confirmed according to the first paragraph of this article, the Commission** shall ensure that the first soil measurements are performed at the latest by... (*OP: please insert the date = 45 years after date of entry into force of the Directive*).
5. Member States shall ensure that new soil measurements are performed ~~at least every 56~~ **years within one sampling campaign or as part of a continuous sampling scheme.**

**By way of derogation from the first subparagraph, Member States may decide, before the new sampling campaign, not to carry out new soil measurements for a soil descriptor in part or all of its territory if it is reasonable and justified to expect, based on data collected pursuant to Articles 6, 7 and 8, and modelling, that the value of such soil descriptor has not evolved since the last cycle. Member States shall without undue delay notify the Commission of such decision.**

Member States shall ensure that the value of the ~~land take and~~ **soil sealing and destruction** indicators are updated ~~at least every year~~ **at least every 3 years, based on available information.**

6. The Commission is empowered to adopt delegated acts in accordance with Article 20 to amend Annex II, **Part B** 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).

## Article 9

### Assessments of the soil health

1. Member States shall assess the soil health in all their soil districts **and associated soil units** 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~~**listed** in Parts A and B of Annex I.

~~Member States shall also take into account the data collected in the context of soil investigations referred to in Article 14, where relevant.~~

Member States shall ensure that **assessments of** soil health ~~assessments~~ are performed at least every **56** years and that the first soil health assessment is performed by ... (OP: please insert the date = **56** years after date of entry into force of the Directive).

- ~~2. A soil is considered healthy in accordance with this Directive where the following cumulative conditions are fulfilled:~~

~~(a) the values for all soil descriptors listed in part A of Annex I meet, **within the uncertainties of the measurements or estimations**, 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, **within the uncertainties of the measurements or estimations**, the criteria set in accordance with Article 7 ('healthy soil').~~

~~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.~~

Soil is unhealthy where at least one of the criteria referred to in subparagraph 1 is not met (~~‘unhealthy soil’~~). **health is assessed with respect to each aspect of soil degradation using the non-binding sustainable target value and the operational trigger values for the related criterion for healthy soil condition in Annex I as set according to Article 7(2).**

~~**When a criterion is not satisfied, this indicates the need for evaluation and to take measures so that that criterion can be satisfied if appropriate and possible at the given area.**~~

**In a given area:**

- ~~**soil is in “good health” when all the criteria are satisfied in that area;**~~
- ~~**soil is in “moderate health” when a maximum of two of the set of criteria in Part A and B, excluding contamination and water retention, are not fulfilled;**~~
- ~~**soil is in “poor health” when the criteria on soil contamination or on water retention or more than two of the other criteria are not fulfilled.**~~

3. Member States shall analyse the values for the soil descriptors listed in ~~P~~**p**art C of Annex I ~~and assess with a view to identify~~ whether there is a critical loss of ecosystem services, taking into account the relevant data and available scientific knowledge.

Member States shall analyse the values of ~~land take and~~ soil sealing **and destruction** indicators listed in ~~P~~**p**art D of Annex I ~~and with a view to~~ assess their impact on the loss of ecosystem services and on the objectives and targets established under Regulation (EU) 2018/841.

As part of the soil health assessment, Member States may identify improvements for each soil descriptor listed in parts A, B and C of Annex I ~~in each soil district~~.

*Within (OP: please insert date = 4 years after date of entry into force of the Directive),* **the Commission shall issue guidelines concerning the identification and assessment of a critical loss of ecosystem services, and the impact of soil sealing and destruction on the loss of ecosystem services.**

4. Based on the assessments of soil health carried out in accordance with this Article, the competent authorities as referred to in Article 5 shall, where relevant in coordination with local, regional, national authorities, identify, in each soil district, the areas **where individual soil health criteria for healthy soil condition are not satisfied and where ~~action measures are is required to improve the soil health to reach good soil health,~~** which present unhealthy soils and inform the public, **on an aggregated level,** in accordance with Article 19.

**In addition, in order to contribute to improving the soil health, the competent authorities as referred to in Article 5 shall, where relevant in coordination with local, regional, national authorities, identify, in each soil district, the areas of sealed and destroyed soil which could contribute to the improvement of soil health through de-sealing and renaturation.**

**Within (OP: please insert date = 4 years after date of entry into force of the Directive), the Commission shall issue guidelines concerning the identification of areas where individual criteria for healthy soil condition are not satisfied and of areas of sealed and destroyed soils.**

- ~~5. **Based on available data,** 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.~~

~~The Commission may **shall** 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.~~

6. **In addition to making the soil health data public in accordance with Article 19,** Member States shall communicate soil health data and assessments referred to in Articles 6 to 9 to the relevant land owners and land managers upon their request, in particular to support the development of the advice referred to in Article 10(32).

## Chapter III

### Sustainable soil management

#### Article 10

#### Sustainable soil management

1. From (*OP: please insert the date = 45 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, **and the geographical and climatic conditions**:
  - (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 ~~m~~ission '~~Aa~~ 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~~ **practices** 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.

**Within (OP: please insert date = 3 years after date of entry into force of the Directive) the Commission with the support of the EEA shall establish guidelines for the sustainable management of soil contamination other than anthropogenic point-source contamination dealt with in Chapter IV of this Directive.**

2. Member States shall ensure easy access to impartial and independent advice on sustainable soil management, training activities and capacity building for soil managers, landowners and relevant authorities.

