



**REPORT TO: ECONOMIC DEVELOPMENT AND INFRASTRUCTURE
SERVICES COMMITTEE ON 14 AUGUST 2018**

SUBJECT: PLASTIC BASED MATERIALS USED IN ROAD CONSTRUCTION

**BY: CORPORATE DIRECTOR (ECONOMIC DEVELOPMENT,
PLANNING & INFRASTRUCTURE)**

1. REASON FOR REPORT

- 1.1 At a recent meeting of this committee on 20 March 2018 (Para 9 of the minute refers), agreed “that a report on the benefits of plastic road surfacing be brought to a future meeting of this Committee”.
- 1.2 This report is to inform the Committee of the potential benefits and drawbacks of considering using this type of material in future works within Moray.
- 1.3 This report is submitted to Committee in terms of Section III (F) (15) of the Council's Scheme of Administration relating to exercising all functions of the Council as Roads Authority.

2. RECOMMENDATION

- 2.1 **The Committee is asked to consider and note the contents of this report and that further evidence as outlined in paragraph 5.8 of this report is required before committing to using recycled plastic in road construction within Moray.**

3. BACKGROUND

- 3.1 There has been a lot of recent publicity about how waste, plastic bottles and bags are being recycled into asphalt mixture to produce roads that are kinder to the environment and the manufacturer claims, longer lasting to make a revolutionary new road surface.
- 3.2 Officers within the Council and across the Industry appreciate that plastics can have a devastating impact on the environment, particularly when the product reaches our seas and oceans. There is a genuine appetite to understand our responsibility and to step up our efforts to help the environment by recycling more, upcycling and responsibly sourcing materials.
- 3.3 The product is the brainchild of MacRebur founder Toby McCartney, who got his inspiration after visiting southern India with a charity helping people who

work on rubbish dumps. During the trip he saw how some of the plastic litter was put into potholes, doused in petrol and then set alight until it melted into the craters.

- 3.4 On his return he went on to develop the idea to produce pellets made out of assorted plastic waste that can be blended with traditional materials to create an enhanced asphalt.
- 3.5 The company secured a £1M investment from Virgin following a successful entry into Richard Branson's 2016 Virgin Voom competition in the "start-up" category. By reducing the use of bitumen in asphalt, the carbon footprint associated with road construction can be reduced.
- 3.6 The process involves making plastic pellets from bottles and bags that would otherwise be destined for landfill sites. The pellets are then melted into the asphalt mix to act as a binding agent. The plastic used makes up approximately 0.5% of the mixture.

4. POTENTIAL BENEFITS OF USING THIS MATERIAL

- 4.1 It is claimed that the product, when used as additive to traditional asphalt mixes provides a unique way of enhancing the material to give a cost effective and longer lasting asphalt solution. Laboratory tests undertaken by the Company promoting the product have shown that when added to traditional mixes, the MR6 filler is 60 per cent stronger and ten times longer-lasting than regular asphalt.
- 4.2 The "Green" benefits clearly link to lowering the environmental impact of roads maintenance as the product is made with 100% recycled materials. The company promoting this product highlight how the use of this type of local waste can be diverted from land fill sites into the asphalt that is produced and used on roads.
- 4.3 After 18 months of testing and trials undertaken by the Company, the product complies within British and European standards, is patent pending and is claimed to be a high performance, asphalt binder additive.

5. RECENT TRIALS

- 5.1 There have been a number of recent and reported successful trials carried out. Cumbria County Council report to be the first authority in England to incorporate the plastic based material into the standard asphalt used to resurface a small section of the A6 in Carlisle in late 2016.
- 5.2 The plastic based product was used in the resurfacing of a demanding section of road at a junction on the A6 close to Calthwaite. The road is used by significant numbers of heavy goods vehicles and had previously failed to stand up to the demands of the traffic going to and from a water bottling plant and a sand quarry. The Council hopes that the new product will prove to be more durable in this location than conventional asphalt.
- 5.3 More locally and recently (September 2017), Dumfries & Galloway Council have used the material on the C28s Henderland road at Shawhead. It is too

early to note the outcome of the trial, however roads officials at Dumfries & Galloway have committed to now closely monitor the performance of the material and share the data with other local authorities considering the use of this product.

- 5.4 Both Councils have reported positive press and supportive community interest in the use of this new concept. Other Scottish authorities like Moray are continuing to monitor the success of these trials. Fife Council has recently commented that they are open to trialling, but the cost of any trial must be economic and competitive with traditional materials.
- 5.5 A recent question dated 17 May 2018 has been asked of the Secretary of State for Transport; *“what steps the Government is taking to encourage the use of (a) recycled plastic materials and (b) other innovative and durable techniques for road repairs”*. The full response is detailed within **APPENDIX 1** of this report. However, the key headline from the response is that at the moment the use of this material is not widespread and that the trial undertaken will continue to be monitored and any outcomes, positive or negative, will be noted.
- 5.6 Within the last few weeks, officers at Moray have also spoken to Ken McNeil, Technical Director at Breedon Aggregates, who chairs the MPA technical committee (Marine Protected Areas Technical group) on surfacing products. Ken has confirmed that he is aware of the trials but results are not available yet, as the durability has yet to be ascertained. The Transport Research Laboratories (TRL) are awaiting data from the company, MacRebur, to analyse their results and publish details.
- 5.7 Dr Karl Williams, director of the University of Central Lancashire’s Centre for Waste and Resource Management, recently reported that it remains unclear how environmentally friendly the roads really are: “They are only going on trial roads at the moment, and in terms of what plastics they are using, where the plastic comes from and the level of contamination, there are lots of issues that are still big question marks.”
- 5.8 As a result, key issues which require to be clarified include:
- more verified research to be undertaken by TRL (Transport Research Laboratory), SCOTS (Society of Chief Officers of Transportation in Scotland) and other industry researchers
 - conclusive proof of the long term durability and financial benefits
 - clarification that any toxins that may be present in the co-mingled plastic waste will not result in leaching once the material has been laid or at some point in the future

6. COSTS OF USING PLASTIC BASED MATERIAL

- 6.1 It is unclear at the moment whether using this product will be more expensive or cheaper. There have been initial conflicting comments made about the costs and it is suggested that until more information becomes available that this is treated with an open mind.

