SUSTAINABLE SOILS ALLIANCE

Response to Defra Environmental land management: policy discussion

Deadline: 31 July 2020

6. Do you have any comments on the design principles on page 14? Are they the right ones? Are there any missing?

A clear reference to the regulatory baseline is missing from the proposed design principles.

As it stands, the Discussion Document states that ELM should sit alongside mechanisms such as regulation (p.7) and that a principle behind what ELM will pay is that it is not required by domestic regulations (p.32).

This point needs to be made more clearly and with greater emphasis. Regulatory compliance needs to be elevated to a position where it sits among the document's core philosophical tenets, raising the bar for all farmers, not just those participating in ELM.

Above all there needs to be a distinction between those farming practices that are required in order to be compliant with existing regulations and those that might be eligible for financial support. Since regulations address both practices that are non-compliant and actions that are required, the phraseology in the Discussion Document is misleading.

A clear explanation of how regulations sit alongside incentivisation sends a clear message to practitioners and would contribute to the achievement of the environmental outcomes desired. It would also reassure taxpayers that their money is being spent in a fair, equitable and transparent manner.

7. Do you think the ELM scheme as currently proposed will deliver each of the objectives on page 8?

No. Strategic Objective 2: *Tackle some of the environmental challenges associated with agriculture* will not be delivered by ELM alone, but will need to be supported by a separate, evidence-based regulatory framework as well as commitment to communication, education, independent advice and enforcement. To achieve its goals, ELM needs to be understood as only one aspect of a far larger, more ambitious land management strategy.

For a start, some farming businesses are not dependent on government support – either because they don't need it or don't have the resources/knowledge needed to apply for it - but might still be causing significant environmental damage. Indeed, the experience of BPS is that many of the worst offenders when it came to soil degradation were not subsidised and so not covered by cross-compliance.

To progress towards the 25 Year Environment Plan goal "*by 2030 we want all of England's soils to be managed sustainably*" greater consideration therefore needs to be given to how ELM's reach and impact can be extended to cover those farming businesses who won't depend on it financially.

Critical to this will be the establishment of new regulatory framework, envisaged in "*Farming for the future policy and progress update"* (due to be developed by 2024) including measures that apply to all farmers, not just those participating in ELM, and that borrows from and extends existing regulations. When it comes to soil, this means the 8 Farming Rules for Water and BPS cross-compliance rules (GAEC 4, 5, 6).

- The 8 Farming Rules were transposed into domestic Diffuse Pollution legislation in 2018 and will be subject to a review in 2021.
- BPS cross-compliance rules (GAEC 4, 5, 6) include *providing minimum soil cover, minimising soil erosion* and *maintaining the level of organic matter in soil* and currently stand to fall once we leave the CAP.

The 8 Farming Rules were a modest but sensible step forward for protecting soils when compared with cross-compliance and the voluntary approach. However, they represent little more than a minimum set of requirements i.e. they do not cover contaminant levels.

Similarly, whilst GAEC rules have been improved in recent years, their impact is limited by in-built derogations and a weak system for ensuring compliance. This is particularly true for soil organic matter content – with no obligation to measure and no baseline data for existing soil carbon stocks in the majority of farms, there are no mechanisms to establish either compliance or breach.

Despite these limitations, we favour seeing the existing GAEC rules transposed into statute. However, since they relate to soil protection (and some soil erosion isn't caused by water), the 8 Farming Rules for Water would not be the appropriate instrument.

Instead, we would call for a soil-specific statutory instrument with the aim to protect soil multifunctionality and the diverse public goods and services provided by soils - in particular those related to carbon storage and sequestration (achieving net zero carbon as well as climate change mitigation, water storage, soil fertility, biodiversity etc). This would explicitly separate those outcomes that are water focused from those that are soils focused – as well as the critical interconnectivity of the two capitals.

We are concerned by some of the wording that implies a watering down, rather than a tightening, of the current rules, and specifically the reference in *"Farming for the future policy and progress update"* to simplifying the rules for cross-compliance starting in 2021 - often a euphemism for a substantially weakened regulatory framework and mechanisms to ensure compliance.

