

Environment, Food and Rural Affairs Committee

***The Sustainable Soils Alliance (SSA) was launched in 2017 to address the current crisis in our soils. Its aim is to campaign to restore UK soils to health within one generation by seeing soil health elevated to where it belongs as a priority alongside clean air and clean water. The SSA is a non-profit organisation (CIC number 10802764).***

*Soil Health Inquiry: Full Response*

1. **A) How can the Government measure progress towards its goal of making all soils sustainably managed by 2030? B) What are the challenges in gathering data to measure soil health and how can these barriers be overcome?**

**A) Measuring progress**

**1.1. Embed measurement within an ambitious policy framework**

The government has had a target of sustainably managed soils in England by 2030 since 2009, and in 2018 it was introduced into the 25 Year Plan for the Environment. Yet in January 2023 the Office for Environmental Protection said it already considers it “*unrealistic to achieve the sustainable management of soils by 2030, given the scale and scope of the challenge, the lack of measures, and the short timeframe.*”<sup>1</sup>

More damning than the failure to meet the target is the failure to even establish the mechanics by which progress can be measured. As the report says:

- *The target is not adequately defined and objectively measurable*
- *For headline indicators on ‘healthy soils’... we could identify no suitable data to assess trends*
- *The lack of measures against which to assess progress is a major gap...*

The failure to establish any of the building blocks needed to evaluate soil health is symptomatic of a broader problem – the fundamental neglect of soil in comparison with the other pillars of the environment – air, water biodiversity etc. Further evidence of this is as follows:

- **Low Investment:** In 2020 a Freedom of Information request commissioned by the SSA demonstrated that soil receives just 0.4% of the total money spent on monitoring England’s water, air and soils.<sup>2</sup>
- **No Strategy:** The last soils strategy was in 2009 (one of the last environmental policies of a Labour government). Since then, a series of piecemeal policy initiatives have addressed soil, but

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<sup>1</sup> Office for Environmental Protection. Progress in improving the natural environment in England, 2021/2022. <https://www.theoep.org.uk/report/progress-improving-natural-environment-england-20212022>

<sup>2</sup> SSA 2020. Soil failure leaving public in dark over environment, scientists warn. FOI reveals just 0.41% of total monitoring budget spent on soil. <https://sustainablesoils.org/images/pdf/FOIdocx.pdf>

with limited ambition, longevity or a clearly defined environmental outcome in mind. The Soil Standards in the Sustainable Farming Incentive (SFI) are the latest example of these.

- **Fragmentation:** Soils policy sits between Defra teams (Soils, Future Farming) and agencies (Environment Agency, Natural England, Joint Nature Conservation Committee (JNCC), even the Agriculture and Horticulture Development Board (AHDB)). Lines of responsibility for policy development and delivery between these organisations are opaque and disjointed. These organisations in turn ‘outsource’ expertise to research institutions who are prevented from collaboration and alignment by contractual limitations or the need to protect their individual business models and income streams.

Soil finds itself in a vicious circle. No clear definition for ‘sustainably managed soils’ means no universal indicator set, no investment in measurement, no target and no policy framework to achieve it.

A genuinely ambitious strategy for England’s soils would provide the mechanism to address these blockages. However, despite promises from ministers of a Soil Health Action Plan for England (SHAPE)<sup>3</sup> throughout 2021, the plan was downgraded to a chapter of the Environmental Improvement Plan (EIP)<sup>4</sup> in January 2023. The abandonment of a standalone strategy for soil is evidence of a continued culture of avoidance and under-prioritisation that has been in evidence since 2009 – when the last action plan for soils was published.

The Committee is right to identify progress-measurement as a priority for England’s soils. However, measurement should not be considered in isolation, but as the cornerstone of an ambitious strategy underpinned by leadership, defined actions and a commitment to long-term resources.

### **1.2. Invest in a fit-for-purpose nationwide monitoring scheme**

Critical for understanding the state of the nation’s soil must be a statistically robust, structured monitoring programme. We understand that the government plans to monitor nationwide soil health as part of the Natural Capital and Ecosystem Assessment (NCEA), with a view to being able to report change against the 2030 deadline.

Whilst we welcome this commitment, it must be more than a one-off initiative. A rolling monitoring programme that extends beyond 2030 is needed with its own designated budget, ring fenced over an extended period of time to safeguard against ad hoc de-prioritisation through future spending reviews.

The programme must be adequately ambitious in terms of budget and design. A good example is sampling depth. Robust measurement must consider carbon below the plough layer and include an assessment of subsoils which are critical (including to topsoil health and function) but are frequently ignored or misunderstood (see below).

### **1.3. Provide technical leadership for consistency in soil assessment**

As highlighted above, soils policy sits loosely across several Defra policy teams, arms’ length bodies and research institutes. These bodies have differing perspectives on soil to reflect their respective mandates and expertise. Some have responsibility for all soils, some focus on agriculture, some address on-farm practices, some on soil’s ability to deliver environmental services.

Differing perspectives and priorities have historically translated into differing approaches to soil description, measurement and interpretation; as well as the use of differing metrics and progress

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<sup>3</sup> <https://questions-statements.parliament.uk/written-questions/detail/2022-07-21/hl1996>

<sup>4</sup> <https://questions-statements.parliament.uk/written-questions/detail/2022-12-19/HL4404/>

indicators. This in turn has led to a fragmentation of research and policy, with work commissioned and carried out according to niche terminology and with niche results in mind.

It is widely accepted that soil health metrics vary according to soil type, and we have ways to classify soils to take their diversity into account. What is missing is for these approaches to be coordinated within one agreed framework that shows how a small number of fit-for-purpose but different approaches to describing, grouping and mapping soils across the landscape operate together. This can then become the common reference point for soil initiatives – from monitoring and benchmarking right through to education.

There is a recent precedent here. Such a framework was created using the national soil classification data as part of a 2021-22 Defra funded project developing an approach for monitoring soil structure. This project proposed a number of broad groups based on risk to degradation related to soil erosion, soil wetness, shallow soils and risk of flooding. Work such as this could form the basis for the consistent approach and framework needed to enable consistent soil metrics, benchmarks and soil assessment.

There is a clear role for the government here to generate a universal vision and framework for how we understand our soils. A Defra-led standardised technical protocol for soil health assessment and interpretation should then sit within such a framework. This would comprise universal metrics, benchmarks and sampling protocols that can then become the common reference point for soil initiatives – cascading through nationwide monitoring, on-farm measurement and even industry-led reporting and communication.

The collection of accurate on-farm soil assessment data is vital since we are concerned that the government plans to use the implementation of practices as the main proxy indicator for change over time. The evidence base connecting the impact of changes on specific soils is thin; and regular, robust and consistent soil assessment is needed to demonstrate real change in situ, which can then improve the overall knowledge base that underpins advice, guidance, modelling – and even public understanding of soils.

The need to monitor non-farm soils was made more acute by the government's decision last week (through the Environmental Improvement Plan) to downgrade its 2030 target for all soils to be sustainably managed to just 60% of agricultural soils. This is an alarming watering down of an ambition that has stood since 2009 – especially as a significant amount of soil degradation will take place in non-farming environments, and in the 40% of soils that fall outside of this target – both of which have to be understood if remedies are to be identified

#### **1.4. Lack of access to public-funded soils data and maps**

The national soil classification and soil maps of England and Wales were created in the 1980s through a publicly-funded £6.5m project<sup>5,6</sup> and have the potential to provide the universal basis with which other approaches (see 1.5) can be aligned. They are currently the only universal consistent resource for describing and understanding the whole soil profile to 1m depth. In the background, there is also a wealth of information about local soils from earlier mapping and surveying.