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 and implementation of holistic soil management concepts;
  - (c) making available a regularly updated mapping of available funding instruments and activities to support the implementation of sustainable soil management.
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.
- ~~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.~~

**Land take Soil sealing and destruction mitigation principles**

- 1.** Member States shall ensure that the following principles are respected in case of ~~land take~~ **soil sealing and destruction, as part of the plans, programmes or projects, as appropriate, within its territory** taking into consideration the appropriate spatial scale within its territory:
- (a) avoid or reduce as much as ~~technically and economically~~ possible the loss of the capacity of the soil to provide multiple ecosystem services, including food production, by:
    - (i) reducing, **as much as possible, the area of soil** affected by ~~the land take~~ **soil sealing and destruction** to the extent ~~as much as possible, in particular, by encouraging the reuse and repurposing of already sealed soils, such as existing buildings,~~ and
    - (ii) selecting areas where the loss of ecosystem services would be ~~minimized~~ **minimal, in particular on soils already severely degraded, such as brownfields,** and
    - (iii) performing the ~~land take~~ **soil sealing and destruction** in a way that minimizes the negative impact on soil **in space and time, in particular by protecting the surrounding soils or keeping the soil sealing as reversible as possible;**
  - (b) ~~compensate/offset~~ as much as possible the loss of soil capacity to provide multiple ecosystem services, **including with the return of services from reverse land take renaturation, by encouraging the de-sealing of sealed soils and the reconstruction of destroyed soils.**
- 2.** *Within (OP: please insert date = 5 years after date of entry into force of the Directive), the Commission shall establish guidelines on soil sealing and destruction mitigation principles.*

## Chapter IV

### Management of Contaminated sites

#### *Article 12*

##### **Risk-based and stepwise approach**

1. Member States shall **ensure that** ~~manage~~ the risks for human health and the environment of potentially contaminated sites and contaminated sites **are identified, managed**, and keep ~~them~~ to acceptable levels, 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)~~. **The risks may be evaluated taking account of the land use during each step referred to in Article 12 paragraph 2.**

**Member States shall establish a hierarchy of responsibility defining the responsible party or parties for the site-specific implementation of point (b) and (c) of paragraph 2.**

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 **and stepwise** 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 **site-specific risk assessment and** 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:

- (a) to ~~participate in~~**comment on** the establishment and concrete application of the risk-based ~~and stepwise~~ approach as defined in this Article;
- (b) to provide information 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 **site-specific risk assessment and** management of contaminated sites in accordance with Article 15;
- (c) to request ~~contribute with the~~**provide information in view of the** correction of information contained in the register for contaminated sites and potentially contaminated sites in accordance with Article 16.

### *Article 13*

#### **Identification of potentially contaminated sites**

1. Member States shall systematically ~~and actively~~ identify ~~the all sites where a soil contamination is suspected based on relevant evidence~~ collected through all available ~~means (potentially contaminated sites)~~.
2. **For the purpose of the identification of potentially contaminated sites, Member States shall lay down a list of potentially contaminating ~~risk~~ activities. Those activities may be further classified or prioritised according to their relevance to cause soil contamination based on scientific evidence.** When identifying the potentially contaminated sites, Member States shall take into account the following criteria **where relevant**:
  - (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<sup>56</sup>;
- (d) operation of an activity referred to in Annex III to Directive 2004/35/CE of the European Parliament and of the Council<sup>57</sup>;
- (e) occurrence of a potentially contaminating accident, calamity, disaster, incident or spill; ~~or;~~
- ~~(f) any other **relevant** event liable to cause soil contamination with unacceptable risks;~~
- (fg) **any relevant** information resulting from the soil health monitoring carried out in accordance with Articles 6, 7 and 8.

~~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 ~~the~~ **all** potentially contaminated sites ~~existent before or at the date of entry into force of this Directive~~ are **identified and duly recorded in the register referred to in Article 16** ~~identified by (OP: please insert date = 7 **10** 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.~~

- 4. Within (OP: please insert date = 2 years after date of entry into force of the Directive) the Commission shall publish guidelines, in consultation with Member States, on the identification of potentially contaminated sites, including information on potentially contaminating activities.**

<sup>56</sup> 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).

<sup>57</sup> 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 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, **in accordance with the rules established under paragraph 2, and the risk-based and stepwise approach of Article 12.**
2. Member States shall lay down the rules concerning the ~~deadline~~**timeframe**, content, form and the prioritisation of the soil investigations. ~~Those rules shall be established in accordance with the risk-based and stepwise approach referred to in Article 12 and the list of potentially contaminating risk activities referred to in Article 13(2), second **first** subparagraph.~~

Member States may consider baseline reports and monitoring measures implemented in accordance with the Directive 2010/75/EU **as well as other investigations fulfilling the requirements of this Directive** as soil investigation where appropriate.

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

## Article 15

### Site-specific ~~R~~ risk assessment and management of contaminated sites

1. Member States shall lay down the specific methodology for ~~determining~~**assessing** the site-specific risks of contaminated sites. Such methodology ~~may~~**shall** be based on the phases and ~~principles~~**requirements** for site-specific risk assessment listed in Annex VI.
2. Member States shall define what constitutes an unacceptable risk for human health and the environment resulting from contaminated sites by taking into account existing scientific knowledge, the precautionary principle, local specificities, and current and ~~future~~**planned** land use.

