International Soil Reuse Forum

Joint Communiqué 1

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1.1 Introduction

The International Soil Reuse Forum is a collaborative forum for organisations that oversee soil reuse and management programmes which aims to:

- foster discussions around mutual challenges, opportunities and innovations in soil reuse;
- share good practices;
- explore policy developments;
- encourage joint problem-solving; and
- establish an authoritative, global voice on soil reuse issues to enhance recognition and advocacy.

In line with this, the International Soil Reuse Forum has decided to publish its first joint communiqué outlining key points made during their inaugural meeting in the autumn of 2024. The joint communiqué explores relevant and pressing topics for the soil reuse and management industry, and expresses general, yet unified, points that the International Soil Reuse Forum reached. The statement reflects the consensus of the involved parties.

The topics discussed below – concerns around the management of PFAS[1] chemicals, implementation of digital tracking, and the importance of clear definitions as a method of avoiding miscommunication – are internationally-recognised challenges facing soil reuse and management programmes. These topics were discussed in line with emerging national and international policies, innovative scientific research, and learning from case studies.

The 2020 release of the EU Circular Economy Action Plan, followed immediately by the UK Circular Economy Package Policy Statement, has elevated the importance of soil reuse and management schemes in current and upcoming environmental management and restoration policies (EU, 2020; Department for Environment, Food & Rural Affairs, Welsh Government, Scottish Government, Department of Agriculture, Environment and Rural Affairs (Northern Ireland), 2020). A circular economy model holds three main principles: eliminate waste and pollution; keep products and materials in use; and regenerate natural systems (Ellen MacArthur Foundation, 2021). Soil reuse and management schemes align all three of these principles in one action. By permitting reuse of soil, less construction material goes to landfills, pre-existing materials are reused and repurposed – therefore not requiring the importation of new materials – and natural systems are permitted to exist and even restore or expand.

The work of the organisations in the International Soil Reuse Forum contributes to existing and future environmental goals across national and international levels. Soil reuse and management organisations often operate alone within specific regulatory confinements; lessons can be learned across programmes as well as within them. Therefore, the International Soil Reuse Forum aims to provide a space for these lessons, and as was noted at the first meeting, each programme shares more similarities with the others than differences. The joint communiqué reflects current challenges being faced by all the organisations. These challenges have the potential to impact many of the positive environmental outcomes already produced by soil reuse and management schemes. By taking a unified stance on them, the organisations are better prepared to face the changes and create interactive, and inventive, solutions.

[1] PFAS: Per- and polyfluoroalkyl substances (PFAS) are a large collection of chemicals used in many technical and consumer goods; recent studies have linked PFAS to severe human and environmental impacts (Glüge et al., 2020).

1.2 PFAS

Limited regulation and classification of PFAS chemicals creates difficulties in developing good practice sampling and analysis along with proper risk assessments in line with limited guidance (Ng et al., 2021). Combined with the understanding that countries are all at different stages and points for regulation and research, it is challenging to answer the question: how should we manage PFAS in soils and stones?

The risks of PFAS are evident and becoming increasingly more so, including the identification of key pollution source sites. Following events such as the 3M incident in the Flanders Region of Belgium, increased public attention on PFAS has encouraged some governments to make swift and stringent PFAS regulation and policies. Rapid regulatory changes often do not leave enough time for scientists to get a firm understanding of the situation, leading to policymakers deciding on thresholds that are temporary standards based on the precautionary principle. PFAS in soil is understudied due to: a lack of consensus on what constitutes the chemicals and their associated salts and compounds; new and rapid development of testing methods and interpretation of results; and a lack of historical records of background levels of PFAS contamination which inhibit understanding of the magnitude of new contamination events. An overall lack of 'Goldilocks zone' for regulation, where harm to humans and the environment is minimised but development activity and end-use specific management of soil is permitted, runs the risk of stopping soil reuse and management programmes altogether (Bolton & Newell, 2017). If this approach were to be taken with every new contaminant that is currently and will likely emerge going forwards, the good work and scientific rigour put into understanding and allowing soil reuse and management will fall to waste. Management values should be proportionate to the measured toxicity of new compounds and in line with the overall pollution levels for the region.

