

Written Evidence submitted by The Environment Agency (SH0044)

- S.1 The Environment Agency's role is to protect and improve the environment. With respect to soil, the Environment Agency (EA) works with all land managers in agriculture, development and construction, amenity, conservation, flood management and other land use sectors to achieve these aims through advice-led influencing and regulatory enforcement. The EA also provides advice to government, informing the design of policies, including the Soil Health Action Plan for England (SHAPE), to help incentivise soil health-associated environmental improvements. A healthy and diverse soil with its links to the wider environment enhances people's lives and contributes to economic growth.
- S.2 The EA cannot protect and improve the environment alone. The EA works as part of the Defra group (Department for Environment, Food & Rural Affairs), with wider government and the devolved administrations, local councils, businesses, civil society groups and local communities to create a better place for people and wildlife.
- S.3 The EA cannot protect and improve the environment without suitable data and a comprehensive soil health baseline. Progress in the EA and wider Defra group on soil data collection approaches and analysis is happening. This is part of the EA's efforts to meet the challenge of enabling soil health to fully perform as an agreed indicator towards the Government's ambition to be the first generation to leave the environment of England in a better state.

Question 1:

How can the Government measure progress towards its goal of making all soils sustainably managed by 2030?

What are the challenges in gathering data to measure soil health and how can these barriers be overcome?

- 1.1 The inquiry specifically refers to Soil Health. A soil in good health is a soil which sustainably delivers the functions (jobs) required and expected of it. The EA wants to see soil deliver: support of ecological habitat and biodiversity; food and fibre production; environmental interaction (air, soil and water), a platform; provision of raw materials (including water held in soil); and protecting cultural heritage¹.
- 1.2 The inquiry's call for evidence usefully identifies threats to soil health as: climate change; soil over-use; erosion; compaction; contamination and carbon depletion. The EA wants these additional threats recognised and included: losses of organic matter, soil biology and good structure; excess nutrient accumulation and avoidable additions of harmful substances (all forms of soil chemical, biological and physical contamination); deliberate physical loss (for example, disposal into landfill); or sealing (creating impermeable surfaces) of soil through land developments. Metrics for these threats are provided in the Environment Agency's (EA) 2019 report².
- 1.3 To measure progress towards a goal of making all soils sustainably managed, it is important to the EA to know the soil health baseline and then establish whether it is moving in a positive or negative direction. This requires adoption of assessment methodology that will endure scientific scrutiny. The EA is working with Defra in development of this methodology. With clear

commissioning from government, the EA is well placed to (i) collect and interpret soil health data and (ii) to evaluate and report progress.

- 1.4 The challenges for soil health data collection include the need for indicators to be measured accurately, easily, affordably and still provide a meaningful, accessible baseline for variable soil types and land management practices in England and across the wider United Kingdom.
- 1.5 Accurate measurement and reporting can be achieved through a combination of improved regulatory requirements and appropriate incentive support. Regulatory requirements for soil sampling and analysis do exist, such as The Reduction and Prevention of Agricultural Diffuse Pollution (England) Regulations 2018 [the Farming Rules for Water (FRfW)]³ and the considerably older Sludge (Use in Agriculture) Regulations 1989. The EA wants to see reporting of the collected soil data, as currently neither do; they do not inform where England's soil baseline is and whether it is changing.
- 1.6 The EA is a proponent of untested opportunities, such as 'citizen science' soil sampling and reporting by landowners or managers. We want to see learning from others, such as schemes which offer free sampling in exchange for data access⁴. Innovative use of remote sensing technology can be built into regulatory and participatory approaches. New soil data collection can be integrated with existing datasets, provided they are appropriate, complete or statistically robust. The EA has identified four potential solutions to overcome some challenges:

Remote Sensing

- 1.7 The EA has an Agricultural Land Environmental Risk Tool (ALERT). This includes detailed analyses of the landscape that can be applied to soil health monitoring. For example, height of land within fields can be accurately measured to identify areas of soil erosion and deposition, potentially allowing a calculation of net soil loss over time. Areas of ponded water in the landscape can be located during wet weather as a proxy for soil compaction issues.

Data Coordination

- 1.8 At a field scale, multiple organisations (private companies, individuals, NGOs) collect data on soil health. Landowners/managers can access historical descriptive soil data that is now available digitally as maps and within decision support tools⁵. The EA wants to maximise opportunities to update and improve (through better co-ordination and collaboration) the collection, collation, interpretation and dissemination of digital soil data.
- 1.9 The Natural Capital and Ecosystem Assessment⁶ (NCEA) is a science innovation and transformation programme, spanning across soil and water environments. The EA work alongside Joint Nature Conservancy Council, Natural England, Forestry Research and the Marine Management Organisation to deliver the NCEA. The NCEA collects data on the extent, condition and change over time of England's ecosystems and natural capital. The EA will be processing and working with new data to be collected by a Natural England-led soil survey.