ELM provides an opportunity to develop a sustainable soil management framework that blends statutory measures (applying to all farmers) and enforced baseline compliance (a condition for public money).

Whether these rules are reflected in enforcement or as a condition for payment, the current low levels of awareness of current rules among farmers also need to be understood. To this effect, DEFRA themselves seem to have in mind a built-in transitionary period whereby regulations become the 'appropriate or effective lever' for some of the actions that Tier 1 might pay for at the start of the scheme.

We favour this approach as it makes sense to build an 'amnesty' period into the vision – enabling the bodies responsible for delivering ELM to educate and inform about both soil management best practice and statutory requirements, embed healthy soils in the Farm Plan architecture, upskill advisors and understand the resource needed for effective enforcement.

This interim period would also enable ELM to collect evidence to inform further refining statutory requirements, guidance and ELM payments to achieve the goals of sustainable soil management

At the end of this transitionary period (5 years) the actions the public would pay for will become the norm for all farmers.

8. What is the best way to encourage participation in ELM? What are the key barriers to participation, and how do we tackle them?

The question of whether ELM should pay for actions or results/outcomes will be central to the scheme's success. A balance needs to be struck between demonstrating value for money to the Treasury and the public, without alienating participants with burdensome reporting.

The dilemma is particularly pertinent for soil which is critical for delivering many of the Public Goods desired, but where change in properties is gradual and the impact of improvements can be hard to prove (given environmental variability over space and time) and therefore reward.

To overcome this, we would recommend a blended approach, whereby payments are made according to proxy indicators (including practices), with some money withheld and subject to a more thorough audit of change in properties every few years.

To support this, there is potential for greater use of self-reporting on some outcomes to reduce inspections – for example tracking of soil health over time which could be cross-checked less frequently by agencies. In Wales it is proposed that professional soil sampling is to be done pre-contract and again after 5 years with encouragement of self-assessment in between.

This later audit is particularly important because improvements can be lost very quickly with change in management - for example the release of stored carbon as CO_2 and soil erosion from ploughing up grassland. There could be deductions in future years if management practices that have improved soil health are changed to those that effectively deplete the otherwise accumulating natural capital.

A focus on pre-defined outcomes emphasises the need to continually adapt and improve – an issue which will become even more important as climate extremes hit the agricultural sector and greater resilience needs to be built into the system.

In order to embed healthy soil outcomes, we need measurements and monitoring of the soil health parameters linked to the delivery of public goods at appropriate time intervals (e.g. every 5 years for arable fields, every 10 years for permanent grasslands and moorlands etc).

This approach should make the most of rapidly evolving technology - both remote and on-farm. Where this proves to be reliable, accurate and cost-effective, every opportunity should be taken to replace more burdensome methods.

For this approach to succeed, however, a universal understanding of the terminology and principles of soil health is needed. This should include the key metrics, methods to measure them, the practices needed to drive change and, most critically, an agreed list of critical soil quality indicators (SQIs) adapted to demonstrate the likelihood that a soil will deliver both agricultural production and Public Goods, according to different soil types and their use and location in a landscape.

ELM provides the ideal driver and rationale for such a universal 'language' through the development of targeted soil-specific guidance that can be embedded throughout the scheme - via advice, measurement and monitoring, actions and outcomes. This in turn will drive an understanding that healthy soils can deliver desirable outcomes for both production and the environment and - by engaging farmers directly in conversation about their most important asset - provide a gateway for ELM participation.

ELM should work both on an individual farm and catchment/landscape scale to encourage participation/ engagement. Encouraging/rewarding farmers and land managers to work together in 'clusters' alongside the NFU, AHDB etc. will help overcome some of the knowledge gap issues and de-risk change by facilitating group experimentation, testing and demonstration of different approaches and practice. The impact of peer pressure on resisting change or peer support in bringing about change should not be underestimated.