3. For each contaminated site ~~identified~~ **established** pursuant to Article 14 or by any other means, ~~the responsible competent authority~~ **Member States shall ensure that** carry out a site-specific assessment **is carried out** for the current and planned land uses to determine whether the contaminated site poses unacceptable risks for human health or the environment. **If the information gathered pursuant to Article 14 is sufficient to conclude that soil remediation is needed, site specific risk assessment does not have to be carried out.**
4. On the basis of the outcome of the assessment referred to in paragraph 3, ~~the Member States responsible competent authority~~ **shall ensure that** take the appropriate measures **are taken and implemented** to bring the risks to an acceptable level for human health and the environment ('risk reduction measures').
5. The risk reduction measures may consist of 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, **sustainability, improvement of soil health** and technical feasibility of available risk reduction measures **shall be taken into account.**
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.
- 7. Within (OP: please insert date = 3 years after date of entry into force of the Directive) the Commission, with the support of the European Environment Agency and after consultation of the Member States, shall publish guidelines for the assessment of site-specific risks of contaminated sites, including common practices, methodologies and toxicological data.**

## 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 **as established according to this Chapter**.
2. The register shall contain the information set out in Annex VII.
3. **Member States shall manage or supervise the register and ensure that it is** ~~shall be managed by the responsible competent authority and shall be regularly kept under reviewed and up-to-dated.~~
4. Member States shall make public the register and information referred to in paragraphs 1 and 2, **and in accordance with Article 19(1)**. 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<sup>58</sup> are fulfilled.

The register shall be made available in **the form of** an online georeferenced spatial database.

- ~~5. The Commission shall 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.~~

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<sup>58</sup> 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).

## Chapter V

### Financing, information to the public and reporting by Member States

#### Article 17

##### Union financing

Given the priority inherently attached to the establishment of soil monitoring, ~~and~~ sustainable management and regeneration of soils **and management of contaminated sites**, the implementation of this Directive shall be supported by existing Union financial programmes in accordance with their applicable rules and conditions.

#### Article 18

##### Reporting by Member States

1. Member States shall electronically report the following data and information to the Commission and to the EEA every ~~5~~**6** years:
  - (a) the data and results of the soil health monitoring and assessment carried out in accordance with Articles 6 to 9;
  - (b) a trend analysis of the soil health for the descriptors listed in parts A, B, and C of Annex I and for the ~~land take and~~ soil sealing **and destruction** indicators listed in ~~P~~**p**art D of Annex I in accordance with Article 9;
  - (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 = 56 years and 6 months after entry into force of the Directive).

2. Member States shall ensure that the Commission and the EEA have permanent access to the information and data referred to in paragraph 1 **as well as the data and information contained in the register referred to in Article 16.**
3. Member States shall provide the Commission with online access to the following:
  - (a) an up-to-date list and spatial ~~data~~-**extent** of their soil districts **and soil units** referred to in Article 4 by ... (OP: please insert the date = 23 years and 3 months after date of entry into force of the Directive);
  - (b) an up-to-date list of the competent authorities referred to in Article 5 by ... (OP: please insert the date = 23 years and 3 months after date of entry into force of the Directive);
  - (c) the measures and sustainable soil management practices referred to in Article 10 by... (OP: please insert the date = 45 years and 3 months after date of entry into force of the Directive).
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.

**Information to the public**

1. Member States shall make accessible to the public, in the form of aggregated data, the data results generated by the monitoring carried out under Article 8 ~~and, the assessment carried out under Article 9, and the register under Article 16~~ of this Directive accessible to the public, in accordance with Regulation (EU) 2016/679 of the European Parliament and of the Council<sup>59</sup>, the provisions under Article 11 of Directive 2007/2/EC of the European Parliament and of the Council<sup>60</sup> for geographically explicit data and Article 5 of Directive (EU) 2019/1024 for other data.
2. The Commission shall ensure that the public has access to soil health data made accessible through the digital soil health data portal referred to in Article 6, is available to the public in accordance with Regulation (EU) 2018/1725 of the European Parliament and of the Council<sup>61</sup> and Regulation (EC) No 1367/2006 of the European Parliament and of the Council<sup>62</sup>.

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<sup>59</sup> — Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), OJ L 119, 4.5.2016, p. 1.

<sup>60</sup> — 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).

<sup>61</sup> — 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).

<sup>62</sup> — 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).

- ~~3. Member States shall ensure that the information referred to in Article 18 of this Directive is available and accessible to the public in accordance with Directive 2003/4/EC, Directive 2007/2/EC and Directive (EU) 2019/1024 of the Parliament and of the Council<sup>63</sup>.~~
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.

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~~<sup>63</sup> 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(6), ~~10~~, **and 15(6)** ~~and 16~~ shall be conferred on the Commission for an indeterminate period of time from the date of entry into force of this Directive.
3. The delegation of power referred to in Articles 8(6), ~~10~~, **and 15(6)** ~~and 16~~ 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.
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(6), 10, 15(6) and 16 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.

*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, **in accordance with the national legal system**, members of the public **concerned**, ~~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 **another** 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 **when one of the following conditions is met:**

- (a) they have a sufficient interest;**
- (b) they maintain the impairment of a right, where administrative procedural law of a Member State requires this as a precondition.**

~~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 shall be deemed to have rights capable of being impaired and their interest shall be deemed sufficient.~~

**Standing in the review procedure shall not be conditional on the role that the concerned member of the public played during a participatory phase of the decision-making procedures under this Directive.**

Review procedure ~~referred to in paragraph 1~~ shall be fair, equitable, timely and ~~free of charge or not prohibitively expensive~~, and shall provide adequate and effective **redress mechanisms** remedies, including injunctive relief ~~where necessary~~ **as appropriate.**

~~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 **of 19 November 2008 on the protection of the environment through criminal law**, Member States shall lay down the rules on penalties applicable to ~~violations~~ **infringements** ~~by natural and legal persons~~, of the national provisions adopted pursuant to this Directive and shall **take all measures necessary to** ensure that ~~they 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~~ **infringement**;
  - ~~(b) the intentional or negligent character of the violation;~~
  - (c) the population or the environment affected by the ~~violation~~ **infringement**, bearing in mind the impact of the infringement on the objective of achieving a high level of protection of human health and the environment;
  - (d) the repetitive or singular character of the infringement.**
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.

