

Grassland subsoiling to loosen compacted soil

Funding is offered for using a low-disturbance grassland subsoiler to loosen compacted soil to a depth of 20 to 35 cm (8 to 13"). This should reduce surface runoff through improved water infiltration. Only use in fields where a Wessex Water catchment advisor has confirmed the presence and depth of sub-surface soil compaction by digging test holes.

Length of agreement available

One-year agreement to carry out grassland subsoiling between 1st March and 31st October 2023.

Where to use this measure

- In **grassland only**, particularly in permanent pasture and longer term leys.
- Only use in fields where a Wessex Water catchment advisor has **confirmed the presence and depth of sub-surface soil compaction** by digging test holes.
- Eligibility is mainly restricted to **heavier, high-clay content soils** in priority target areas.
- Priority will be given to funding soils at greatest risk of compaction (e.g. cattle farms with a high stocking rate and fields which have regular passes with farm machinery such as silage making equipment and slurry tankers).

Where this measure cannot be used

- This funding is for **low-disturbance grassland subsoiling / sward-lifting** only and not for slit aeration nor use of an arable-subsoiler.
- Do not use in arable fields.
- Do not use on historic or archaeological features
- Do not use unless test holes have been dug by a Wessex Water catchment advisor and the presence and depth of compacted soil layers confirmed.

Requirements

Timing and ground conditions

- Soil conditions are critical in determining the performance of the equipment;
 - working in soils that are **too wet** will result in the subsoiler leg acting as a narrow tine and simply cutting a slot through the soil. Tractor wheelings may cause rutting and compaction.
 - working in soils that are **too dry** will result in unacceptable levels of sward damage, soil heave and excessive power requirement.
- **Sward lift in autumn**, if conditions permit, to allow the disturbed soil to settle over winter and the sward to regrow and repair root damage.

- **Avoid re-compaction** – recently sward lifted areas are more susceptible to compaction damage. Grazing or using heavy machinery in the lifted field should be avoided for several weeks after.

Working depth

- The depth of compaction dictates the required depth of working, which should be just below (i.e. 3-4 cm) the layer that needs to be broken up. It is important to examine the extent of shatter of a trial run and to adjust the equipment if necessary.
- It is also important to make sure the working depth is above the critical depth of the implement used:
 - as a general rule of thumb, critical depth occurs at approximately six times the individual loosening tine's width; for example, a tine foot that is 6 cm in width will have a critical depth of around 36 cm.
 - operations carried out below critical depth will result in compaction because of the sideways resistance of the surrounding soil.

Important considerations

- As there will be some channels evident from the passing of the sward lifter, operators should consider the direction of travel across a field in advance of completing the works required. Attempt, if possible, to **work across the slopes** to ensure that heavy rainfall does not give rise to soil erosion from within the channels.
- The **tractor power requirement** for a sward lifter is recommended at 140-160 HP to prevent wheel slip and further soil structure damage. This power requirement is also dependent on the lifter size, model and field conditions.
- Research from SRUC has shown that even with only moderate grassland compaction on a clay loam soil there was a 0.5 t/ha dry matter yield advantage in the following year's silage cuts after the use of the sward lifter on areas that had suffered tractor compaction.

Record keeping and payment terms

Agreement holders will need to keep the following records and supply them with *the payment claim* each year. Payment will only be made upon satisfactory receipt of all of the following records:

- Photographs of the soil profile dug from the test holes (unless pictures were already taken by a Wessex Water catchment advisor).
- Photographs of each subsoiled field after lifting.
- Soil analysis results (pH, P and K as a minimum) for the relevant fields dated within the past 3 years (only required for first payment claim).
- Farm and field information needed to run a phosphorus loss tool for the farm and calculate the reduction in phosphorus loss to water arising from this work. This will include farm data relating to livestock numbers, crop areas and fertiliser and manure inputs.
- Self-declaration that the terms of the project agreement have been adhered to (*key terms are listed above*).
- Successful applicants are required to sign a declaration confirming that:
 - reasonable precautions are taken to prevent nutrients and soil from the relevant field entering watercourses or from being leached to groundwater to an extent that could cause pollution.

- the relevant fields have not been (i) the source of a recorded pollution incident which could have been prevented by the farmer taking reasonable precautions to prevent that pollution and/or (ii) the subject of a warning, fine, prosecution or BPS deduction issued to the farmer by the Environment Agency or RPA for a breach of NVZ rules or Farming Rules for Water in the past 5 years.
- It is expected that to support and inform the above declaration, successful applicants will complete the Environment Agency's Agricultural Compliance Tool (ACT) by 31st December in each year of the agreement and submit it when completed to Wessex Water (who will hold it in confidence) and address any actions identified by the ACT. For agreements involving annual payments of more than 5 years duration and/or with a value in excess of £5,000 of annual payments, this is a requirement.
- Agreement holders are required to complete a Wessex Water supplier application form in order to receive their first payment. A copy of this is available on the scheme website.
- Agreement holders will need to keep the following records and supply them *on request*.
 - Field operations at the field parcel level, including associated invoices

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Additional Information

Farm Advisory Service (Scotland) advice note:

<https://www.fas.scot/downloads/use-of-a-sward-lifter-to-improve-grassland-soil-compaction/>

Adas report on soil structural issues and mitigations:

<http://publications.naturalengland.org.uk/publication/5089918056398848>

Environment Agency 3D buffer strip guidance:

<https://www.gov.uk/government/publications/3d-buffer-strips-designed-to-deliver-more-for-the-environment>



Grassland subsoiler used in West Dorset. Lifted area on left, unlifted area on right. *Photo credit: J Franklin.*



Leading disc to cut the sward

'Leg' or 'tine' to loosen the soil

Rollers to level the surface

A grassland subsoiler / swardlifter at work and it's key components. *Photo credit: Adas*