9. For each tier we have given a broad indication of what types of activities could be paid for. Are we focussing on the right types of activity in each tier?

We welcome the inclusion of soil management among the list of actions that ELM might pay for under Tier 1 of the scheme. This represents a ground-breaking appreciation of the importance of soil for delivering many if not all of the Public Goods identified.

The list of suggested activities relating to soil health looks sensible and should generally improve soil health where they replace more damaging practices. We appreciate this is not the time for a shopping list, but would like to see diversification of crop rotations, a reduction in synthetic fertiliser application and movement away from monocultures added.

Having said that, we have concerns about the essentially 'menu driven' approach which is unlikely to inspire or motivate adaptation and innovation by farmers over time to improve and optimise management practices to the local context or adjust for ongoing environmental, market and political changes.

Similarly, to achieve its ambitions ELMs should look to achieve holistic, systemic change in farming practices, rather than the cherry-picking of practices that might not be universally applicable. A simple example is no till systems that can increase dependence on agro-chemicals for weed control. Instead, ELM might propose a set or bundle of practices that are "essential/unequivocal" alongside others that are additional, reflect local conditions or may have unintended consequences.

An additional, critical weakness with the menu approach as outlined is that it does not give sufficient emphasis to the importance of soil carbon management. Given that this is the single most important measure of soil health and thus the provision of public goods and services, a requirement to monitor and maintain soil organic matter should be a bare minimum prerequisite for public money.

Alongside this, specific goals with respect to soil organic matter need to be integrated into the outline scheme now with a commitment to develop mechanisms to deliver a workable system for rewarding actions that improve carbon sequestration and storage, by the time the scheme is fully implemented.

10. Delivering environmental outcomes across multiple land holdings will in some cases be critical. For example, for establishing wildlife corridors or improving water quality in a catchment. What support do land managers need to work together within ELM, especially in Tiers 2 and 3?

When it comes to collaborating on soil health, our experience is that farmer networks, both physical and online, are a powerful tool for driving knowledge exchange around the adoption of sustainable soil management practices and could be more strongly supported.

We see a particular role for pioneer farmers trialling new approaches / new combinations of land and water management that are then shown to deliver improved environmental outcomes. There needs to be funding to support such innovative farmers conducting trials and to facilitate them serving as demonstrators - showing visitors what has been achieved and supporting them to build networks to guide and inspire others to learn from their experiences and implement best practices that are established.

These kinds of demonstrator / experimental trials might fit as a higher tier option (2/3).

Community partnerships involving a range of stakeholders and their specific interests to improve water quality at the level of river catchments are also a proven model for distributing advice to farmers.

ELM designers should learn from the above and especially their experience with peer-to peer learning. The final scheme needs to strike a balance: capitalising on the tailored, regional expertise that is the speciality of local initiatives, underpinned by standardised guidance (e.g. for soils as part of the nation's natural capital), so that different initiatives are working according to a shared baseline understanding and set of standards.

Finally, sharing and learning from the outcomes of other national initiatives within the UK should be encouraged as well as more broadly across EU and globally where context is appropriate.

11.While contributing to national environmental targets (such as climate change mitigation) it is important ELM should also help to deliver local environmental priorities, such as in relation to flooding or public access. How should local priorities be determined?

Despite recent flood incidents, soils' capacity to slow the flow of water through river catchments continues to be overlooked (from an engineering, policy and investment point of view) in comparison with on-site mitigation efforts - and even when compared with other natural flood management options.

Central to this soil function is SOM, since soil organic matter content reduces bulk density, increases pore space and populations of earthworms and other beneficial organisms that improve soil structure and macropores, through which the majority of rainfall infiltrates during storm events. Since soils with more organic matter store more water and nutrients, and filter and slow the flows of water and chemicals, this is a critical issue.

Whilst it is true that natural flood management approaches can be targeted to be more effective in some places than others, good soil management across large landscape areas is usually likely to make a difference to flood attenuation, thus avoiding the need for additional and unnecessary interventions.