## Article 24

### Evaluation and review

1. By (*OP :please insert the date = ~~67~~ years **and 6 months** 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 requirements to **achieve the objectives of Article 1** ~~ensure that unhealthy soils are regenerated and that all soils will be healthy by 2050~~. This evaluation shall take into account, inter alia, the following elements:
  - (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;
  - (d) an analysis of the gap towards achieving healthy soils by 2050;
  - (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 and soil sealing and destruction indicators listed in Part D** of ~~A~~annex I;
    - (iii) the addition of new soil descriptors for monitoring purposes.
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.

*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~~ 3 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 Brussels,

*For the European Parliament*

*The President*

*For the Council*

*The President*

ANNEX I

SOIL DESCRIPTORS, CRITERIA FOR HEALTHY SOIL CONDITION, AND LAND TAKE AND SOIL SEALING AND SOIL DESTRUCTION INDICATORS

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

- (1) **‘natural land’ means an area of land in which the natural process is dominant and human intervention is minimal or non-existent, with the primary ecological functions and species composition not substantially modified**~~‘reverse land take’ means the conversion of artificial land into natural or semi-natural land;~~
- (2) **‘net land take sealing’ means the result of land take soil sealing minus reverse land take de-sealing;**
- (3) **‘Settlement area’ as defined in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories; means the area of land used for housing, industrial and commercial purposes, health care, education, nursing infrastructure, roads and rail networks, recreation (parks and sports grounds), and other uses related to human settlements.**
- (3a) **‘Organic soils’ and ‘mineral soils’ as defined in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.**

Aspect of soil degradation	Soil descriptor <sup>64</sup>	Criteria for healthy soil condition – <u>non-binding sustainable target values</u> <sup>65</sup>	Land areas that shall be excluded from <u>achieving fulfilling meeting</u> the related criterion
<i>Part A: soil descriptors with criteria for healthy soil condition established at Union level</i>			
Salinization <sup>66</sup>	Electrical Conductivity (deci-Siemens per meter)	< 4 dS m <sup>-1</sup> when using saturated soil paste extract (eEC) measurement method, or equivalent criterion if using another measurement method	Naturally saline land areas, <u>areas with regular flooding from marine submersion and areas subject to sea spray</u> ;  <u>Land areas directly affected by sea level rise</u>  <u>Sealed soils and soil in areas of land take</u>
Soil erosion	Soil erosion rate (tonnes per hectare per year)	≤ 2 t ha <sup>-1</sup> y <sup>-1</sup> <u>for shallow soils, ≤ 5<sup>67</sup> t ha<sup>-1</sup> y<sup>-1</sup> for deeply developed soils</u>  <u>Member States may apply different thresholds corresponding to the actual local soil formation rate</u>	Badlands and <u>natural</u> other unmanaged natural land areas, except if they represent a significant disaster risk

<sup>64</sup> The methodology for in-situ sampling of soil descriptors is provided as basic principles in Part A.2 of Annex II and further detailed in the guidelines as established in accordance with Article 8(2) subparagraph 5.

<sup>65</sup> The methodology on setting sustainable target values and operational trigger values for soil descriptors of Part A, B and, when possible, Part C of Annex I are further detailed in the guidelines as established in accordance with Article 7(2) subparagraph 3.

<sup>66</sup> The measurement of electrical conductivity can be excluded in areas not at risk of salinisation. The methodology for assessing areas at risk of salinisation are further detailed in the guidelines as established in accordance with Article 8(2) subparagraph 4.

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) .../... <sup>+</sup>	No exclusion
		<p>- For mineral soils: SOC/Clay ratio &gt; 1/13 (<b>that is SOC content to the content of the clay fraction (fraction with a diameter of less than 0.002 mm)</b>);</p> <p>Member States <del>may</del><b>are expected to</b> apply a corrective factors <b>to the ratio</b> where specific soil types or climatic conditions justify it, taking into account the <b>link to structural stability</b>. <del>actual SOC content in permanent grasslands.</del></p>	<p>Non- managed soils in natural land areas</p> <p><b><u>Sealed soils and soil in areas of land take</u></b></p>
Subsoil compaction	<b><u>Saturated hydraulic conductivity – Ksat (cm/day)</u></b>	<p><b><u>≥ 10 cm/day</u></b></p> <p><b><u>Member States may adapt this threshold according to their local soil conditions.</u></b></p>	<p>Non-managed soils in natural land areas <b>and areas with naturally compacted soils</b></p> <p><b><u>Sealed soils and</u></b></p>

<sup>67</sup> **FAO. 2019. Soil erosion: the greatest challenge to sustainable soil management. Rome. 100 pp. Licence: CC BY-NC-SA 3.0 IGO**

<sup>+</sup> OP : please insert in the text the number of Regulation on nature restoration contained in document COM(2022) 304