- 6.2 A recent survey published in the International Journal of Innovative Research in Science, Engineering and Technology (Vol 6, Issue 2, Feb 2017), suggests its initial cost is slightly more as compared to conventional methods.

7. OTHER OPTIONS BEING CONSIDERED

- 7.1 There are other options being considered both by Officers within the Council and on a wider scale throughout the roads industry. These include;
- 7.2 Researchers at Delft University in the Netherlands have come up with a self-healing asphalt that incorporates steel wool fibres. The fibres are conducive to electricity and, at the first sign of a crack, a magnetic induction machine is rolled over the surface to heat the mixture and close the cracks before they develop into potholes.
- 7.3 Researchers have conducted successful trials in the Netherlands on 12 different roads since 2010, with none needing repairs. Although the material will cost 25% more than regular asphalt, like MacRebur's plastic compound, it could double road life, and save councils money long term.
- 7.4 A research partnership between Brunel University in London and engineering company Epicuro has developed a Controlled Pothole Repair System that uses infrared heat technology to double road lifespan. It is suggested by heating the pothole so its temperature is aligned with that of the hot asphalt mix, the researchers believe road life could be doubled. Testing has also shown a 25 per cent reduction in repair costs, helping councils to meet their shrinking budgets.
- 7.5 Other attempts to improve the environmental credentials of roads include solar road surfaces - one such road is being tested in the village of Tourouvre-au-Perche, Normandy, which cost €5 million (£4.2 million) to build in 2016.

8. SUMMARY OF IMPLICATIONS

(a) Corporate Plan and 10 Year Plan (Local Outcomes Improvement Plan (LOIP))

The maintenance of the road infrastructure aligns with the Council's outcome of "Empowering and connecting communities" and a CPP focus of "A thriving and well connected place, where more people live well in their communities".

(b) Policy and Legal

The Council is responsible for the maintenance of 1556 km of road and 18,136 street lights which have been adopted by the Local Authority in terms of the Roads (Scotland) Act 1984. The Act places a duty on the Local Authority to maintain the roads, lighting units and structures so adopted, but does not prescribe the level of maintenance to be delivered.

Codes of Practice for Highway Maintenance Management, Management of Highway Structures and for Highway Lighting Management identify good practice and consideration has to be given to this advice.

The Council have agreed standards for response to identified roads and lighting defects (public performance standards).

(c) Financial implications

None at this stage.

(d) Risk Implications

There are no current risks identified at this moment in time. Once further results are available the Council may organise a trial using plastic products in road materials.

There is a risk of exceeding revenue budget although every attempt will be made not to do so. Pressure on general maintenance budgets will increase in terms of reactive maintenance as carriageway conditions deteriorate.

(e) Staffing Implications

None.

(f) Property

There are no property implications as a result of this report.

(g) Equalities/Socio Economic Impact

There are no equalities or socio economic implications as a result of this report.

(h) Consultations

The Legal Services Manager (Property and Contracts), P Connor, Principal Accountant, L Rowan, Committee Services Officer and the Equal Opportunities Officer have been consulted and comments have been taken into account.

9. CONCLUSIONS

- 9.1 While early indications are promising it is felt there is not sufficient evidence yet to support the use of this material in road construction within Moray Council's road infrastructure, particularly in relation to long term financial benefits and environmental impact.

Author of report: Mark Atherton, Roads Maintenance Manager

Background Papers:

Ref:

APPENDIX 1 – WRITTEN QUESTION TO SECRETARY OF STATE

Roads: Repairs and Maintenance: Written Question -145382

To ask the Secretary of State for Transport, what steps the Government is taking to encourage the use of (a) recycled plastic materials and (b) other innovative and durable techniques for road repairs.

Q

Asked by Alex Chalk(Cheltenham) Asked on: 17 May 2018

Department for Transport

To ask the Secretary of State for Transport, what steps the Government is taking to encourage the use of (a) recycled plastic materials and (b) other innovative and durable techniques for road repairs.

A

Answered by: Jesse Norman Answered on: 24 May 2018

The use of recycled plastic materials as a component in road surfacing is not widespread. Officials at the Department for Transport are, however, aware that it has been used in a small proportion of England's strategic road network for high friction surfacing materials, and on one short stretch of public road in England.

Officials from the Department have been in discussion with Cumbria County Council, which is trialling the use of recycled plastic materials in their road resurfacing, and with the company that supplies the material. They will continue to monitor the situation and any outcomes, positive or negative, from the trial currently underway.

The Department is also encouraging local highway authorities to trial new innovations and technology to help repair the roads for which they are responsible. The Department recently announced that it is working in collaboration with the Association of Directors of Environment, Planning and Transport (ADEPT) on future-proofing the local road network through the use of smart infrastructure and new materials.