We urge for catchment hydrology and soil characteristics to be among the first considerations when designing a local flood management plan, and for these to be reflected in Tier 1 and 2 ELM design and subsequent payment allocations. Central to this should be an understanding of local soil depth (topsoil v subsoil), water holding capacity and organic matter content, which determine soil structure and the hydrological functioning of soils e.g. infiltration rates and runoff generation.

The role of depleted soil organic matter content, compaction and erosion in exacerbating flood risk and increasing flood damage is also a useful reminder of the importance of a strong regulatory framework – the value of which will be particularly understood in local, flood hit areas. Where both water and sediment (i.e. eroded soil) impact on communities ELM should be harnessed to foster this link and make the argument for both compliance and investment in enforcement.

12.What is the best method for calculating payments rates for each tier, taking into account the need to balance delivering value for money, providing a fair payment to land managers, and maximising environmental benefit?

Healthy soil is unique in its ability to deliver each of the five Public Goods identified by the government's Agriculture Bill, but it also bestows private benefits to the landowner through productivity increases. It can increase yield quantity and quality, but more importantly resilience from extreme climate events and other disruptors, underpinning farmers' livelihoods in the longer term.

Striking a balance between these dual benefits will be critical for incentivising behaviour change and overcoming the prevailing disconnect between the way soils are used and the broader consequences for society and, critically, for demonstrating responsible and transparent use of taxpayers' money.

When it comes to soil, payments should be calculated with the following principles in mind:

- Soil organic matter/carbon is critical for delivering the environmental benefits listed above and should be the principal target and indicator for Tier 1 soil management payments – mindful of the challenges surrounding the measurement and monitoring of meaningful change in SOC
- Payments should be for a blend of outcomes and activities; activities as a proxy to start with – then outcomes (payment withheld) over a period of time
- We foresee a 4-step process, whereby payments are made to farmers:
    - To carry out a baseline survey of their soil assets (including SOM, nutrient status and structure)
    - To develop a contract on how to improve their asset over a given time period (informed by a trained independent advisor)
    - To undertake management practices that improve soil health
    - According to a survey of results/outcomes

In the early days of the scheme it is important that a proportion of ELM payments should be allocated to compensate farmers for any costs incurred. This is needed to overcome any inconvenience and inertia to change practices and kickstart widespread, generational soil knowledge and understanding. Once farmers and land managers see the private goods benefits (e.g. increased yields and greater revenue) or improved financial margins (lower inputs) provided by their soil, public money can be tapered down and replaced by a regulatory baseline.

There is also a question of fairness, given that damaged soils are potentially better placed to receive the greatest reward for building soil carbon whereas farms where soil husbandry has a record of maintaining soil carbon stocks might be rewarded less. In this instance, farmers should be rewarded for their ongoing stewardship and preservation of this natural capital.

13.To what extent might there be opportunities to blend public with private finance for each of the 3 tiers?

A clear strategy is needed upfront to ensure private sector money is neither relied upon to do the Government's job, nor crowded out.

There are some existing models of public-private finance helping to deliver environmental improvements. A number of water companies are paying farmers (as compensation for potential lost income from crop losses) not to use slug pellets (metaldehyde) in order to maintain drinking water quality standards. Yorkshire Water has been trialling a scheme to relocate sheep from vulnerable uplands to reduce their costs of removing eroded sediment at water-treatment works.

In addition, a voluntary marketplace that rewards and incentivises soil carbon sequestration and storage on the basis of its contribution to Net Zero and other natural capital benefits – through off-setting and other corporate ESG policies - is emerging as a source of private sector funding to farmers around the world.

These schemes have the potential to provide a complementary income source for English farmers alongside ELM and to blend public with private finance, but might also become a source of confusion, distraction, double-counting and unintended consequences. For such a marketplace to generate income for English farmers alongside ELM (via Tier 1 – or on an aggregated basis via Tiers 2 and 3), a number of issues need to be addressed. These include:

- A clear understanding of the specific nature of English soils and the soil type/ crop landscape that have the potential to sequester and store the most carbon, as well as the practices (organic, agroecology,

leys, deep rooted plants) with the best record of increasing carbon sequestration and storage, and soil health.