	<u>Air capacity (%)</u>	<u>≥ 5%</u>  <u>Member States may adapt this threshold according to their local soil conditions.</u>	<u>soil in areas of land take</u>
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<p><b>Optional:</b></p> <p>Bulk density in subsoil (<u>upper part of B or E horizon</u>);</p> <p><del>Member States may replace this descriptor with an equivalent parameter (g per cm<sup>3</sup>)</del></p>	Soil texture <sup>68</sup>	range
	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
	Sandy clay, silty clay, clay loam with 35-45% clay	<1.58
	Clay	<1.47
<p><b><u>Member States may apply different texture classes or thresholds corresponding to the levels seen as a problem for plant rooting system development.</u></b></p> <p><u>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”.</u></p>		

<sup>68</sup> 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. IUSS Working Group WRB. 2022. World Reference Base for Soil Resources. International soil classification system for naming soils and creating legends for soil maps. 4th edition. International Union of Soil Sciences (IUSS), Vienna, Austria

**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)	<p>&lt; “maximum value”;</p> <p><u>The “maximum value” shall be laid down by the Member State within the range 30-50 mg kg<sup>-1</sup>. Member States shall define their own “maximum value”, to a level that would not entail damage to the environment and human health.</u></p>	<p><u>Sealed soils and soil in areas of land take</u>  <del>No</del> exclusion <u>Non-managed soils in natural land areas</u></p>
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Soil contamination	<p>- concentration of heavy metals in soil: As, Sb, Cd, Co, Cr (total), <del>Cr(VI)</del>, Cu, Hg, Pb, Ni, Tl, V, Zn (<del>#</del>mg per kg)</p> <p>- 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</p>	<p>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.</p> <p><b><u>Natural and anthropogenic background levels should be taken into account in the risk assessment.</u></b></p> <p><b><u>If natural background is the only reason leading to unacceptable risks, then such soil should be deemed as compliant with healthy soil criteria provided it is managed in such a way that there is no unacceptable risk for human health.</u></b></p> <p>Habitats with naturally high concentration of heavy metals that are included in Annex I of Council Directive 92/43/EEC<sup>69</sup> shall remain protected.</p>	No exclusion
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<sup>69</sup> 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).

<p>Reduction of soil <b><u>water retention capacity and infiltration</u></b> to retain water</p>	<p><b><u>Water retention:</u></b></p> <ul style="list-style-type: none"> <li>- Soil water holding capacity of the soil sample (% of volume of water / <b><u>total pore volume</u></b> of saturated soil)</li> </ul> <p><b><u>Water infiltration:</u></b></p> <ul style="list-style-type: none"> <li>- <b><u>Saturated hydraulic conductivity – Ksat (cm/day)</u></b></li> <li>- <b><u>Air capacity (%)</u></b></li> </ul>	<p>The estimated value for the total water holding capacity, <b><u>the saturated hydraulic conductivity and the air capacity</u></b> of a soil <del>district</del><b>unit is above the minimal threshold and may also be assessed</b> by river basin or subbasin, <b><u>taking into account water processes occurring at that scale</u></b>, <del>is above the minimal threshold.</del></p> <p>The minimal threshold shall be set (in tonnes) by the Member State at <b><u>the relevant scale</u></b> <del>soil district and river basin or subbasin level</del> 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.</p>	<p>No exclusion</p>
<p><b><u>Loss of soil organic carbon</u></b></p>	<p><b><u>Soil organic carbon stocks (tC ha<sup>-1</sup>)</u></b></p>	<p><b><u>Contribute to national targets for net greenhouse gas removals in the LULUCF sector as referred to in Article 4(3) of Regulation (EU) 841/2018</u></b></p>	<p><b><u>No exclusion</u></b></p>

<i>Part C: soil descriptors without criteria</i>	
<b>Aspect of soil degradation</b>	<b>Soil descriptor</b>
Excess nutrient content in soil	Nitrogen in soil (mg g <sup>-1</sup> )  <b><u>Soil organic carbon to nitrogen ratio</u></b>
Acidification	Soil acidity (pH)  <b>Member States may also select the optional descriptor:</b>

	- <b>base saturation in the B horizon (i.e. (Ca + Mg + K)/effective CEC)</b>
Topsoil compaction	Bulk density in topsoil (A-horizon <sup>70</sup> ) (g cm <sup>-3</sup> )  <b><u>Saturated hydraulic conductivity (cm/day)</u></b>  <b><u>Air capacity (%)</u></b>
Loss of soil biodiversity	<b><u>Soil basal respiration ((mm<sup>3</sup> O<sub>2</sub> g<sup>-1</sup> hr<sup>-1</sup>) in dry soil</u></b>  Member States <del>may</del> <b>shall</b> also select <b><u>at least one</u></b> other optional soil descriptors for biodiversity such as: - metabarcoding of bacteria, fungi, protists and animals; <b>- <u>Phospholipid fatty acid analysis (PFLA)</u></b> - abundance and diversity of nematodes; <del>- <u>microbial biomass;</u></del> - abundance and diversity of earthworms (in cropland); <b>- <u>abundance and diversity of springtails;</u></b> <b>- <u>abundance and diversity of native ants;</u></b> <b>- <u>bacterial diversity based on DNA;</u></b> <b>- <u>presence of</u></b> invasive alien species and plant pests
<b><u>Optional:</u></b> <b><u>Loss of soil biological activity</u></b>	<b><u>Member States may select soil descriptors for biological activity such as:</u></b>  - <b><u>soil basal respiration ((mm<sup>3</sup> O<sub>2</sub> g<sup>-1</sup> hr<sup>-1</sup>) in dry soil</u></b> - <b><u>microbial biomass;</u></b> - <b><u>Soil respiration;</u></b> - <b><u>Enzyme activity.</u></b>