Modelling

1.10 Evaluation of soil health requires varied and complex data to be integrated spatially and temporally. New data gathering, together with modelling of established soil capabilities and soil functioning, can provide a solution to the challenges of measuring soil health. The EA has significant experience in using a 'weight of evidence' approach (farmer surveys, water monitoring and diffuse pollution models) to successfully evaluate Catchment Sensitive Farming and its delivery of reduced diffuse pollution from agriculture.

Visual Soil Assessment

1.11 For over 15 years, the EA has successfully developed and shared expertise in soil assessment. Examples include the thinksoils manual⁷. Covering both topsoil and the often-overlooked subsoil, soil assessment helps land managers and others recognise and so be able to tackle problems with erosion and runoff from agricultural land; a challenge made even more important with our changing climate. The thinksoils manual continues to be actively used to protect and improve soil health.

Question 2:

Do current regulations ensure that all landowners/land managers maintain and/or improve soil health? If not, how should they be improved?

2.1 The Environment Act 1995 mandates the EA to protect and enhance the environment and promote sustainable development. In relation to soil health, the principle is largely unqualified.

2.2 Despite soil being a finite non-renewable resource of significant environmental and economic importance, no primary legislation and very little statutory protection currently exists specifically for soil within England or the wider UK. There are several regulations that indirectly protect soil and provide benefits for soil health. The Environment Agency is responsible for some of these but in most instances this is secondary legislation and soil is not their focus.

2.3 Examples where soil has a consideration include: the FRfW³ that focus on agricultural diffuse water pollution; the Sludge (Use in Agriculture) Regulations and Environmental Permitting Regulations (EPR). Of these, only the EPR provide the EA with a charging mechanism to support the compliance assessment of permits used by those who spread materials to land for soil health and wider agricultural or ecological benefits. Better funding mechanisms (that use the polluter pays principle) are required for the EA to effectively regulate the impact of land spreading on soil.

2.4 Compliance with the limited soil-related legislation is considered poor, or at best inadequately assessed. For example, under FRfW, 31% of farms inspected cannot demonstrate adequate soil testing for key nutrients and pH. Compliance with the rules focussing on soil erosion are not, to date, being routinely checked by field walking. Time available for a farm visit often limits regulatory scope to other priorities (such as nutrient management and farm infrastructure).

2.5 Areas for (regulatory) development include enhancing biological activity by increasing organic matter content in depleted arable soils, minimising soil structural damage via sensitive

cultivations/trafficking/stocking, reducing/limiting the addition of contaminants to soil, more balanced soil nutrient management and matching cropping and stocking to land/soil capability. Consideration should also be given to reinforcing the 'polluter pays' principle and enabling the EA to maximise cost recovery associated with soil pollution incidents.

2.6 It is recognised that options have featured in agri-environment schemes over time (see Q3) but an absence of performance data means that in most instances their efficacy is largely unquantified.

2.7 The EA is working with Defra and Natural England in delivering the England Peat Action Plan⁸ and Net Zero Strategy⁹.

2.8 Within upland areas, peatland soils are under serious threat. Some areas (notably the Peak District) have been historically degraded by aerial pollution, overgrazing, and burning. It is important to us that we support restoration work through Grant in Aid (GiA) funding and promote nature-based solutions for Natural Flood Management and water quality gains.

2.9 The Lowland Agricultural Peat agenda is still in development, with design of interventions informed by a limited evidence base. Across Defra, there is a recognition that economic end-use through paludiculture and wetter farming may be an optimal future for many of these soils and those who manage them.

2.10 Whilst targets for the reduction of carbon emissions through responsible peatland management exist, no additional regulation is currently proposed to underpin strategic objectives.

2.11 The EA wants to see the creation of new or improved regulations that focus on the natural capital value of soil itself. This would recognise the functions healthy soils can deliver for wider society. We advocate regulatory development, together with supporting communications to give visibility to soil, that would help those with a role in maintaining and protecting soil health to understand its value and also its fragility.

Question 3:

Will the standards under Environmental Land Management schemes (ELMs) have sufficient ambition and flexibility to restore soils across different types of agricultural land?

What are the threats and opportunities for soil health as ELMs are introduced?

3.1 Our State of the Environment Report for soil² highlights many threats to soil including:

- Most arable soils have already lost 40 to 60% of their organic carbon;
- c.3.9 million hectares of agricultural land are at risk of compaction in England and Wales, affecting soil fertility, water quality, water resources and flood risk;
- Out of the 1.4 million hectares of peatland in England, less than 1% remains undamaged.

