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Geosynthetics & Steel Meshes [as Asphalt Interlayers]:

- **Used to limit cracks and moisture in your pavement structure.**
- **Extending your structural life, reducing your carbon and costs.**

Craig Andrews, Technical Director
Foster Contracting Ltd | www.fcl.uk
07355 679023 | craig.andrews@fcl.uk
Geos & SM Sub-committee Member

An introduction to your Geos&SM presenter for today.

Geosynthetics & Steel Meshes S/C
Craig Andrews, Technical Director
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Craig Andrews

IEng MICE FIHE MIAT MCIHT

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Connect with me on LinkedIn

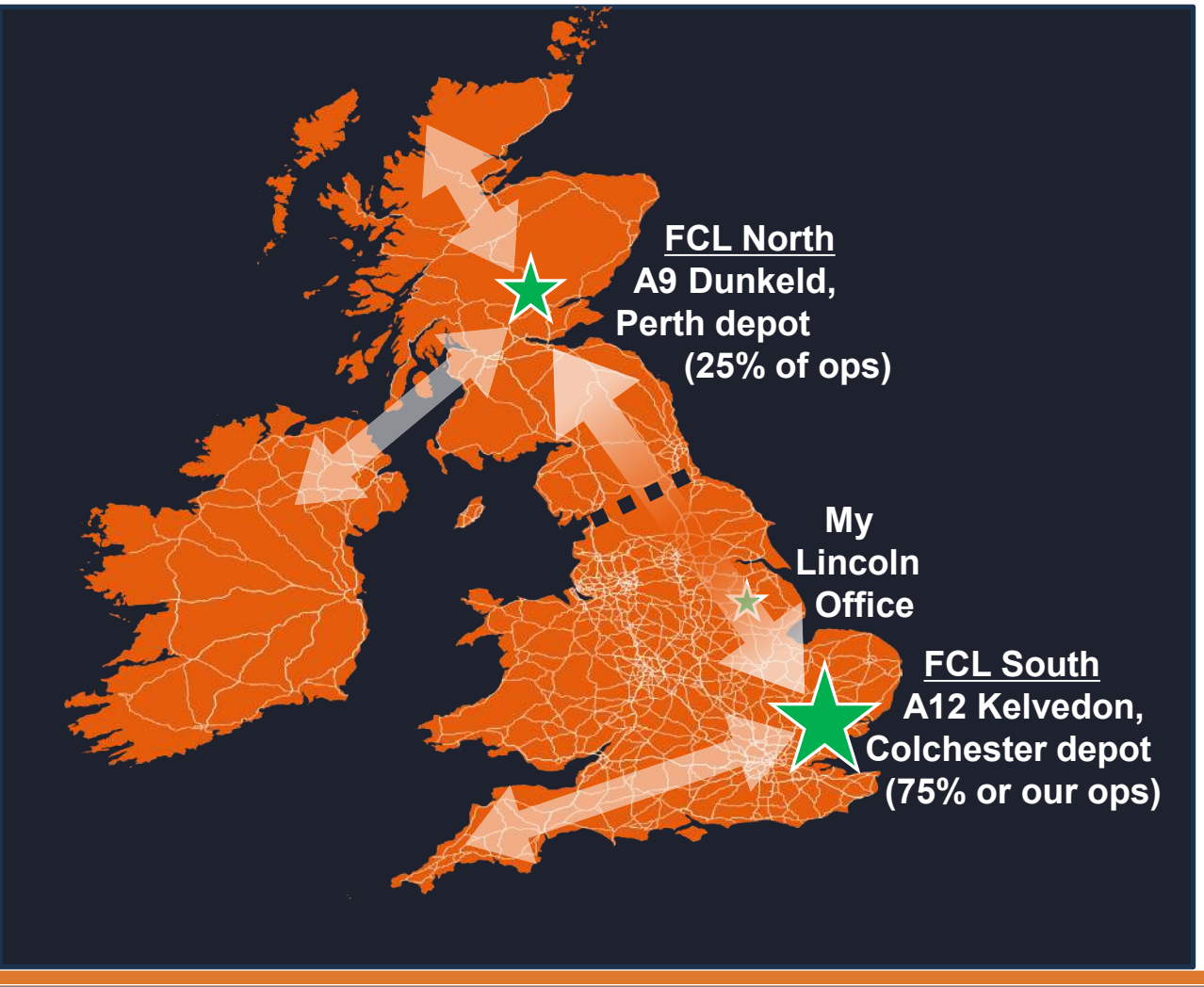
(to see updates and videos)

36 years of highway sector knowledge compressed into 20 minutes!

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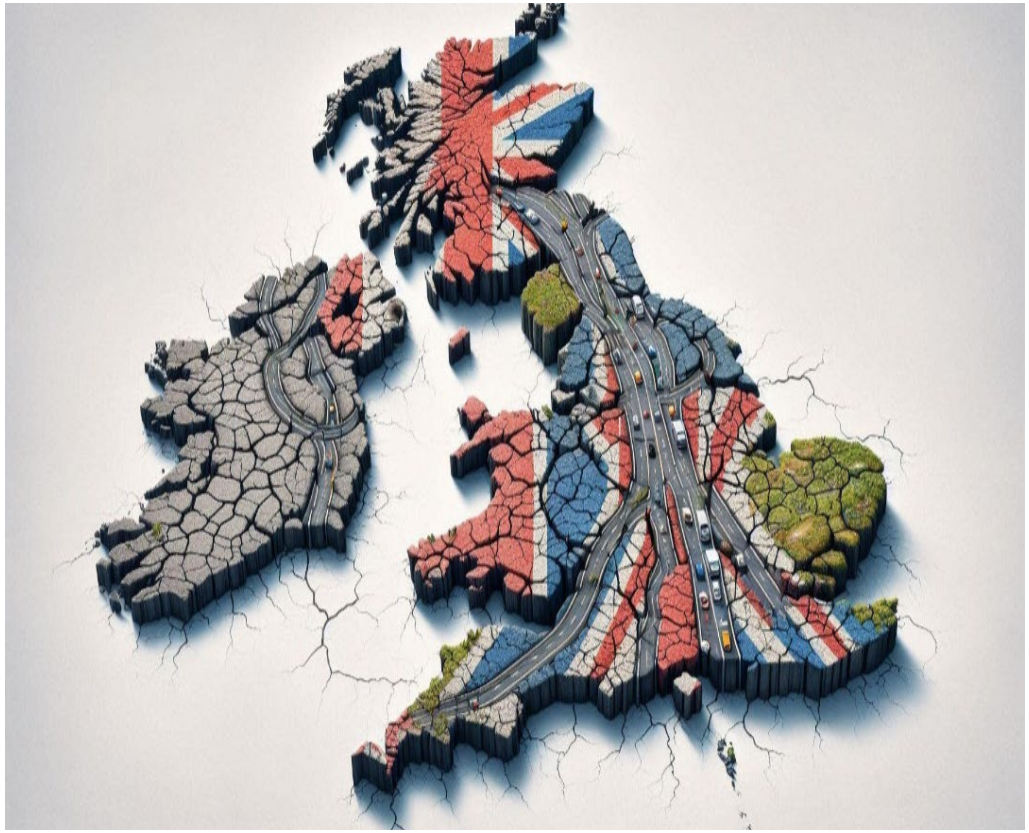


FCL typically limit our operations & capabilities to the UK, operating a nationwide business as a specialist SME, but have worked as far South as the Falkland Islands.

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I / we get to witness the sorry state of our UK network.

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Britons demand urgent help with road repairs as drivers face £14billion cost in annual vehicle repairs

Story by Felix Reeves • 1h • 3 min read



Britons demand urgent help with road repairs as drivers face £14billion cost in annual vehicle repairs
© GB News

Our road network is ‘cream crack-d’ and the potholes are costing us all.

The pothole narrative has become a distraction.

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LHAs are wasting money by filling potholes, usually badly @ £60-80/sq.m!

Proactive / preventative measures have declined.

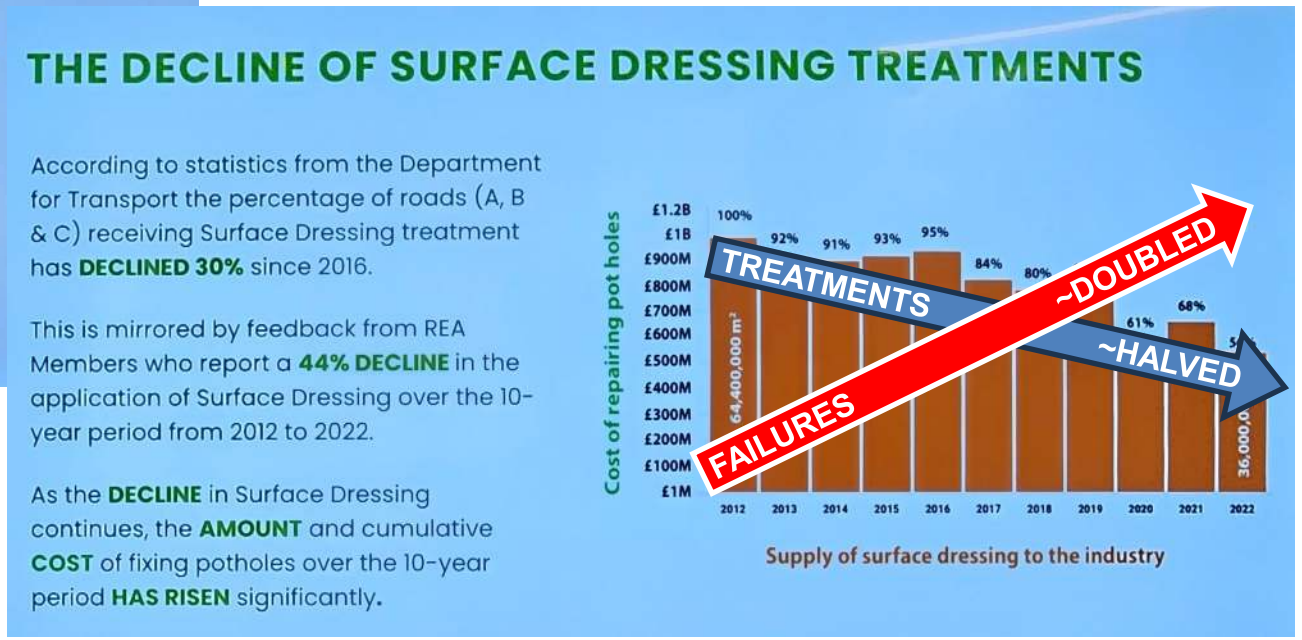
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2010, 100M m² of surface treatments used

By 2022, this area had approx. halved.

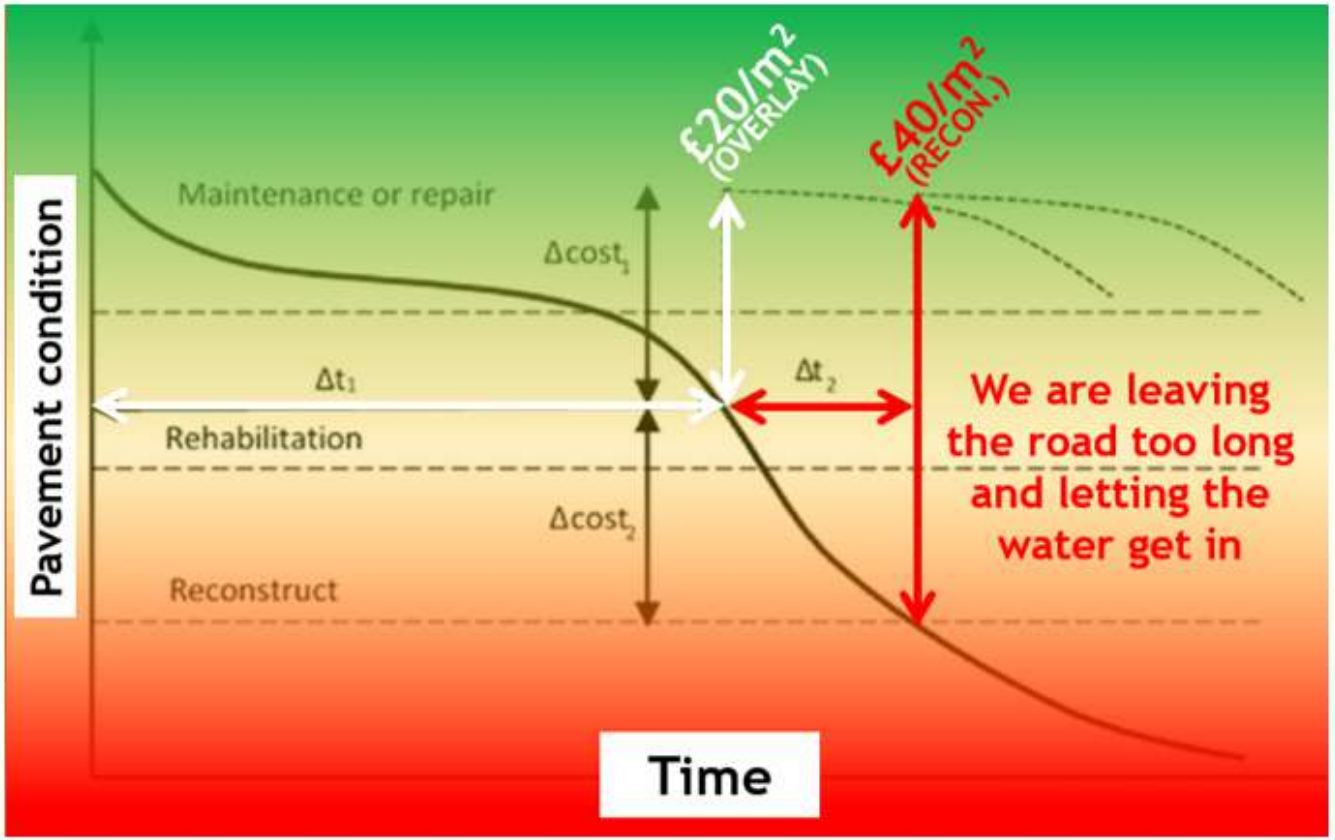
Information presented at the Liverpool JMU Pavements Conference, 28/02/24
By Paul Goosey, MD Eurovia, representing the REA



As the use of specialist treatments has halved, potholes have doubled.

The resultant costs for rehab. works have doubled.

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"It doesn't save money long-term as these projects, or similar projects, will have to be built later down the line at a much greater cost"

Noble Francis,
Economics Director, CPA
(Construction Products Association)

The longer we leave the failure, the more expensive it gets.

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The RSTA members have come to the rescue!

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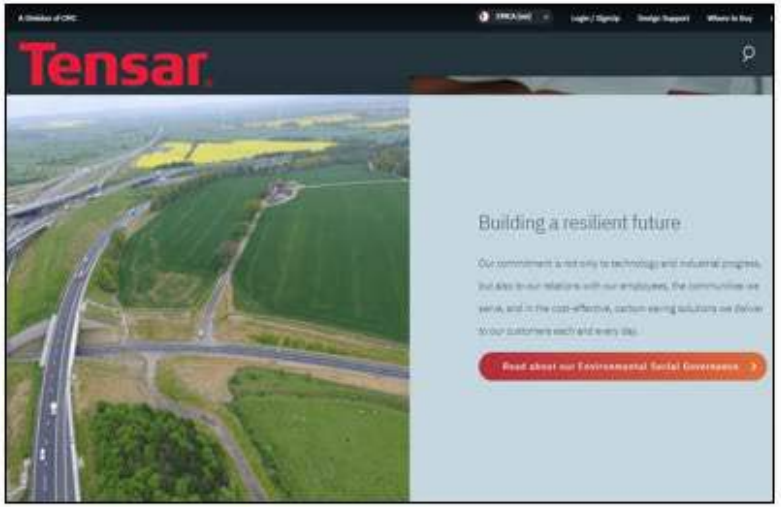


Fortunately, contractors and their subbies have innovated and evolved.

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Manufacturers are a key part of the supply chain.

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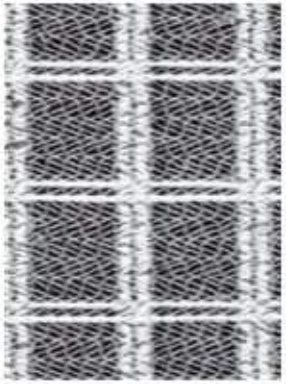




Product manufacturers [from around the world] have innovated.

40+ years of manufacturing has created the products.

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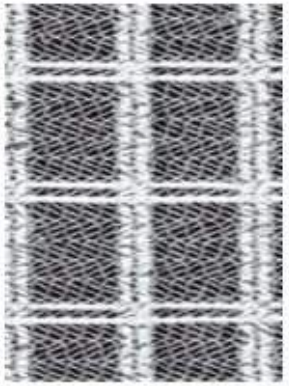
PAVING FABRICS	PAVING GRIDS		COMPOSITE GRIDS		OTHER GRIDS	
	FLEXIBLE FIBRES	RIGID WITH PROFILES	FLEXIBLE FIBRES	RIGID WITH PROFILES	SELF-INSTALLATION GRIDS	SELF-INSTALLATION MATS
						
~~REINFORCEMENT~~ STRESS RELIEF MOISTURE BARRIER	REINFORCEMENT WITH AN INSTALLATION AID	REINFORCEMENT BY NAILING IN PLACE	REINFORCEMENT STRESS RELIEF MOISTURE BARRIER	REINFORCEMENT STRESS RELIEF MOISTURE BARRIER	REINFORCEMENT WITH AN ADHESIVE BACKING	REINFORCEMENT STRESS RELIEF MOISTURE BARRIER ADHESIVE BACKING
UNDER SURFACE DRESSING OR UNDER 40MM AC	40MM AC COVER IN THE FIRST INSTANCE	70MM AC COVER IN THE FIRST INSTANCE	40MM AC COVER IN THE FIRST INSTANCE	60MM AC COVER IN THE FIRST INSTANCE	40MM AC COVER IN THE FIRST INSTANCE	40MM AC COVER IN THE FIRST INSTANCE

Product manufacturers have created an extensive range of materials.

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Different functions can be adopted to suit your sites.

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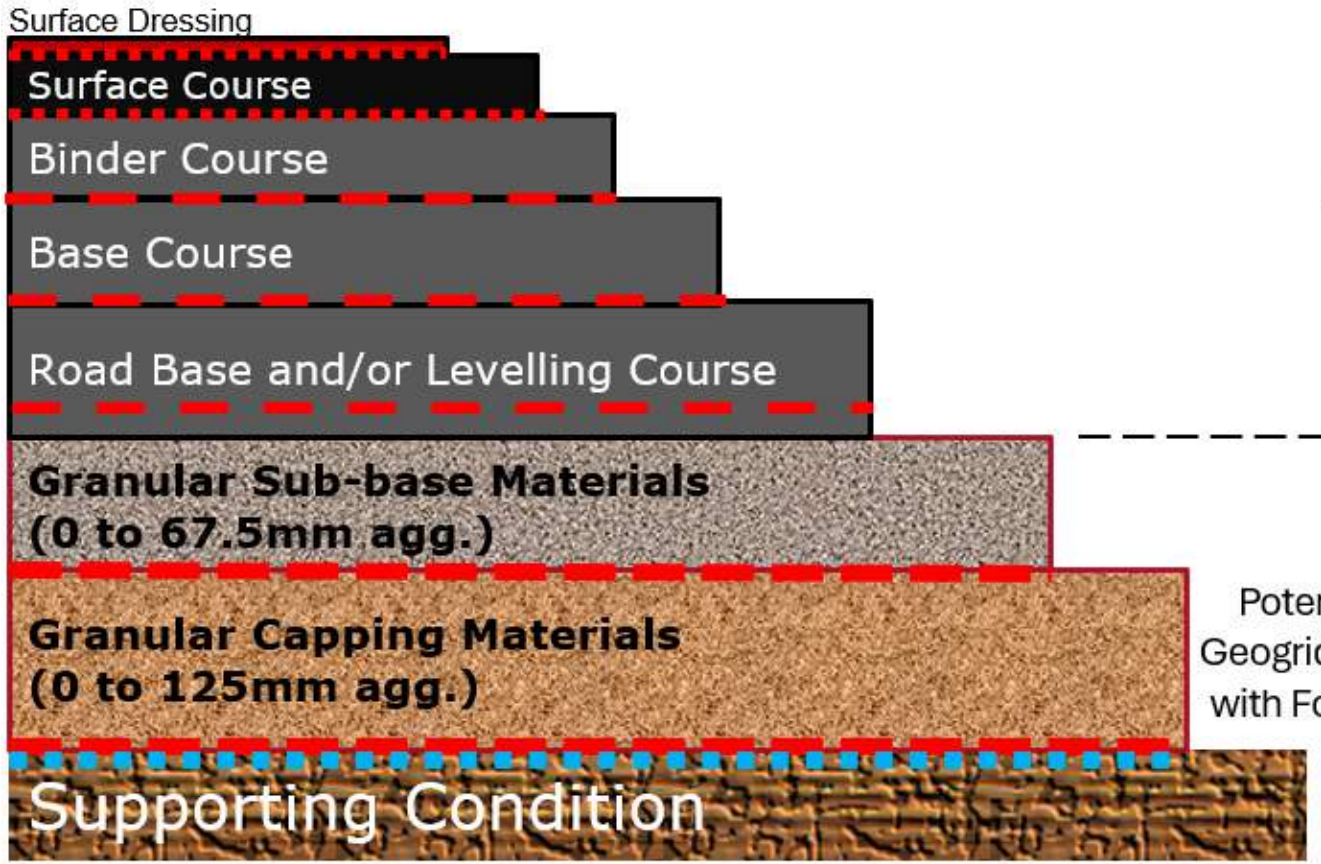
PAVING FABRICS	PAVING GRIDS		COMPOSITE GRIDS		OTHER GRIDS	
	FLEXIBLE FIBRES	RIGID WITH PROFILES	FLEXIBLE FIBRES	RIGID WITH PROFILES	SELF-INSTALLATION GRIDS	MATS
						
~~REINFORCEMENT~~ STRESS RELIEF MOISTURE BARRIER	REINFORCEMENT WITH AN INSTALLATION AID	REINFORCEMENT BY NAILING IN PLACE	REINFORCEMENT STRESS RELIEF MOISTURE BARRIER	REINFORCEMENT STRESS RELIEF MOISTURE BARRIER	REINFORCEMENT WITH AN ADHESIVE BACKING	REINFORCEMENT STRESS RELIEF MOISTURE BARRIER ADHESIVE BACKING
~130 GSM FABRIC + 1.1LT BITUMEN SPRAY BEFORE	~30 GSM FABRIC + 0.35LT BITUMEN SPRAY BEFORE	NO FABRIC BACK + 0.35LT BITUMEN SPRAY AFTER	~130 GSM FABRIC + 1.1LT BITUMEN SPRAY BEFORE	~130 GSM FABRIC + 1.1LT BITUMEN SPRAY BEFORE	NO FABRIC BACK + 0.35LT BITUMEN SPRAY AFTER	FABRIC WITHIN + 0.35LT BITUMEN SPRAY AFTER

These products come in different types and have different functions.

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The sites are different so the depths can vary too.

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FLEXIBLE PAVEMENTS
(NEW / EXISTING)
Potential Product Locations
For Reinforcing Pavements
with Asphalt Interlayers

Potential Locations for
Geogrids / Geocomposites
with Founding Aggregates

Products can be installed at various locations in the pavement structure.

