Agricultural use of sewage sludge in the UK

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Our Position

Sewage sludge is a source of nutrients such as phosphorus and nitrogen, as well as organic matter that can benefit soil health. Given the growing need to move away from the application of chemical (or synthetic) fertilisers that are either finite mineral resources or derived from petrochemical feedstocks, sewage sludge is often viewed as a renewable circular alternative. This is further exacerbated by global shortages in chemical fertilisers that have occurred of late[1].

However, as the byproduct of wastewater treatment, **sewage sludge contains harmful contaminants including metals, pathogens, pharmaceuticals, microplastics, PFAS and bisphenols[2],** removed from wastewater during treatment. Sewage sludge acts as a sink for these contaminants and they are incredibly challenging to remove from treated sewage sludge (biosolids) products[3].

Current UK legislation outlines a list of potentially toxic elements (PTEs) such as lead and cadmium whose levels must be tested by biosolids producers to ensure that sludge is not applied to agricultural lands if any of these limits are breached. However, only the limited set of PTEs on this list fall under the remit of obliged testing, allowing other contaminants to build up to harmful levels in sewage sludge applied to UK soils[4]. In the UK, the majority (60-80%) of the total biosolids generated[5,6], equating to around 3.6 million tonnes (fresh weight) of biosolids, are recycled to agricultural land[7]. Based on a detailed study of biosolids from one UK wastewater treatment plant, it has been estimated that the microplastic content of the biosolids, assuming they were all continuously applied to agricultural lands, could result in land receiving the equivalent of more than 20,000 bank cards worth of plastic every month[8]. It has also been found that **microplastic contamination from sewage sludge in the UK could be the highest in Europe**[1]. Given microplastics levels are not currently tested and with no upper limits in place, their application to UK farmland is occurring unabated, most **likely resulting in significant harm to the environment and human health**[9]. Germany, a country with similar population density to the UK, has limited application of treated sewage sludge to land due to the presence of contaminants with unknown risks[5]. The sludge they do spread on agricultural land (around 23% of total sludge produced[5]), has upper limits on glass and plastics.

Despite this, the recycling of sewage sludge to land is considered the best practicable environmental option by UK governments[10,11]. But the use of sewage sludge and other bioresources for fertilisation is not managed in an adequately safe and environmentally beneficial way. These issues are longstanding and growing. In 2020, it was publicised how the 1995 Netherlands ban on agricultural use of sewage sludge invariably led to Dutch sludge imports and application to UK land, despite the risks of contamination being known to the Environment Agency[12].

In addition, whilst a key benefit of sewage sludge from a farming perspective is a reliable and organic (as opposed to chemical) source of nutrients, the nutrient content of sewage sludge is variable and depends upon the source material, treatment processes and resultant product type[13]. Furthermore, biosolids producers don't always provide specific nutrient content data as recommended under the UK's voluntary biosolids certification scheme[7]. Sludge regulations must enforce more careful management of biosolids land application, to also avoid unacceptable risks to the water environment from diffuse nutrient pollution.

Our Recommendations for Immediate Regulatory Action on the Use of Sewage Sludge

***Fidra* and the *Environmental Investigation Agency, as well as sixteen co-signatories* believe that unregulated and uncontrolled microplastic and chemical contaminants found in sewage products cannot continue to be overlooked by sludge producers and regulators.** Several actions at the earliest feasible date are required to safeguard the environment (particularly soil and freshwater ecosystems), the farming industry, and people's health in addition to supporting the UK's circular economy and net zero ambitions.

Ongoing updates to the regulations controlling the UK's agricultural use of sewage sludge and other organic waste materials must use these recommendations:

1. Regulatory action to phase out the agricultural use of sewage sludge until it is a clean safe resource would uphold the **precautionary principle**[14] to protect soils and the environment from the risks from contaminants of concern not currently regulated, as opposed to considering only the benefits over using chemical fertilisers.
2. Source control is the preferred option to avoid contamination of waste in the first place and to avoid the need for interim incineration or thermal conversion of biosolids. These outlets coupled with the extraction of nutrients, metals and energy are currently the only safer alternative disposal routes that enable destruction of contaminants such as PFAS. Research into sustainable alternative ***interim*** uses is encouraged, for instance, there have been studies in the incorporation of biosolids into construction materials/bricks[15].
3. Ensure farmers are provided with financial support for nature-friendly farming initiatives including **full financial support and operational guidance** to seek less contaminated alternatives (e.g., animal manures, composts and digestates, nitrogen-fixing crops) to sewage sludge until it is proven to be safe. Ensuring appropriate use of these alternative organic fertilisers is also necessary to minimise nutrient losses and support existing regulations (e.g., Farming Rules for Water[16]) that improve water quality by reducing diffuse pollution.
4. Act urgently on existing and emerging expert backed evidence around risks to human and environmental health associated with the agricultural use of contaminated biosolids and other organic fertiliser products[17,18,19].
5. Ensure that regulatory plans to incorporate the Safe Sludge Matrix UK level voluntary agreement into new UK Agricultural Use of Sewage Sludge Regulations are robust, carefully monitored and strong enough to protect soils and the wider environment from pathogens, as well as the already regulated potentially toxic elements (PTEs).
6. **Ensure that every effort and resource is made available in a time bound manner to ensure that sewage sludge treatment produces safe biosolids to capitalise on the use of this potentially circular resource.**