- An evaluation of the efficacy and applicability of existing carbon valuation and management protocols – both those developed overseas (especially in the US) and domestic codes for Peatland and Woodland. Current concerns about some of these schemes are that they are either too costly to be adopted, not rigorous enough to be valuable or not designed in a manner that delivers directly to farmers.
- A shared understanding (between public and private sector) of some of the legal, economic and practical principles at stake is needed. These include additionality (any carbon is genuinely 'added' – i.e. would not have been drawn down anyway), saturation (the upper limits of any soil's sequestration and storage potential) and permanence (the need to guarantee any carbon stays in the soil for a fixed period).

Whether public or private income is at stake, the appetite for potential carbon gains should also not distract from the more urgent need to halt C losses (e.g. through atmospheric emissions when soil is exposed to the atmosphere and through soil erosion) which should be the policy priority.

Interest in Net Zero should also not distract from the wider environmental benefits of increasing soil organic carbon (biodiversity, flood management etc.) – where the evidence base is better established. A good example is no-till farming which, some evidence suggests, should be better viewed as a method for reducing soil erosion, improving soil hydrological functioning, reducing fossil fuel use in tillage, adapting to climate change and greater climate resilience - while any increase in SOC storage is a co-benefit for farmer and society in terms of reducing greenhouse gas emissions.

The widespread benefits of soil carbon sequestration mean it should be pursued on a no-regrets basis, and we urge Defra to approach it on this basis, whilst remaining open-minded to the possibility that private incentivisation might sit alongside public money.

A possible approach might be one whereby public money is used to maintain good levels of soil carbon or prevent loss and reward existing best practice, while private finance should target land that has been degraded and where private Natural Capital Contracts / carbon offsetting can reward for building soil carbon or reversing declines.

Such an approach should recognise that transitioning to conservation practices which increase soil carbon might require investment in new equipment, inputs and knowledge, and ELM might best be used to jump-start this process – up to the point when improved understanding enabled by technology allows for a reliable, transparent carbon accounting that would enable a trusted marketplace.

Further assurance might be offered by regulatory interventions. The Discussion Document refers to *conservation covenants* to ensure land use change protection; however, there is no reason why these – or equivalent mechanisms - shouldn't be applied to Tiers 1 and 2 where soil organic carbon is at particular risk.

14. As we talk to land managers, and look back on what has worked from previous schemes, it is clear that access to an adviser is highly important to successful environmental schemes. Is advice always needed? When is advice most likely to be needed by a scheme participant?

When it comes to soil, we urge Defra to consider advice provision alongside guidance and applied research.

Advice

All farmers would benefit from advice about their soils. Indeed, we see a soil management plan, developed where necessary in collaboration with a trained advisor then followed up with advice and soil health outcome assessment, as a prerequisite for any funding. Farm advice on soil is most needed at the beginning of a new tenancy, and at the start of any transition (to new cropping or regenerative approach) to guide best practice and measurement.

One of the critical issues is that sustainably managed healthy soils are multifunctional- success in their management cannot be assessed just by crop yield or economic margins on production, yet this has been the priority of the advisory services (often dominated by agronomists) who are more focused on nutrient management rather than soil organic carbon management. This is one of the reasons many of our arable soils in particular have become so degraded.

Because these advisors work for companies selling inputs, they will face a conflict of interest, e.g. between supporting farmers using IPM and selling agrochemicals. Because they are product salespeople by training, they will require extensive training to have the knowledge or experience that farmers will need.

Given the amount of time it will take to train these advisors, this needs to be addressed as a matter of urgency. The government needs to ensure there is adequate budget to provide this, and to deliver the advice for free for all farmers to get over the huge gap in capacity in the next few years.