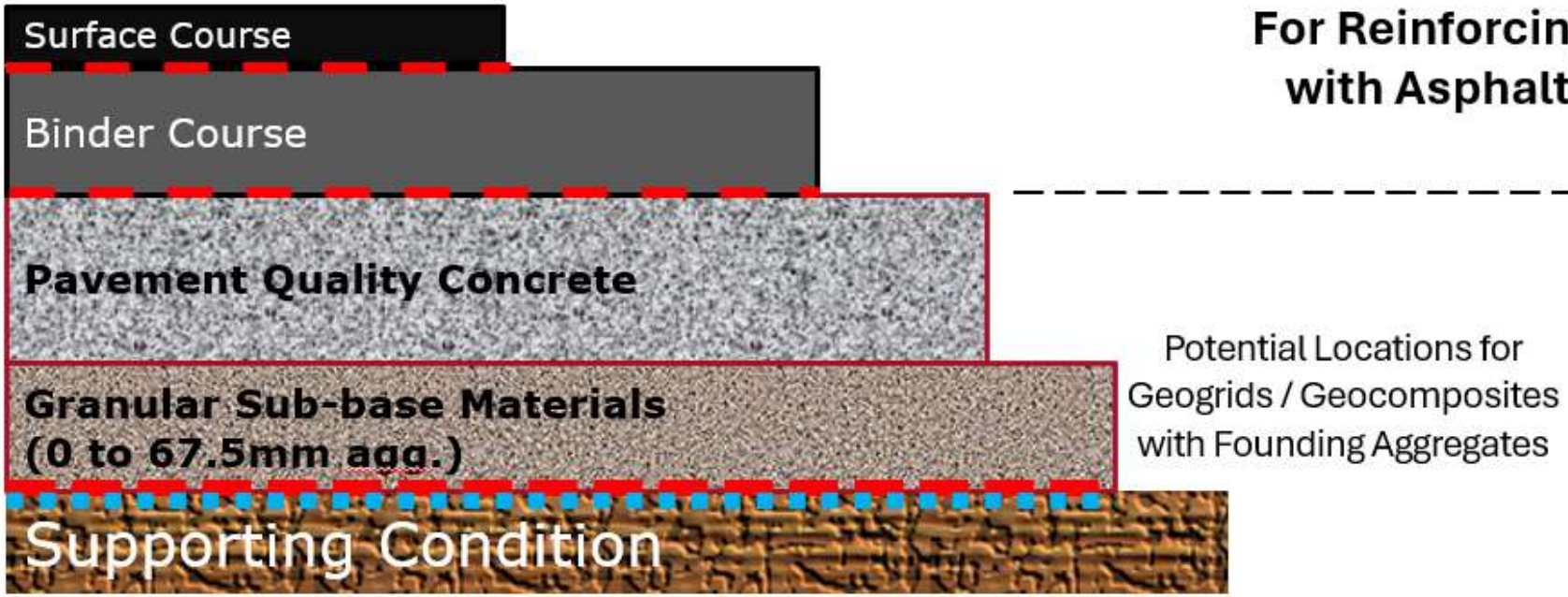
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Not all pavements are flexible, so failures can vary.

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COMPOSITE PAVEMENTS (NEW / EXISTING)

Potential Product Locations For Reinforcing Pavements with Asphalt Interlayers



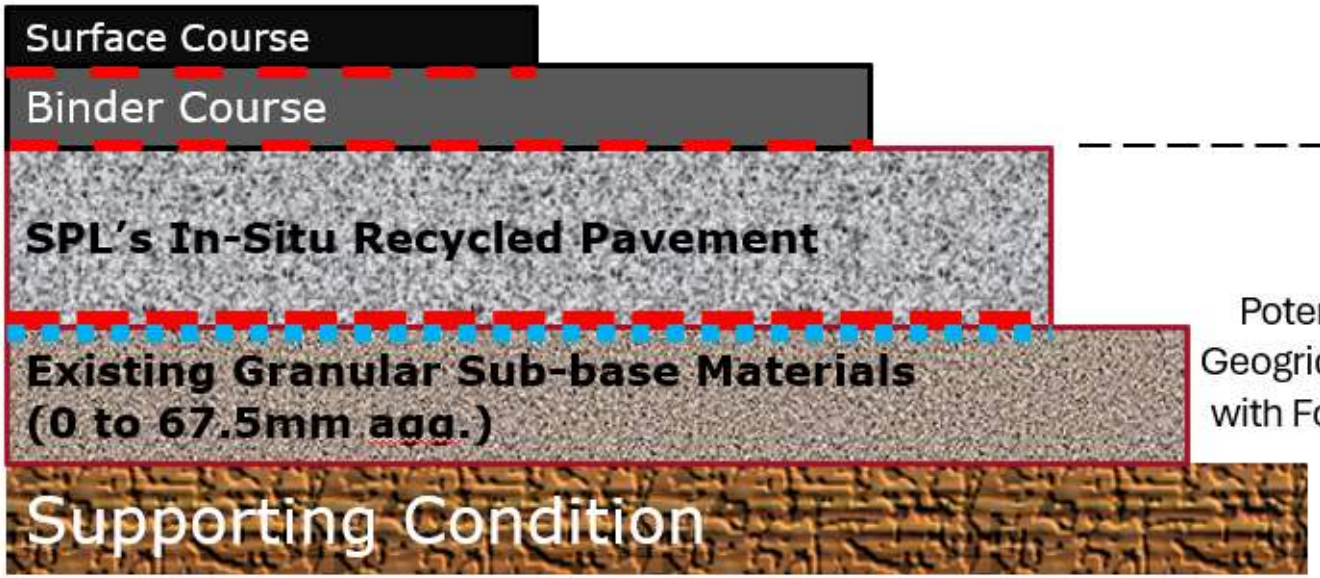
Products can be installed at various locations in the pavement structure.

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Roads can even be maintained with an in-situ recon.

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RECYCLED PAVEMENTS (EXISTING)
Potential Product Locations For Reinforcing Pavements with Asphalt Interlayers

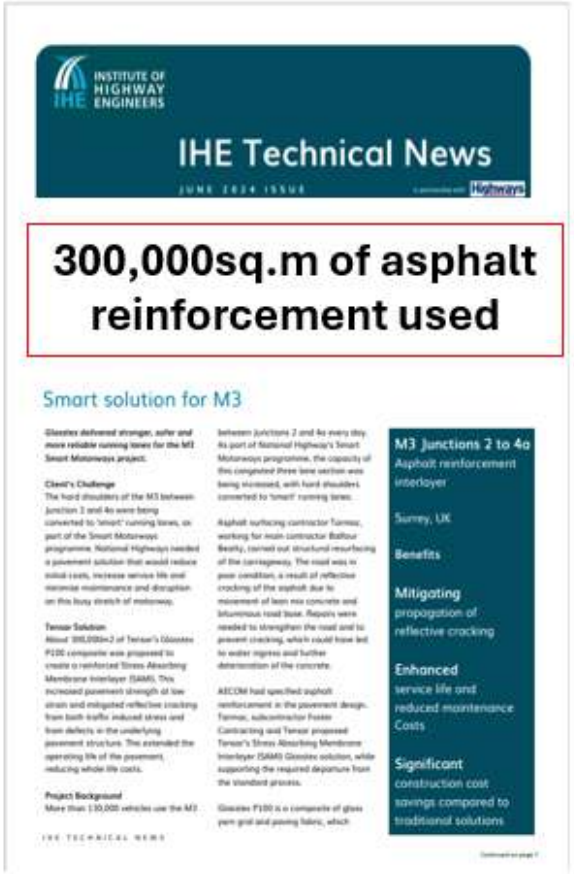


Products can be installed at various locations in the pavement structure.

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National Highways have been utilising the benefits of asphalt interlayers for years.

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INSTITUTE OF HIGHWAY ENGINEERS

IHE Technical News

JUNE 2024 ISSUE

300,000sq.m of asphalt reinforcement used

Smart solution for M3

M3 Junctions 2 to 4a
Asphalt reinforcement interlayer

Surrey, UK

Benefits

Mitigating propagation of reflective cracking

Enhanced service life and reduced maintenance Costs

Significant construction cost savings compared to traditional solutions



Main contractor:
Balfour Beatty

Asphalt contractor:
Tarmac

Subcontractor:
Foster Contracting Ltd

Client:
National Highways

Consultant:
AECOM

"Tensar's Stress Absorbing Membrane Interlayer was fast to lay and will meet National Highway's requirements for a low-maintenance pavement with long operational life."

Barrie Farquhar, Project Manager, Tarmac

Tensar

PAVEMENT SURFACING

National Highways

1. Balfour Beatty
2. Tarmac
3. Foster Contracting

Tensar (products)

"Tensar's Stress Absorbing Membrane Interlayer was fast to lay and will meet Highways England's requirements for a low-maintenance pavement with long operational life."

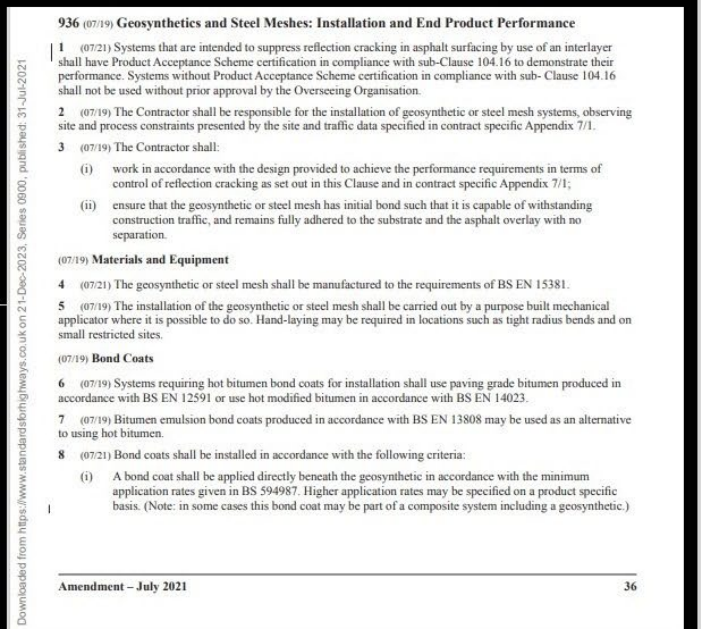
"No cracks were found when the M3 was inspected" (by XAIS PTS in 2023).

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Even more so since the MCHW SHW now includes the Specification Clause 936 = no departure.

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MCHW SHW Cl.936 has already got your risks covered and avoids a departure.



936 (07/19) **Geosynthetics and Steel Meshes: Installation and End Product Performance**

1 (07/21) Systems that are intended to suppress reflection cracking in asphalt surfacing by use of an interlayer shall have Product Acceptance Scheme certification in compliance with sub-Clause 104.16 to demonstrate their performance. Systems without Product Acceptance Scheme certification in compliance with sub- Clause 104.16 shall not be used without prior approval by the Overseeing Organisation.

2 (07/19) The Contractor shall be responsible for the installation of geosynthetic or steel mesh systems, observing site and process constraints presented by the site and traffic data specified in contract specific Appendix 7/1.

3 (07/19) The Contractor shall:

(i) work in accordance with the design provided to achieve the performance requirements in terms of control of reflection cracking as set out in this Clause and in contract specific Appendix 7/1;

(ii) ensure that the geosynthetic or steel mesh has initial bond such that it is capable of withstanding construction traffic, and remains fully adhered to the substrate and the asphalt overlay with no separation.

(07/19) **Materials and Equipment**

4 (07/21) The geosynthetic or steel mesh shall be manufactured to the requirements of BS EN 15381.

5 (07/19) The installation of the geosynthetic or steel mesh shall be carried out by a purpose built mechanical applicator where it is possible to do so. Hand-laying may be required in locations such as tight radius bends and on small restricted sites.

(07/19) **Bond Coats**

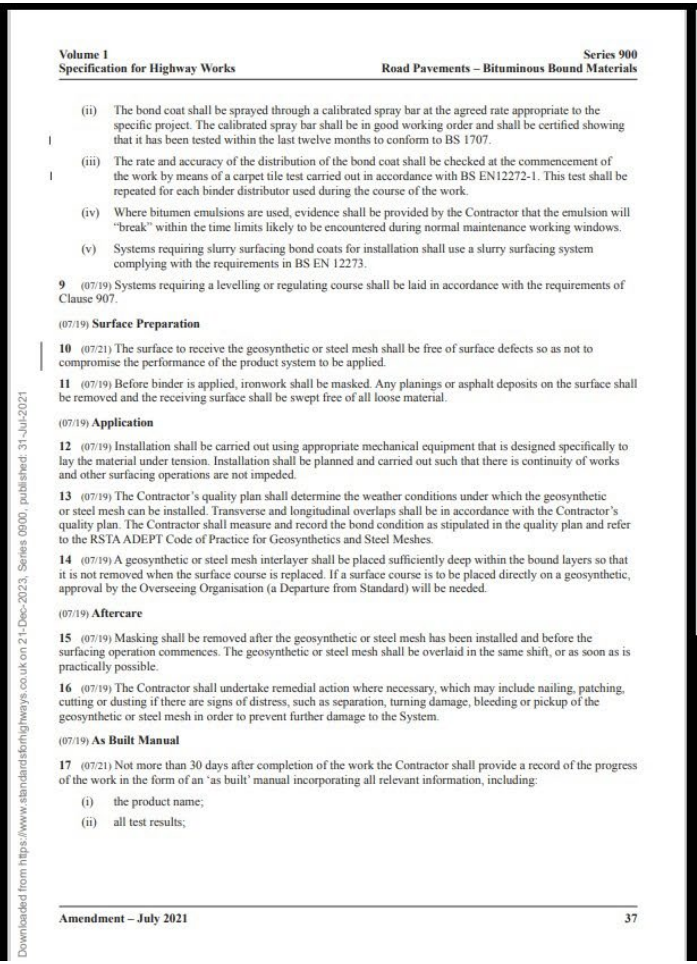
6 (07/19) Systems requiring hot bitumen bond coats for installation shall use paving grade bitumen produced in accordance with BS EN 12591 or use hot modified bitumen in accordance with BS EN 14023.

7 (07/19) Bitumen emulsion bond coats produced in accordance with BS EN 13808 may be used as an alternative to using hot bitumen.

8 (07/21) Bond coats shall be installed in accordance with the following criteria:

(i) A bond coat shall be applied directly beneath the geosynthetic in accordance with the minimum application rates given in BS 594987. Higher application rates may be specified on a product specific basis. (Note: in some cases this bond coat may be part of a composite system including a geosynthetic.)

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(ii) The bond coat shall be sprayed through a calibrated spray bar at the agreed rate appropriate to the specific project. The calibrated spray bar shall be in good working order and shall be certified showing that it has been tested within the last twelve months to conform to BS 1707.

(iii) The rate and accuracy of the distribution of the bond coat shall be checked at the commencement of the work by means of a carpet tile test carried out in accordance with BS EN12272-1. This test shall be repeated for each binder distributor used during the course of the work.

(iv) Where bitumen emulsions are used, evidence shall be provided by the Contractor that the emulsion will "break" within the time limits likely to be encountered during normal maintenance working windows.

(v) Systems requiring slurry surfacing bond coats for installation shall use a slurry surfacing system complying with the requirements in BS EN 12273.

9 (07/19) Systems requiring a levelling or regulating course shall be laid in accordance with the requirements of Clause 907.

(07/19) **Surface Preparation**

10 (07/21) The surface to receive the geosynthetic or steel mesh shall be free of surface defects so as not to compromise the performance of the product system to be applied.

11 (07/19) Before binder is applied, ironwork shall be masked. Any planings or asphalt deposits on the surface shall be removed and the receiving surface shall be swept free of all loose material.

(07/19) **Application**

12 (07/19) Installation shall be carried out using appropriate mechanical equipment that is designed specifically to lay the material under tension. Installation shall be planned and carried out such that there is continuity of works and other surfacing operations are not impeded.

13 (07/19) The Contractor's quality plan shall determine the weather conditions under which the geosynthetic or steel mesh can be installed. Transverse and longitudinal overlaps shall be in accordance with the Contractor's quality plan. The Contractor shall measure and record the bond condition as stipulated in the quality plan and refer to the RSTA ADEPT Code of Practice for Geosynthetics and Steel Meshes.

14 (07/19) A geosynthetic or steel mesh interlayer shall be placed sufficiently deep within the bound layers so that it is not removed when the surface course is replaced. If a surface course is to be placed directly on a geosynthetic, approval by the Overseeing Organisation (a Departure from Standard) will be needed.

(07/19) **Aftercare**

15 (07/19) Masking shall be removed after the geosynthetic or steel mesh has been installed and before the surfacing operation commences. The geosynthetic or steel mesh shall be overlaid in the same shift, or as soon as is practically possible.

16 (07/19) The Contractor shall undertake remedial action where necessary, which may include nailing, patching, cutting or dusting if there are signs of distress, such as separation, turning damage, bleeding or pickup of the geosynthetic or steel mesh in order to prevent further damage to the System.

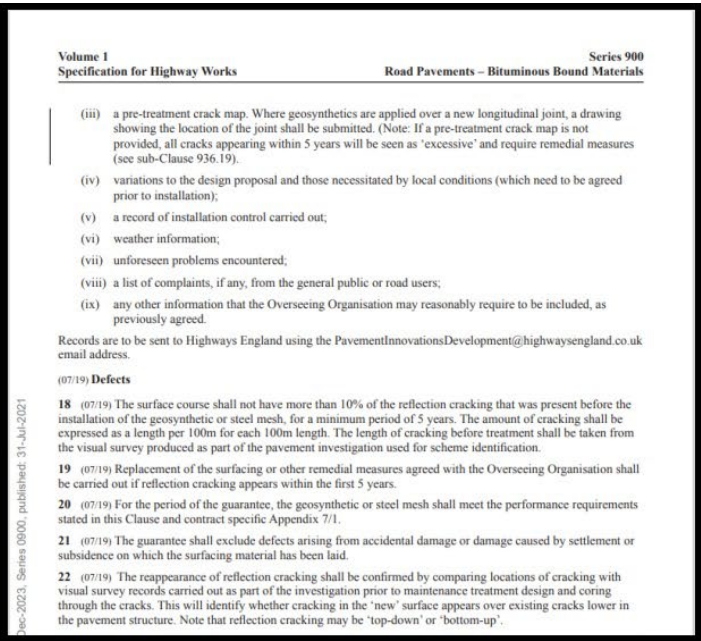
(07/19) **As Built Manual**

17 (07/21) Not more than 30 days after completion of the work the Contractor shall provide a record of the progress of the work in the form of an 'as built' manual incorporating all relevant information, including:

(i) the product name;

(ii) all test results;

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(iii) a pre-treatment crack map. Where geosynthetics are applied over a new longitudinal joint, a drawing showing the location of the joint shall be submitted. (Note: If a pre-treatment crack map is not provided, all cracks appearing within 5 years will be seen as 'excessive' and require remedial measures (see sub-Clause 936.19).

(iv) variations to the design proposal and those necessitated by local conditions (which need to be agreed prior to installation);

(v) a record of installation control carried out;

(vi) weather information;

(vii) unforeseen problems encountered;

(viii) a list of complaints, if any, from the general public or road users;

(ix) any other information that the Overseeing Organisation may reasonably require to be included, as previously agreed.

Records are to be sent to Highways England using the PavementInnovationsDevelopment@highwaysengland.co.uk email address.

(07/19) **Defects**

18 (07/19) The surface course shall not have more than 10% of the reflection cracking that was present before the installation of the geosynthetic or steel mesh, for a minimum period of 5 years. The amount of cracking shall be expressed as a length per 100m for each 100m length. The length of cracking before treatment shall be taken from the visual survey produced as part of the pavement investigation used for scheme identification.

19 (07/19) Replacement of the surfacing or other remedial measures agreed with the Overseeing Organisation shall be carried out if reflection cracking appears within the first 5 years.

20 (07/19) For the period of the guarantee, the geosynthetic or steel mesh shall meet the performance requirements stated in this Clause and contract specific Appendix 7/1.

21 (07/19) The guarantee shall exclude defects arising from accidental damage or damage caused by settlement or subsidence on which the surfacing material has been laid.

22 (07/19) The reappearance of reflection cracking shall be confirmed by comparing locations of cracking with visual survey records carried out as part of the investigation prior to maintenance treatment design and coring through the cracks. This will identify whether cracking in the 'new' surface appears over existing cracks lower in the pavement structure. Note that reflection cracking may be 'top-down' or 'bottom-up'.

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Contractually refer to

- ✓ **BS EN 15381**
- ✓ **NHSS13**
- ✓ **SHW Cl.936**

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Some LHAs are extremely proactive, whilst others are years behind, still thinking this is innovation.

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Deep structural shear, needed a deeper rehab.



340 to 420mm structural dip

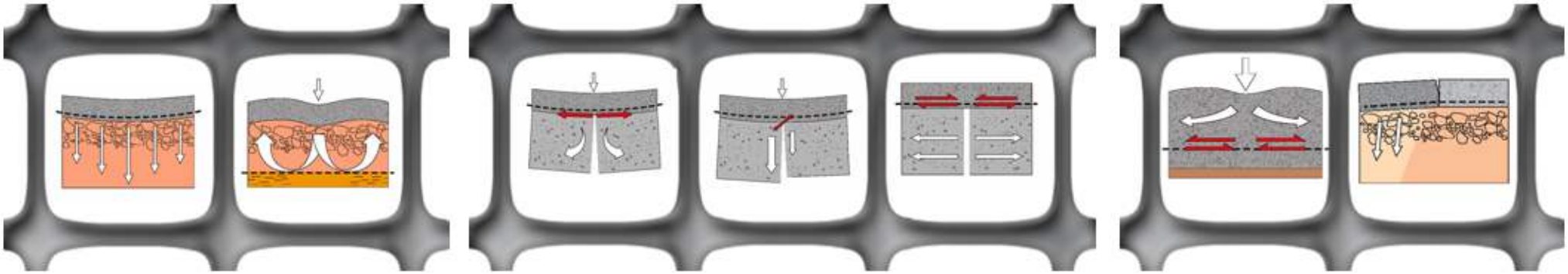


Lincs. County Council's fen roads suffer from several failure modes.

There are several key failure modes that can generate cracks, each with their own issues.