<sup>70</sup> As defined in the FAO Guidelines for Soil Description, Chapter 5 (<https://www.fao.org/3/a0541e/a0541e.pdf>)

<b>Part D: <u>land take and soil sealing and destruction indicators</u></b>	
<b>Aspect of soil degradation</b>	<b><u>Land take and soil sealing and destruction indicators</u></b>
<b><u>Land take and soil sealing and destruction</u></b>	<p>Total <del>artificial land</del><b><u>sealed soils and destroyed soils</u></b> (km<sup>2</sup> and % of Member State surface)</p> <p><b><u>Soil sealing and destruction, de-sealing, net-sealing (average per year-- in km<sup>2</sup> and % of Member State surface)</u></b></p> <p><del>Land take, Reverse land take Net land take</del><b><u>Total settlement area (km<sup>2</sup> and % of Member State surface)</u></b></p> <p><b><u>Land use change towards and from settlement area</u></b> (average per year-- in km<sup>2</sup> and % of Member State surface)</p> <p><del>Soil sealing (total km<sup>2</sup> and % of Member State surface)</del></p> <p>Member States may also measure other related optional indicators such as:</p> <ul style="list-style-type: none"> <li>- <b><u>settlement area</u></b></li> <li>- <b><u>artificialisation</u></b></li> <li>- land fragmentation</li> <li>- land recycling rate</li> <li>- land taken for commercial activities, logistic hubs, renewable energies, surfaces such as airports, roads, mines</li> <li>- consequences of <del>land take</del><b><u>soil sealing and destruction</u></b> such as quantification of loss of ecosystem services, change in floods intensity</li> </ul>

**ANNEX II**  
**METHODOLOGIES**

Part A: Methodology for determining sampling points **and for the sampling survey**

<b>Activity</b>	<b>Minimum criteria for methodology</b>
<p><b>1. Determination of soil sampling points (sample survey) for soil health assessment</b></p>	<p>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 <b><u>relevant national measurements and surveys pursuant to Article 6 paragraph 3(c)</u></b><del>and measurements under the LUCAS programme.</del></p> <p>The sampling scheme shall be a stratified random sampling optimized on the <b><u>best available information on the variability of soil health descriptors and the stratification shall be based on the soil units established in accordance with Article 4(2).</u></b></p> <p>The <b><u>number and locationsize</u></b> of the national samples <b><u>sampling points</u></b> shall <del>meet the requirement of</del> <b><u>represent the variability of the chosen soil descriptors within the soil units with</u></b> a maximum percent error (or Coefficient of Variation) of 5% <del>for the estimation of the area having healthy soils.</del></p> <p><del>The Commission sample for the survey set under Art 6(4) may contribute to a maximum of 20 % of the size of national samples.</del></p> <p>The allocation and size of the sample shall be determined by applying <b><u>appropriate procedures (e.g. the Bethel algorithm - (Bethel, 1989)<sup>71</sup>) able to</u></b> accounting for the required maximum estimation error.</p> <p><b><u>The sample survey designed by the Member States for each monitoring cycle may change or remain the same.</u></b></p> <p><b><u>For further details Member States may refer to the guidelines as established in accordance with Article 8(1a) subparagraph 2.</u></b></p>

<sup>71</sup> Bethel, J. 1989. "Sample Allocation in Multivariate Surveys." Survey Methodology 15: 47–57.

<p><b><u>2. Field sampling survey</u></b></p>	<p><b><u>Exact sampling locations should be sampled unless duly justified circumstances prevent sampling the locations, such as soil saturated with water or a high level of rock content.</u></b></p> <p><b><u>When soil composite samples are taken, they shall be a mixture of at least 5 subsamples.</u></b></p> <p><b><u>When sampling soil in non-forested areas, residues and organic debris should be removed from the surface.</u></b></p> <p><b><u>When sampling soil in forested areas, litter layer should be sampled separately and its thickness should be recorded.</u></b></p> <p><b><u>When taking samples or subsamples for the composite sample, they should be taken to a depth of at least 30 cm of soil. Information such as soil type and genetic soil horizons should be recorded. Subsamples should be mixed together in order to get a homogeneous composite sample. Sampling can be done by fixed depth or by horizon, but data shall be reported by fixed depth.</u></b></p> <p><b><u>Bulk density samples should be undisturbed samples taken at the relevant depth, including below 30 cm for subsoil. Samples related to soil compaction (saturated hydraulic conductivity and air capacity) are the same undisturbed samples than the ones taken for bulk density.</u></b></p> <p><b><u>For further details Member States may refer to the guidelines as established in accordance with Article 8(2) subparagraph 5.</u></b></p>
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Part B: Methodology for determining or estimating the values of soil descriptors

When a reference methodology is set, either the reference methodology **or equivalent 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 <sup>72</sup> )?
Soil texture (clay, silt and sand content – needed for the determination of other descriptors and related ranges)	<p><del>Preferred method: ISO 11277:1998</del>  Determination of particle size distribution in mineral soil material – Method by sieving and sedimentation</p> <p><del>Alternative method: ISO13320:2009 Particle size analysis Laser diffraction methods</del></p>		YES
Electrical Conductivity	<p><b><u>Option 1: ISO 11265:1994</u></b>  <b><u>Determination of The Specific Electrical Conductivity;</u></b></p> <p>Option <del>1</del><u>2</u>: saturated soil paste extract (eEC) measurement method (FAO SOP: GLOSOLAN-SOP-08<sup>73</sup>)</p> <p><del>Option 2: ISO 11265:1994</del>  <del>Determination of The Specific Electrical Conductivity;</del></p>		YES
Soil erosion rate		Soil erosion rate estimation shall take into account all actions taken to mitigate or	<b><u>Not applicable/A</u></b>

<sup>72</sup> The methodologies different from the reference methodology shall either be available in the scientific literature or publicly available.

