Tender

Strategies for Rapid, Long-Term Structural Remediation of Compacted Agricultural Soils

DEPARTMENT OF ENVIRONMENT, FOOD AND RURAL AFFAIRS

UK4: Tender notice - Procurement Act 2023 - view information about notice types
Notice identifier: 2026/S 000-004554
Procurement identifier (OCID): ocds-h6vhtk-06094d
Published 19 January 2026, 6:27pm

Scope

Reference

C32752

Description

Background

Conventional intensive agriculture has, for the past 70 years, relied on a system of agricultural interventions to grow food, characterised by intensive tillage, use of agrochemicals and frequent periods of bare soils or monocultures. This regime has resulted in widespread soil degradation, with our arable soils containing the least carbon, lowest diversity of soil fauna and highest density of all UK soils (Countryside Survey, 2007 soils report).

Regenerative agriculture now hopes to address this soil degradation while maintaining productivity by adopting techniques that more closely mirror natural processes, such as avoiding soil disturbance, sowing diverse crops, maintaining plant cover, and ensuring ongoing supply of organic matter. However, despite abundant evidence that, in the long-

term, regenerative techniques are better for maintaining soil structure and function, a transition from a previously degraded soil to a regenerative, e.g. no till, approach may result in little recovery from soil degradation, provide poor returns for the farmer, and may result in farmers returning to the conventional techniques they'd previously abandoned.

Approaches are required to rapidly return a degraded soil to a state which is resistant to degradation and resilient to the impacts of regenerative techniques, to enable farmers to fully embrace regenerative approaches and benefit from them in the long term, and which can be encouraged through agri-environment schemes, as part of the wider drive to improve soil health. This project aims to conduct a large-scale field experiment to evaluate a range of approaches to rapidly alleviate soil degradation and deliver resilient soils suited to long-term regenerative agriculture, and to use this to identify and develop clear management guidance for farmers on how to repair degraded soils to deliver lasting resilience.

In this project the Authority is concerned with structural degradation, rather than purely chemical or biological degradation (e.g. land contamination or loss of biodiversity). It is recognised that structural degradation will have interactive effects with soil chemistry and biology, and that both these factors may influence recovery. Structural degradation is broadly synonymous with compaction, and results from weak soil aggregates collapsing into pore spaces, to leave a structureless mass with few, poorly connected, large pores. It can be indicated by various techniques such as measurement of bulk density, visual evaluation, infiltration, x-ray tomography etc. The resilience or susceptibility of soils to degradation or rapid loss of structure may be indicated by aggregate stability, or assessments of physical soil strength. Recovery of physical condition would be viewed as the soil reaching a self-sustaining state characterised by a greater volume of larger, better connected, pores. This would usually be accompanied by an increase in overall soil volume, achieved by upwards movement of soil material. Such upwards movement might be achieved by mechanical disruption of the soil, but also through biological activity, frost heave, or shrink-swell. A resistant or resilient structure may be maintained by strengthened aggregates, presence of more non-tessellating soil particles, or by ongoing dynamic soil movement by soil organisms.

Compaction of soils may occur in different locations in the soil profile. Repeated cultivation to a standard depth, using heavy machinery, often results in compaction below the cultivated layer which is exacerbated by each machinery pass. Subsoil is usually wetter than topsoil and may therefore compact more readily under machinery weight. A compacted subsoil will limit root growth and may provide a slowly permeable or impermeable layer which may result in waterlogging in the topsoil. However, regularly cultivated topsoil also compacts. The topsoil is the layer of soil which interacts with rainfall, receives traffic, receives surface fertilisers and other agrochemicals and receives inputs of organic matter. It is the location of most decomposition, nutrient cycling and where the majority of soil life lives. While temporary reduction in density is delivered by cultivation, the rapid re-compaction of a poorly functioning topsoil will result in increased

runoff, lower support of machinery or other traffic, poorer processing of fertilisers and chemicals, slower recycling of organic matter, and poorer biodiversity. Furthermore, the success of reduced or no-till agriculture relies initially on the ability of the topsoil to maintain its structure and function without the need for physical intervention. While it is recognised that compacted subsoils are a matter of concern, the primary focus of this project is on compacted topsoils under combinable arable cropping rotations.

A recent systematic review and meta-analysis was commissioned by Natural England (not yet published) to explore the evidence base for approaches to deliver soil structural remediation. This project identified that reduction of cultivation intensity, addition of organic materials, increased rotational diversity and minimising vehicular traffic all showed longer-term benefits to soil structure, and would be likely to interact positively. However, this conclusion was based on separate studies and did not investigate this interaction effect. Furthermore, the review revealed only the impact of system-based, long-term approaches, and did not identify studies that could indicate the most rapid way to initiate the regeneration of improved soil structure on structurally damaged, degraded soils. No studies were mentioned that identified mechanical soil loosening or cultivation as a mechanism for delivering long term reductions in soil structural degradation. However, many organisations and advisors continue to suggest some form of cultivation as an important, even necessary, component of management to remediate damaged soil structure.

Previous Defra-funded studies (BD5001) have looked at the impacts of soil loosening and introduction of diverse grassland plants on soil compaction in grassland soils, but the study was limited in its ability to look at compaction alleviation, partly due to nature of the experimental study sites, in which the soils were only moderately compacted. The study concluded that the impacts of loosening in grasslands had a temporary effect on infiltration and visual soil assessment but did not significantly affect bulk density or microbial communities or processes (N_2O flux). However, in the one site where earthworms were studied, soil loosening had a detrimental effect on earthworms, particularly anecic (deep burrowing) earthworms that are most likely to deliver decompaction of soils by deposition of soil as worm casts on the soil surface.

The Authority requires that these issues are explored using experimental approach that demonstrates the comparative and interactive success of a range of approaches to remediate severely compacted soils in England, using existing compacted soils, exploring the role of cultivation, organic matter, and diverse plants, as means to accelerate the delivery of resilient, improved soil structure. The project should consider measuring the impacts of treatments on subsoils but should not focus on remediation treatments that are aimed solely at subsoil compaction unless these are known to be a significant constraint to the adoption of regenerative agriculture.

Total value (estimated)

- £700,000 excluding VAT
- £840,000 including VAT

Above the relevant threshold

Contract dates (estimated)

- 13 April 2026 to 30 March 2029
- Possible extension to 31 March 2030
- 3 years, 11 months, 18 days

Description of possible extension:

Possibility of 1 year no cost extension to allow for any delays as a result of unseasonal weather or other unforeseen causes of delays in the field experiment.

Main procurement category

Services

CPV classifications

- 73110000 - Research services

Participation

Legal and financial capacity conditions of participation

1. Bidder Pack- Part One Core Requirements above threshold PA 2023

2. Bidder Pack - Part 2_Procurement Specific Requirements above threshold PA 23

3. Tender Specification

Particular suitability

- Small and medium-sized enterprises (SME)
- Voluntary, community and social enterprises (VCSE)

Submission

Enquiry deadline

20 February 2026, 12:00pm

Tender submission deadline

6 March 2026, 12:00pm

Submission address and any special instructions

https://atamis-9529.my.site.com/s/Welcome

Tenders may be submitted electronically

Yes

Languages that may be used for submission

English

Award decision date (estimated)

6 April 2026

Award criteria

Name	Description	Type	Weighting
Ouality	Quality	Quality	70.00%
Price	Price	Price	30.00%

Other information

Conflicts assessment prepared/revised

Yes

Procedure

Procedure type

Open procedure

Contracting authority

DEPARTMENT OF ENVIRONMENT, FOOD AND RURAL AFFAIRS

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