Co-funding through ELMS should also be available for farmers and agronomists to gain soil-specific qualifications e.g. BASIS soil and water qualification, level 4 farmer and level 6 agronomist. Taking a risk-based approach, those farmers with the qualification 'should' have better knowledge resulting in lower risks of soil degradation and improved management.

Guidance

We urge DEFRA to consider formal guidance and the advisory services alongside one another as there are challenges common to both.

Guidance aimed at farmers on soil health, soil functions and undertaking new practices for soil health in England is patchy. Its evolution over recent decades has been formed by 'unofficial' bodies – universities, research institutes, levy organisations, NGOs, retailers and input manufacturers as well as statutory organisations (DEFRA, NE, EA etc). As a result, farmer understanding and appreciation of soil is also patchy. The connection between soil health and productivity is much better understood than the link between soils and public goods which is a new concept and provides a very different set of goals and associated management challenges.

At the heart of the problem lies the absence of consistent, authoritative and independent guidance on how to avoid, diagnose and remedy soil problems, and the lack of sufficient nationally-coordinated research that provides the evidence needed to deliver sound management guidance on best practices. This would not be a one-size-fits-all blueprint but built on the farming enterprise, existing practice, soil type, climate and other factors.

As a starting point we would draw attention to the AHDB GREAT Soils extensive programme of research and knowledge exchange on soil management culminating in practical information, case studies, guidance on particular aspects of soil health and a scorecard which helps farmers understand and evaluate *the chemical, physical and biological properties of soil.*

This ongoing project is professional, comprehensible and has extensive reach with farmers. However, it focuses on agricultural productivity. ELMS-driven Guidance would need to balance this with information about compliance, stewardship and the environmental impacts associated with soils. It should also address some critical knowledge gaps including how to remedy soil compaction and degradation, the role of sub-soils, the benefits of land drainage and the understanding and interpretation of soil carbon.

Evidence supporting the need for this is a farm practice survey in the UK (Defra, 2018) which found that one of the main reasons (31% farmers surveyed) for farmers not testing soils for SOM was that they found the results difficult to interpret and act on.

Research

There remains a major problem of long-term underinvestment in soil science teaching and research and its low prioritization – and the increasing problem of lack of national capabilities with respect to agricultural soils management teaching and inadequate research to guide policy and effective land-management. Most degree courses in agriculture have little or no soil science content. The Soil Survey of England and Wales was disbanded in the 1980's and national soil mapping digitised by Cranfield University.

The multifunctionality of soils and their roles in delivering a wide range of both public and private goods and services needs to be understood and embedded in future management systems and goals - and this needs to be based on sound scientific knowledge and understanding. Where there are gaps in this knowledge these need to be urgently identified and research commissioned so that these gaps are filled. The formulation of the hypotheses to be tested will be as important as the research itself.

The fact that many progressive farmers in recent years have started conducting experiments on their own land or joining in networks with other farmers to try to determine better ways of managing soils is a positive sign, but also reflects the worrying lack of national coordinated applied research to meet these needs.

15.We do not want the monitoring of ELM agreements to feel burdensome to land managers, but we will need some information that shows what's being done in fulfilling the ELM agreement. This would build on any remote sensing, satellite imagery and site visits we deploy. How might self-assessment work? What methods or tools, for example photographs, might be used to enable an agreement holder to be able to demonstrate that they're doing what they signed up to do?

There is a consensus among the community of soil scientists about the core set of key soil health measures that are needed to monitor soil health.

Where there is variation, it is in the methodology used to establish these measures – both the method used (the same method can't be used for all soils due to their different chemistry) and consistency of the timing and location (GPS) of sampling. Cost and practicability also need to be taken into account.

However, there are well-established, relatively cheap and effective measures of soil health available, and the variation above should not be used as an excuse not to pursue routine measurement as a matter of urgency – particularly for soil organic carbon or soil structure.

There is no reason why SOC can't be assessed (via lab tests) as routinely as nutrients, and while there may be variations in precise accuracy from one test to another, trends and meaningful change at scale can be established using benchmarks developed for specific soil types, crops and climate zones for methods.