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STRUCTURAL FAILURE **REFLECTIVE CRACKING** **PERMANENT STRAIN**



Fatigue **Subgrade** **Bending** **Shear** **Thermal** **AC Mix** **Rotation**

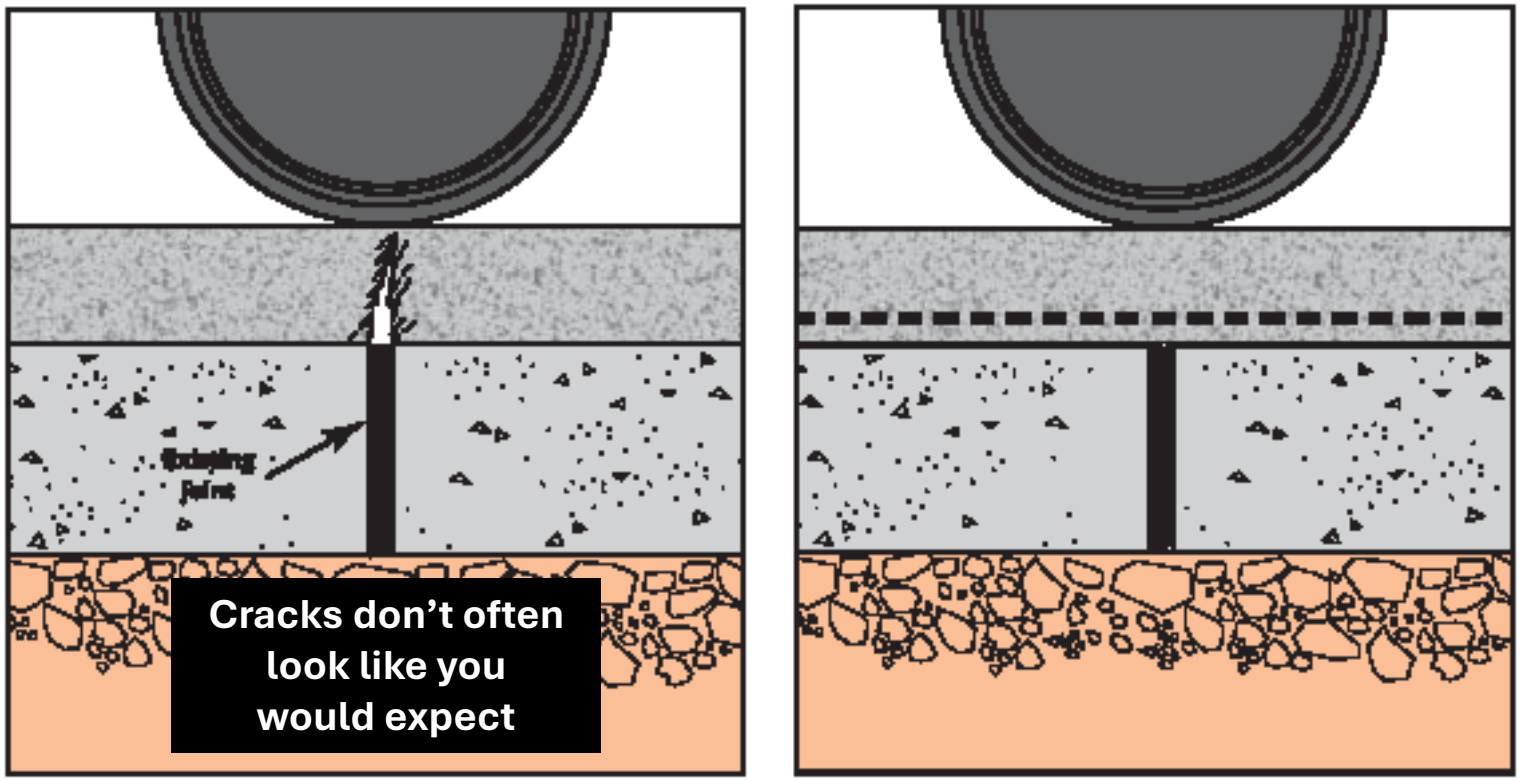
(Including environmental movement due to changes in moisture levels.

These failure mechanisms have been researched for decades.....

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There are several key failure modes that can generate cracks, each with their own issues.

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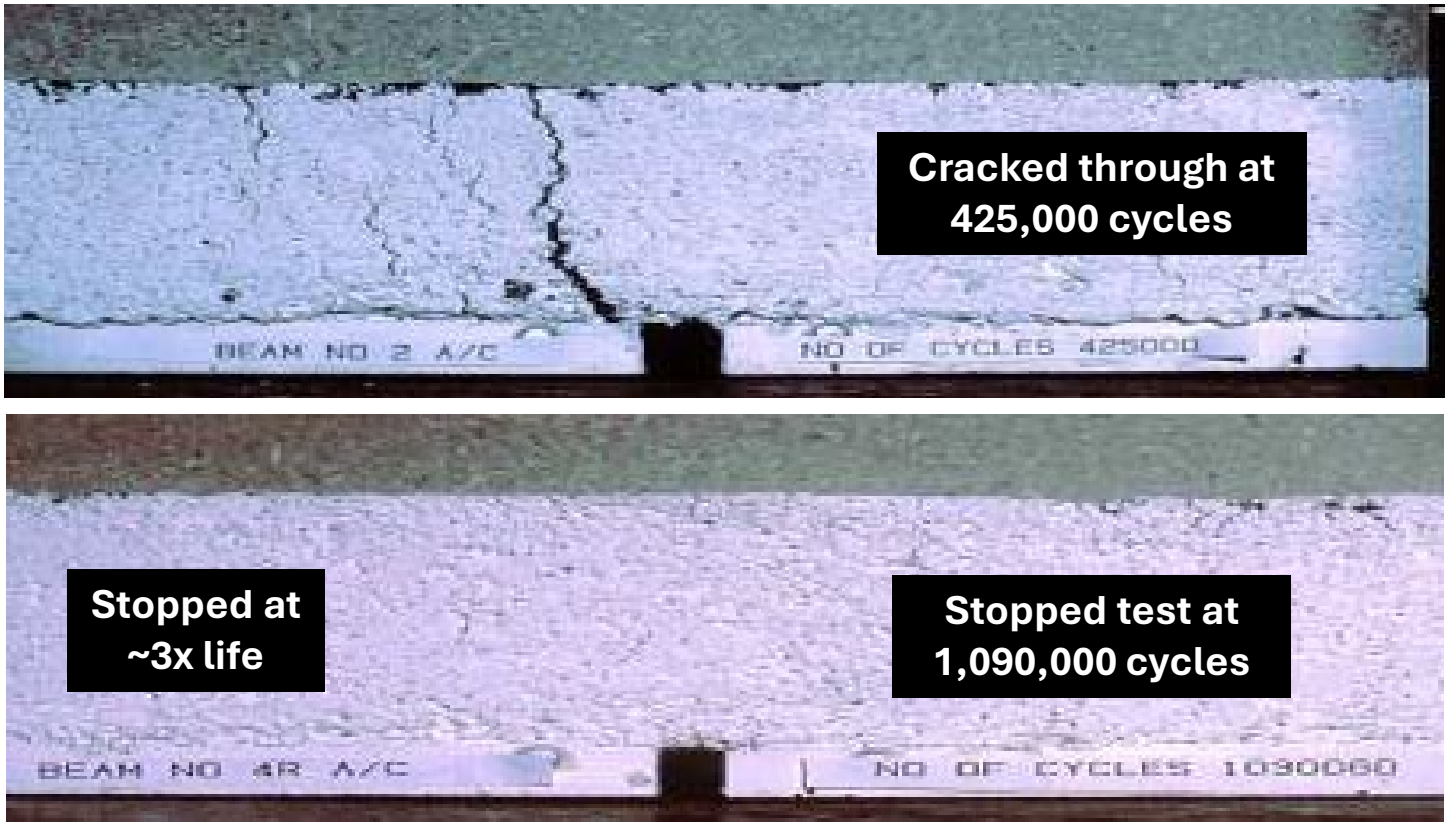


You must understand the basics of crack propagation.

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There are several key failure modes that can generate cracks, each with their own issues.

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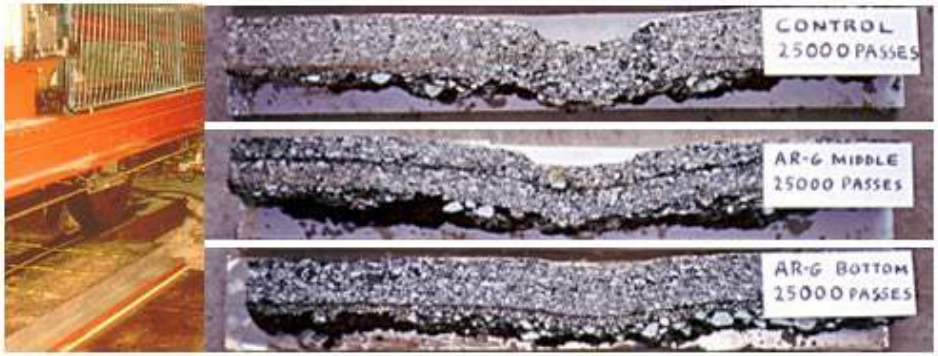


Crack propagation is not always what / where you'd expect.

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We don’t need more research.

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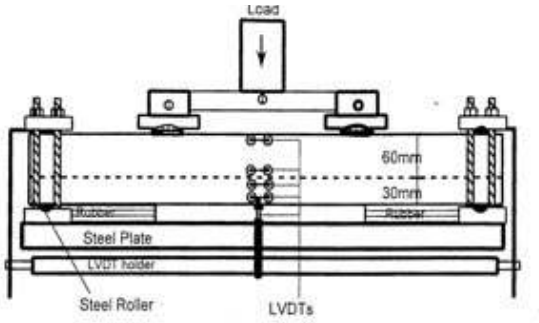


Figure 11: The Semi-Continuously Supported Beam Test Arrangement



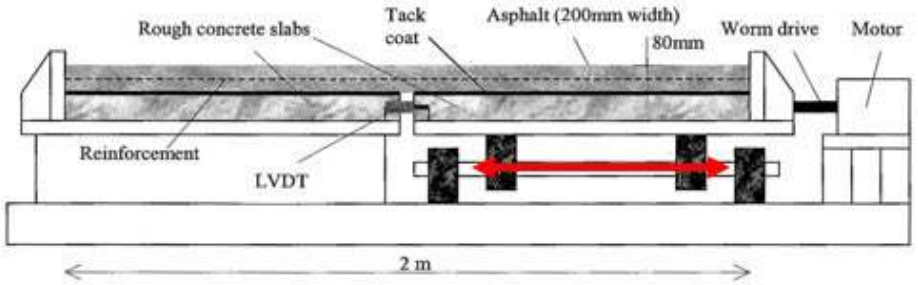


Figure 42: The Thermal Crack Simulation Apparatus

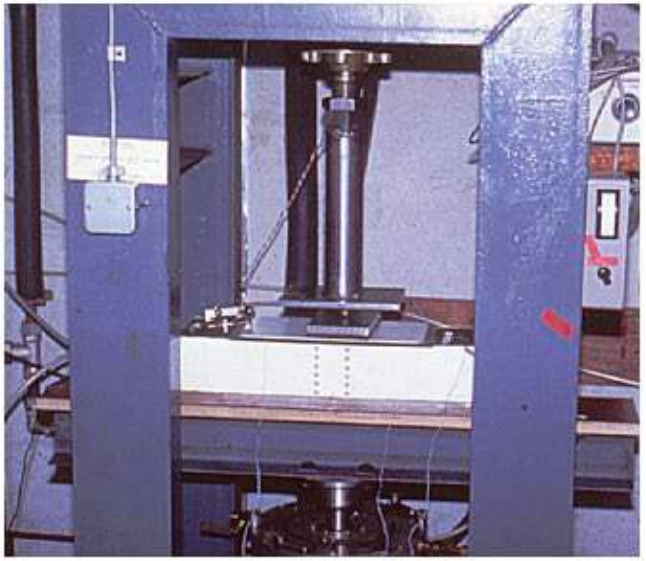
These failure mechanisms have been researched for decades.....

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We need more projects and case studies.

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These failure mechanisms are now well understood.

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Each site we support, generates even more data.

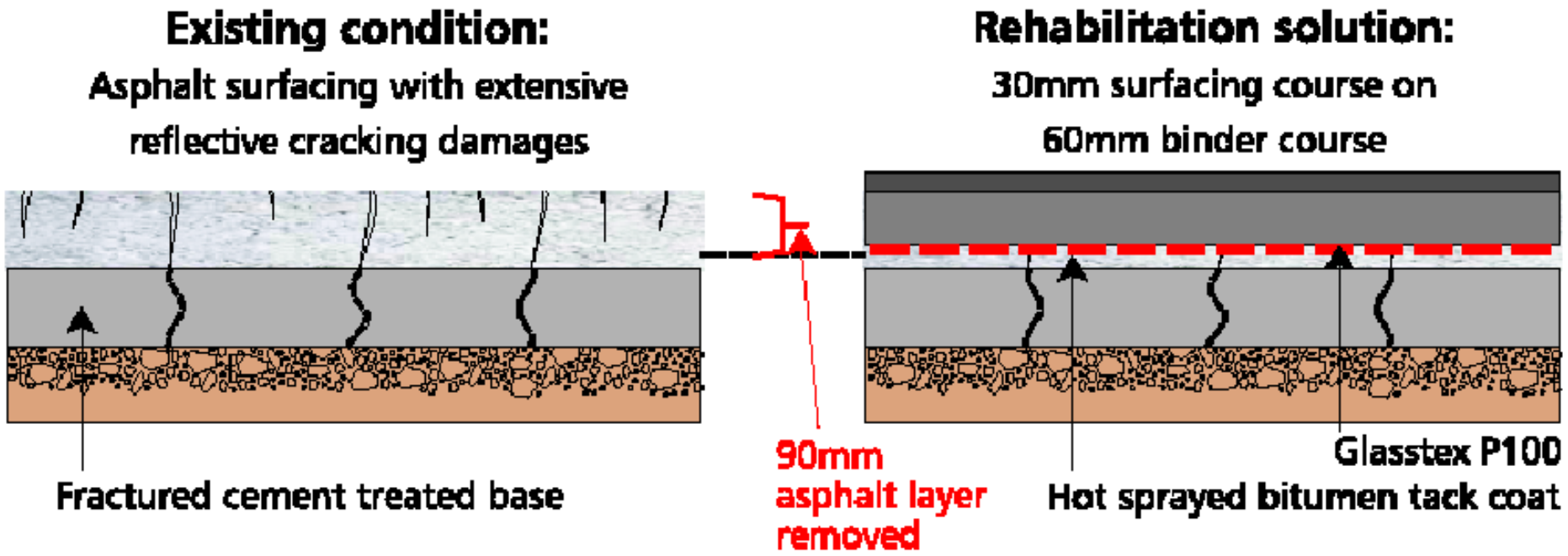
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craig.andrews@fcl.uk



Cracks are a form of energy that will always look for another path.

The more we understand in-situ, the better for all.

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Craig Andrews, Technical Director
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A505 Hitchin (to Luton Airport): 2-year failure converted to a 9.5-year life

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The most significant aspect, is to ensure that a certified product, is laid by a certified installer.

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national highways

Motorway schemes must be installed by a Cl.936 / PA936 installer.

The most significant aspect, is to ensure that a certified product, is laid by a certified installer.

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Inspection of the general area before milling.


Identifying the locations of specific cracks.


Inspection of the surface after milling.


Inspection of the surface after initial sweeping.


Inspection of the documentation for the plant.


Inspection of the documentation for the product


Installation of product over the bitumen spray.


Ensuring that the product has sufficient cover.

SRN / PRN schemes must be installed by a Cl.936 / PA936 installer.

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The most significant aspect, is to ensure that a certified product, is laid by a certified installer.

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Carpet tile test to verify the bitumen spray rate



Inspection of the documentation for the product



Final check of the installation before surfacing.

SRN / PRN schemes must be installed by a Cl.936 / PA936 installer.

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The most significant aspect, is to ensure that a certified product, is laid by a certified installer.

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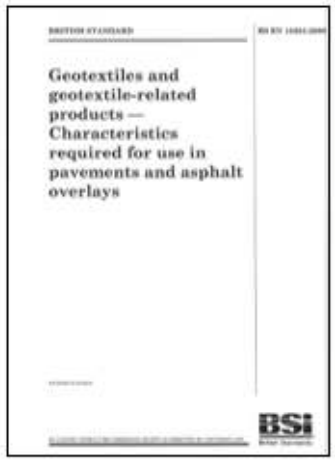


The supply chain has lots of legislation, registrations and affiliations.

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The most significant aspect, is to ensure that a certified product, is laid by a certified installer.

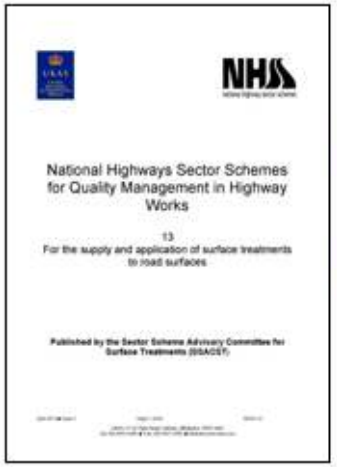
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We (the supply chain) have all you need – what we need is your orders!

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Here are some examples of site installs.....

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2003 A143 Bungay Bypass survived without any issues until the next SD application in 2014 (over some of the site) due to SCRIM.

Inspected again in 2024 by the NorfolkCC Labs. (Norse) and FCL.

Copy of report available soon.



"Some sections have now survived 21 years using this specialist technique, with no further dressing needed"



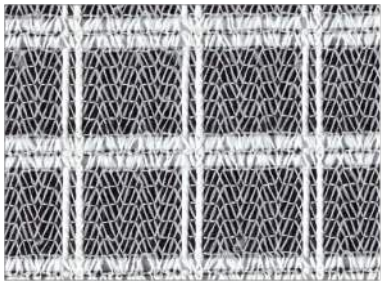
Norfolk County Council

Paving grade fabric used under an inverted (10mm on 6mm) SD.

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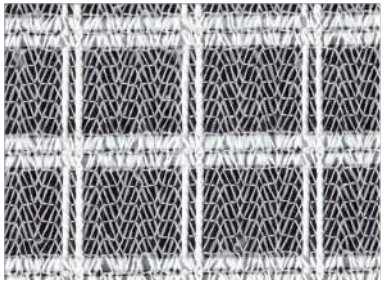


A glass composite being used directly under the surface.

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Here are some examples of site installs.....

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Ministry of Defence





A glass composite being used directly under the surface, on concrete.

Here are some examples of site installs.....

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A glass composite being used for footway rehabilitation

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Cheshire West and Chester





A self-adhesive glass composite being used for localised repairs.

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EDINBVRGH
THE CITY OF EDINBURGH COUNCIL





A self-adhesive glass composite being used for bigger projects.

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Here are some examples of site installs.....

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A polyester composite being used for an airport scheme.

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A steel mesh being installed with different methods.

Here are some examples of site installs.....

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A PolyProp geogrid being used for in-situ-stabilisation.

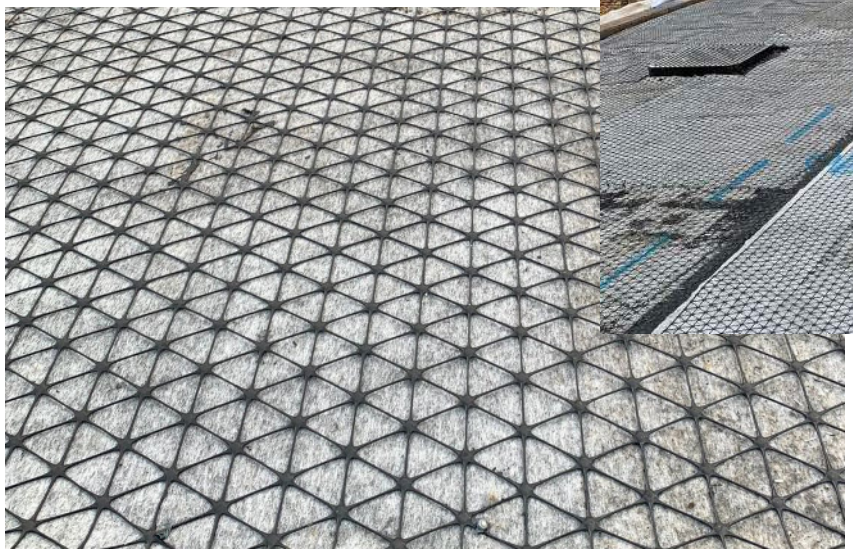
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Hampshire County Council



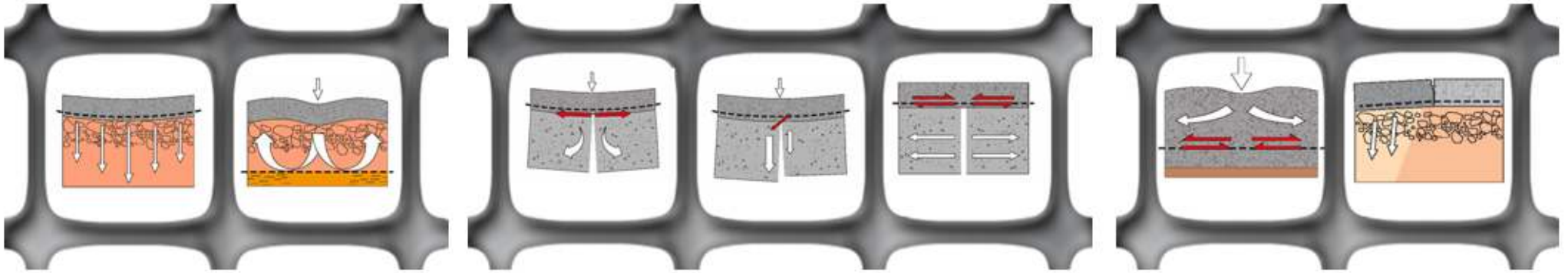


A PolyProp composite being used for high strain applications.

Different products and different conditions can produce a wide range of performance values.

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STRUCTURAL FAILURE | **REFLECTIVE CRACKING** | **PERMANENT STRAIN**



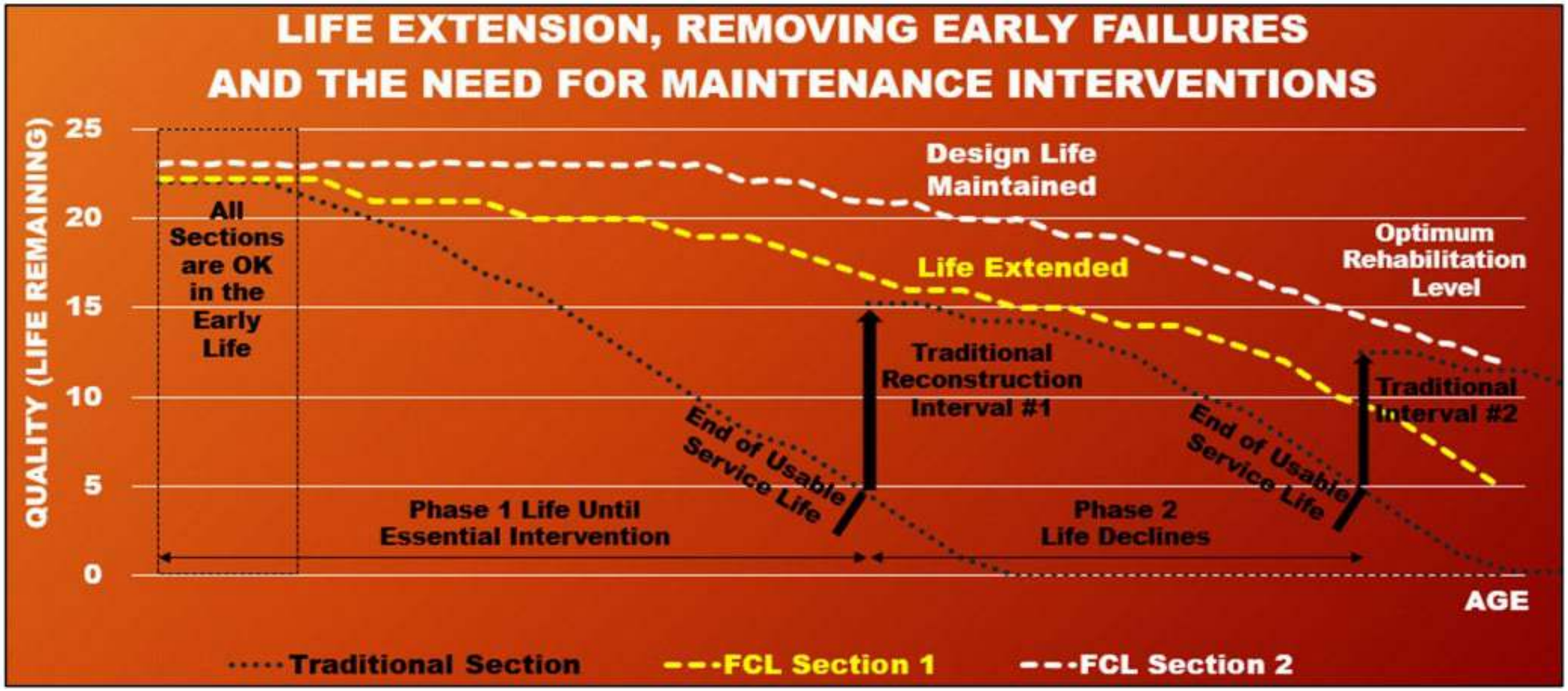
Fatigue	Subgrade	Bending	Shear	Thermal	AC Mix	Rotation
2-5-22 x Life	2-4-5 x Life	2-4-5 x Life	2-3-6 x Life	2-3-4 x Life	2-3 x Life	2-3-4 x Life

Even with just a 2 to 3x life extension, they increase resilience in the road.