In addition, new research by the British Ecological Society¹⁰ suggests significant declines in earthworm numbers.

3.2 The recognition of soil in its own right in the Sustainable Farming Incentive (SFI) scheme is

positive. This highlights the importance of soil health for delivering a wide range of ecosystem services. The EA wants to see an increase in the ambition of the scheme, by the inclusion of additional actions to ensure that the scheme can help reverse the decline in soil health across large areas of England. For example, additional regenerative agricultural practices could be introduced, such as the introducing grass or herbal leys into arable rotations.

3.3 Landscape Recovery (LR) focuses on the delivery of landscape and ecosystem recovery through long-term, land use change projects. The EA considers this scheme has significant potential to improve soil health. Round 1 LR projects¹¹ fall under two themes (i) *Recovering and restoring England's threatened native species* and (ii) *Restoring England's streams and rivers*. These introduce a range of interventions that will improve soil health: regenerative agriculture; arable reversion to floodplain meadows; extensively managed grassland and woodland habitats; and peatland restoration. The EA wants to see a specific focus on soil health in a future round of Landscape Recovery, as this could further enhance the contribution to soil health and deliver wider benefits for water quality, flood and drought resilience.

3.4 The EA believes it is essential the enhanced version of Countryside Stewardship (CS) recognises soil health as a key, intrinsic, objective, alongside its role in delivering the existing water quality and biodiversity objectives of the CS scheme. CS should include locally targeted measures that restore soil health to help deliver nature recovery and other outcomes in the farmed environment and the wider countryside, alongside food production. The Agri-environment Evidence Programme¹² shows that, to date, uptake has been skewed to a small number of popular options (rather than more ambitious interventions, including those benefitting soil health).

3.5 Soil is essential to the delivery of a wide range of ecosystem services and underpins our terrestrial environment. The EA wants to see soil recognised as a priority objective and embedded in the aims of most ELM outcomes as these other components of ELM are developed. It is important that a wide range of land management actions are included to allow flexibility and support farmers in adopting the most effective practices for restoring the health of a wide range of soils. Some of the key additional measures to improve soil health include:

- Reversion of arable land to grassland;
- Management and restoration of improved grassland;
- Actions to maintain and restore good top and sub-soil structure. This will have multiple benefits by reducing runoff, erosion, nutrient losses and flooding and maintaining and improving crop and grass yields;
- Options for lowland peat restoration (see Q2);
- The SFI actions regarding Soil Organic Matter (SOM) analysis and the addition of minimum levels of organic matter is positive, but more detailed guidance is required to help farmers identify what changes to crop rotations and organic manure additions would help improve organic matter management.

3.6 Increased flexibility in choice of actions to meet soil health outcomes in a range of different farming systems could be introduced. The Countryside Stewardship Wild Pollinators and Farm Wildlife Packages have been shown to encourage the uptake of the essential measures to

provide food, shelter and habitat for farm wildlife. The EA proposes a similar approach be taken for a soil health package that groups management actions together, guiding uptake of the most important actions that restore physical, chemical and biological elements of soil health.

3.7 The delivery of Catchment Sensitive Farming¹³ has shown the importance of government investment in practical and trusted farm advice for raising awareness of water pollution from agriculture and delivering tangible improvements in water quality. The EA wants to see an expansion of this successful partnership approach to soil health, supporting the uptake of improved practice.

3.8 It is essential to provide farmers with data, mapping and guidance to help identify issues and opportunities for soil health. A soil plan could be added to the ELM application process to help farmers and advisers identify locations for intervention across entire land holdings. In return, ELM could play a very useful role in the collection and sharing of baseline data and monitoring changes to soil health; schemes should ultimately include a requirement to carry out simple visual soil structure and earthworm assessments, in addition to the existing SOM analysis criteria.

Question 4:

What changes do we need to see in the wider food and agriculture sector to encourage better soil management and how can the Government support this transition?

4.1 The EA believes that, when something is valued it becomes visible to those who can play a part in looking after it. An example is water, in the rivers we enjoy and use for recreation, food, drinking water, flood protection, transport and energy. Value is derived by those with direct control of the water through to a business or person whose livelihood or quality of life depends upon access to enough water of the right quality. The same needs to be said of soil, except soil is not visible or valued enough by land managers, those who rely on it in the supply chain from farm to fork, or for wider needs such as timber, energy crops, leisure, flood avoidance and carbon storage. Soil needs to be more valued.

4.2 The EA wants to see the development and strengthening of standards to improve soil health, in farm assurance scheme standards, supermarket supplier's standards, and food company/brand standards. For example, LEAF Marque have standards on soil health, and advise farmers how to improve over time¹⁴.