However, since being transferred to private ownership, a paywall and intellectual property protection limits the full and widespread access and use of this valuable data resource, with no strategic government investment to update soils data and maps for current commercial and research needs.

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<sup>5</sup> SSA 2021. Soil Maps of England and Wales. [https://sustainablesoils.org/images/pdf/Thought\\_Piece\\_-\\_why\\_soil\\_maps\\_are\\_important\\_V2.pdf](https://sustainablesoils.org/images/pdf/Thought_Piece_-_why_soil_maps_are_important_V2.pdf)

<sup>6</sup> <http://www.ukso.org/static-maps/soils-of-england-and-wales.html>

Publicly funded projects that use the maps and their underlying data cannot realise return on investment as their outputs are not fully sharable, requiring them to develop costly workarounds rather than use a resource that was created with tax-payers money. In Scotland, soil maps and their underlying data have been made fully publicly available, with updates and new additions to this resource produced as an on-going commitment of the Government's strategic research programme.<sup>7</sup> As part of this, work was carried out to produce digital maps at a higher spatial resolution (1:25k) which are more useful to research and commercial organisations requiring field-scale soils information. The soil maps of England and Wales are currently at a much lower resolution.<sup>8</sup> Anecdotally, we understand offers of ways to compensate the current owners (Cranfield University) for transferring ownership back to the public or to make this resource open access have been made but not pursued.

In 2022, Defra commissioned a report<sup>9</sup> by the Sustainable Soils Alliance on the Future Requirements of England's Soil Maps. This project included multi-stakeholder engagement (workshop and one-to-one meetings) and written case studies from organisations both inside and outside government.<sup>10</sup> It found that current arrangements prohibit soil data being used for important public good projects (soil monitoring, global reporting, catchment and forest planning/management), to underpin consistent soil metrics and for wider public and practitioner understanding of soils.

## ***B) Challenges in measuring soil health***

### **1.5. Challenge: Inconsistent metrics at farm level**

Farmers are critical drivers of soil measurement and represent the greatest opportunity for data collection about the state of our soils. However, farmers are confused about which soil health metrics to use, their purposes and their interpretation. Decades of soil measurement initiatives – driven by governments, NGOs, businesses and research institutes – have promoted inconsistent and sometimes contradictory approaches to soil description, monitoring and interpretation – and their implications for management practices.

Even now, technical guidance on the implementation of the Sustainable Farming Incentive directs farmers through a labyrinth of third-party sites – each giving different advice on how to measure soils and why.

Inconsistent data collection has broader consequences. The various spatially explicit datasets (maps) that farms currently have to provide or feed into (for the Basic Payment scheme, Countryside Stewardship etc.) don't align, meaning they can't be aggregated and so don't support spatially applied planning – both locally and nationally. To the best of our knowledge this data has never been analysed or made available – but it could provide a useful baseline from which to set targets.

The EIP stated Defra's intention to address this through the development of *a methodology and tools to collect consistent information about the health of the soil under all land uses*. This needs to be addressed with urgency and ambition. Such a methodology needs to be:

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<sup>7</sup> <https://soils.environment.gov.scot/maps/soil-maps/national-soil-map-of-scotland/>

<sup>8</sup> <https://www.hutton.ac.uk/learning/natural-resource-datasets/soils/25k-soils>

<sup>9</sup> SSA 2021. Future Requirements for England's soil maps. Workshop Report. <https://sustainablesoils.org/images/pdf/Soils%20Maps%20Workshop%20Report.pdf>

<sup>10</sup> SSA 2021. Future Requirements for England's soil maps. Annex II - Case Studies and Written Submissions. <https://sustainablesoils.org/images/pdf/Soils%20Maps%20Case%20Studies%20and%20Written%20Submissions.pdf>

- Universal: A protocol for soil health assessment built around universal metrics, sampling protocols and benchmarks set within a standardised framework (see sections 1.3, 1.4).
- Holistic: Provide the means to assess both topsoil and subsoil.
- User-friendly: The methodology must help farmers identify practices that will improve both the condition and health of their soils as well as their yields.
- Multi-purpose: It should be compatible with a variety of policy ambitions - Regulations, Environmental Land Management schemes, nationwide monitoring etc.
- It should also be compatible with industry-led certification schemes (LEAF, Red Tractor, Organics) and so help engage the food industry in a clearer understanding of soil's place in sustainable food supply.

We would direct the Committee's attention to the AHDB/NIAB Soil Health scorecard approach, which established a set of measures and an interpretation framework that can be applied to mineral soils under lowland agricultural management. Last year, guidance on how the scorecard might be applied to these soils in England was published. This follows the precedent of the RB209 nutrient management guide, also held by the AHDB<sup>11</sup> which established a uniform approach to nutrient management – a case study of using a simple protocol to link science with practice.

This scorecard approach should be accompanied by visual assessment of topsoil and subsoil in a consistent way. Such a tool was developed by Defra in 2022 under its Soil Structure Measuring and Monitoring scheme.<sup>12</sup> However, despite having been referred to by ministers on various occasions<sup>13</sup> it has yet to be implemented.

Either way, the government needs to establish these metrics as a matter of urgency so that they can be incorporated and adopted by the numerous initiatives being implemented by both the private and third sector. The government's inertia in this area is a significant barrier to innovation and uptake.

### **1.6. Challenge: Concerns over data ownership**

The terms of the SFI make it explicit<sup>14</sup> that *data is one of the public goods that the standard is paying for and part of wider government measures in relation to our future soils strategy*. The collection and aggregation of farm-level soils data has the potential to improve understanding of macro trends in soil health and inform practice decisions.

For such a scheme to work, however, farmers must have control over the data being shared and how it is utilised, as well as complete confidence in the safeguards in place to protect their information.

As it stands, there is no mechanism stated for how this data will be placed in the public domain. These should include limiting applications of its use to anonymised macro- and micro-level analysis, and the protection of sensitive personal and commercial information.

If sufficient confidence can be achieved, we see a role for a single mechanism for farmer collection of soil assessment data and its storage on an open-access soils data repository. This could have significant

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<sup>11</sup> AHDB, 2022. RB209 nutrient management guide.

[https://projectblue.blob.core.windows.net/media/Default/Imported%20Publication%20Docs/RB209%202022/RB209\\_Section1\\_2022\\_220224\\_WEB.pdf.pdf](https://projectblue.blob.core.windows.net/media/Default/Imported%20Publication%20Docs/RB209%202022/RB209_Section1_2022_220224_WEB.pdf.pdf)

<sup>12</sup>SSA & UKCEH, 2022. Unpublished. A practical guide for land managers in assessing soil structure as a measure of soil health in arable and horticulture land and modified/improved grassland. *Available on request*

<sup>13</sup> <https://questions-statements.parliament.uk/written-questions/detail/2022-03-10/HL6855>

<sup>14</sup> <https://www.gov.uk/guidance/the-sfi-arable-and-horticultural-soils-standard>

benefits for future scheme (Countryside Stewardship or ELM) design via improved reward mechanisms for environmental delivery, more targeted advice, informed research, and evidence-based best practice on-farm.