In addition, the UK government must ensure that guidance and regulation on nutrient applications adequately cover the risks from use of biosolids and must adopt more robust regulations on chemicals to prevent contamination at source. Restrictions on PFAS, bisphenols and microplastics are *urgently* needed alongside reform to the UK chemicals regulation framework to ensure a safe circular economy.

UK Alignment with the EU and Wider Actions to Improve Practices

Fidra and the Environmental Investigation Agency as well as co-signatories are advocating the precautionary principle[14] that would protect soils and waterways and prevent harmful contaminants from continuing to enter and build up in our environment**.** Adoption of this fundamental principle relies on bold regulatory action as soon as possible in the UK and alignment with other European countries that have already taken steps to divert

biosolids away from agricultural land until they have been proven to be clean and safe for recycling to agricultural land for sustainable nutrient provision and food production. Alignment with other European countries avoids divisions in public safety and deficiencies in regulations but until the specific recommendations above are implemented, here are some wider actions that need to be taken to **safeguard soils and improve the quality of waste materials used as fertilisers**:

1. The urgent need for all UK regulations **to list all harmful substances (metals/potentially toxic elements, pathogens, pharmaceuticals, microplastics, PFAS and bisphenols) as contaminants of concern that require testing**, and that testing thresholds are in line with best available evidence.
2. Pledges by environmental regulators to tighten soil protection and **improve sampling, monitoring and testing provisions** (for both biosolids products and receiving soils) must also be upheld with clear time frames.
3. **Upstream wastewater solutions**. Commitments from across the sewage sludge supply chain stakeholders, especially producers and regulators, to prevent contaminants of concern in sewage sludge through working with consumer product manufacturers and using source control. Sweden are taking steps to implement upstream solutions and sludge certification schemes to tackle biosolids contaminants[20]. The restriction of PFAS and other potentially harmful contaminants in products, as well as avoiding the addition and processing of industrial wastewater streams in domestic wastewater treatment plants, will ultimately reduce or prevent the presence of harmful unregulated contaminants in sewage sludge[21].
4. **Downstream sewage sludge solutions**. Ongoing commitments from sewage sludge producers to invest in research and innovative new technologies required for achieving safe clean biosolids as soon as possible[22].
5. Use of an **Extended Producer Responsibility** scheme to apply the '**Polluter Pays Principle**'. This would improve the quality of biosolids through pollution prevention measures upstream, such as producers contributing to additional sewage/wastewater treatment costs for microplastics and chemicals, and measures downstream, such as funding remediation and new technologies required to remove these contaminants from biosolids[23]. As an example, a recent revision of the EU's water management and urban wastewater treatment standards have introduced a cost responsibility to producers of pharmaceuticals and cosmetics for additional micro-pollutant treatment[24].
6. Act on **best scientific evidence** available and water industry chemical investigation programme[25] findings to protect people, soils and waterways and respond with urgency to any necessary changes to the sludge use in agriculture regulations.
7. Act on **comprehensive chemical and microplastic management programme restrictions** and prevent or phase out the application of contaminated wastes to land accordingly.

Strong regulation against all contaminants at the earliest feasible date must be taken. The barrier that these contaminants pose to the circular economy are significant issues that cannot be overlooked. Misalignment between both UK and EU sludge microplastics and chemicals legislation must be addressed. EU plans to restrict non-essential PFAS use must also be adopted in the UK[10]. The reliable new scientific evidence pointing towards the need to divert contaminated organic waste materials away from land to reduce future human and environmental harm cannot be ignored.

Benefits from Acting on Recommendations

These recommendations will 1) mitigate an unacceptable source of potentially harmful microplastics and chemical contaminants as well as excess nutrients, 2) force stronger commitments from biosolids producers and regulators to tackle contaminants using interim downstream solutions for clean biosolids that will lead to higher priority upstream solutions, 3)

reassure concerned farmers[26] and further encourage sludge supply chain best practices, and 4) improve nutrient circularity and sustainable use of clean safe renewable biosolids and other currently contaminated bioresources (e.g. food waste compost/digestates)[11],[17].

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Scottish Environment Link
Surfers Against Sewage
The Rivers Trust
The Wildlife Trusts
Whale and Dolphin Conservation
Wildlife and Countryside Link

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