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What they all have in common though, is that they extend the life of the pavement structure.

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If they remove 2, 3 or more interventions, they reduce your carbon and costs.

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We are reducing both carbon and costs.

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What if a geosynthetic interlayer being included in your pavement, prevents the need for a 40mm surface course maintenance intervention?

Estimated Reduction in kgCO2e/m² (supplied and installed)

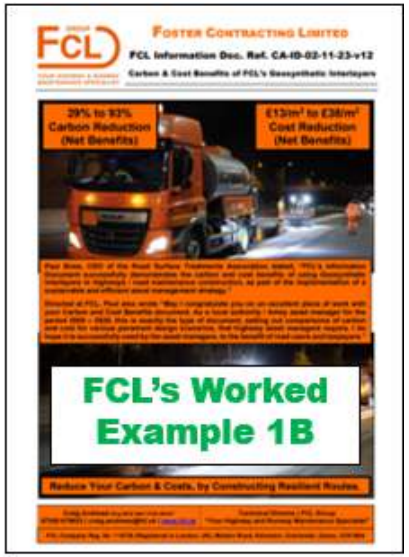
FCL's Geosynthetic Interlayer	@ ~1 kgCO2e/m²	(est. figures rounded)
40mm Surface Course (Initial)	@ ~6 kgCO2e/m²	(est. figures rounded)
Vs		
40mm Surface Course (Initial)	@ ~6 kgCO2e/m²	(est. figures rounded)
40mm Surface Course Intervention	@ ~6 kgCO2e/m²	(est. figures rounded)

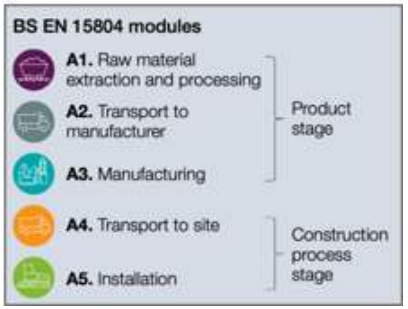
= 5 kgCO2e/m² **= 29% reduction in kgCO2e/m²**

Estimated Reduction in £/m² (supplied and installed)

FCL's Geosynthetic Interlayer	@ ~£6/m²	(est. figures rounded)
40mm Surface Course (Initial)	@ ~£20/m²	(est. figures rounded)
Vs		
40mm Surface Course (Initial)	@ ~£20/m²	(est. figures rounded)
40mm Surface Course Intervention	@ ~£20/m²	(est. figures rounded)

= £14/m² cost reduction **= 35% reduction in £/m²**





Reducing carbon is perfectly linked to reducing your whole life costs.

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What if a geosynthetic interlayer being included in your pavement, prevents the need for 2 x 50mm surface course maintenance interventions?

Estimated Reduction in kgCO2e/m² (supplied and installed)

FCL's Geosynthetic Interlayer	@ ~1 kgCO2e/m²	(est. figures rounded)
50mm Surface Course (Initial)	@ ~7 kgCO2e/m²	(est. figures rounded)
Vs		
50mm Surface Course (Initial)	@ ~7 kgCO2e/m²	(est. figures rounded)
2 x 50mm Surface Course Interventions	@ ~14 kgCO2e/m²	(est. figures rounded)

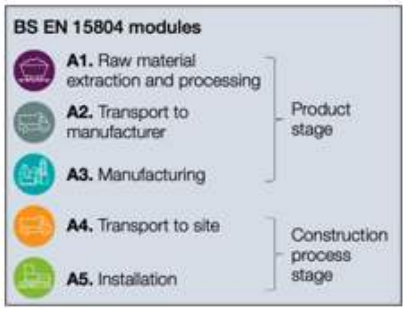
= 13 kgCO2e/m² **= 62% reduction in kgCO2e/m²**

Estimated Reduction in £/m² (supplied and installed)

FCL's Geosynthetic Interlayer	@ ~£6/m²	(est. figures rounded)
50mm Surface Course (Initial)	@ ~£22/m²	(est. figures rounded)
Vs		
50mm Surface Course (Initial)	@ ~£22/m²	(est. figures rounded)
2 x 50mm Surface Course Interventions	@ ~£44/m²	(est. figures rounded)

= £38/m² life cost reduction **= 58% reduction**





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What if a geosynthetic interlayer being included in your pavement, prevents the need for just one additional 40mm SURF & 60mm BIN maintenance intervention?

Estimated Reduction in kgCO2e/m² (supplied and installed)

FCL's Geosynthetic Interlayer	@ ~1 kgCO2e/m²	(est. figures rounded)
100mm Surface & Binder Course	@ ~14 kgCO2e/m²	(6+8 est. figures rounded)
Vs		
100mm Surface & Binder Course	@ ~14 kgCO2e/m²	(6+8 est. figures rounded)
100mm Surface & Binder Course	@ ~14 kgCO2e/m²	(6+8 est. figures rounded)

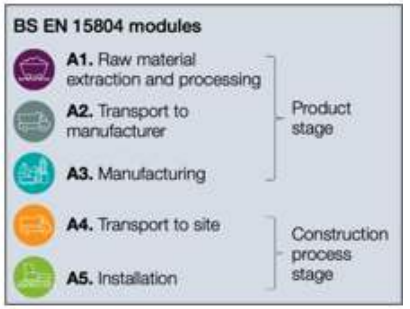
= 13 kgCO2e/m² **= 46% reduction in kgCO2e/m²**

Estimated Reduction in £/m² (supplied and installed)

FCL's Geosynthetic Interlayer	@ ~£6/m²	(est. figures rounded)
100mm Surface & Binder Course	@ ~£40/m²	(est. figures rounded)
Vs		
100mm Surface & Binder Course	@ ~£40/m²	(est. figures rounded)
100mm Surface & Binder Course	@ ~£40/m²	(est. figures rounded)

= £34/m² cost reduction **= 43% reduction in £/m²**





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What if a geosynthetic interlayer being included in your pavement under a 100mm deep recon., is used instead of a 200mm depth reconstruction intervention?

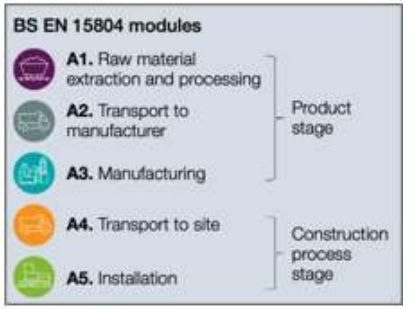
Estimated Reduction in kgCO2e/m² (supplied and installed)

FCL's Geosynthetic Interlayer	@ 1.015 kgCO2e/m²	(=14.955 total)
100mm Surface and Binder Course	@ 13.94 kgCO2e/m²	(from PYE figures)
Vs		
200mm Surface, Binder and Base Course	@ 24.308 kgCO2e/m²	(from PYE figures)
= 9.353 kgCO2e/m²	**= 38.5% reduction in kgCO2e/m²**	

Estimated Reduction in £/m² (supplied and installed)

FCL's Geosynthetic Interlayer	@ ~£6/m²	(est. figures rounded)
100mm Surface and Binder Course	@ ~£40/m²	(est. figures rounded)
Vs		
200mm Surface, Binder and Base Course	@ ~£70/m²	(est. figures rounded)
= £24/m² constr. cost reduction	**= 34.3% reduction**	





Reducing carbon can also be linked to reducing your up-front costs.

There are no more barriers to use these solutions.

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Tell us - what are the reasons for you NOT using these products?

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Let’s focus on the benefits and the value for you.

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Many thanks for your attention.



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Craig Andrews | Technical Director
craig.andrews@fcl.uk | 07355 679023 | www.fcl.uk





Let's discuss how we can reduce the carbon and costs on your projects.

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THE ROAD SURFACE TREATMENTS ASSOCIATION

Asphalt Rejuvenator

Will Lewis
Roadtechs – UK Business Manager

Spending Time & Money Fixing Potholes?

Wouldn’t it be more effective to stop them forming in the first place?

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Reclamite

- Reclamite is the **only penetrative bitumen rejuvenator with a HAPAS certificate in the UK.**
- **Restores the chemical elements lost in the bitumen** through the aging and oxidation processes.
- **Penetrates through the voids in the asphalt surface**, strengthening the aggregate bond and rejuvenating the bitumen.
- **Extending the life of the carriageway at minimum cost.**



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What it does

- **Prevents** cracks and potholes forming in the carriageway
- **Reduces** reactive maintenance & associated costs
- **Reduces** the carbon footprint
- **Keeps good roads in good** condition for longer
- **Enables** the available highways budget to be maximised
- **Leaves** material that has been paid for in the network for longer



© The Road Surface Treatments Association

Why Choose Reclamite?

Penetrative, restorative and durable solution that enables the lifecycle extension of carriageways by **5 years +.** This also provides the following benefits:



Environmental

Reducing the carbon footprint by over **95%**



Operational

Fast & Efficient installation minimising disruption to the public



Financial

Whole life cost reduction of up to **40%**



Safety

Primarily mechanical process - minimal human interaction

© The Road Surface Treatments Association

20 years old SMA

- Surface was 7 years old when first treated in 2012
- Now 20 years old
- Has been treated three times
- Remains serviceable
- Untreated area has now had surface dressing applied due to deterioration in the surface condition



© The Road Surface Treatments Association

Carbon Footprint



EN 15804



Lowest Carbon Footprint per m^2 of all UK Surface Treatments

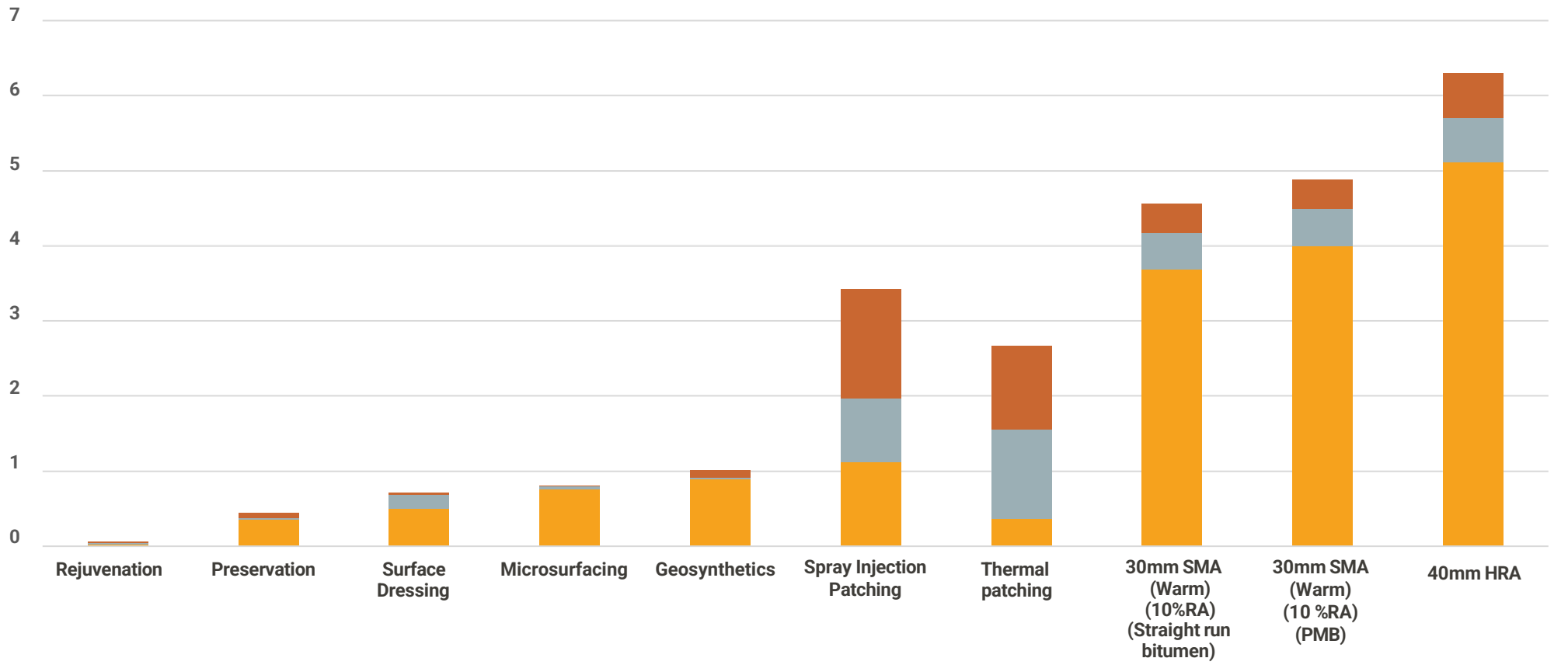
Pye Management Ltd April 2023



We have one planet - we need to care for it

© The Road Surface Treatments Association

The results



Units: Kg CO2 e/m²

Please note that the figures do not include break out or removal of existing road surface.

© The Road Surface Treatments Association

Reclamite

Thank you for your time this afternoon

Please come and talk with the team if you would like to know more

will.lewis@roadtechsgroup.com

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THE ROAD SURFACE TREATMENTS ASSOCIATION

Sustainable Low Carbon Penetrative Asphalt Preservation

Phil Eadon
Head of Technical Services



© The Road Surface Treatments Association

SUSTAINABILITY

Conserve bitumen usage



© The Road Surface Treatments Association

SUSTAINABILITY

Conserve high PSV aggregates



© The Road Surface Treatments Association

SUSTAINABILITY

Reduce maintenance traffic movements



© The Road Surface Treatments Association

RHiNOPHALT® Asphalt Preservation

- UKCA/CE Marked, and BBA HAPAS approved for the UK high speed network since 2007
- Does not change the the characteristics of the surface course.
- Penetrates deep into the asphalt surface course via microcracks and interconnecting voids
- Seals and waterproofs the surface and prevent further deterioration.
- It fortifies the aggregate-bitumen bond, strengthening the surface, increasing its resistance to ravelling.
- Significantly slows down the rate of binder oxidisation.
- Day or Night time application. >30,000m^2 can be treated in one shift. No aftercare.
- Fast and safe application by approved contractors, quick cure times and minimal traffic disruption.
- Provides 94% less CO_2 and improved site safety compared to conventional asphalt resurfacing.

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RHiNOPHALT® Asphalt Preservation

SAFETY

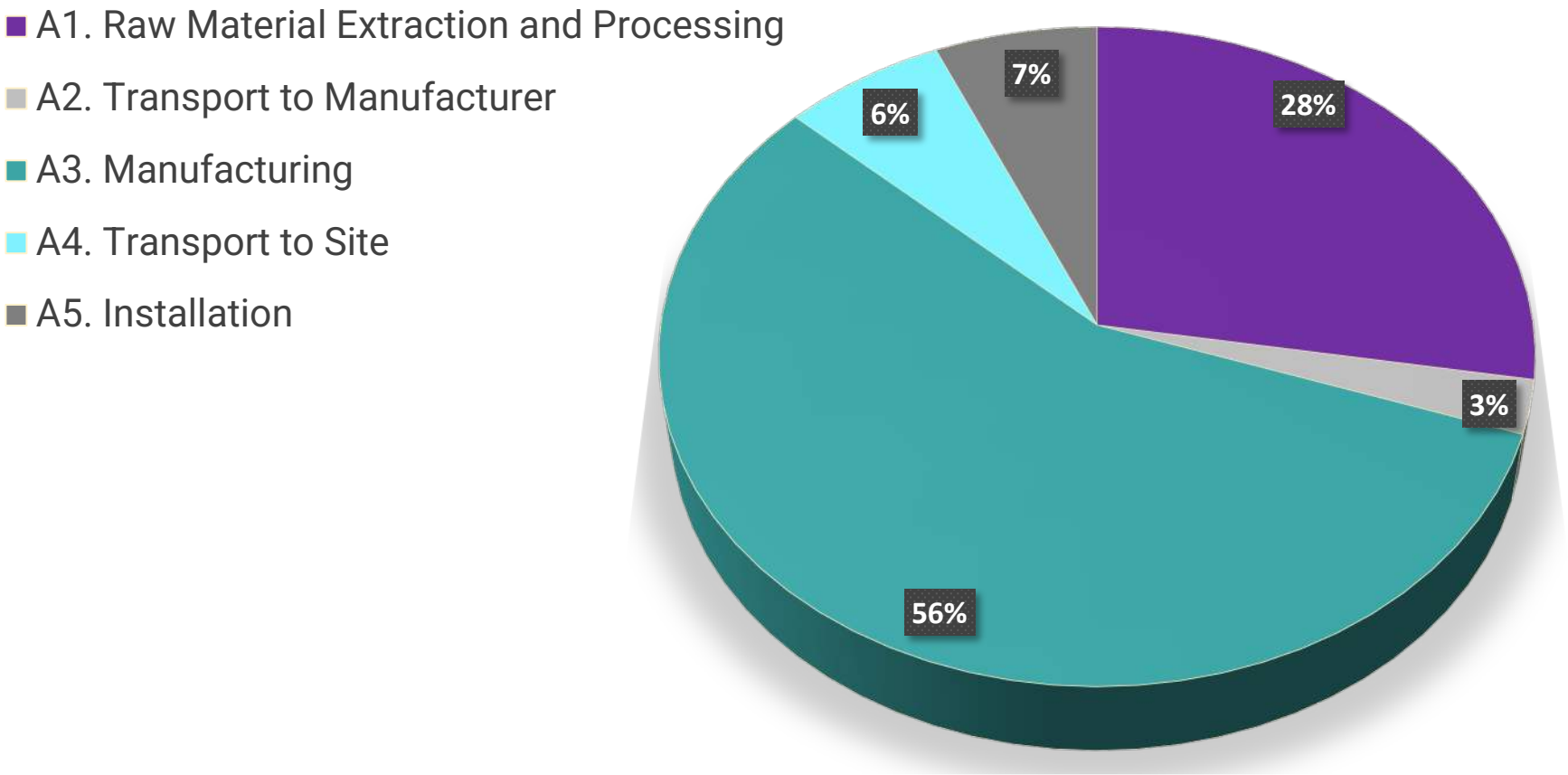
No adverse effect on skid resistance, surface macrotexture and road noise levels



No need to raise ironwork and no change to kerb height

© The Road Surface Treatments Association

Asphalt Total Carbon Dioxide equivalent % emissions ($kgCO_2e/t$)



- Material Extraction & Processing and Asphalt Manufacturing have the biggest Carbon impact
- Extending the asphalt surface course life would have the biggest effect on Carbon reduction

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120,000m² of Asphalt Resurfacing



34
road / lane closures



68
TM movements



1,200
HGV movements

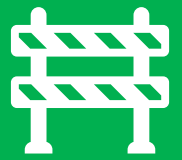


12,000
Tonnes of Asphalt



780,000
Carbon $kgCO_2e/m^2$

120,000m² of RHiNOPHALT® Asphalt Preservation



4
road / lane closures



8
TM movements



6
HGV movements



45
Equivalent Tonnes of RHiNOPHALT®



48,000
Carbon $kgCO_2e/m^2$

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Slowing down the rate of bitumen oxidation

Bitumen is the ‘binding’ agent of the asphalt. It is constantly oxidising (ageing) when in contact with:

- ATMOSPHERIC OXYGEN
- UV LIGHT
- WATER

This ageing causes rheological and mechanical changes to the asphalt.



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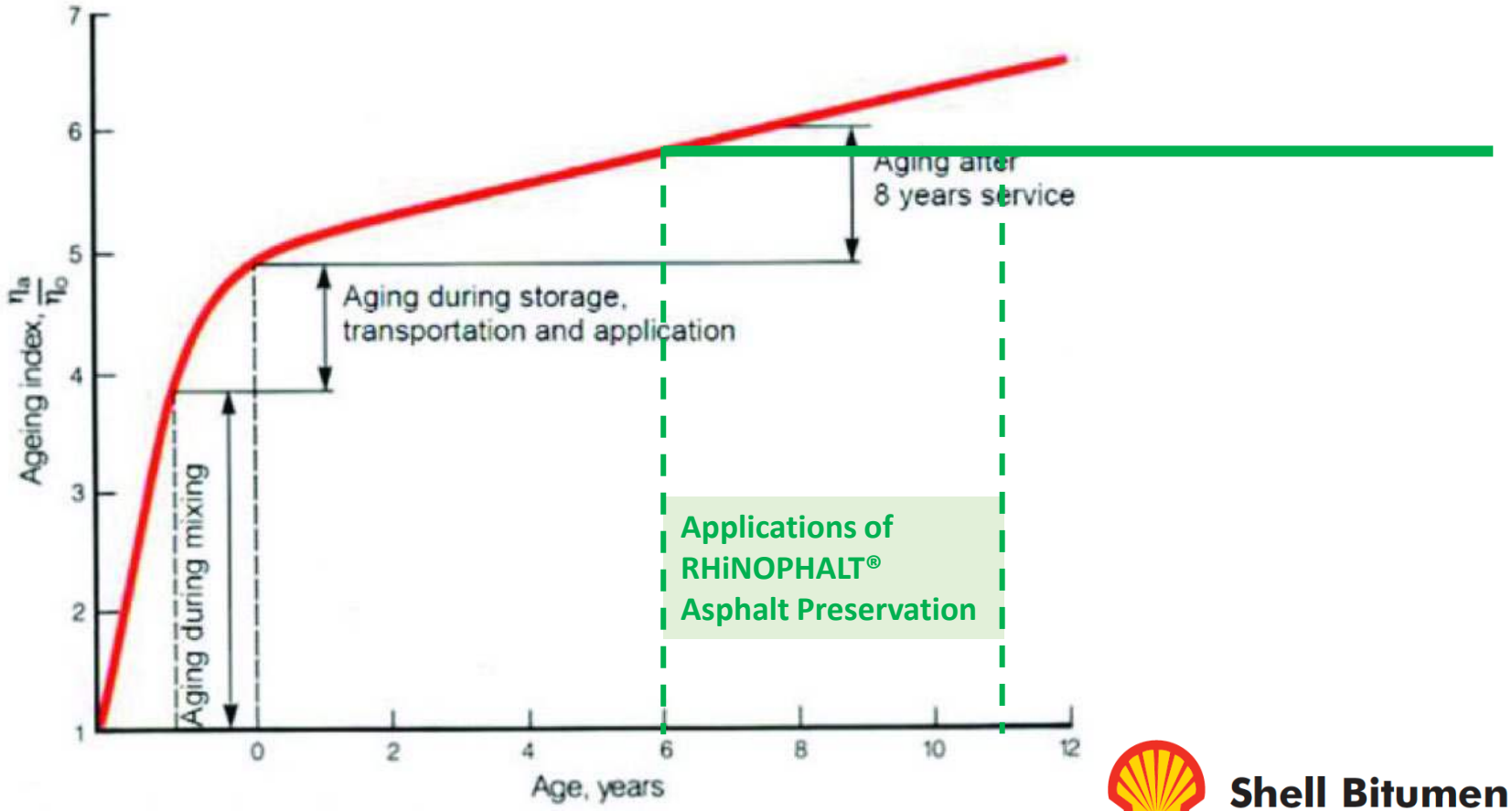
Ageing of bitumen in asphalt surface course

Short Term Ageing

Happens during mixing, transport and paving. Mainly mixing when thin film of bitumen is exposed to heat and oxygen.

