Briefing for policy makers about soils and flooding

LAND USE *for* NET ZERO HUB

Expert Panel

- **Prof. David Robinson**, Soil Scientist, UK Centre for Ecology & Hydrology
- **Dr. Richard Smith**, Technical Specialist, Environment Agency
- **Prof. John Boardman**, Environment Change Institute, University of Oxford
- **Dr Alejandro Dussaillant**, Civil Engineer and Hydrologist, UK Centre for Ecology & Hydrology

1. **Making soil data accessible and understandable** is imperative for understanding and mapping the inherent soil characteristics that influence flood risk, such as soil type/texture/hydrology and underlying geology. This needs to be presented at field scale to account for the variety in soil types and key aspects of associated soil hydrology.
2. **Erosion and compaction that lead to flooding is largely management driven**, particularly where crop selection isn't sensitive to soil type & land capability (maize is a frequent example here). The continued use of high-risk crops on steep slopes in high-rainfall areas demonstrates the need for regulatory controls and guidance to prevent or adapt certain operations on vulnerable soils to minimise flooding impacts.
3. **Runoff and muddy flooding linked to soil erosion are predictable and connected.** Risk is governed by interactions between soil erodibility, slope, crop choice, and farming practices, with landscape connectivity playing a key role. For example, 66% of eroding fields connect to watercourses, increasing downstream impacts.
4. **Soil type and long-term practice matter.** Remediating soil degradation must be tailored to soil type and local conditions. Where soils occur that are naturally poorly draining, there is limited potential to store water in the soil but water can be stored above the soil in natural or constructed wetland habitats. Freely draining soils with good soil structure under protective vegetation naturally absorb rainfall. While a combination of regenerative agricultural practices can improve soil organic matter, water infiltration and flood resilience, the most significant benefits typically accrue over several years depending on context. Sustained, long-term funding and technical support, linked to robust performance monitoring and adaptive management, is therefore essential.
5. **Landscape ‘infrastructure’ can exacerbate problems.** Existing features such as ditches, drains, and hedges can act as pathways for runoff and sediment, increasing flood and erosion risk rather than reducing it. However, there is potential to design infrastructure to slow the flow of water.
6. **Condition of soil structure is a major driver of surface water flooding risk in some landscapes.** Structurally degraded and compacted soils (historical surveys show around 40% in South-West England) can dramatically increase runoff and erosion, leading to localised surface-water flooding and muddy floods with significant social and political impacts. The highest risk soils are the erodible soils on steep slopes.
7. **Non-compliance with farming rules and guidance limits effectiveness.** If farmers repeatedly ignore guidance, particularly when growing maize crops, and continue high-risk practices on vulnerable soils, recurring erosion events can follow.
8. **Soil-focused interventions and information are essential for NFM.** Evidence is needed at small catchment scales to understand soil’s contribution to natural flood management; improving soil structure, porosity, permeability and aquifer connectivity can reduce runoff, speed drainage after saturation, and increase workable days for farmers. This can also mitigate impacts from the other extreme, such as droughts, by increasing soil water retention capacity.

9. **Sustained, well-designed policy is critical.** Long-term, correctly located mitigation supported by sustained, monitored agri-environment funding can be effective, but policy must also address behaviour, compliance, technical support and guidance, and long-term commitment, not just practical application of measures.

UK Research and Innovation
Department for Environment Food & Rural Affairs
Department for Energy Security & Net Zero
Scottish Government Riaghaltas na h-Alba gov.scot
Llywodraeth Cymru Welsh Government
Department of Agriculture, Environment and Rural Affairs