### **1.7. Challenge: Confusion about the role and importance of Soil Organic Matter/Carbon**

Growing interest in soil's ability to sequester carbon and so mitigate against climate change is one of the drivers of soil measurement. However, an emphasis on carbon can distract from overall soil health, especially if soil organic matter (SOM) is used as a proxy indicator without context. As above, soils metrics benchmarks vary according to soil type. By way of example, in a sandy soil, 2% SOM may be the upper end of what a soil can maintain - a figure that would be considered very low in a clay soil.

In addition, determining when and how agricultural practices increase carbon stocks, and how to measure and credit their gains, is more complex than for other indicators (pH etc). The efficacy of soil carbon interventions depends on local climate conditions, land management history, and soil characteristics. Changes in SOM storage takes place over a long period of time, making a specific and measurable result or outcome unrealistic.

Soil carbon features in soil sampling methodologies and farm carbon audits - increasingly for the purpose of Net Zero accounting. Whilst increased awareness about soil carbon is welcome, these tests need to be treated with caution, and clarity is needed as to their value and application.

For example, neither the measurement method proposed for soil carbon (Loss on Ignition or LOI) under the SFI guidance, nor the approach used by Carbon audit toolkits, would meet the minimum standards for soil testing/modelling methods expected from private sector investment in farm soil carbon, e.g. the voluntary carbon market for soil carbon credits and soil carbon certificates.

### **1.8. Challenge: Focus on topsoil only**

Subsoil is a vital but neglected part of the soil profile. It mainly consists of altered rock fragments and materials that have been transported from the topsoil and rearranged in a lower horizon or layer. Together with underlying parent material, it fundamentally affects whether soil is freely draining or waterlogged, and its condition is crucial to farming crops and supporting different habitats.

The upper subsoil is prone to physical degradation, but despite its importance the vast majority of soil monitoring and soil assessment projects and approaches focus on the topsoil, with subsoil referred to by some experts as the 'forgotten soil'.

Thus, the goal of sustainably managed soils by 2030 cannot be achieved if information about and methodologies for assessing subsoils are not adopted at both local and national scale. This can be achieved by a) making the soil data of England and Wales and associated maps freely available (see 1.4) and b) integrating this into a standardised methodology for visual soil assessment. This last exercise was started by Defra for lowland agricultural soils in the Soil Structure Measuring and Monitoring Methodology and associated guidance (1.5) but has never been published.

### Question 1 Recommendations

- The government should fulfil its promise of publishing a Soil Health Action Plan for England. It should include a clear definition of ‘sustainably managed soils’, a set of underlying progress indicators, a framework of policies and actions to achieve it and a commitment to fund nationwide soils monitoring to evaluate progress to 2030 and beyond.
- The government should create a standardised technical framework for describing, grouping and mapping soils (topsoil and subsoil). This should become the established reference point for soils research and monitoring – nationwide, on-farm and by industry.
- The soil data and maps of England and Wales should be made freely available to view and download. Further investment is needed to increase the resolution of existing maps. The online resource (map viewer etc.) should be made accessible in an intuitive, interactive and user-friendly manner, including e.g. via an app. This resource should then be better communicated, including to schools, colleges, farming organisations etc.
- The government should actively promote the clear and user-friendly 2022 AHDB Soil Health scorecard as the first step towards a universal approach to on-farm topsoil measurement and interpretation. It should provide the common soil measurement thread throughout Environmental Land Management, certification schemes etc. as requested by the NFU and others. In due course, it should be completed by the addition of standardised guidance for the visual assessment of subsoils.
- The government should establish a protocol for the collection and use of soils data – applicable whether it is privately or publicly funded. This should include necessary safeguards to anonymise data and protect any sensitive personal and commercial information. The ambition should be to establish a single mechanism for soil assessment data collection, and its storage on an open-access soils data repository – reflecting farmer concerns and the fact that environmental data collection is a public good in itself.

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

Poor soil management and inappropriate land use can impact soils’ ability to deliver environmental and productivity services by causing compaction, erosion, runoff, and contamination. The extreme weather witnessed in 2022 (drought followed by flooding and widespread evidence of topsoil being stripped off fields by heavy rain) highlighted the urgent need to ensure soils are resilient to the long-term effects of climate change.

The total cost for England and Wales was estimated at between £0.9 and £1.4 billion, with a mid-estimate of £1.2 billion a year<sup>15</sup>. Since 80% – or around £980 million – relates to impacts ‘off-site’, i.e. invisible to the farmer in the form of flood damage, poor water quality and increased GHG emissions; regulations are needed – in line with the polluter pays principle.

The principal regulations that apply to farm soils in England are the Farming Rules for Water (FRfW) (2018), created to achieve compliance with the EU Water Framework Directive and transposed into domestic Diffuse Pollution legislation in 2018. Standards of Good Agricultural and Environmental Condition (GAEC) rules 4, 5, 6 required farmers to achieve minimum soil cover, minimise soil erosion and maintain the level of organic matter in soil, but have been phased out since the end of cross-compliance – with the effect that, as it stands, agricultural soils will be afforded less protection than prior to the agriculture transition.

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<sup>15</sup> Graves, A.R., Morris, J., Deeks, L.K., Rickson, R.J., Kibblewhite, M.G., Harris, J.A., Farewell, T.S. and Truckle, I., 2015. The total costs of soil degradation in England and Wales. *Ecological Economics*, 119, pp.399-413.

It is hard to evaluate the impact of the Farming Rules for Water because so little data seems to have been gathered about their implementation – awareness, behaviour change, incidents, prosecutions etc., that might act as proxies for their impact on soil or broader environmental health. However, two recent investigations give cause for concern:

- Environment Agency visits<sup>16</sup> (2016-2020) to more than 100 cattle farms in north Devon revealed nearly 9 in 10 farms were not compliant with safe slurry storage and spreading regulations and two-thirds were causing pollution.
- A similar investigation<sup>17</sup> of 86 dairy farms (2016-2019) in the River Axe Catchment revealed that 95% didn't comply with environmental regulations and 49% were polluting.

The continued decline in the health of our rivers, the result of both point and diffuse pollution, should be seen as a clear indicator that the existing regulatory Framework is failing to ensure land managers are maintaining their soils – and are in urgent need of reform.

### **2.1. Opportunity for Improvement: Soil focused regulations**

As is implicit in the title, the FRfW were designed with water in mind. Their impact on soil has always been a secondary consideration - a by-product of water health.

As a result, the gaps are not so much in the Rules themselves but in the overall regulatory Framework which does not reflect soils' services and functions - or the threats they face. Significant damage caused to soil (e.g. wind erosion) has little to do with water, while some damage caused by poor soil management (carbon and biodiversity loss) would not be measurable directly through water-specific metrics.

Soils need to have their own regulatory instrument in accordance with the diverse public goods and services they provide. This should go beyond preventing/reversing degradation but look to actively improve our soils, specifically their capacity to store or release carbon.

As a starting point, we would like to see soil referred to explicitly in the Regulations (FRFW). These should be re-written as an umbrella set of harmonised baseline standards for water, soil and air (covering nutrients, soil health, carbon, ammonia etc.).

### **2.2. Opportunity for Improvement: Improved Communication**

Another significant challenge with the Farming Rules for Water is the lack of awareness. Again, robust data to establish this is lacking, and we are dependent on anecdotal evidence drawn largely from insights from partner organisations and public events – insights which give the impression that awareness is patchy at best.