Long Term Ageing

Dependant on void content, atmospheric oxygen UV light, dynamic forces and water.



Shell Bitumen

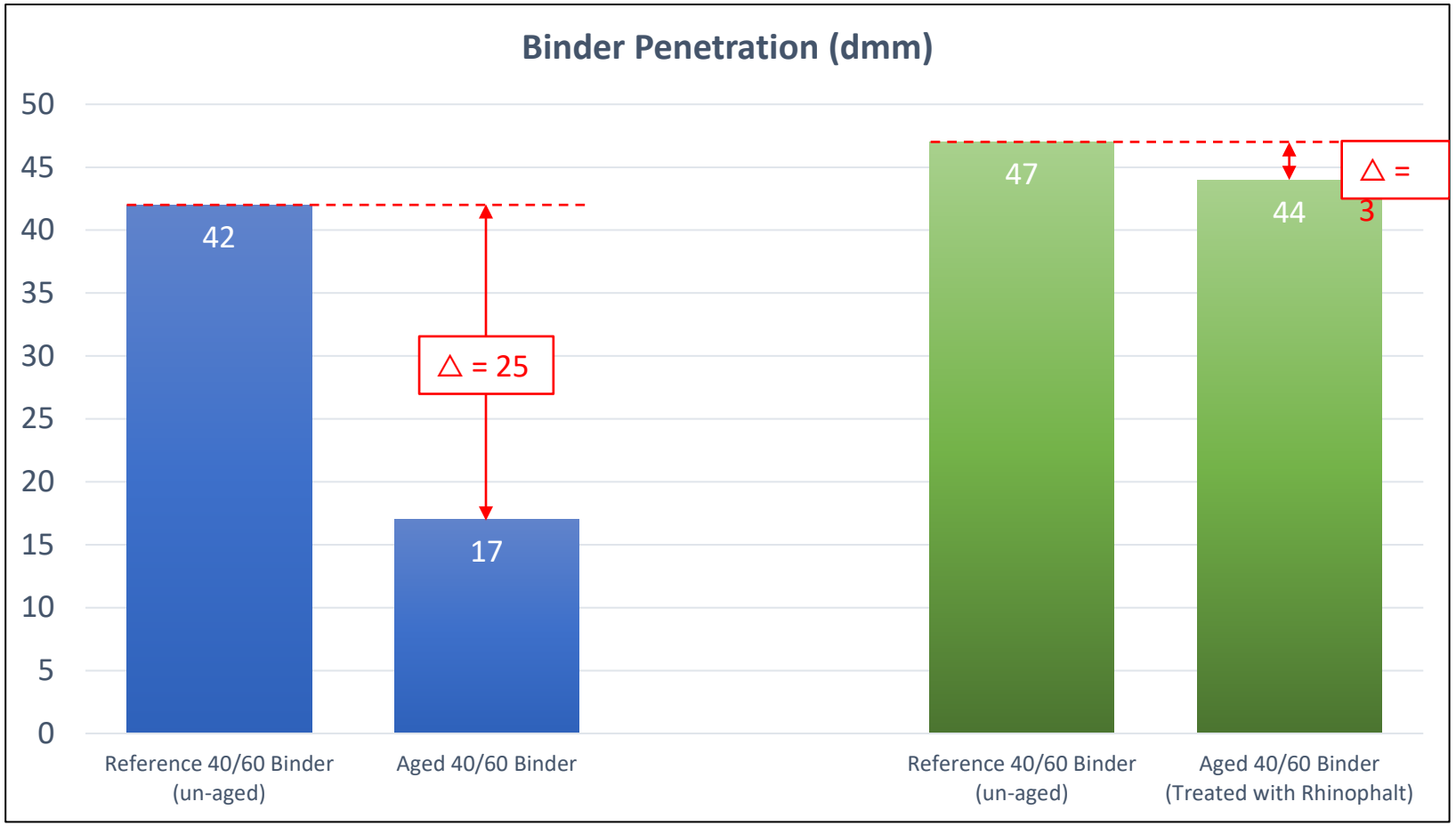
© The Road Surface Treatments Association

Accelerated Durability Testing of RHiNOPHALT® Preserved Asphalt Mixtures using the Immersion Ageing Test

Laboratory ageing test at a set temperature, pressure and moisture represents 10 years service life.

After ageing, the recovered binder penetration values of the **Untreated** asphalt hardened by 60% of the original value.

RHiNOPHALT® treated asphalt showed no age hardening.



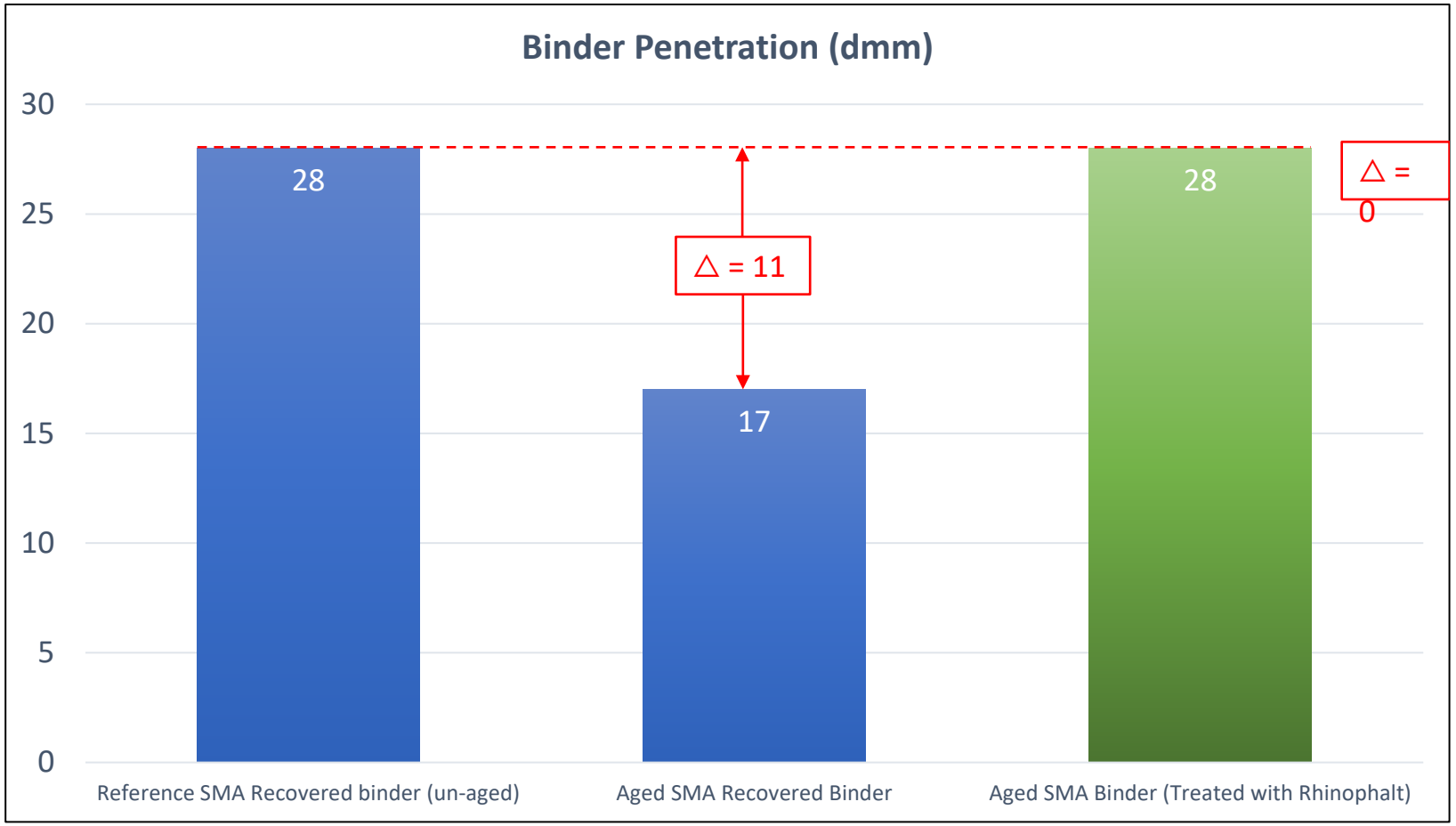
© The Road Surface Treatments Association

Accelerated Durability Testing of RHiNOPHALT® Preserved Asphalt Mixtures using the Immersion Ageing Test

Cores extracted from a site of >5 year old asphalt surface course underwent the same laboratory accelerated ageing test.

Untreated asphalt continued to age harden further.

RHiNOPHALT® treated asphalt showed **no age hardening effects** of the asphalt binder.

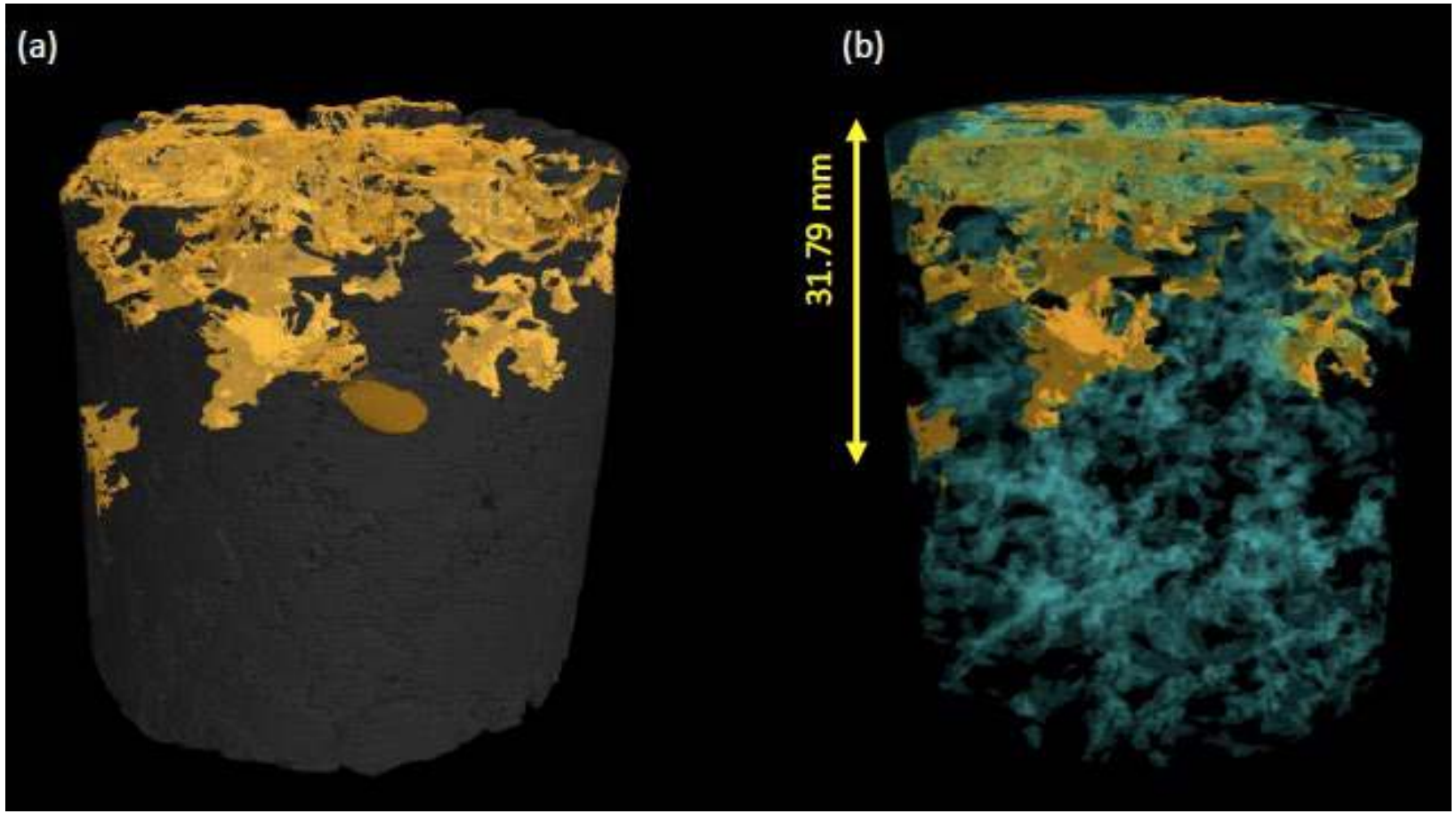


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Waterproofing and Sealing the surface

(a) Extent of RHiNOPHALT® penetration into the asphalt (transparency of solid reduced to aid visualization).

(b) Extent of RHiNOPHALT® penetration into the asphalt (showing pores in blue). Visible penetration distance from surface is 31.79mm.



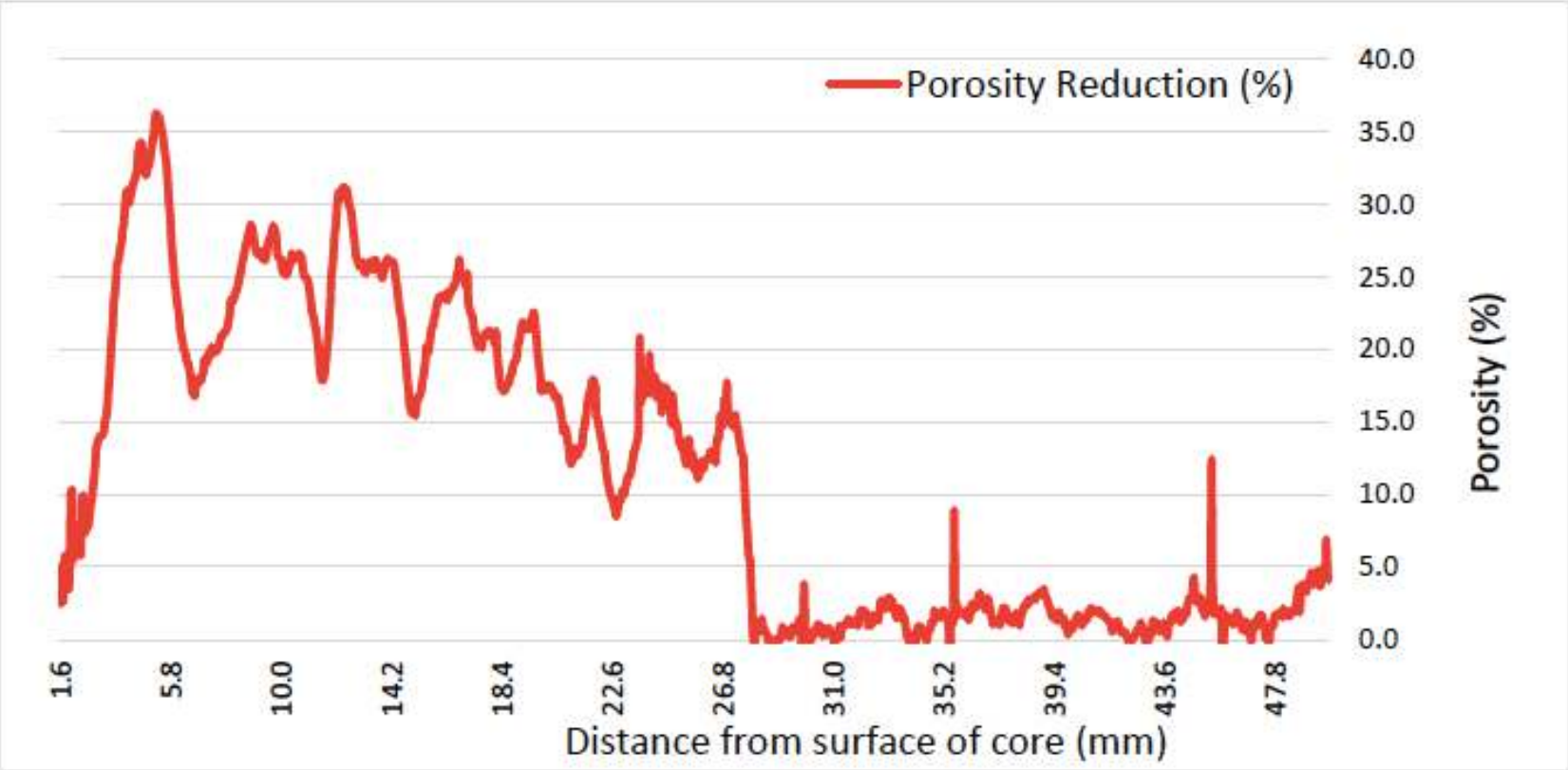
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Waterproofing and Sealing the surface

Plot showing change in porosity vs depth from RHiNOPHALT® application, calculated as (pre-post)/pre*100

Up to **35%** porosity reduction

Average of **20%** porosity reduction in the top half of the asphalt core



© The Road Surface Treatments Association

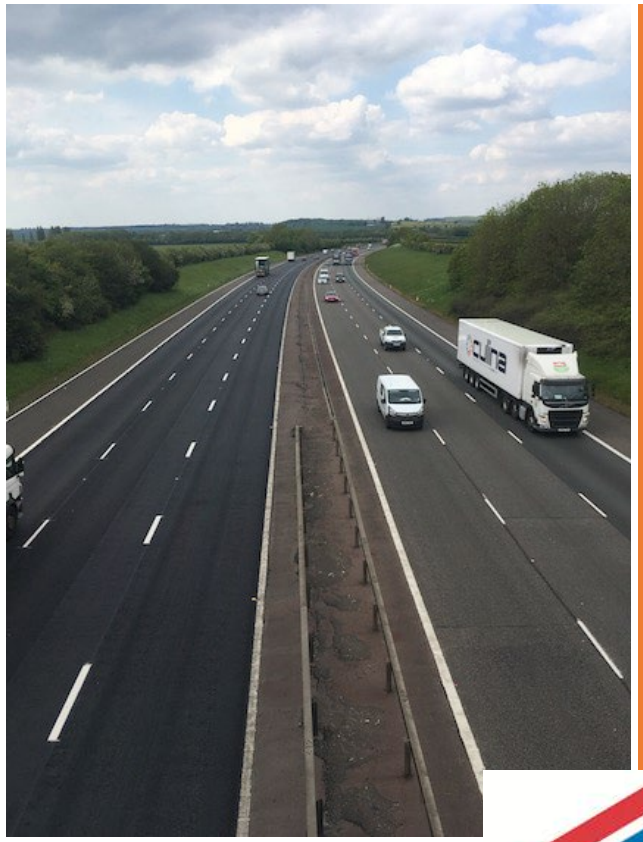
M40 - England's best motorway

M40 – RHiNOPHALT®

123km length treated 3 times

Reduced road user disruption is a result of less reactive maintenance and less potholes.

The SMA is over 26 years old in some sections….
and still in a great condition.



BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE 07/H125

© The Road Surface Treatments Association

M40 - England's best motorway

*"UK Highways is satisfied that **RHiNOPHALT® Asphalt Preservation** has delivered on its performance claims for significantly reduced maintenance and repair costs and has delivered improved network availability and resilience.*

As a result, we anticipate substantial lifecycle cost savings over the course of the remaining period of our concession, which runs to 2026."

John Gardner - General Manager, UK Highways M40 Ltd



"It has held the surface in a consistent condition since the first application"

BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE 07/H125

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Local Authority



Cheshire



Blackpool



Portsmouth



Knowsley

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THANK YOU

Contact for further information

phil.eadon@asisolutions.co.uk

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De-carbonizing ironwork

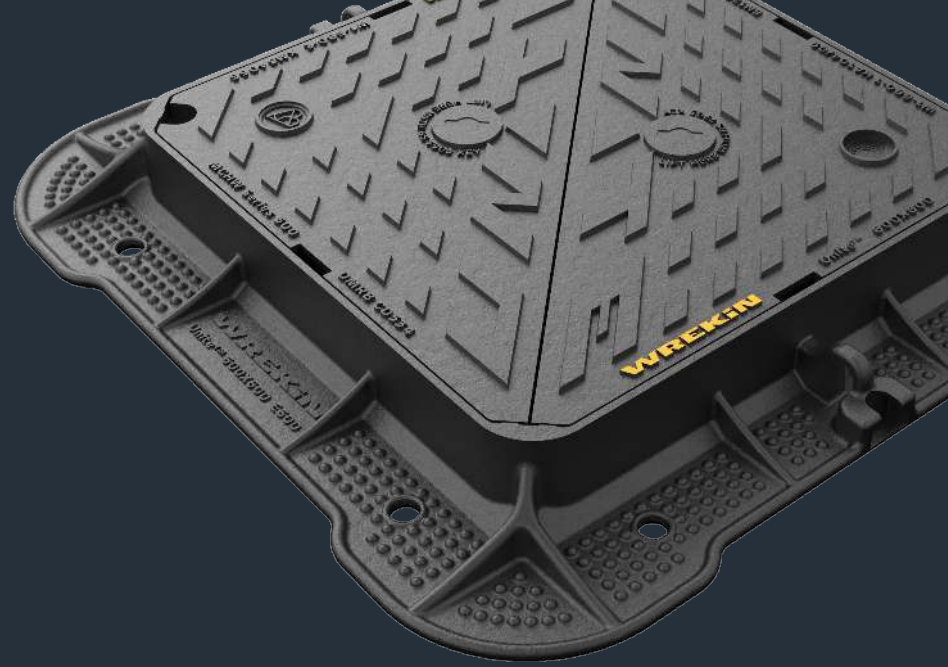
WREKIN
MAKE EVERY DAY BETTER

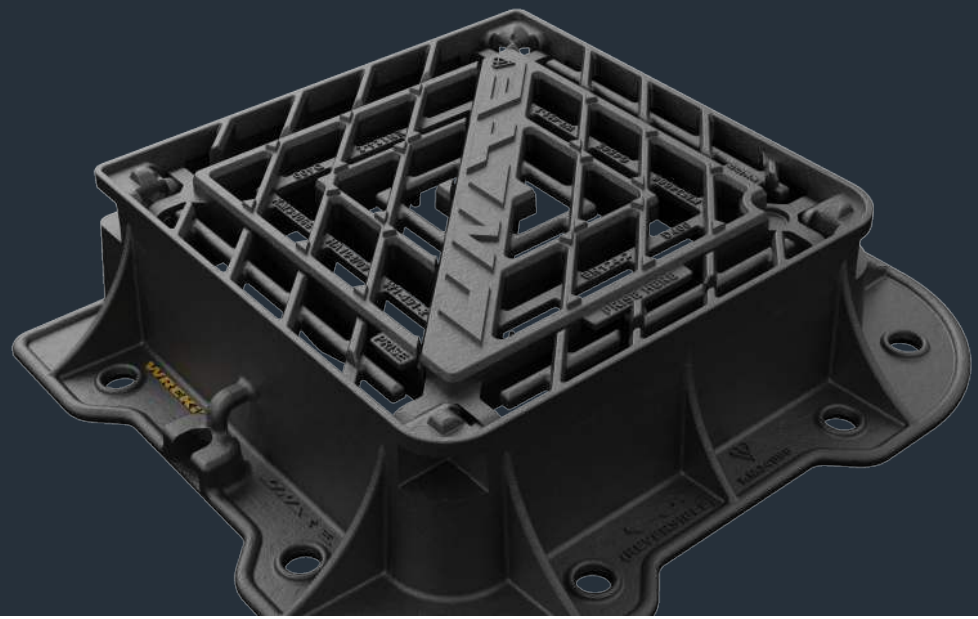
Presented by:
Paul Thompson

Friday, 22 November 2024



Ductile iron access cover & gully grating solutions





>200kg CO_2e

After manufacturing the 2nd largest area we see emissions generated is during installation, replacement or reinstatement







What causes failure?