If there was a requirement that data was collected at appropriate regular intervals (e.g. 5-yearly) and in the same location (using GPS coordinates) and the data was provided to a national database, these trends - and the effectiveness of management systems, e.g. to maintain and improve soil carbon storage - could then be monitored with the data used to intelligently guide future developments of ELM for further enhancing soil carbon storage.

Where a more accurate but also efficient, low-burden and transparent audit trail is needed for soil carbon (especially for private sector/market purposes), technology will play a crucial role. Potential tools include high accuracy direct sampling and analysis systems for soil carbon quantification which can provide a ground truth for measurement either in isolation or in tandem with remote sensing/modelling and other technologies: satellite, smartphone and drones.

Many of these separate elements are currently being trialled with a view to having a proven evidence base by the time ELM goes live, and the European Space Agency is currently commissioning work to identify if and how Earth Observation can be used for SOC assessment. There is currently no approved remote sensing technology that can effectively measure the profile distribution of soil organic matter, however.

16. Do you agree with the proposed approach to the National Pilot? What are the key elements of ELM that you think we should test during the Pilot?

We are concerned about lack of reference to soil within the National Pilot, and the fact that soil as a topic is not included within the list of 'expertise' from which the Pilot's designers will be drawing. There are over 700 soil types in England and Wales, so appreciation of the variety and diversity of soil types is vital. We recommend that this be addressed as a matter of priority.

The need for improved soil management to be addressed in the Pilot's design reflects the fact that so many of the technical and practical aspects for incentivising soil health are untested. Soil was a late addition to the Agriculture Bill and is not a key feature of many of the approved Tests and Trials. There is also little knowledge to be drawn upon through the experience of cross-compliance or Countryside Stewardship.

The aspects that we would like to see tested include:

- Measurement and Monitoring: The use of a uniform approach (standard operating procedure) across different landscapes and crop types soil organic carbon and soil structure, including measures of compaction, to accompany existing requirements with respect to nutrient loadings. The organic matter and structure measurements will provide vital and currently missing information about soil carbon storage and potential hydrological functioning - both of which deliver public goods / services. There is less

evidence as to how soil biology components deliver public goods but they do provide private goods such as improving crop yields and reducing pathogen attacks etc.

- Contracts: Short term land tenures, whereby businesses on short term tenancies/land use license agreements degrade soils then move elsewhere is a major issue. Where they exist, these contracts are based on punitive models (for damage, degradation/dilapidation etc.) rather than incentives. We would like to see the Trial explore a reward system built into tenancy & license agreements to reward good practice or build soil health/capacity/resilience/carbon etc. This approach might include the creation of a 'soil MOT' to give tenants an understanding of that soil's recent history.
- Payments: Based on outcomes and practices – especially combinations of practices that, over full crop rotations, deliver sustained improvements in soil health.
- Technology: Both remote and on-farm, to generate data, as well as the machine learning needed to consolidate inputs into a coherent outcome. There has never been more data generated on farms, but it is the interpretation and interrogation of that data that is needed to support ELMs and better outcomes.

17.Do you have any other comments on the proposals set out in this document?

Decisions on how/why money is spent under ELM will be influenced by the Treasury – who will want to see clear evidence of delivery against flagship policies, especially the 25 Year Plan for the Environment. The Plan includes the target *by 2030 we want all of England's soils to be managed sustainably.*

While the evidence base and technical oversight for nationwide soil monitoring (that examines progress against this target) will differ from on-farm measurement (carried out by farmers), greater consistency between the two approaches (SOPs, agreed indicators) will enable these practitioner-led results to contribute to the national picture, and vice versa. This, in turn, will increase the evidence base and strengthen the case for investment in on-farm soil health.

Again this current situation reflects the lack of a national extension service and lack of local and national data gathering to monitor how soils respond to different management interventions. Since farmers need to analyse soils in order to effectively manage them it would make sense for the data that they are already required to collect to be used to help assess soil quality and its response to different management approaches over time.