For example, at a farming cluster meeting in late 2019 in Hampshire the question was asked of the farmers (generally on the more environmentally aware side of the spectrum), and less than 50% had heard of the 2018 FRfW, let alone operated by them. If these communities are not being reached, there is little chance of the regular offenders in the farming community (those responsible for the worst incidents) being cognisant of the rules.

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<sup>16</sup> [https://uploads.guim.co.uk/2022/10/24/2022\\_09\\_28\\_NDPFA\\_Case\\_Study\\_v5\\_FINAL\\_\(1\).pdf](https://uploads.guim.co.uk/2022/10/24/2022_09_28_NDPFA_Case_Study_v5_FINAL_(1).pdf)

<sup>17</sup> <https://anglingtrust.net/wp-content/uploads/2021/04/Final-Axe-Regulatory-Report.pdf>

This lack of awareness reflects a lack of investment in their communication and political will for their adoption. There was media coverage of the rules at the time of their launch, and this was replicated in subsequent NFU bulletins, as well as in the work undertaken by NGOs and CaBA (Catchment Based Approach) in particular working with Catchment Sensitive Farming. However since then, there seems to have been little concerted effort to proactively remind farmers of the rules or to keep them on the agenda (save for a clarification in March 2022 regarding slurry application).

The government needs to make a concerted effort to revisit the rules and invest in their widespread communication. To resonate with farmers, it must focus as much on the business case as the environmental rationale. Degraded soil results in increased input costs, lower yields and productivity and increased vulnerability to climate change. Following last year's droughts, farmers will be particularly responsive to the message that healthy soils store more water.

### **2.3. Opportunity for Improvement: Greater Clarity and visual presentation**

The Farming Rules for Water as they stand would also benefit from greater clarity about how they should be implemented - and how they might be enforced. Terms like 'reasonable precautions' and 'soil erosion affecting a single area of more than 1 hectare' are ambiguous and open to interpretation.

To that end, the rules might take a lead from the GAECs, specifically GAEC 5 which requires *limiting erosion through land management reflecting site specific conditions*. This rule has proved to be effective because it is built around a specific outcome – and would be applicable for high-risk cropping scenarios e.g. maize and root crops grown on unsuitable sites.

There is also an opportunity for more effective visual presentation of the rules, and the use of case studies and infographics to make them understandable in a real-life setting. We understand that the government's own communications rules restrict these formats in favour of text, but this is a significant barrier to successful communication to farmers of the tools the public needs them to access in order to assist progress towards sustainable soil management.

### **2.4. Opportunity for Improvement: Greater enforcement**

The impact of the rules is also lessened by low levels of enforcement by the Environment Agency - a lack of farm visits and a limited use of penalties. Analysis by Salmon & Trout Conservation UK (now WildFish)<sup>18</sup> revealed that farmers can expect to receive an inspection from the regulator just once every 263 years, and despite the recruitment in 2022 of 50 new agriculture regulatory inspection officers, the regularity of inspections increases to only once every 50 years (River Action UK). As it stands, few farmers have been prosecuted under the farming water pollution rules.

There is also a lack of transparency about how inspectors are assigned around the country and how regulations are enforced, specifically the circumstances or protocols that might lead inspectors to take an advice-led approach, and what action (or lack of action) might trigger stricter penalties (fines).

The absence of this information makes evaluating the Rules' impact more challenging. The Organisation for Environmental Protection is tasked with holding both the government and the Environment Agency to account for its record on agricultural pollution, and we urge it to conduct a thorough audit of all the different factors at stake – the consistent, transparent application and interpretation of the Rules, levels of expertise among inspectors, available resource from the government etc.

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<sup>18</sup><https://www.endsreport.com/article/1695475/free-all-ea-officers-inspect-just-one-farm-every-263-years>

## **2.5. Opportunity for Improvement: Engage the Supply Chain**

Supply chain contractual pressures are one of the major drivers of soil damage. Indeed, Environment Agency inspectors report informally of farmers knowingly damaging their soils (e.g. harvesting in wet weather) because they fear breaching the delivery terms of a customer agreement. Research carried out by the Sustainable Soils Alliance in 2021<sup>19</sup> revealed that the Farming Rules for Water are not reflected in contractual relations between farmers and their clients.

Defra (via the Environment Agency) needs to better understand these pressures through the enforcement and communication of the Farming Rules, and identify mechanisms to help safeguard farmers against undue pressure. Protecting and improving soils comes at a cost, and with a degree of risk for farmers which their customers should help them share. Note that the Certification schemes (LEAF, Red Tractor) can help drive a consistent and transparent approach, but should not be used as a substitute for regulation.

Protection could come via the new supply chain codes of practice (promised in the 2020 Agriculture Act which are crucial to tackle problems of unfairness and poor trading practices by large food businesses. In addition, the Government must retain the Groceries Code Adjudicator (GCA), which has had some success in addressing the worst examples of unfair and poor practices, and not amalgamate it into the Common Markets Authority.

## **2.6. Opportunity for Improvement: Incorporation of Organic Matter**

Regular, consistent soil testing is the critical gateway to understanding soil's role and functions. It generates a positive feedback mechanism whereby farmers see that their soils are changing and that their practices are having an effect – motivating them to make continued improvements.

Currently, the legal requirement is for farmers to test their soil pH, Nitrogen, Phosphorus, Potassium, and Magnesium levels on cultivated land a minimum of every 5 years. Soil carbon/organic matter is not on this list – despite the fact that it is a critical indicator of soil health. Although around half of farmers undertake routine chemical soil analysis, less than 20% undertake monitoring of other soil health indicators such as Soil Organic Matter<sup>20</sup>.

As it stands, soil organic matter testing is included among the standards paid for under the SFI. Whilst in the short term this might be an effective tool for embedding understanding and appreciation of soil organic matter's importance, over time it should become an expectation and a baseline condition for public money. Consistent loss of organic matter over time should be subject to the 'Polluter pays' principle.

To that end, we would draw Defra's attention to the example set in Ireland where a guideline threshold for organic matter (3.4%) is set for farmers applying for the Single Farm Payment, and where falling below this threshold triggers the need for advice and the development of a strategy (rather than fines).

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<sup>19</sup> <https://www.sustainablesoils.org/images/pdf/8-FRW-Review.pdf>

<sup>20</sup> <https://www.sheffield.ac.uk/sustainable-food/research/translational-transformative/achieving-sustainable-soil-management-uk#Research%20findings>

### Question 2 Recommendations

- The government should carry out a review of the regulatory protections for soils to establish whether existing rules adequately reflect the services they deliver and the threats they face. On the basis of this, a soil-specific regulatory instrument protecting soils should be developed.
- The government should take clear steps to ensure that the Farming Rules for Water will be maintained despite the REUL process, and that greater investment will be made to their communication, enforcement and widespread understanding throughout farming and the food supply chain.
- The government should embed the Farming Rules in Environmental Land Management schemes through Standards and Guidance (including visual content). It should set a clear deadline after which compliance with the Rules become a precondition for receiving public money.

### 3. Will the standards under Environmental Land Management schemes have sufficient ambition and flexibility to restore soils across different types of agricultural land? What are the threats and opportunities for soil health as ELM are introduced?

We welcome the early emphasis on soil within the Sustainable Farming Incentive (SFI), the first pillar of ELM, as an important recognition that soils are one of the country's critical assets, delivering a range of ecosystem services and outcomes essential for food production, flood protection and climate change mitigation.