52% of covers in the carriageway suffer from seating wear

30% exhibit symptoms that indicate either failure of the bedding material or failure of the structure

44% suffer from failure of the paved surround







Time ! Opening of the road to soon



Inadequate chamber top preparation and support



Damaging tamping/ compaction techniques

“incorrect work practices and the use of inappropriate bedding materials accelerate the rate of failure of cover installations.“



Insufficient and inappropriate reinstatement materials



Incorrect ironwork alignment to chamber top



How can failures be avoided?

You need a combination of factors for a longstanding installation. It’s a harmony of:



Ironwork



High performance materials



Chamber Condition



Work Practices

…..SYSTEM!

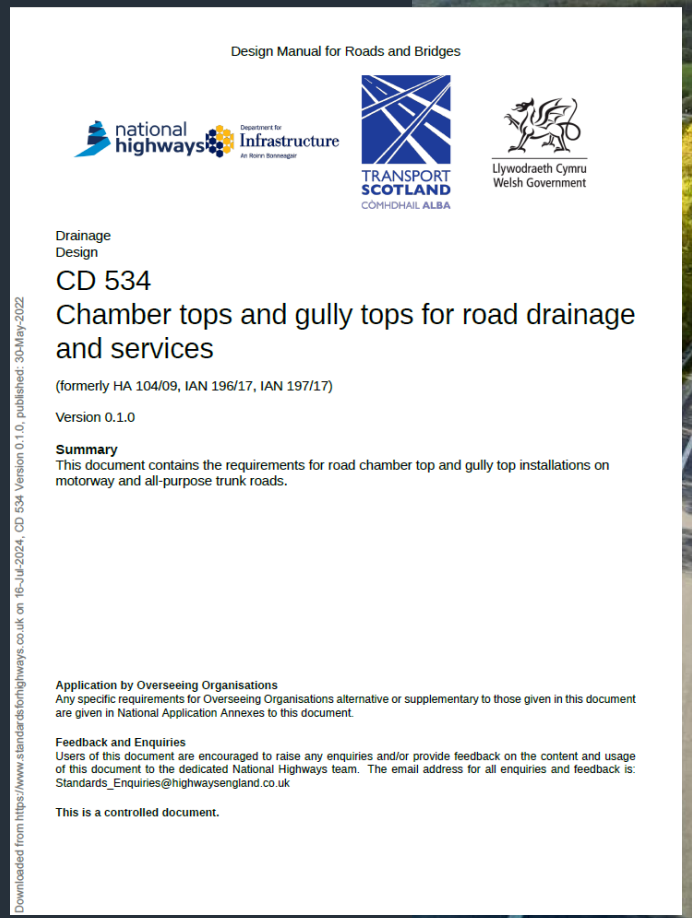



1
A15
GROUP 1
CLASS A15 - MINIMUM
Manhole covers and gratings capable of withstanding a 15 tonne test load. For use in areas which can only be used by pedestrians and cyclists.
2
B125
GROUP 2
CLASS B125 - MINIMUM
Manhole covers and gratings capable of withstanding a 12.5 tonne test load. For use in foot-ways, pedestrian areas and comparable areas such as car parks.
3
C250
GROUP 3
CLASS C250 - MINIMUM
Manhole covers and gratings capable of withstanding a 25 tonne test load. For installation no more than 500mm from the kerb face into the carriageway.
4
D400
GROUP 4
CLASS D400 - MINIMUM
Manhole covers and gratings capable of withstanding a 40 tonne test load. For use in areas where pneumatic-tyred cars and lorries have access, including carriageways, hard shoulders and pedestrian areas. All units to be either non-rock or silent in operation.
5
E600
GROUP 5
CLASS E600 - MINIMUM
Manhole covers and gratings capable of withstanding a 60 tonne test load. For use in areas where heavy wheel or high point loads from pneumatic and non-pneumatic-tyred vehicles are imposed, such as loading areas or docks.
6
F900
GROUP 6
CLASS F900 - MINIMUM
Manhole covers and gratings capable of withstanding a 90-tonne test load. For use in areas where very heavy wheel or high point loads from pneumatic and non-pneumatic-tyred vehicles are imposed, such as aircraft pavements. All units are to be either non-rock or have quietness in use.
WREKIN

NATIONAL HIGHWAYS CD 534 v0.1.0

- CD 534 is part of Standards for Highways Design Manual for Roads and Bridges
- It provides guidance of correct product specification based on location
- It ensures product designs provide an adequate area to distribute the load, without over-stressing the bedding material.





Design Manual for Roads and Bridges

national highways | Department for Infrastructure | TRANSPORT SCOTLAND CÒMHDHAIL ALBA | Llywodraeth Cymru Welsh Government

Drainage
Design

CD 534
Chamber tops and gully tops for road drainage and services

(formerly HA 104/09, IAN 196/17, IAN 197/17)

Version 0.1.0

Summary
This document contains the requirements for road chamber top and gully top installations on motorway and all-purpose trunk roads.

Application by Overseeing Organisations
Any specific requirements for Overseeing Organisations alternative or supplementary to those given in this document are given in National Application Annexes to this document.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated National Highways team. The email address for all enquiries and feedback is: Standards_Enquiries@highwaysengland.co.uk

This is a controlled document.

Downloaded from https://www.standardsforhighways.co.uk on 16-Jul-2024, CD 534 Version 0.1.0, published: 30-May-2022



Example of current county council specification

APPENDIX 5/1 : DRAINAGE REQUIREMENTS (Continued)

5. Chamber Covers & Frames

5.1 Notwithstanding the additional requirements stated below, all chamber covers and frames for highway drainage shall be made of ductile iron and be both certified by a UKAS accredited body (e.g., BSi or equivalent) this body should have both EN 45011 & EN 45012 within its scope and, unless otherwise stated in Schedule 3a, 3b or 3c, to BS EN 124:2015 D 400 - Group 4 (suitable for use in carriageways subject to high-density-, fast- or slow-moving traffic) and CD 534.

Materials

Paragraph 24 of Section 507 within Specification for Highway Works Series 500

- Chamber tops and gully tops shall be bedded upon material which has the following properties:

  - non-shrinkable;
  - a minimum workable life of **15 minutes**;
  - a compressive strength that **exceeds 30N/mm² within 3 hours of placing**; and,
  - a tensile strength that **exceeds 5N/mm³ within three hours of placing.**



Chamber condition

Clean & dry but textured chamber top surface

Chamber top height to allow sufficient bedding depth

Chamber top to be incompressible and robust, free from loose or compromised brickwork etc

Chamber opening is compatible with ironwork size

Sufficient bedding area (50mm past the edge of flange)





Department for Transport

Specification for the Reinstatement of Openings in Highways

Fourth edition



May 2020

RSTA ADEPT Code of Practice for Ironwork Systems Installation and Refurbishment

RSTA ADEPT highways england driving forward

CODE OF PRACTICE

FOR IRONWORK SYSTEMS INSTALLATION AND REFURBISHMENT



May 2017 1

BS 7903:2020



BSI Standards Publication

Selection and installation of manhole tops and gully tops within the highway — Guide

bsi.


>200 kg CO_2e


Thank You
WREKIN
MAKE EVERY DAY BETTER
www.wrekinproducts.com
Friday, 22 November 2024



THE ROAD SURFACE TREATMENTS ASSOCIATION

Whole Lifecycle Cost and Carbon Planning for Sustainability

Mike Hansford
Chief Executive Officer, RSTA

Road Surface Treatments Association (RSTA) Ltd

Trade organisation within the highways sector 5 staff, consultants, 90 members

Private, not for profit, company

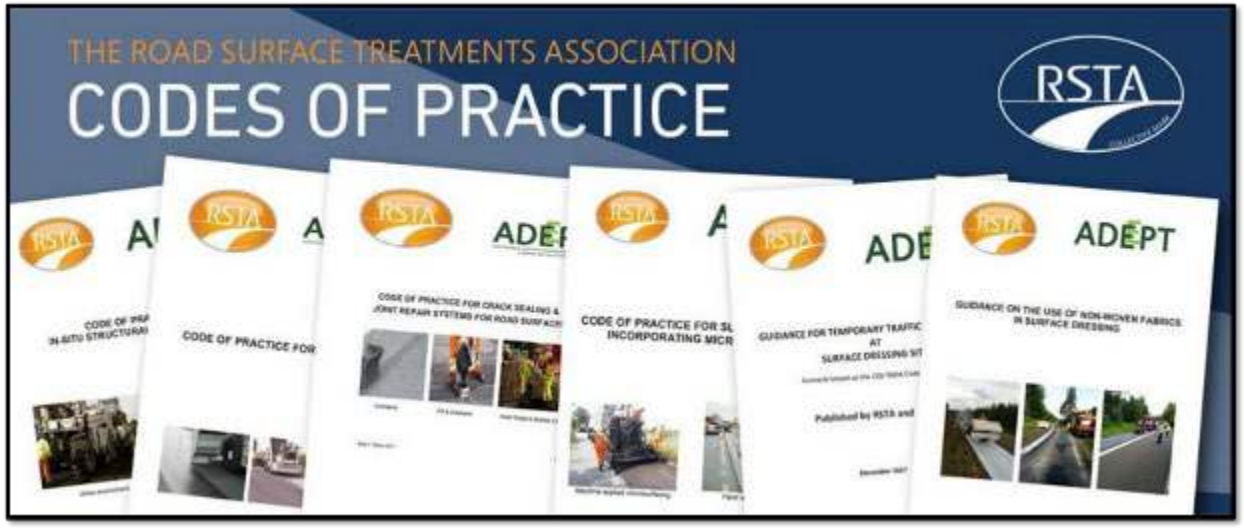
Acting in the interests of the highways industry, through collaboration

Technical advice, guidance and support to our member organisations, but also to local highway authorities

Promote surface treatments,

Production of technical guidance notes (access to document library – see below)

Open and bespoke CPD accredited training,
Offer free to LA technical training days (skid resistance /decarbonisation)
NVQ assessment centre (discounts for member organisations)
Conformance testing and professional witness
Responsible for Sector Schemes 13 and 23



© The Road Surface Treatments Association

RSTA Carbon Guidance



Free to download
[Document Gallery - RSTA (rsta-uk.org)]

© The Road Surface Treatments Association

RSTA Carbon Emissions Report and Guidance

- Produced by Pye Management, on behalf of the RSTA
- Figures for CO_2e from Cradle to Practical Completion
- Comprehensive guidance for Local and National roads authorities
- Calculations and Evaluations in accordance with the International Standards (EN 17392-1:2020) (EN 15804 A1-A5) (NH 1-7)
- Covers all Surface treatments, Insitu recycling and conventional asphalts in one single source
- Example carbon generation comparisons for sample of schemes
- Launched at the RSTA Annual Conference on 13th April 2023
- Second edition to be launched in 2025, with 60 to 90 year lifecycles

© The Road Surface Treatments Association

Carbon Reduction – WHY??

Clean up begins after 'extreme' rain and flooding



Parts of Gloucestershire experienced heavy rain and 'extreme' flooding on Monday

Polish city urged to evacuate as floods batter central Europe



Summer 2024 was world's hottest on record



Strongest typhoon in a decade hits 'China's Hawaii'

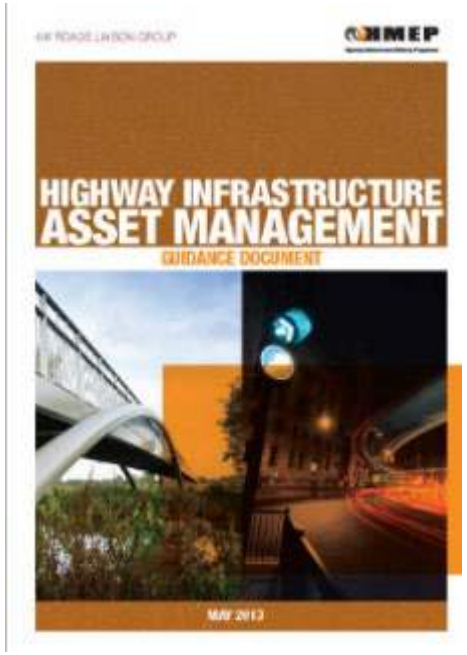


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Whole Lifecycle Cost and Carbon Planning for Sustainability

Approach to evaluating environmental impact, considering carbon emissions and cost throughout an asset's life cycle, from construction to disposal

HAMPS/TAMPS/Strategic documents must be updated



© The Road Surface Treatments Association

Carriageway Deterioration Curve

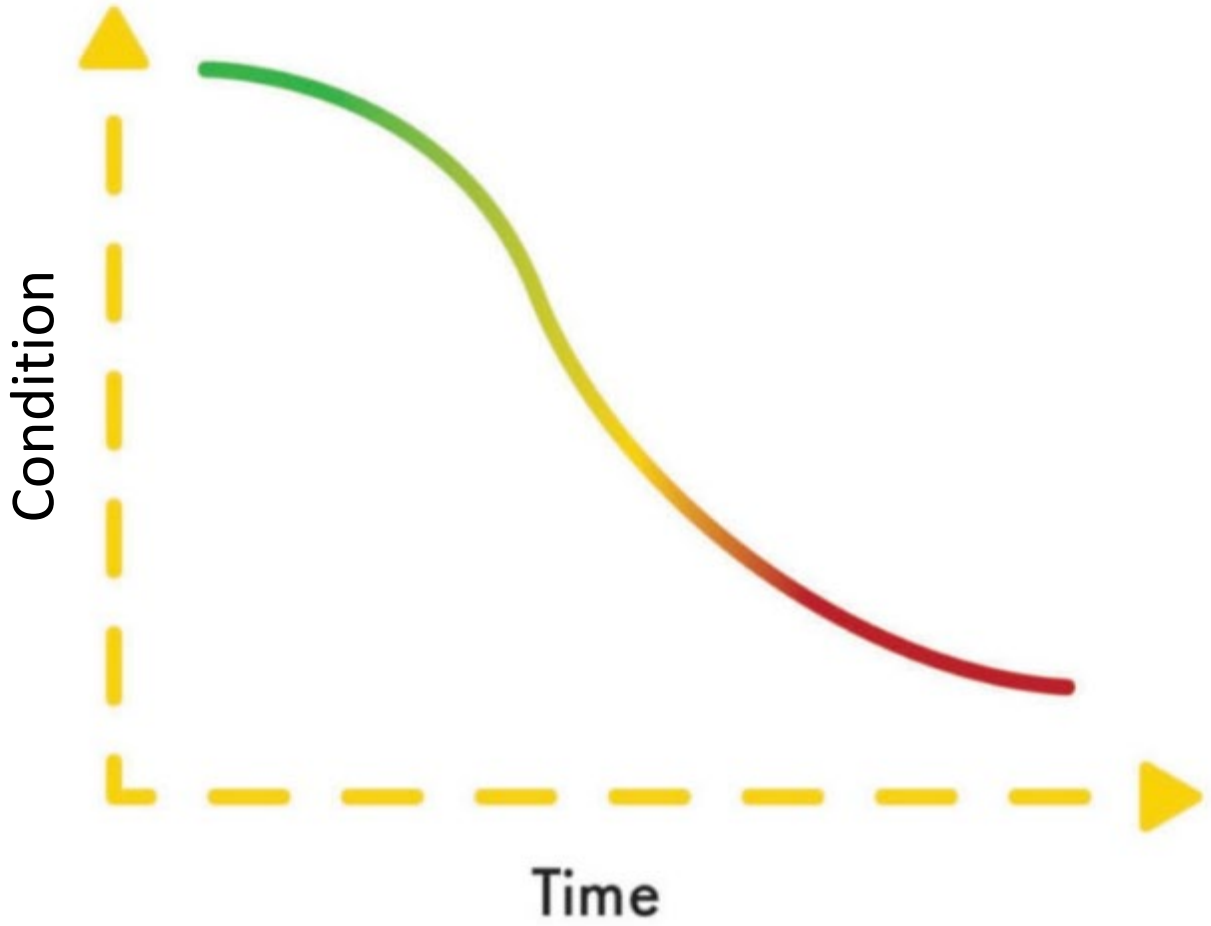


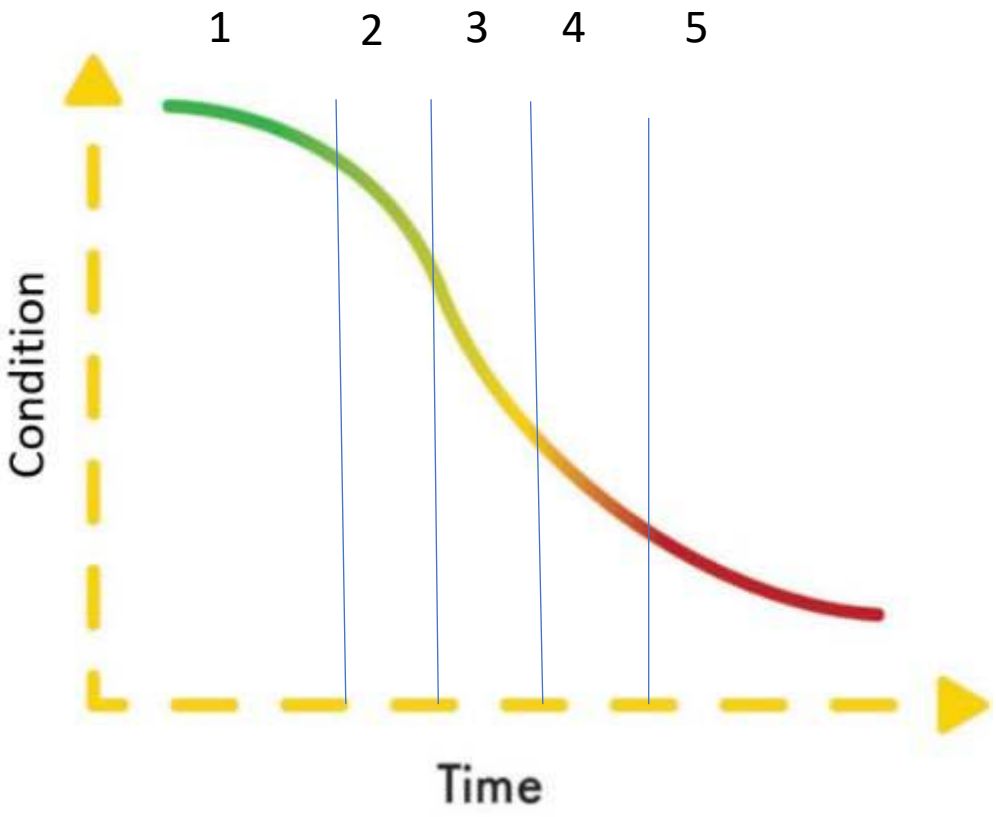
Table 2 – Road condition categories

Category	Description	Potential maintenance treatment option
1	No deterioration	Pavement is not considered for maintenance
2	Minor (and/or aesthetic) deterioration	Light maintenance (e.g. minor patching)
3	Moderate deterioration	Localized intervention or mid-life preventative maintenance (e.g. surface dressing, patching, crack sealing)
4	Moderate to severe deterioration	Rehabilitative maintenance, perhaps full carriageway (e.g. resurfacing with thin overlay/surface dressing and multiple patching, edge haunching)
5	Severe deterioration	Structural maintenance (e.g. full carriageway resurfacing or reconstruction)

PAS 2161:2024 Road condition monitoring (RCM) data – Specification

© The Road Surface Treatments Association

Carriageway Deterioration Curve – Treatment Options



Category	Description	Potential maintenance treatment option	Timing (yrs)
1	No deterioration	~~Not considered for maintenance -~~ Pavement prime for preservation or rejuvenation treatment	5 to 6
2	Minor (and/or aesthetic) deterioration	Light maintenance- Patching, crack/joint sealing, then surface dress	7 to 8
3	Moderate deterioration	Localised intervention or mid-life preventative maintenance – Micro surfacing?	9 to 10
4	Moderate to severe deterioration	Rehabilitative maintenance, perhaps full carriageway *Surface course inlay/overlay *80mm in situ recycle	10 to 15
5	Severe deterioration	Structural maintenance (e.g. full carriageway resurfacing or reconstruction *Conventional resurface / recon *150mm (medium depth) or >300mm (deep) in situ recycling *Geosynthetics (reduce material thickness)	15+

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Preservation and Rejuvenation

Spray application to roads still in good condition

Penetrates the asphalt surface to seal microcracks, acts as barrier to elements protecting against oxidisation.

Rejuvenation further chemically modifies the bitumen binder in the asphalt



Weymouth Relief Road, Dorset - Preservation

Treatment	Cost £	kgCO2e/m²
Preservation / Rejuvenation	4	0.054 (Rejuvenation) 0.440 (Preservation)
Conventional asphalt (40mm inlay)	20	4.567 (SMA warm mix) 6.292 (HRA)

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Surface Dressing

Surface dressing is applied to roads in good to fair conditions

- Pre patched / joint or crack seal the season before
- Seals road surface (cracks, joints) to prevent water ingress
- Restores surface texture
- Prolongs life of road



Encapsulation

Biggest development in use of surface dressing

- Aesthetics similar to conventional asphalt
- Locks down chippings (no loose chippings)
- Prevents stripping (tree canopies), bleeding
- Use on roads incl urban unclassifieds, strategic roads

	Cost £	kgCO2e/m²
Surface dressing	5	0.715 (single) 0.938 (racked-in)
Conventional asphalt (40mm inlay)	20	4.567 (SMA warm mix) 6.292 (HRA)

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Microasphalt

Cold applied, thin surface overlay of mixed bitumen emulsion and aggregate

Regulates out minor surface defects – shallow material loss, cracks

Quick process, enables roads to be reopened quickly

Cold Applied Ultra Thin Surfacing (CAUTS) 250> cv per day







	Cost £	kgCO2e/m²
Microsurfacing	8 to 10	0.807
Conventional asphalt (40mm inlay)	20	4.567 (SMA warm mix) 6.292 (HRA)

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In Situ Recycling

Many roads are evolved roads, with limited asphalt construction

May also contain coal tar contaminated material

Patch?? £51.40 - 79.53!