<sup>73</sup> <https://www.fao.org/3/cb3355en/cb3355en.pdf>

		<p>compensate the erosion risk, including post-fire mitigation measures.</p> <p>Soil erosion rate estimation shall include all relevant erosion processes such as erosion by water, wind, harvest and tillage.</p> <p>Soil erosion by water shall be assessed by considering the following factors:</p> <ul style="list-style-type: none"> <li>- soil characteristics (e.g. erodibility, soil crusting, soil roughness, <b>stoniness</b>),</li> <li>- climate (e.g. rainfall erosivity – intensity and duration, <del>considering relevant climate change projections for a given area</del>),</li> <li>- topography (e.g. slope steepness and length),</li> <li>- vegetation cover, crop type, land use and management practices to control or reduce erosion,</li> <li>- management practices (e.g. cover crops, reduced tillage, mulching, etc.),</li> <li>- burned areas.</li> </ul> <p>Soil erosion by wind shall be assessed by considering the following factors:</p> <ul style="list-style-type: none"> <li>- soil characteristics (e.g. erodibility),</li> <li>- climate (e.g. soil</li> </ul>	
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		<p>moisture, wind speed, evaporation),</p> <ul style="list-style-type: none"> <li>- vegetation (e.g. crop type),</li> <li>- management practices to control or reduce erosion (e.g. wind breaks).</li> </ul> <p><b><u>Soil erosion by management practices such as tillage or export of biomass shall be quantitatively assessed based on a methodology either available in the scientific literature or publicly available.</u></b></p>	
Soil Organic Carbon (SOC)	<p>ISO 10694:1995 Determination of organic and total carbon after dry combustion, <b><u>ensuring all carbon is incinerated.</u></b></p> <p><b><u>Carbon in carbonates should be determined using ISO 10693 and organic carbon should be expressed as difference.</u></b></p>		YES
<b><u>Soil Organic Carbon Stocks (SOC stocks)</u></b>	<b><u>Methodology as set out in Annex V of Regulation 2018/1999 in accordance to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories</u></b>		<b><u>Not applicable</u></b>
Bulk density in subsoil ( <del>B</del> horizon) or equivalent parameter chosen by Member States	<p>ISO 11272:2017 for determination of dry bulk density</p> <p>In case an equivalent</p>		YES

	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.		
Extractable phosphorus	<p><b>Preferred:</b> ISO 11263:1994 for spectrometric determination of phosphorus soluble in sodium hydrogen carbonate solution (P-Olsen)</p> <p><b><u>Other methods can be used as an alternative.</u></b></p>		YES
<p>- Concentration of heavy metals in soil: As, Sb, Cd, Co, Cr (total), Cr (VI), Cu, Hg, Pb, Ni, Tl, V, Zn</p> <p>- Concentration of a selection of organic contaminants defined by Member States and taking into account existing <u>UnionEU</u> legislation (e.g. on water quality or pesticides)</p>	<p><del>Potential environmentally available content of heavy metals in soils based on ISO 17586:2016 using dilute nitric acid.</del></p> <p><b><u>ISO 54321: Aqua Regia</u></b></p> <p><b><u>Optional: bioavailable fractions of contaminants, such as ISO 17586 using dilute nitric acid.</u></b></p>	<p>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</p>	<p>YES</p> <p><b><u>Not applicable/A</u></b></p>
Soil water holding capacity, <u>air capacity and saturated hydraulic conductivity</u>	<p>Methodology to determine the value for one sample point:</p> <p><b><u>1) Soil water holding capacity and air capacity:</u></b></p> <p>Option 1:</p>	<p>Minimum criteria for estimating the total soil water holding capacity, <u>the air capacity and the saturated hydraulic conductivity</u> of a soil <u>unit district or</u> on a river basin or sub-basin scale:</p>	YES (for point value)

	<p>LABORATORY: ISO 11274:2019 for determination of the water-retention characteristic.</p> <p>Option 2: ESTIMATION: apply <u>methodology described in the scientific article “New generation of hydraulic pedotransfer functions<sup>74</sup> requiring soil-specific input data such as for Europe” based on texture (or particle size distribution, <u>bulk density,</u> and soil organic carbon <u>concentration.</u></u></p> <p><b><u>2) Saturated hydraulic conductivity:</u></b></p> <p><b><u>Option 1: LABORATORY: ISO 17312: Determination of hydraulic conductivity of saturated porous materials</u></b></p> <p><b><u>Option 2: ESTIMATION: apply pedotransfer functions requiring soil-specific input data such as particle size distribution, bulk density, soil organic carbon concentration.</u></b></p>	<ul style="list-style-type: none"> <li>- for the area of <u>soils not sealed or destroyed, land not taken</u> estimate the total value of soil water holding capacity, <u>air capacity and saturated hydraulic conductivity</u></li> <li>- for the area of <u>land taken sealed and destroyed soils,</u> consider setting the water holding capacity, <u>air capacity and saturated hydraulic conductivity</u> of impervious areas to zero, attributing proportionately intermediate values to semi-impervious and other artificial areas.</li> </ul>	
Nitrogen in soil	<p>ISO 11261:1995 for determination of total soil nitrogen using a modified Kjeldahl method</p> <p><b><u>ISO 13878: Determination of total nitrogen by dry</u></b></p>		YES