4.3 It is important to the EA that there is joint responsibility and investment across the supply chain, to enable farmers to invest and change practices. Government can engage with the agri-food industry and help to co-develop schemes to bring up the standard. For example, the Quality Meat Scotland scheme¹⁵, which is led by the Scottish Government, has measurably improved environmental standards on livestock farms.

4.4 Government could develop better labelling, enabling consumers to understand the impact of their food on environmental resources. It can also provide funding and information to help support the transition to better soil management.

4.5 The EA wants to see a clearer and more visible role for the education sector in increasing societal appreciation of the UK's soil resources. However, it is not within the EA's remit to suggest potential delivery mechanisms.

Question 5:

What does the UK Government need to do to tackle other stressors on soil health such as soil contamination?

- 5.1 Exceptional weather events and the wider issue of climate change is a source of stress on soil health. Longer and more intense periods of waterlogging or drought both contribute to negative stresses on soil health. The EA is concerned that these stresses are made worse if the soil is not in good health to start with. At its most extreme, a stressed soil can biologically and physically collapse to the point it may stop supporting plant and animal life and be washed or blown away. This is relevant to all soils in both agricultural and non-agricultural landscapes. Currently soil health is often neglected and undervalued in peri-urban environments, such as parklands, woodlands and heathlands.
- 5.2 The Soil Health Action Plan for England (SHAPE) provides an opportunity to recognise the health and hence value of rural and urban soils across the country's varied landscapes. Soil contamination from natural and anthropogenic sources is the undesirable presence of substances at concentrations which prevent a soil being able to function in good soil health. It is important to the EA and so we are working to understand the state of soils (with the need for a baseline, as covered in response to Q1) and to manage sources of contamination before they can enter the soil.
- 5.3 Unfortunately, the UK has multiple industrial legacy contaminated sites that need remediating. Over 80% of brownfield sites are cleaned up via the planning system, so influencing how this happens is vital if we want to protect groundwater resources, prevent further soil degradation and restore soils across England. Tackling soil contamination creates sustainable, better places for people and communities and it helps to 'level up'. Recent reductions in GiA (see also 2.3) mean the EA needs to find other sources to fund this type of work - this is extremely difficult.
- 5.4 If land affected by contamination isn't remediated via planning, the public purse pays for regulatory action. To provide a holistic and sustainable land contamination service, the EA needs to work with relevant Government Departments to:
- Revise the National Planning Policy Framework (NPPF) to include the requirement for all land contamination reports to be prepared in line with the National Quality Mark Scheme (NQMS) for Land Contamination;
 - Ensure a fully funded formal role and process for all Planning Authorities and the EA to scrutinise all remediation strategies/plans submitted via Planning;
 - Revise the Environmental Permitting Regulations (EPR) to (i) include a mandatory requirement for a site condition report, establishing impacts before and during the life of the permit and (ii) resolve the current conflict where waste regulations prevent re-use of excavated materials especially on old landfills;
 - Explore how soil contamination risks will change with climate change and extreme weather events;

- Identify and assess the risks around emerging legacy contaminants like Persistent Organic Pollutants, including PFAS;
- Review progress made in identifying and cleaning up the legacy of historic land contamination in England; explore options to provide financial support to regulators to manage unacceptable risks from sites which aren't being dealt with voluntarily or under planning;
- Establish a baseline for soil health (see also Q1) and agree a WRAP protocol for soils and subsoil.

5.5 The EA provides advice and regulatory interventions to help prevent new soil contamination from occurring, such as from pollution incidents and when industrial activities cease and an operator abandons a site. The EPR are an important tool for the EA to use in regulating impacts on the soil and wider environment from a wide range of industrial and waste management activities. The EA wants to see greater use of EPR as an option to tackle stresses on soil health. This should include looking up the supply chain for sources of contamination which affect materials and waste that are spread to benefit soil health. We advocate the use of EPR in implementing the EA Strategy for Safe and Sustainable Sludge Use¹⁶. This will help enable the beneficial gains to SOM and soil nutrient levels from use of treated sludge (biosolids) while ensuring that use does not threaten soil health, endanger human health, or harm the wider environment.

5.6 These materials and wastes may be spread for their nutrient value, soil conditioning and organic matter benefits. However, many can contain harmful chemicals and pathogens (including antimicrobial resistance) and undesirable physical contaminants (including plastics). The EA wants to see better upstream controls and interventions, so limiting and removing contaminants at source as an action that can effectively tackle soil stresses created by soil contamination. This is illustrated in the Environmental Audit Committee's 'Water Quality in Rivers' report¹⁷. This provided positive actions to address risk to human health, soil and the wider environment from the chemical and microplastic contaminants found in sewage sludge that is spread to agricultural land.

References

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