Resurface (B&SC)?? £40 per m2!

In situ recycle

Pulverising the existing asphalt (and granular material) and mixing it with cement or emulsion binders to create a new bound layer, on which to add a new surface course.

Double surface dressing (+encapsulation), microasphalt or asphalt surface





	Cost £	kgCO2e/m²
210mm In situ recycling	30-40	12.483*
Conventional asphalt (200mm)	40-50	24.308

*Plus saving on coal tar contaminated disposal (£150 + per tonne)

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Retexturing

Retexturing – Used to improve skid resistance

Methods -

- Hydro blasting (water under pressure)
- Shot blasting

Used to restore -

- Microtexture
- Macrotexture







	Cost £	kgCO2e/m²
Retexturing	4	0.312 (Hydro) 0.357 (Shot)
Asphalt inlay 40mm	20	4.567

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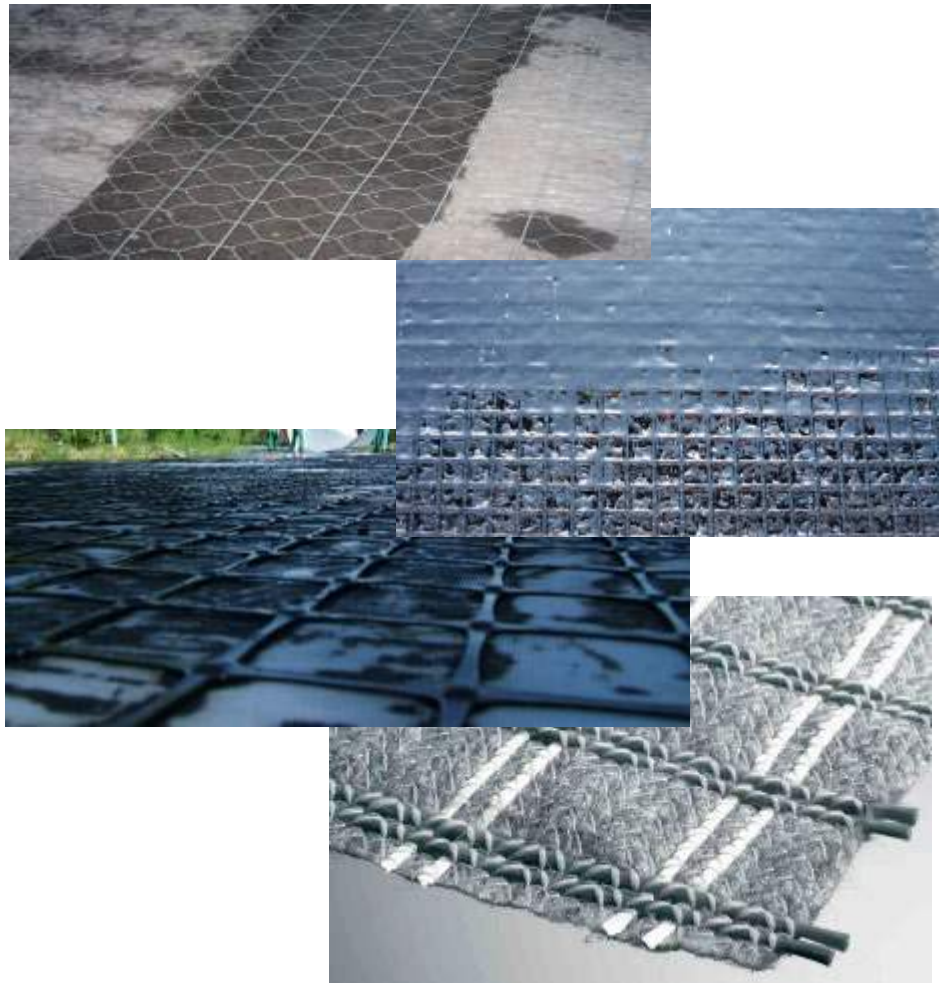
Geosynthetics & Steel Meshes

Types

- Steel mesh
- Glass grids
- Polymer grids
- Composits
- Non woven fabrics

Prevents reflective cracking in road construction

Reduced depths of asphalt required



	Cost £	kgCO2e/m²
Geosynthetics		1.015
Asphalt inlay 40mm	20	4.567
90mm	30	12.22
200mm	40 to 50	24.308

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Patching

Thermal patching	2.665kgCO2/m2
Spray injection patching	3.436kg/CO2e/m2
Conventional 30mm SMA	11.226kg/CO2e/m2



Other hot / cold applied screed patching methods



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Carriageway Lifecycle Cost – Conventional Asphalt

Treatment Type	Heavily Trafficked ('A' &'B' Class)	Lightly Trafficked ('C' & 'U' Class)	Cost (£/m2)
New Road/Renewal	10 Yrs	15 Yrs	
Surface Course	10 Yrs	15 Yrs	19
Surface Course	10 Yrs	15 Yrs	19
Binder/Surface Course	10 Yrs	15 Yrs	40
Surface Course	10 Yrs	15 Yrs	19
Surface Course	10 Yrs	15 Yrs	19
	60 Yrs	90 Yrs	116

© The Road Surface Treatments Association

Carriageway Whole Lifecycle Cost – Surface dressing

Treatment Type	Heavily Trafficked ('A' &'B' Class)	Lightly Trafficked ('C' & 'U' Class)	Cost (£/m2)
New Road/Renewal	10 Yrs	15 Yrs	
Surface Dressing	10 Yrs	15 Yrs	5
Surface Dressing	10 Yrs	15 Yrs	5
Surface Course	10 Yrs	15 Yrs	19
Surface Dressing	10 Yrs	15 Yrs	5
Surface Dressing	10 Yrs	15 Yrs	5
Total	60 Yrs	90 Yrs	39

Still not convinced???

© The Road Surface Treatments Association

Carriageway Lifecycle Carbon Generation - Conventional Asphalt

Treatment Type	Heavily Trafficked ('A' &'B' Class)	Lightly Trafficked ('C' & 'U' Class)	Carbon (Kg/CO2/m2)
New Road/Renewal	10 Yrs	15 Yrs	
Surface Course	10 Yrs	15 Yrs	6.292
Surface Course	10 Yrs	15 Yrs	6.292
Binder/Surface Course	10 Yrs	15 Yrs	13.940
Surface Course	10 Yrs	15 Yrs	6.292
Surface Course	10 Yrs	15 Yrs	6.292
Total	60 Yrs	90 Yrs	39.108

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Carriageway Whole Lifecycle Carbon

Treatment Type	Heavily Trafficked ('A' &'B' Class)	Lightly Trafficked ('C' & 'U' Class)	Carbon (Kg CO2/m2)
New Road/Renewal	10 Yrs	15 Yrs	
Surface Dressing	10 Yrs	15 Yrs	0.715
Surface Dressing	10 Yrs	15 Yrs	0.715
Surface Course	10 Yrs	15 Yrs	6.292
Surface Dressing	10 Yrs	15 Yrs	0.715
Surface Dressing	10 Yrs	15 Yrs	0.715
Total	60 Yrs	90 Yrs	9.152

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Surface Treatments – 2023 Dorset



Total cost	£5,146,577.00
Would have cost	£17,782,847.00
Saved	**£12,636,270.00**
	71.06%

Carbon used (total)	780,448.86	**kgCO2e**
Would have used	4,452,433.06	**kgCO2e**
Saved	**3,671,984.19**	**kgCO2e**
	82.47%	

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Preventative Maintenance Strategy

Use of surface dressing down 90million+ m2 in 2012, down to 38million m2 in 2024

In 2023 Dept for Transport ‘work done’ returns, 62 English highway authorities registered a ‘zero’ return for surface dressing, microasphalt or preservation/rejuvenation

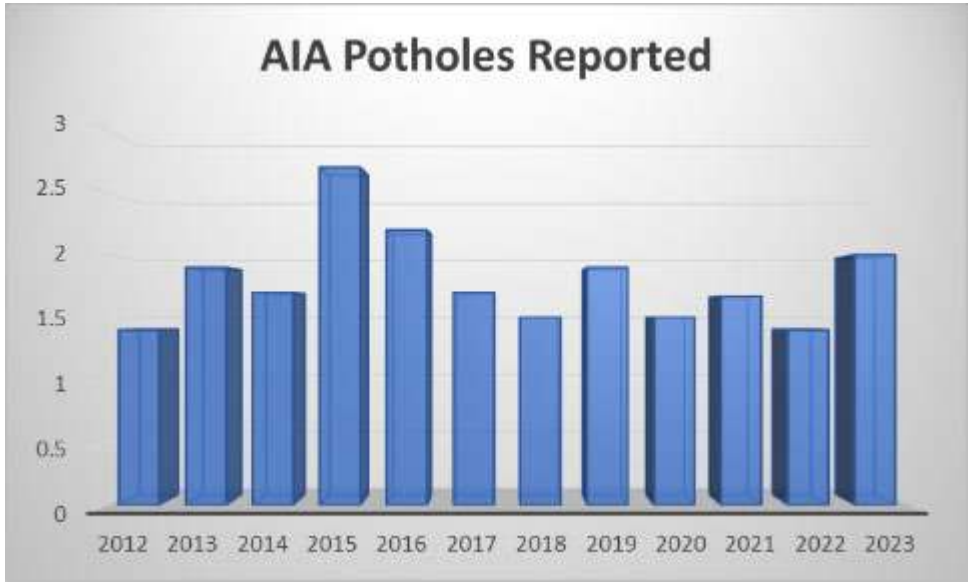
Pothole numbers increased in 2023

Pothole average cost (England):

£79.53 Reactive

£51.40 Planned

11.226 kgCO^2e/m2 – 30mm SMA



AIA ALARM Survey

© The Road Surface Treatments Association

Preventative Maintenance Strategy

"…we just want to continue laying hot asphalt!"

You can't afford to!

Cost – treat such a small proportion of your network if only laying hot or warm asphalt

Carbon reduction targets – net zero!

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National Pothole Prevention Week



[Home - Pothole Prevention Week]

© The Road Surface Treatments Association

National Pothole Prevention Week

A positive spin on the otherwise negative ‘National Pothole Day’

Intended to raise awareness of possible solutions to prevent potholes

To inform decision makers of surface treatments solutions supporting a preventative maintenance strategy

To educate, inform, and to address any misconceptions or misunderstandings about surface treatments

Create awareness of the carbon saving associated with surface treatments (as per the RSTA Carbon Guidance – as written by Pye Management Ltd)

© The Road Surface Treatments Association

Thank you for listening

[Home - RSTA (rsta-uk.org)]



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Decision Support & Lifecycle Modelling

Leonardo Rodrigues, PhD in Civil Engineering, Senior Asset Performance Modeller, XAIS-PTS

What do we mean by Decision Support?

XAIS-PTS
INFRASTRUCTURE ASSET AND PAVEMENT SOLUTIONS
A PHENNA GROUP COMPANY

We provide **data-led evidence** to support the **right decisions for the right objective**.

Evidence that supports decisions such as:

- What actions should I take?
- When should I take them?
- What products are best for purpose?
- How much will it cost?
- What maintenance strategies should I employ?
- Are my strategies working?
- **What effects will my actions have?**

Evidence that provides confidence in long-term planning and, therefore…

- Improves **Funding** or Revenue opportunities.

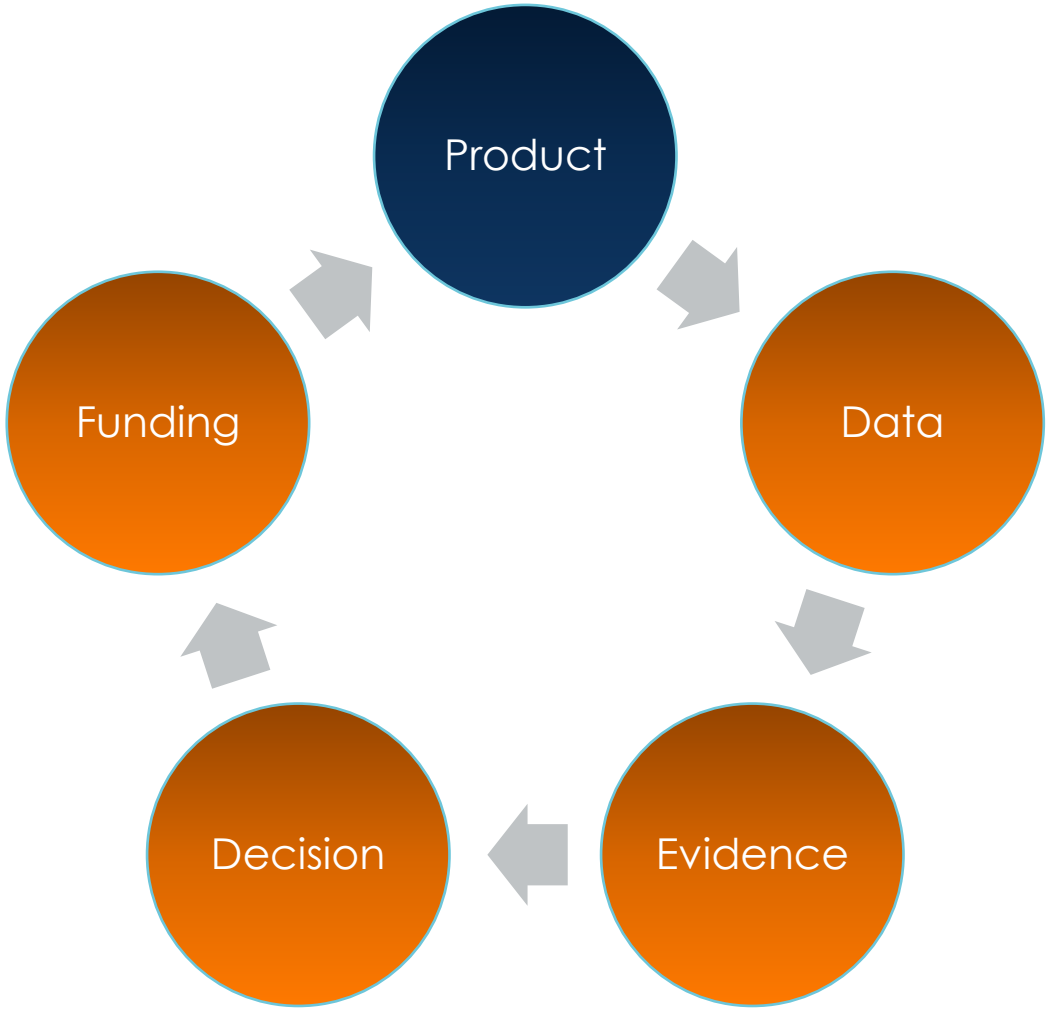
What do we mean by Decision Support?

For many organisations in the room,
data-led 'real world' evidence **should matter**.

Products that provide data
increase the opportunity of take-up and
increase chances of local authority funding…..

…which in turn increases the opportunity of
take up.

So, what do we mean by **data-led evidence**?



Performance Management via Prediction

We look at how different scenarios can 'play out' in terms of their effect on our objectives

Asset Performance | Value for Money | Corporate Agendas | Funding Opportunities | Risk Reduction | **Carbon Reduction**

Asset Performance can often be correlated with Condition, so we present how asset condition changes over time.

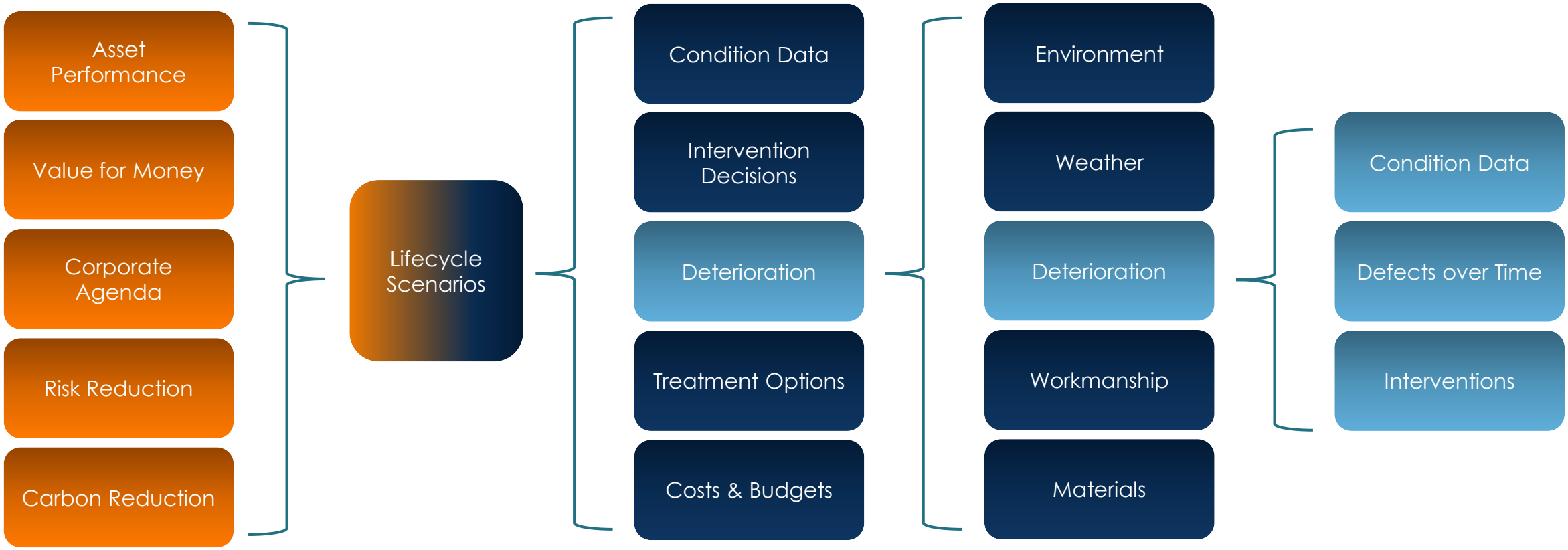
Similarly, how an asset risk profile might change over time.

Understanding a **maintenance need** and **backlog** over time provides valuable evidence of resource use and cost.

For example, the positive effect of **carbon reduction** will also be presented in the context of the other objectives.

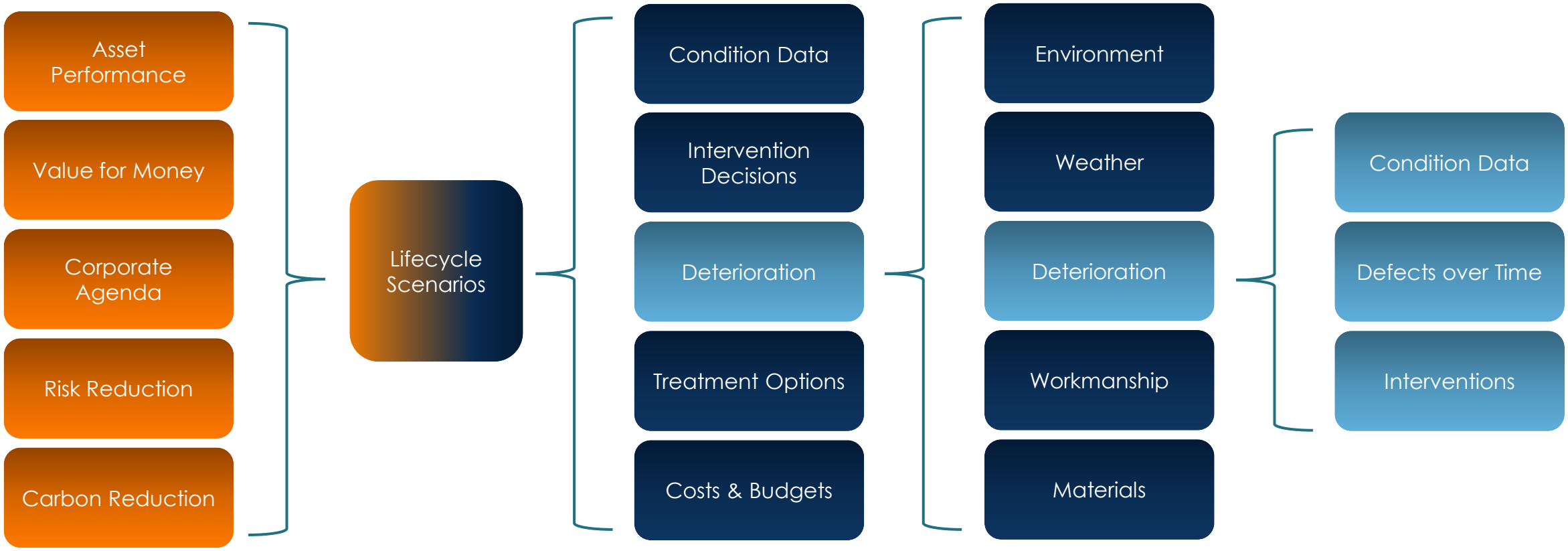
Comparing Predicted Scenarios?

We look at how things can 'play out', by **changing the objectives** and **changing the variables**.



Comparing Predicted Scenarios?

The long-term picture is what we would like as our **Lifecycle Model Condition Projection Model.**



Which method is appropriate to model deterioration?

XAIS-PTS
INFRASTRUCTURE ASSET AND PAVEMENT SOLUTIONS
A PHENNA GROUP COMPANY

Deterministic models

- Regression Analysis
- Incremental Models
- Non-Linear Models

Probabilistic-based models

- Survival Analysis
- Petri-Nets
- Markov Chains

Machine Learning Algorithms

- Support Vector Machines
- Decision Trees and Ensemble Methods
- Artificial Neuronal Networks

Markov Chains

- Traditional statistical regression approaches are unsuitable when **historical data is sparse**, such as **pavement age and condition records**, which often rely on assessments with **low repeatability**. The Markov Chain method can be selected to address this because it enables **performance modelling even with limited historical information**, capturing the probabilistic and **stochastic nature of asset deterioration over time**. This method will significantly enhance our decision-making process, providing more accurate and reliable insights (Osorio-Lird et. al, 2018).

Reference:
Osorio-Lird, A., Chamorro, A., Videla, C., Tighe, S., & Torres-Machi, C. (2017). Application of Markov Chains and Monte Carlo simulations for developing pavement performance models for urban network management. Structure and Infrastructure Engineering, DOI: 10.1080/15732479.2017.1402064.

Markov Model

- The Markov process is a way to model systems that transition between states over time, where future states depend only on the current state (memoryless property).