#### 3.1. Threat: Lack of soil-specific metrics to evaluate progress

ELM is hampered by the lack of clarity around what it is trying to achieve and how. In January 2022 the government published some of the expected outcomes from the scheme, including to *bring at least 40% of England's agricultural soil into sustainable management by 2028*, but without a clear definition, or any sub-indicators as to what this means in practice.

Similarly, in the June 2021 Agriculture Transition Plan, Defra estimated that the standards could save up to 60,000 tonnes of CO<sub>2</sub> each year from 2023 to 2027, increasing to 800,000 tonnes per year by 2037. However, it is not clear how this number was reached, what actions specifically will deliver it, or how it will be assessed over time.

A clear thread between guidance, practices, targeting, metrics and outcomes must be established for the SFI to deliver the government's ambitions, built on the universal approach to soil health measurement and data collection (see section 1).

As it stands, the scheme is taking a broad-brush approach to results quantification, with an emphasis on monitoring outputs (e.g. green cover) rather than outcomes (improved soil health). Both SFI soil standards require farmers to undertake a soil health assessment and create a soil management plan, however the data will not be collected and, as it stands, farmers will not be expected to conduct a specific standardised methodology for these assessments.

#### 3.2. Threat: Regulatory Compliance

It is clear from January's EIP that the government sees ELM as being the main driver of soil health, with a particular focus on the Soil Standards embedded in the SFI. No mention was made of the regulatory

framework for agricultural soils at all, and neither does the guidance on the SFI make any mention of the Farming Rules for Water.

Indeed, it is unclear what the relationship between the two policies is. As it stands, there is an overlap between what is being paid for under the scheme and what is required by law; as well as gaps where neither the regulations nor the standards address the full suite of soil threats. These include compaction; loss of organic matter and biodiversity etc.

This sends a confusing message to both farmers and the taxpayer who will expect public money to pay for additional benefits over and above the regulatory baseline.

ELM and regulations need to work in harmony, with a clear description of how they align. ELM must also act as a mechanism for regulatory compliance – and for raising the bar over time. Given the low levels of awareness of the rules, however, this must be done in a proportionate manner. Initially it should be used as a vehicle for communicating about soil and water regulations, and the baseline expectations of what farmers can and should be doing, however there should be a clear timeline for when regulatory compliance should be a precondition for public funds.

### **3.3. Threat: Inadequate Payment rates**

Central to the schemes' uptake will depend on whether farmers see it as financially worthwhile in the long run. We are concerned that existing payment rates for the soil-specific standards will make participation attractive for farmers who are already on a journey to sustainable farming, but not enough to incentivise those who need to make the fundamental shift and change their farming system. The Government already acknowledges "*evidence from farmers already in the scheme that the current payments don't fully account for the costs of entering and implementing an agreement.*"<sup>21</sup> By way of an example, payment rates for the intermediate arable standard currently on offer will not cover the seed costs for multi-species green cover.

There is an urgent need to establish what level of payments are required to achieve sufficient uptake by farmers – of different systems and different sizes. We urge the government to keep the payment rates under constant review and ensure they reflect all relevant costs and overheads – soil measurement, cover crop seed mixes etc., as well as the value of the benefits generated.

To support this, we ask for greater transparency behind the original payment rates which underpin ELM. Specifically, we urge the government to publish the cost-benefit analysis/calculations carried out before the scheme was announced in 2020.

### **3.4. Opportunity: Scheme evolution**

Broadly speaking the interventions incentivised by the SFI standards are the right ones. However, they currently represent only a foundation from which to build, and in many cases resemble little more than the regulatory baseline (minimise bare ground over the winter). In some instances the combination of a low target (70% green cover) and flexibility (e.g. choice of what cover to use) means that many farmers can be compliant without making any meaningful change in practice.

We look forward to seeing the scheme increase in terms of scope and ambition over the coming years. When it comes to soil, this should include the ability to address all the ecosystem services soils deliver, as well as the risks that soils face. Specifically we look forward to seeing further detail about the

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<sup>21</sup> <https://defrafarming.blog.gov.uk/2023/01/05/introducing-sfi-management-payments-and-changes-to-countryside-stewardship-rates/>

proposed standard for minimum/no tillage, since tillage has been associated with many negative impacts on soil quality, most notably a reduction in soil organic carbon (SOC).

We would also draw the Committee's attention to the evolving evidence base that underpins regenerative agriculture. It indicates that, while individual soil management promoted under SFI interventions (such as cover crops) are beneficial, it is only when these are introduced as part of a holistic transition incorporating a wide range of practice changes (e.g. livestock integration) that the true benefits – climate change adaptation, biodiversity increase, SOM storage – can be witnessed.

The ultimate measure of success for ELM must be achieving long term change, i.e. a transition to sustainable, regenerative farming practices – meaning the schemes must focus on a direction of travel, underpinned up by robust soil assessment.

### **3.5. Threat: Alignment with the Private Sector (Additionality)**

An important consideration for ELM/SFI in the years to come relates to how it aligns with the growing market for ecosystem services, and especially farm soil carbon, whereby farmers are paid to adopt carbon-positive farming practices. Central to this is the concept of 'additionality'; the principle that buyers/investors will only pay for carbon-sequestering activities that would not happen without carbon funding.

Defra have indicated that they do not want ELM schemes to 'crowd out' private funding and investment, however many voluntary carbon market projects have *Additionality* clauses that essentially preclude participation in both public and private schemes if certain conditions are not met. Concerns that SFI participation might disqualify farmers from private markets are already disincentivising them from signing up to the scheme.

We urge Defra to address this issue and engage with private market players to better understand the legal and economic implications, and develop an effective workaround enabling SFI and these schemes to work in harmony.

### **3.6. Opportunity: Alignment with the Private Sector (New Standards)**

As ELM/SFI evolves, it should evaluate and reflect on the impact of the private marketplace, identify overlaps and fill in any gaps – where the market does not reward or even disincentivises best practice.

There is a clear policy rationale for this. Private money is needed to fill the gap between the available public money and the amount needed to tackle the twin challenges of climate change and biodiversity loss in the UK. The 2021 Green Finance Initiative *Finance gap for nature report*<sup>22</sup> puts this figure at £56bn over the next 10 years, of which 3.75 billion is the amount of private investment needed to transition to more sustainable soil management in the UK.

Examples of the kind of standards that will support this process are:

- **Soil Carbon Storage:** Private markets pay for additional carbon that is sequestered in the soil but not for existing carbon to be maintained in the soil. This a) is unfair to those land managers that have sequestered carbon into their soils through long-term good practice, and b) opens up the potential for this carbon to be lost through a return to intensification. Since regulation does not address this, we would like to see an SFI standard/Countryside Stewardship option for maintaining SOC above

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<sup>22</sup> <https://www.greenfinanceinstitute.co.uk/news-and-insights/finance-gap-for-uk-nature-report/>

‘comparable’ farms to incentivise long term SOC storage. Since these payments would not be for ‘additional’ carbon, they would not be faced with the challenge raised in point 3.5.

- The cost of farm soil carbon measurement to enable participation in the voluntary carbon markets is significant – and considerably more than is currently paid for under SFI. Improved modelling and measurement and the use of technology will bring these costs down over time, but in the meantime, these costs act as an important barrier to widespread participation in farm soil carbon markets.

We would draw the Committee's attention to schemes in Northern Ireland, Scotland and Australia where the government carries out or significantly subsidises baseline carbon measurement costs. English government support along these lines will deliver standardisation, help reduce costs to projects, and act as the ‘market enabler’ to attract the £3.75 billion in private investment in soil needed.