	<b><u>combustion</u></b>		
Soil acidity	ISO 10390:2005 for determination of pH in H <sub>2</sub> O, <u>KCl</u> and CaCl <sub>2</sub> extract ( <del>pH-H<sub>2</sub>O and pH-CaCl<sub>2</sub></del> )		YES
<b><u>Base saturation and exchangeable concentrations of sodium, potassium, calcium, and magnesium</u></b>	<b><u>ISO 11260: Determination of effective cation exchange capacity and base saturation level using BaCl<sub>2</sub></u></b>		<b><u>YES</u></b>
Bulk density in “topsoil” (A-horizon <sup>75</sup> )	ISO 11272:2017 for determination of dry bulk density	<b><u>Methodology can be refined depending on the proportion of coarse fragments</u></b>	YES
<del>Soil basal respiration</del> <b><u>Descriptors linked to soil biodiversity and biological activity</u></b>  <del>Member States may also select optional soil biodiversity descriptors such as:</del> <del>-Metabarcoding of bacteria, fungi, protists and animals;</del> <del>-Abundance and diversity of nematodes;</del> <del>-Microbial biomass;</del>	<del>Follow indications described in the scientific article “Microbial biomass and activities in soil as affected by frozen and cold storage”</del>	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.	<b><u>YES</u></b>  For other soil biodiversity descriptors: <b><u>Not applicable/A</u></b>

<sup>75</sup> As defined in the FAO Guidelines for Soil Description, Chapter 5 (<https://www.fao.org/3/a0541e/a0541e.pdf>)

<del>Abundance and diversity of earthworms (in cropland)</del>			
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**Part C: minimum methodological criteria for determining the values of land take and soil sealing and destruction 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.~~

**- For soil sealing and destruction indicators, the methodologies used shall comply with the definitions set in Article 3 and Annex I. They shall be based on best available data, including remote sensing images, with the Copernicus products as a minimum common data source, and supplemented with relevant national inventories and data.**

~~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<sup>76</sup> 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;<sup>77</sup>
- (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 to avoid negative impact on the structure and composition of such soils are not negatively affected;~~<sup>78</sup> **to avoid negative impact on the structure and composition of such soils**;
- (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;

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<sup>76</sup> 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).

<sup>77</sup> This principle does not apply to forest soils

<sup>78</sup> This principle does not apply to urban soils

- (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~~ **restore** those soil functions.

## ANNEX IV

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

- (1) The national restoration plans prepared in accordance with Regulation .../...<sup>79</sup>+
- (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.
- (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.

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<sup>79</sup> + OP : please insert in the text the number of Regulation on nature restoration contained in document COM(2022) 304

- (14) The national actions plans adopted in accordance with Article 8 of Regulation .../...<sup>80+</sup>.
- (15) **The national actions plans adopted in accordance with Article 4 of Directive 2009/128/EC.**

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<sup>80</sup> + 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. **Monitored** 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 **to reduce the transfer of contaminants** ~~for~~ **(through** 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 **to reduce exposure**:
- 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 (**e.g. constructive measures for ventilation, tanking, etc.**);
  - 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

### INDICATIVE PHASES AND REQUIREMENTS PRINCIPLES FOR SITE-SPECIFIC RISK ASSESSMENT

1. Characterization of the contamination requires identifying the **nature of the** contaminants (**e.g. heavy metals, organic contaminants, etc.**) present at the site and determining their source, concentration, chemical form, and distribution in the soil, **parent material** and groundwater. The presence and concentration of contaminants **in the different media** is determined through soil-sampling and investigation **on-site and off-site, if a transfer of contaminants is suspected. Contaminants associated with the potentially contaminating risk-activities are sampled in the relevant media on the basis of the environmental context and the physico-chemical properties of the contaminants that influence their behaviour in the environment. Natural and anthropogenic background concentrations should be considered.**
2. Exposure assessment **requires to** identify 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~~ **concentrations of the contaminants in the exposure media** is ~~is~~ **are** combined with ~~the~~ **exposure parameters (e.g. frequency and duration of exposure, soil ingestion rate, etc.)** and receptor characteristics such as age, gender, and health status to estimate the ~~contaminant uptake~~ **daily exposure dose**. The source-pathway-receptor linkages are summarized in a graphic, schematic and simplified representation: the conceptual site model. **Exposure can be assessed through direct analysis at the point of exposure or by modelling the transfer of a contaminant to the medium of exposure.**

3. Toxicity or hazard assessment involves the evaluation of the potential **human** health and environmental **adverse** 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 **exposed receptors (humans and ecosystems 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 **assess and** prioritize the need for risk reduction and remediation measures, **and to ensure that the condition of the soil is compatible with the current and planned land use**. 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. **Risk assessment involves a large number of hypotheses and uncertainties. It is therefore essential to evaluate these uncertainties to fully understand the significance of the results obtained and to make well-informed decisions.**

**The assessment of risk for human health or environment should be proportionate to the complexity of the contaminated site.**

## 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) **Required** 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;
  - (d) **timeline of next actions and management steps.**
-