

# The Use of Waste-derived Materials in Road Construction

## Summary Report

There are around 56,000 km of roads in Scotland, providing the infrastructure to support the economy, connecting people and places and enabling goods and services to be delivered and accessed. The materials required to maintain this essential asset need to perform as expected so the roads are safe and travel disruption is kept to a minimum, but they must also have a long life, be cost-effective and have minimal impact on the environment.

Different surfacing materials are required depending on how a road is used and its situation. Motorways and 'A'-roads for example, tend to have faster and higher volumes of traffic, whereas rural roads have slower and lower volumes of traffic. Different materials are also needed on sharp corners, at junctions and in built-up areas where road noise may be a consideration.

The use of recycled and waste-derived materials in road construction has been a key topic of discussion within the roads construction and maintenance industry for several decades, and has relatively recently generated interest from the public, regulators, politicians and developers who all aspire to a greener transport infrastructure. Often the assumption is that using waste-derived materials as a substitute for virgin raw materials or to enhance the performance of a product is a cost-effective and environmentally sound idea, but this is not always the case.

Whilst ideas for novel and innovative uses for waste may have resulted from a desire to solve a waste problem by putting discarded

materials to good use, there may sometimes be unintended consequences. These may include a reduction of the performance of the road surfacing, diverting a waste from more environmentally preferential forms of recycling, release to the environment during use or during processing at the end of life of a road surface, or hindering its recycling when a surface needs to be replaced. Consequently, those charged with maintaining Scotland's roads are necessarily cautious about procuring surfacing materials containing waste-derived additives that are new to the UK market.

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The Use of Waste-derived Materials in Road Construction  
Briefing Report



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Scottish roads authorities have examined these issues collaboratively, sharing knowledge and experience, and engaging with their supply chains, so that they can continue to contribute to Scottish climate change and circular economy priorities. Consequently, an independent opinion was sought and in 2020 a Scottish Roads Research

Board project was commissioned to assess the potential to use waste-derived materials in road surfacings in Scotland. Three materials were assessed with the following conclusions.

**Glass** has potential, but as there is a well developed closed-loop recycling network within the UK, which means waste glass is used to produce more glass products, its use in roads is not the best environmental option for this waste stream.

**Tyre rubber** could potentially be used, but more trials are needed in the UK to provide proof of performance. Currently, there are also concerns about quality control, as not all tyres are suitable for use and contamination in the form of non-rubber components needs to be kept to a minimum; end of life recyclability and the potential for fine rubber, which is a type of microplastic, to be released to the atmosphere and aquatic environment from road wear and processing at the end of the life of the road surface. If evidence can be provided to address these concerns, the use of tyre rubber in road surfacing materials may be a viable option.

The use of waste-derived **plastics** in road surfacing materials is still in the development stage and although some demonstration strips have been laid, formal trials still need to be undertaken so that performance claims can be independently verified. In addition:

- quality control must be assured, as not all types of plastic are suitable for use;
- contaminants (liquid and solid) within the plastic waste streams must be removed; and
- evidence is required to show that road surfaces containing waste-derived plastic can be recycled.

There are also significant concerns within Scotland and internationally, that nano and microplastics may be released into the environment as a result of road wear and

when the surfacing is reprocessed at the end of its life, which still need to be addressed. The latter is of particular relevance as Scotland is a signatory to the Ellen MacArthur Foundation's New Plastics Economy global commitment to end plastic pollution.

Cost comparisons between road surfacings that contain waste-derived materials and those that do not are difficult due to commercial sensitivities. However, there is no evidence to suggest that surfacing materials containing them would be cheaper or even cost comparable with conventional materials.

The conclusions drawn and recommendations made in the research report do not seek to stifle the use of waste-derived materials in road surfacings, but to draw attention to the issues that need to be considered before procuring them, all of which may be possible to address. In order for a supplier to get a prospective new material to be accepted for use on Scotland's road network, its suitability should be assessed by an expert-led road industry forum. A protocol is proposed to facilitate this, which would ensure that decisions are transparent for all those involved in the supply chain. It would also enable material procurers to make evidence-based recommendations to roads maintenance budget holders.

Whilst the process to make Scotland's road surfaces 'greener' still requires work, opportunities to use products containing waste derived material on the road network already exist. Some examples include kerb blocks, warning reflectors, bollards, noise barriers, signs and their posts and drainage components. It should also be remembered that most conventional road surfacings can be reprocessed and re-used on the road network, and are probably already 'greener' than is often assumed.