### **Question 3 Recommendations**

- The government should be fully transparent about the calculations behind the payment rates for the Soil Standards, and to keep these rates under constant review to ensure they reflect all relevant overheads. Payment rates should also take into account the value of the benefits generated by healthy soils, and the nationwide costs of soil degradation.
- The government should establish a clear thread between guidance, practices, metrics and outcomes that will clearly demonstrate how ELM, SFI and individual standards will contribute to the delivery of national environmental ambitions. This will enable the constant evaluation of the standards to establish if they are delivering all aspects of soil health, and their updating where necessary.
- The government should ensure that Environmental Land Management evolves in tandem with the private market for ecosystem services; that it fills the economic ‘gaps’ left by the market, supports market entry and enables public and private scheme income to be stacked for maximum financial and environmental benefit. As a priority we urge Defra to address the legal and economic challenges around additionality, and develop an effective workaround enabling SFI and these schemes to work in harmony.

#### **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?**

Ultimately, the transition to sustainable, regenerative farming needs to make financial sense for farmers, many of whom will see a drop in yield and an increase in overheads (training, capital, seed costs etc.), especially in the early years. However, both the scientific and economic evidence base underpinning regenerative farming is new, and at a time of market volatility, farmers are reluctant to gamble on an untested business model. Supporting farmers through this initial ‘dip’ – i.e. by front-loading any finance/advice - should be a priority for the government in order to secure the greatest long-term economic/environmental rewards.

This goes beyond Environmental Land Management schemes. Potential financial rewards for regenerative farming also include a ‘premium’ from customers (food businesses) who see a value in the brand and the growing market for ecosystem services whereby farmers are paid for practices that deliver carbon sequestration, improved water quality and filtration and biodiversity.

All three of these ‘markets’ are in their infancy, but early indications are that the sums at stake for farmers on their own are modest. In many instances, only when public and private ecosystem support

are combined will there be the necessary impetus (investment, joined-up thinking) needed to give farmers confidence and motivation for long-term land management change.

The government has a clear oversight role to ensure potential income streams are maximised as follows:

#### **4.1. Minimum Standards for Ecosystem Markets**

We would like to see greater government clarity on how different ecosystem markets will operate in future - specifically how the different codes and programmes will be regulated. This includes clarifying the relationship between the UK Land Carbon Registry, existing soil carbon programmes and other new and emerging nature-based codes.

We look forward to seeing the (UK-wide) Ecosystem Markets Framework due for publication early in 2023 which will set the high-level principles for private investments in sustainable farming and nature recovery (as was confirmed in the Environmental Improvement Programme). To that end, we would draw attention to an Environment Agency funded project by a Consortium led by the Sustainable Soils Alliance.

The Consortium recently published a report laying out minimum requirements for high integrity soil carbon projects<sup>23</sup>, including the MRV (Monitoring, Reporting, Verification) and principles including permanence, additionality, leakage etc. We urge the government to embed these recommendations into the Framework so as to give investors, farmers and other stakeholders confidence in the marketplace and unlock both income streams and environmental benefits.

#### **4.2. An Ecosystem marketplace that enables stacking of payments for different services where possible**

The sequestration and storage of soil carbon in particular provides multiple co-benefits including improved climate change mitigation and resilience, water filtration and biodiversity, all of which may attract private investment (carbon offsetting and insetting, water companies seeking to improve water quality etc.).

Future policy frameworks cannot preclude the stacking of payments from voluntary markets (stacking with compliance markets is already not possible). However, there is a role for policy to ensure the integrity of ecosystem markets, to ensure these operate with robust additionality rules that will prevent double-counting (where outcomes arising from one payment are sold to multiple buyers, whose investment made no difference to the outcome).

Considerations around the integrity of voluntary markets in relation to stacking include:

- Integration of full cashflow for projects in additionality calculators to demonstrate whether additional ecosystem market payments are necessary to make a project financially viable (hence meeting financial additionality tests).
- The existence of credible voluntary standards for each ecosystem service in the stack, and where these do not yet exist, the development of methods that could be used to approve their use as part of a high-integrity stack.
- Methods for distinguishing bundled projects (in which other ecosystem services are sold as part of a bundle of benefits alongside the carbon) from stacked projects for buyers, including mechanisms to show this on the UK Land Carbon Registry (and other relevant registries) and ensure checks are made between registries to avoid double-counting, so that claims are clear and explicit.

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<sup>23</sup> <https://sustainablesoils.org/soil-carbon-code/minimum-requirements>

Again, we urge Defra to follow the example of existing successful pilots, including the regionally focused Landscape Enterprise Networks, which harness commercial interest in how landscapes function to drive investment and innovation around strategic assets like soils, aquifers, access infrastructure, habitats and tree cover.

#### **4.3. An aligned and engaged food supply chain**

UK food businesses have a vested interest in soil health for long-term food production, and have invested in soil research, measurement and improvement alongside their suppliers, as was highlighted through research carried out by the Sustainable Soils Alliance in 2021<sup>24</sup>. A dedicated Soil Health Industry Platform (SHIP), made up of major food businesses, is exploring ways to collaborate and so scale up this work.

We urge Defra to acknowledge the food supply chain as an important driver of best practice, data and high standards and a source of innovative research. They should also be seen as a vehicle for farmer engagement on SFI participation, regulations, guidance etc.

Business interest is partly motivated by a growing understanding that soil carbon can be incorporated into Scope 3 GHG reporting, and increased clarity about how this can be measured, embedded in environmental targets, delivered and reported. The government has a role here to ensure that this 'insets' market operates according to a level playing field, and to equivalent high standards as carbon offsets. This should be accompanied by safeguards to ensure farmers have clear oversight over their carbon, and are properly rewarded for the practices over the long-term.

#### **4.4. Soil reflected in consumer information**

There is a gradual move towards formal, official on-pack information tools (labelling, claims) that will sit alongside existing certification schemes (Red Tractor, LEAF, organic) that will enable informed consumer decision-making related to the environmental impact of the food they are buying. Where the government has influence over these tools (e.g. the Environment Agency's Seebeyond project) we call for soil health to be among the cornerstone metrics, alongside water, biodiversity etc.

Alongside this, we need a clearer definition of 'regenerative' that can be understood and applied across the sector. This need not be a one-size fits all definition, but enable flexibility to reflect diverse soil and farming types. It should also be noted that for some crops (especially root crops), 'regenerative' farming is very challenging.

#### **4.5. Investment in research**

When it comes to the storage of carbon in soils (soil carbon sequestration), the evidence base is thin - especially when it comes to understanding the impact of specific management options on specific soil types and under specific environmental and social conditions. As a priority, we urge the government to invest in filling this knowledge gap, and specifically scenario modelling to predict outcomes of different soil management interventions on soil carbon sequestration across all UK farming systems.

This would provide vital information to UK farmers and land managers to help them make critical land use and management decisions under growing demands and markets for land-based carbon, alongside the increasing pressures on agricultural food production. Such research will also provide the necessary data to help understand the impact of the SFI against one of its core metrics – carbon sequestration.

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<sup>24</sup> [https://sustainablesoils.org/images/pdf/Soil\\_in\\_the\\_UK\\_Supply\\_Chain\\_Report\\_Dec\\_2021.pdf](https://sustainablesoils.org/images/pdf/Soil_in_the_UK_Supply_Chain_Report_Dec_2021.pdf)

#### **4.6. Education and training**

Despite significant advances in soil science and understanding in recent years, we are concerned that these innovations are not being reflected in the nationwide soils 'curriculum' - the various educational modules that form the basis of expert soils understanding – the advisory services, higher education, Continued Professional Development and even inspector training.