At this stage, the International Soil Reuse Forum recommends a threefold approach:

- **follow good practice and established land contamination risk management processes,**
- **identify high risk sites to control access and outputs whilst remaining in discussion with the relevant regulators,**
- **create standards that address the current issues while considering the future use for the material and the impact on the wider industry involved.**

Purported costs of a full cleanup of PFAS contamination in soils and stones, which includes high levels of excavation and near-certain destruction of soil ecosystems, remains beyond current means. **It is critical, then, that solutions are risk based and pragmatic, with clear guidance and sensible legislative limits and permitting requirements.**

1.3 Digital Tracking and Technology

The construction and development industry has high potential for technological transformation. Issues such as disjointed and separated stakeholders, disconnections between project design ideas and project implementation, and a lack of relevant and specific regulations often hinder the widespread use of new digital technologies (Naji et al., 2024). Despite this, one technology is in sharp industrial focus and demand: digital tracking.

Digital materials tracking is the use of cutting-edge technology to follow material movements from beginning to end so governments and corporations can understand where discarded material is created, the levels of contamination it may hold, and the material's potential for alternative end-use options such as sustainable reuse (Chartered Institute of Waste Management, 2023). Thus, digital tracking has the potential to greatly assist the creation and maintenance of circular economy principles.

In the UK, for example, the Department for Environment, Food & Rural Affairs is mandating digital tracking for waste and waste movements beginning in April 2026 to help guide more effective legislation and regulation in line with circular economy goals and assist organisations in complying with their duty of care of waste (Environment Agency, Department for Environment, Food & Rural Affairs, 2025). While no mandate exists for non-waste materials tracking, the sustainability sector is focusing on how digital tracking may resolve some long-standing sustainability challenges within the construction and development industry. Certain countries have already implemented mandatory digital waste tracking, a complementary system to understand waste movement and end-use. In the Flanders region of Belgium, for example, the use of digital transport documents for waste has been mandatory since January 2023. Similarly, the European Waste Framework Directive asks for waste traceability, commonly in digital form. The implementation of digital waste tracking may create learning opportunities for non-waste digital tracking systems as well.

For soil reuse and management programmes, materials tracking can be a critical part of their procedures to enable the continued production of sustainability benefits. Following soil from 'cradle-to-cradle' provides opportunities to better understand the supply and demand for specific types of topsoil and subsoil, as well as foster an understanding of background levels of soil components, including historical and present pollutants. The potential for real-time synchronisation of tracking data will help to provide operators with more comprehensive data assisting both industry compliance and macro-data analysis for organisations and researchers. It also reinforces confidence in the market for reused soils, as more transparency often leads to more understanding. Finally, digital tracking will also enable data-sharing capabilities between organisations, streamline workflows and processes, and generate industry-wide usable items such as background contamination maps.

The technological update of digital materials tracking in the soil reuse and management sector is not without challenges. Implementation of digital-based improvements face a few critical issues:

- incorrect, incomplete or lost information;
- lack of oversight, transparency (for all stakeholders) and control;
- lack of synchronisation due to time delays and differences between technological systems;
- regulation and policy differences for stakeholders;
- difficulties implementing cohesive systems across a wide industry (Baralla et al., 2023)

- long-term data management, particularly the handling of out-dated values;
- depreciated property value; and
- computer knowledge and skills.

Each one of these challenges has the potential to result in delays to, or reductions in, sustainable material movements, leading to negative environmental outcomes. Compounded together, these challenges may result in blocking, instead of unlocking, industry progress. Serious consideration needs to be paid to resolving the snagging points in implementation, ensuring lengthy time for acceptance, uptake, feasible accessibility and modification for various stakeholders.

Despite these concerns, it is worth noting that the potential benefits provided by digital tracking within the construction and development industry may outweigh the concerns. The more data that can support such outcomes, the better organisations are able to make decisions and improve their performance. The International Soil Reuse Forum, while interested in the potential for digital tracking to improve the industry, also urges caution when adopting new methodologies so that scientific rigour and careful oversight remain as guiding principles.