The universal framework and metrics will go a long way to aligning and updating these disparate elements, especially when delivered through guidance and the SFI, and we urge Defra to ensure these new tools extend to all corners of the farm-knowledge community.

We also see great value in farmer-to-farmer peer learning, so newcomers to environmental land management can learn from those who have been delivering objectives through improved soil management. Defra should invest in this approach – seeing results 'in field' is often the most convincing rationale to change practices, and signpost to the growing numbers of living laboratories and lighthouses<sup>25</sup> where farmers and scientists are pioneering new and highly innovative soil management techniques around the country.

#### **4.7. Understanding the economics of soil**

A clear understanding of the economic case for sustainably managed soils is needed to underpin future policy – and demonstrate that the benefits of soil protection and improvement will hugely outweigh the costs. The most recent, holistic study was produced in 2015 by Cranfield University – *The Total Cost of Soil Degradation in England and Wales*<sup>15</sup>. It showed that the cost to the economy of soil degradation was up to £1.4bn per year, mainly due to loss of organic matter and compaction.

Since 2015, repeated first-hand experience of extreme weather has increased our appreciation of the economic cost of climate change, biodiversity loss and flooding – as has the science linking soil health with both the mitigation of and adaptation to these threats. As a result, there is an urgent need to repeat this study to reflect available data and trends as well as an understanding of the interconnectivity of diverse environmental pressures; and to generate an up-to-date and accurate picture of soil's true economic cost and value, including climate change mitigation and resilience.

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<sup>25</sup> <https://uksoils.org/living-labs-lighthouses>

#### Question 4 Recommendations

- The government should support the development of high-integrity markets for ecosystem services based on minimum requirements for farm soil carbon codes and adaptable to reflect advances in science and technology.
- The government should better understand and harness the impact of the major food businesses in driving soil health – through guidance, regulatory compliance etc. The need for fair payments for farmers and protection from adverse contractual agreements should be reflected in its work on supply chain codes of practice, the work of the Grocery Code Adjudicator and a level playing field for farm soil carbon.
- The government should use its influence to amplify soil's importance for the farm-knowledge community and accelerate the transfer of science into practice. We also urge it to promote peer-to-peer farmer education since seeing results 'in field' is often the most convincing rationale to convert to pioneering new and innovative soil management.
- The government should commission an updating of the research: *The Total cost of soil degradation in England and Wales* to reflect new data and trends.

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

##### 5.1. Plastic pollution to soil in the UK (with input from BBIA and UKCEH)

There is growing evidence about the scale and source of plastics contamination in soil. 2017 research from UKCEH<sup>26</sup> illustrates that plastic and microplastic contamination received by soils is likely to be as great, if not greater, in volume than plastics entering water courses.

Much of this contamination is derived from spreading digestate and sewage sludge as compost because of their considerable nutrient value to land as a substitute for chemical fertilisers. A study by researchers at Cardiff University found that up to 650 million microplastic particles, measuring between 1mm and 5mm (0.04in-0.2in), entered one wastewater treatment plant in south Wales, every day<sup>27</sup>. All these particles ended up in the sewage sludge, making up roughly 1% of the total weight, rather than being released with the clean water.

Another source of contamination is via direct use in farm applications of plastics including soil mulch films; tree guards; clips on fruit trees/bushes and bale wraps that (after use) leave fragments. Soil mulch and bale wraps are generally collected after use, but when stripped out of soil or when unwrapped, they leave fragments that accumulate year after year in the same fields. Confidential industry sources report that around 3000 tonnes of plastic tree guards are used across the UK annually and remain *in situ*, breaking down into microplastics over time.

Microplastics from the wear and tear of tyres<sup>28,29</sup> are another important source of plastics debris entering the environment. A 2022 report from Suez<sup>30</sup> puts this figure at 63,000 tons - a significant amount of which is likely to be deposited on soil, near roads<sup>3</sup>.

<sup>26</sup>[https://www.researchgate.net/publication/313358945\\_Microplastics\\_in\\_freshwater\\_and\\_terrestrial\\_environments\\_Evaluating\\_the\\_current\\_understanding\\_to\\_identify\\_the\\_knowledge\\_gaps\\_and\\_future\\_research\\_priorities](https://www.researchgate.net/publication/313358945_Microplastics_in_freshwater_and_terrestrial_environments_Evaluating_the_current_understanding_to_identify_the_knowledge_gaps_and_future_research_priorities)

<sup>27</sup> <https://www.sciencedirect.com/science/article/pii/S0269749122004122>

<sup>28</sup> <https://www.gov.uk/government/news/tyre-particles-are-contaminating-our-rivers-and-ocean-study-says>

<sup>29</sup> [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=4265609](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4265609)

<sup>30</sup> <https://www.mrw.co.uk/news/suez-warns-tyre-wear-contributing-to-microplastic-pollution-06-04-2021/>

Plastics accumulating in soils have a negative effect on soil health, fertility, microbial activity and plant growth<sup>31</sup>. The consequences of microplastics entering our food chain on human health are yet to be fully understood but disruptive impacts on human endocrine systems have been found<sup>32</sup> that these are no longer simply “contaminants” but should be classed as “pollutants” i.e., with impacts on human health.

Contamination of soils from avoidable sources can be addressed by making upstream changes. A precautionary principle should be applied in case of doubt. These include:

- **Standards for biodegradable plastics:** There is potential for biodegradable or compostable soil mulch and bale wraps, tree guards and clips which are designed to be ploughed in after use rather than collected. For these to be effective, however, we need to be sure that the tests for biodegradability and composting represent conditions in the field (i.e. are predictive of actual behaviour of the plastic in practice) and measure the right endpoints. This will require the application of international standards (to which the UK adheres) are made in determining material choices.
- **Mandating biodegradable materials:** Soil biodegradable materials cost more than traditional plastics due to small scale use and production. By mandating the introduction of soil biodegradable materials (over a period of say five years) production would rise and prices fall.
- **Compost and digestate spread to soil.** The Environment Agency is imposing new, stringent limits to plastics entering waste treatment facilities and thus also in the outputs. We recommend that (when this mandate enters into force in 2024) all household food and garden waste is collected using only compostable bags certified to the standard BS EN 13432 which was recognised into law in the UK in 2000. Such a mandate requires Government legislation with the framework on the Resource and Waste Strategy and is a solution which Defra are studying.
- **Sewage sludge:** Some European countries already prohibit sewage sludge from being spread to soil (e.g. Switzerland and the Netherlands). We recognise that such a measure will place a financial burden on water companies and should be balanced against the important role sludge has in our agricultural system, however an interim ban on the spreading of sewage sludge to soil until contamination levels fall should be considered. One solution is to mandate the use of microplastic filters on all washing machines<sup>33</sup>, which would give a positive outcome not just for soils but also for water courses, though would require responsible management of waste from filters.
- **Accurate Testing:** Any intervention to reduce plastic emissions into the environment needs to be underpinned by data, which will require robust and targeted monitoring. There are 5 ISO standards currently under development relating to the sampling and analysis of microplastics in waters, however additional standards will be needed for monitoring plastics in soils.
- **Tire redesign/management of road runoff:** In many EU countries, national EPR (Extended Producer Responsibility) systems for tyres operate to avoid dumping in the environment.

## 5.2. Soils on construction sites and urban soils

Some of the most significant impacts on soil function, and the services it provides, occur as a result of activities associated with land development (housing, infrastructure, public realm, commercial, retail and private development) yet there is a general lack of awareness and understanding of this within the development sector, the public and across policy areas. Key findings associated with this are:

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<sup>31</sup> <https://www.mdpi.com/2076-3298/7/5/38/pdf>.

<sup>32</sup> <https://www.ciel.org/plasticandhealth/>

<sup>33</sup> <https://www.sciencefocus.com/news/microplastics-laundry-filters-dramatically-reduce-fibres/>

- Soils make up 58% of the total tonnage received by landfills.<sup>34</sup>
- In 2018, 29.5 million tonnes of soil from construction sites were disposed of in landfill in the UK<sup>35</sup>- this is 10 times greater than the 2.9 million tonnes of soil lost due to soil erosion each year in England and Wales.<sup>15</sup>
- Soil erosion on construction sites globally can be up to 100 times greater than on agricultural soils.<sup>36,37</sup>
- In 2013, soil carbon losses due to development were estimated at 6.1 million tonnes of CO<sub>2</sub><sup>38</sup>; this is greater than losses of greenhouse gases from other big emitting industries such as concrete production (6 million tonnes CO<sub>2</sub> equivalent) and the chemical industry (5.2 million tonnes CO<sub>2</sub> equivalent.)<sup>39</sup>

Despite this understanding that soil disturbance from construction releases carbon, soil does not feature in the most recent costing of carbon in construction reports.<sup>40</sup>

### 5.3. Soil compaction caused by development projects

Compaction caused during the construction process represents a significant and growing stress on soils, with deeply concerning consequences for the wider environment (flooding and water filtration, carbon storage abilities, biodiversity and habitat creation).

The 2009 Defra code of practice<sup>41</sup> for the sustainable use of soils on construction sites lists the main functions that soils deliver – habitat creation, water attenuation, flood mitigation, support for ecological habitat and biodiversity. Compacted soils are unable to deliver most of these functions. In fact, no sooner do construction activities commence than soils are degraded, with carbon released into the atmosphere, microbial communities destroyed and water holding capacity compromised. While the construction process eventually puts soil back, soil quality is lost or diminished in the process and compaction is by far the main cause of soil quality and soil function loss.

The Defra *Code of Practice for the Sustainable Use of Soils on Construction Sites* (COP) is the main tool for minimising soil damage and improving soil health during the construction process. The current updating of the COP has the potential to deliver this. It is critical therefore that the new COP does not focus predominantly on contamination, but instead takes full account of its role in guiding the construction industry to safeguard soil health, quality and function as a key component of responsible development, with soil contamination understood in parallel. It is not enough however, to just update the COP. It must then be effectively communicated throughout the industry. Mechanisms should be considered to embed the COP into reporting and certification schemes.

<sup>34</sup> Defra, 2022. UK statistics on waste. Updated 11 May 2022. <https://www.gov.uk/government/statistics/uk-waste-data/uk-statistics-on-waste>

<sup>35</sup> Defra, 2022. ENV23. <https://www.gov.uk/government/statistical-data-sets/env23-uk-waste-data-and-management>

<sup>36</sup> Hani Ismail and Yee, 2012. MUSLE Evaluation of Soil Loss on a Construction Site by Using Gauging Weirs. *Advanced Materials Research*, 446-449, 2718-2721

<sup>37</sup> Weil and Brady, 2017. *The nature and properties of soils*. 15th edition.

<sup>38</sup> Soils in Planning and Construction Task Force, 2022. *Building on soil sustainability: Principles for soils in planning and construction*. <https://wp.lancs.ac.uk/sustainable-soils/files/2022/09/Soils-in-Planning-and-Construction-Sept-22.pdf>

<sup>39</sup> Committee on Climate Change, 2016. *Environmental Audit Committee – Inquiry into Soil Health*, Written Submission. <https://www.theccc.org.uk/wp-content/uploads/2016/01/CCC-Written-Submission-to-Environmental-Audit-Committee-Inquiry-into-Soil-Health.pdf>

<sup>40</sup> <https://committees.parliament.uk/publications/22427/documents/165446/default/>

<sup>41</sup> [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/716510/pb13298-code-of-practice-090910.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/716510/pb13298-code-of-practice-090910.pdf)

#### 5.4. Soil loss

In the 25 Year Plan for the Environment, the government committed to *embed an 'environmental net gain' [ENG] principle for development, including housing and infrastructure*. The Environment Act downgraded this to Environmental Net Gain, with the Natural Capital Committee concluding that this poses a *real danger of further degradation of England's terrestrial and marine ecosystems*.<sup>42</sup>

With ten to 100 times more soil being lost through the construction process than through erosion, policy must drive a new approach to surplus soil on construction sites being seen as waste, such as through a database of re-usable soil.<sup>43</sup> Soil in construction should be seen as a commodity, and this should be underpinned by connecting soil to biodiversity net gain and understanding its carbon storage (and loss) potential. In this we could look to soil policy development in other countries, with Switzerland for example developing a national policy of no net soil loss.<sup>44</sup> The updating of the COP represents an opportunity for leadership from the government in this.

#### 5.5. Further issues

There are numerous additional well-known issues that pose threats to soil, and in turn the wider environment and human health. These include atmospheric nitrogen pollution, transfer of excess nutrients and human pathogens to waters, antimicrobial resistance from pharmaceuticals and veterinary medicines, climate change pressures on soils leading to increased issues with water quality, soil erosion and carbon loss.

Many of these are known as Contaminants of Emerging Concern (COEs) and find their way to soil via the drive to support a circular economy (i.e. treating organic wastes from farms and industry for application to land to increase SOM and as a nutrient source). Thus, there is an urgent need to establish the global risks of these chemicals in our agricultural systems.

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<sup>42</sup>[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/858739/nc-c-annual-report-2020.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/858739/nc-c-annual-report-2020.pdf)

<sup>43</sup> <https://soilhub.co.uk>

<sup>44</sup> <https://www.oneplanetnetwork.org/knowledge-centre/policies/swiss-national-soil-strategy>

## **Question 5 Recommendations**

### *Plastics*

- The government should mandate the use of soil biodegradable film mulch and bale wraps using the standard BS EN 17033 as point of reference. It should explore market intervention opportunities to promote their uptake throughout the industry.
- Defra should include the obligation for the collection of food and garden waste for treatment in composting and anaerobic digestion to be with certified compostable bags according to the standard BS EN 13432.
- The government should investigate the feasibility of mandating the installation of microplastic filters on all washing machines sold in the UK post (for example) 2023.

### *Construction*

- The government should update the Code of Practice for the sustainable use of soils on construction sites to fully focus on soil health, quality and function, and set a goal of no net soil loss from construction in England.
- Soil Re-use and Storage Depots, the government should invest in a national database of available re-usable soil from construction sites – to avoid soil going to landfill and facilitate soil to be ‘shipped’ much shorter distances.
- The government should make good on its commitment to environmental net gain and find a mechanism to include this in the all future environmental policies.

### *Further risks*

- The government should urgently establish the global risks posed by chemicals in our agricultural systems and take clear, well-communicated steps to address them. We call on government to assess the risks to soils from climate change, including associated impacts on other parts of the environment and to include the findings future policy development.