1.4 Terminology Debate

Soil can be considered a material, matrix, surface, volume or an ecosystem. Yet each definition of soil brings with it a unique theoretical root and real-life implication, changing the way scientists and researchers consider the substance. Extensive debate exists on which phrase provides the most concrete positive environmental outcomes. Scientifically debated terminology includes soil health, soil quality, and considering soil as an ecosystem. It is important to unify the concepts and definitions of soil within soil reuse and management schemes, as this will impact the way funds are allocated, policies are created, and procedures are written.

The notion of soil ‘health’ was introduced in the early 2000s to complement that of ‘soil quality’, which dominated the 1990s and was mainly defined in terms of physical and chemical soil fertility, particularly for agricultural purposes (Sarthou, 2016). Soil quality as defined overlooks the importance of soil biota to achieve soil functionality, failing to achieve the desired ‘biological fertility’. The definition of soil health under the Food and Agriculture Organisation of the United Nations (FAO) includes a critical temporal component, which reflects the importance of soil’s ability to continue functioning over time, a metric often not quantified by physical and chemical diagnoses (FAO, 2008). Both terms resulted in limited end-use of soil, where a ‘healthy’ or ‘good quality’ soil was predominantly defined by agricultural metrics, as opposed to the geotechnical needs of the construction and development industry.

For soil scientists, however, to consider soil as a living system is to reduce it to purely its biological characteristics. It may be preferable, therefore, to more regularly use the definition of soil which considers it an ecosystem, one defined by its biotope, the habitat it constitutes, and its biocenosis and its inhabitants. Ponge (2015) calls soil an ‘embedded and embedding’ ecosystem: it is naturally included within the forest or grassland ecosystems of which it is a functional and essential part, but soil itself also contains numerous microecosystems, ranging from the rhizosphere to soil aggregates. Furthermore, as ecosystems are ‘far from being machines made of clearly discernible elements’, their interlocking is ‘reversible and unstable’ implying that the loss of soil will lead to the loss of functionality of other ecosystems (Ponge, 2015). Considered this way, managing excavated soil to transform it into functional soil is tantamount to transforming a material into an ecosystem. This transformation requires a great deal of attention, the most important of which is undoubtedly the structuring of the biotope to be created. The use of such a definition allows for extensive new research areas and funding opportunities within the broader soil reuse and management systems.

Yet, the construction and development industry does not define soil in any of these terms. Instead, it looks at the geotechnical needs soil can provide for specific development purposes, such as creating car parks, golf courses, or housing developments. The metrics by which soil is sufficient for development use cares little about biological components; the misalignment between the development uses of soil, and the scientific consideration and use of soil, often create barriers between communication and the development of good practices.

Integrating and explaining each definition of soil to the relevant industries, however, many allow space for nuanced conversations to begin around end-use specific reuse and remediation of soil. Car parks developers, for example, may not care about PFAS so long as it does not reach the groundwater; nature reserve managers, on the other hand, are aware of the health concerns associated with PFAS and often prioritise contaminant control and biodiversity protection.

Therefore, the notion of soil health, soil quality, and soil as an ecosystem may help to drive greater understanding of nuance within soil for the construction and development industry, as they reach a wider audience and can raise awareness of all facets of soil multifunctionality.

1.5 Conclusion

Widespread PFAS contamination, the forthcoming implementation of digital tracking and other advanced technological transformations, and an expansion of terminology with which to refer to soil are all potential issues which may affect the important work of soil reuse and management programmes.

The International Soil Reuse Forum hopes to create a shared space for communication and mutual learning as science and policy progress in the face of these new challenges. The positive environmental benefits of soil reuse and management programmes cannot be overstated; it is critical to leverage as many resources as possible to overcome present and future challenges.

The International Soil Reuse Forum will continue to meet annually to coordinate learning and opinion on relevant topics as they appear.

Appendix 1: References

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