States



$$a_t = a_0 P^t$$

Distribution of the states of the process at a specific elapsed time ***t***

Distribution of the states of the process at the **initial time** (*t=0*)

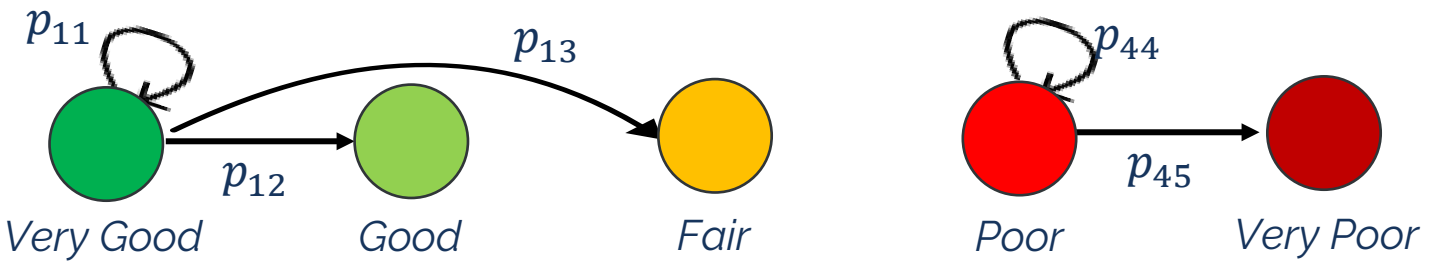
Transition probability matrix

$$P = \begin{bmatrix} p_{11} & p_{12} & p_{13} & p_{14} & p_{15} \\ 0 & p_{22} & p_{23} & p_{24} & p_{25} \\ 0 & 0 & p_{33} & p_{34} & p_{35} \\ 0 & 0 & 0 & p_{44} & p_{45} \\ 0 & 0 & 0 & 0 & p_{55} \end{bmatrix}$$

Markov Model

- The Markov process is a way to model systems that transition between states over time, where future states depend only on the current state (memoryless property).

States



$$a_t = a_0 P^t$$

Distribution of the states of the process at a specific elapsed time ***t***

Distribution of the states of the process at the **initial time** (*t=0*)

Transition probability matrix

$$P = \begin{bmatrix} p_{11} & p_{12} & p_{13} & 0 & 0 \\ 0 & p_{22} & p_{23} & p_{24} & 0 \\ 0 & 0 & p_{33} & p_{34} & p_{35} \\ 0 & 0 & 0 & p_{44} & p_{45} \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

Markov Theory - Example

XAIS-PTS
INFRASTRUCTURE ASSET AND PAVEMENT SOLUTIONS
A PHENNA GROUP COMPANY

States



Very Good *Good* *Fair* *Poor* *Very Poor*

Initial distribution of condition

$$a_0 = \{45.0 \quad 35.0 \quad 15.0 \quad 3.0 \quad 2.0\}$$

Transition probability matrix

$$P = \begin{bmatrix} 0.93 & 0.07 & 0 & 0 & 0 \\ 0 & 0.83 & 0.17 & 0 & 0 \\ 0 & 0 & 0.80 & 0.15 & 0.05 \\ 0 & 0 & 0 & 0.87 & 0.13 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

Distribution of condition Year 1

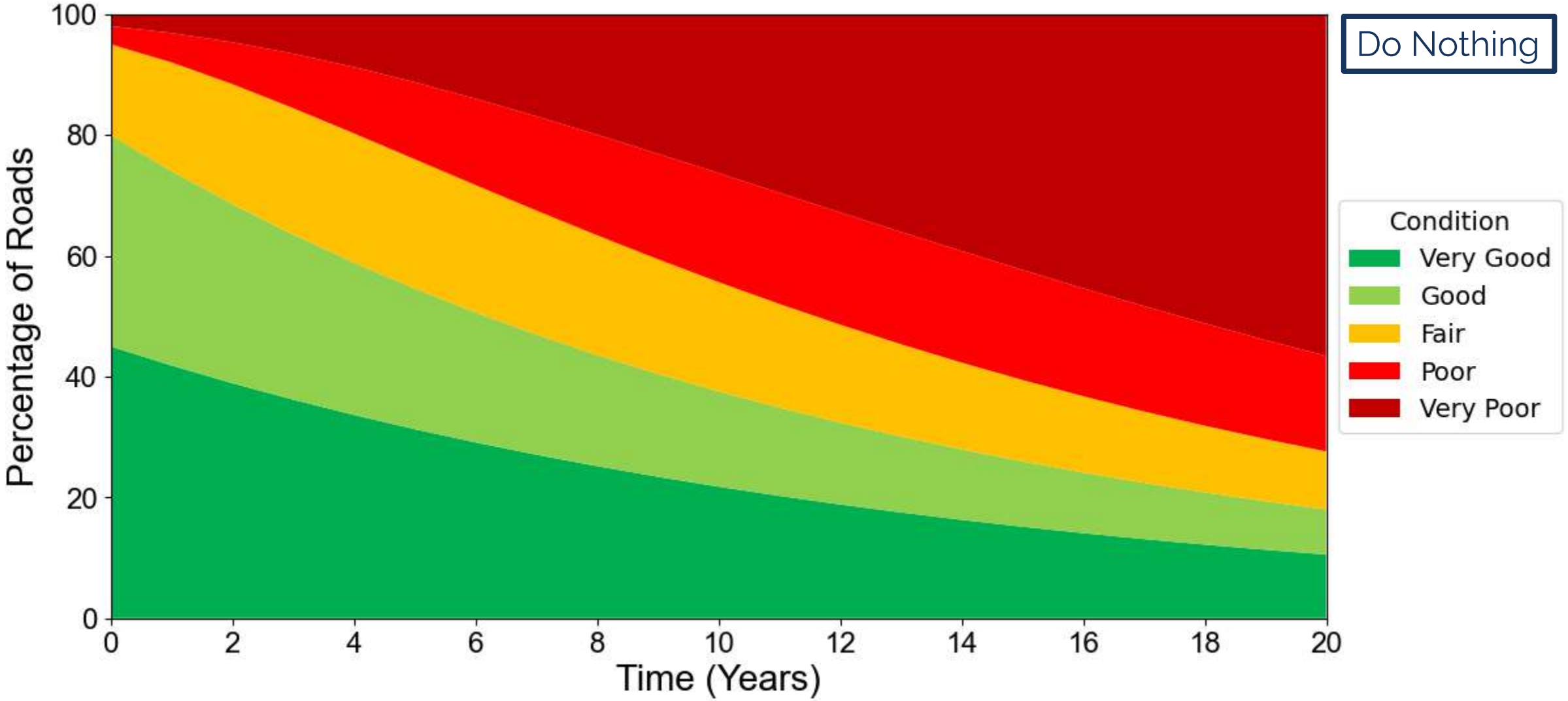
$$a_1 = \{42.0 \quad 32.0 \quad 18.0 \quad 7.0 \quad 3.0\}$$

Do Nothing



Run Analysis

Markov Theory - Example



Markov Theory - Example

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States



Initial distribution of condition

$$a_0 = \{45.0 \quad 35.0 \quad 15.0 \quad 3.0 \quad 2.0\}$$

Transition probability matrix

$$P = \begin{bmatrix} 0.93 & 0.07 & 0 & 0 & 0 \\ 0 & 0.83 & 0.17 & 0 & 0 \\ 0 & 0 & 0.80 & 0.15 & 0.05 \\ 0 & 0 & 0 & 0.87 & 0.13 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

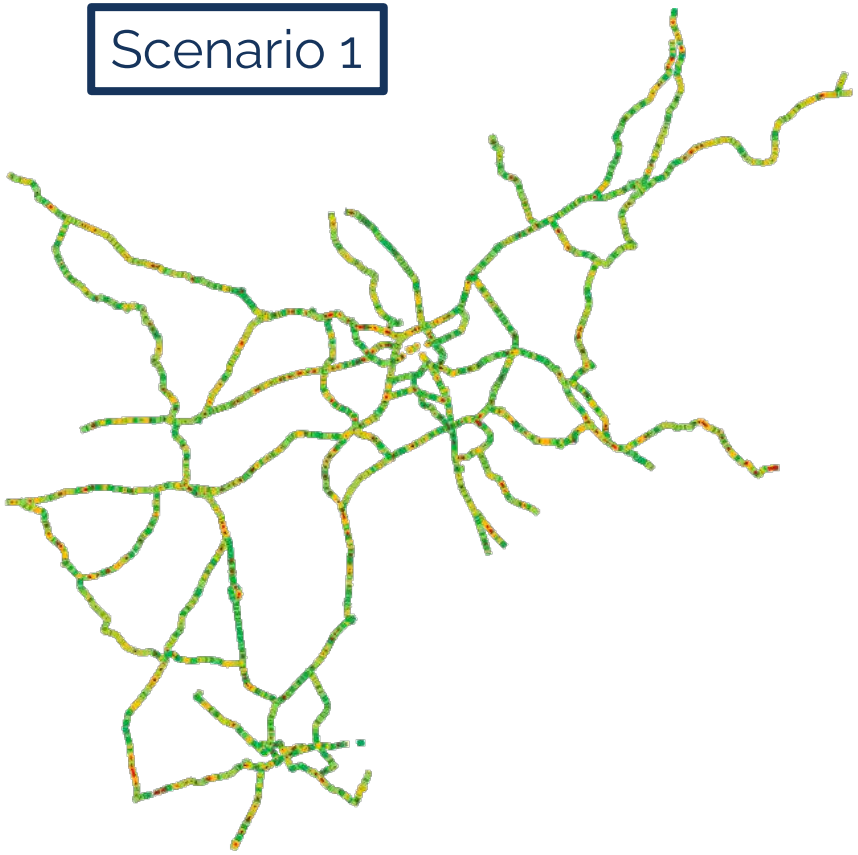
Distribution of condition Year 1

$$a_1 = \{42.0 \quad 32.0 \quad 18.0 \quad 7.0 \quad 3.0\}$$ ✗

After interventions

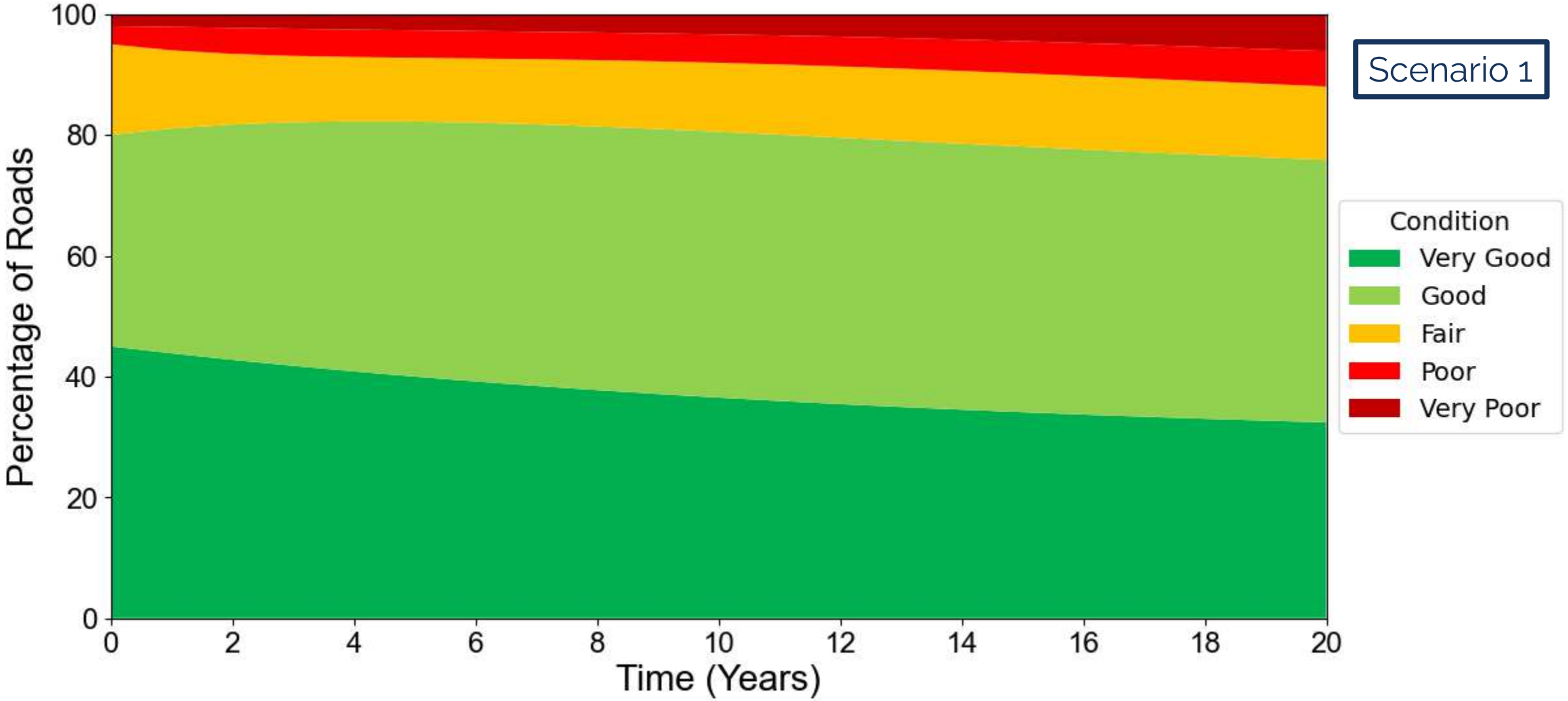
$$a_1 = \{43.0 \quad 38.0 \quad 13.0 \quad 6.5 \quad 2.5\}$$ ✓

Scenario 1



Run Analysis

Markov Theory - Example



Markov Theory - Example

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States



Initial distribution of condition

$$a_0 = \{45.0 \quad 35.0 \quad 15.0 \quad 3.0 \quad 2.0\}$$

Transition probability matrix

$$P = \begin{bmatrix} 0.93 & 0.07 & 0 & 0 & 0 \\ 0 & 0.83 & 0.17 & 0 & 0 \\ 0 & 0 & 0.80 & 0.15 & 0.05 \\ 0 & 0 & 0 & 0.87 & 0.13 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

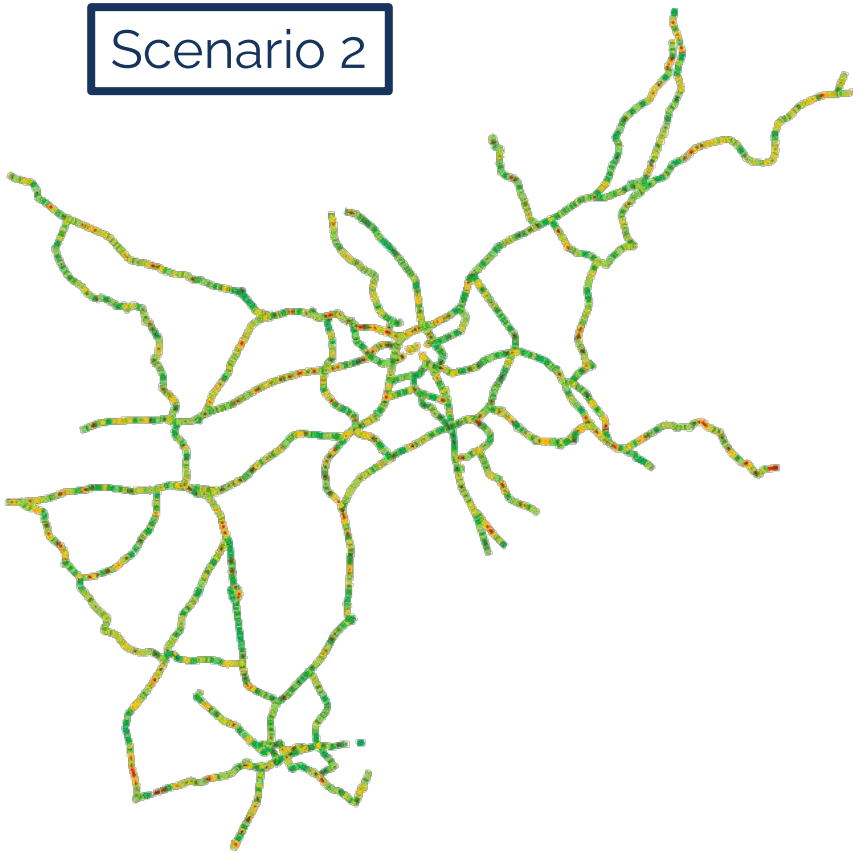
Distribution of condition Year 1

$$a_1 = \{42.0 \quad 32.0 \quad 18.0 \quad 7.0 \quad 3.0\}$$ ✗

After interventions

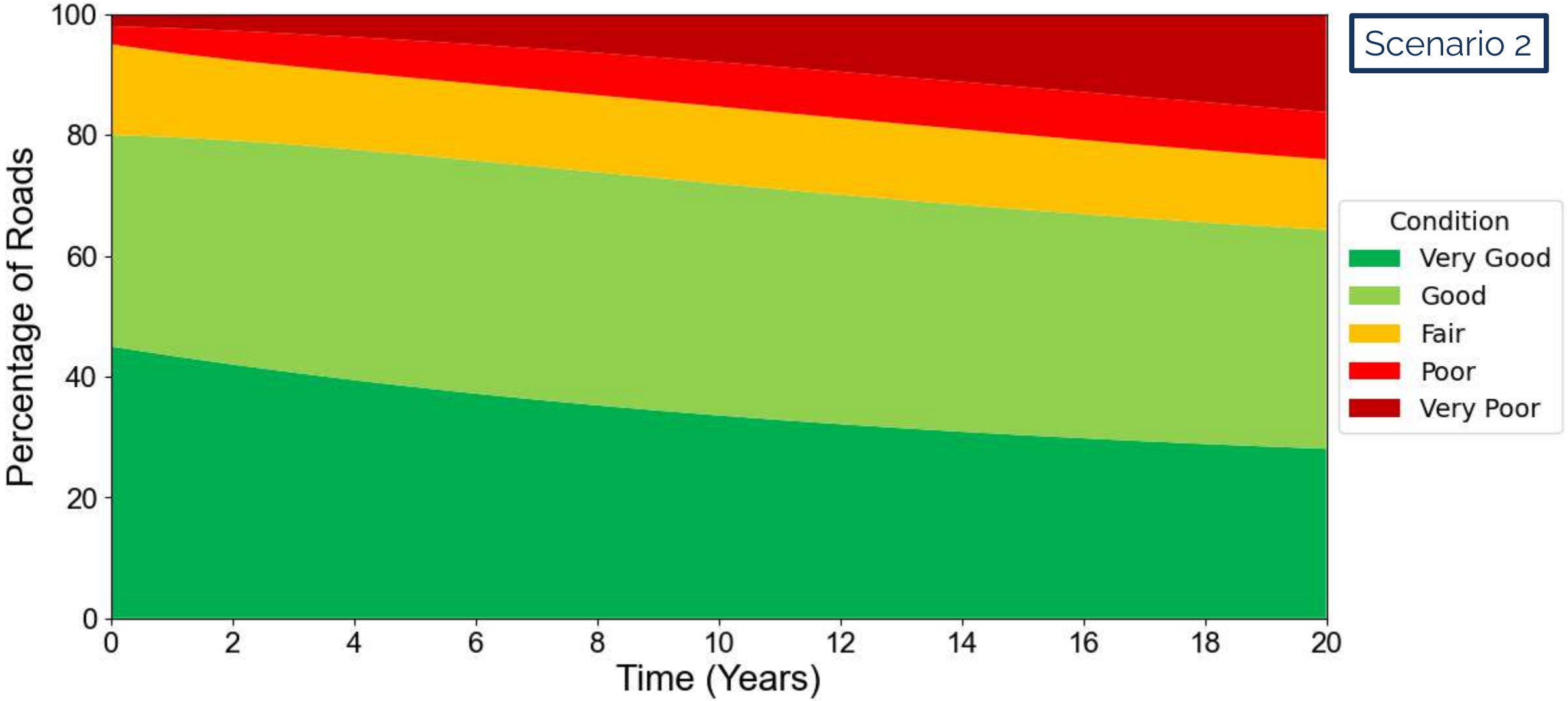
$$a_1 = \{42.8 \quad 36.0 \quad 14.0 \quad 6.6 \quad 2.6\}$$ ✓

Scenario 2



Run Analysis

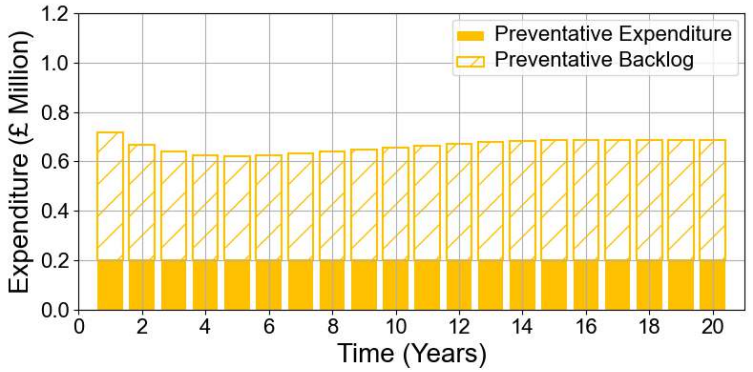
Markov Theory - Example

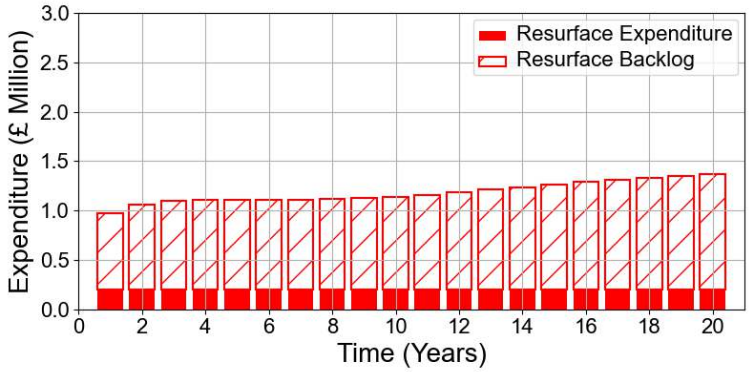


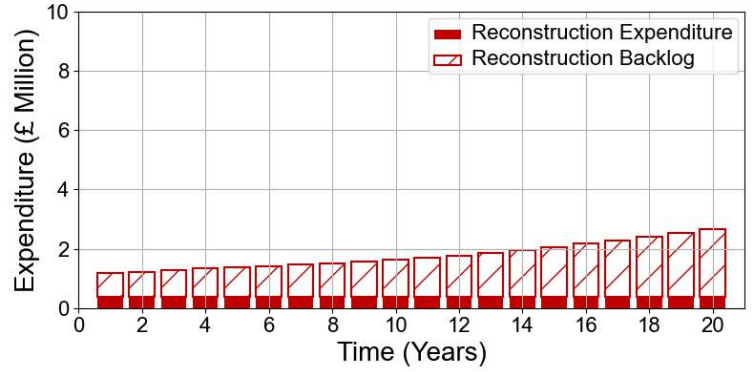
Markov Theory - Example

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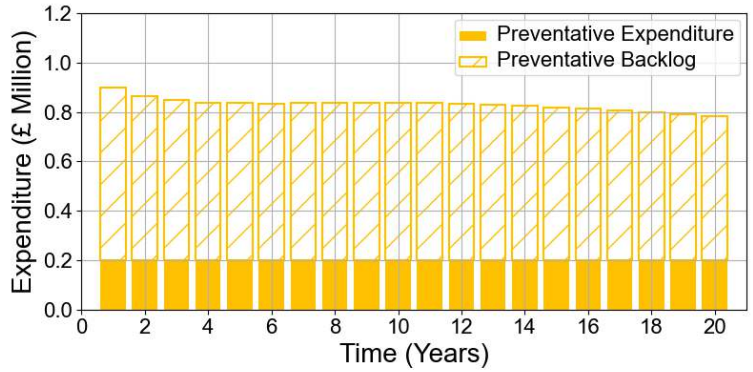
Scenario 1

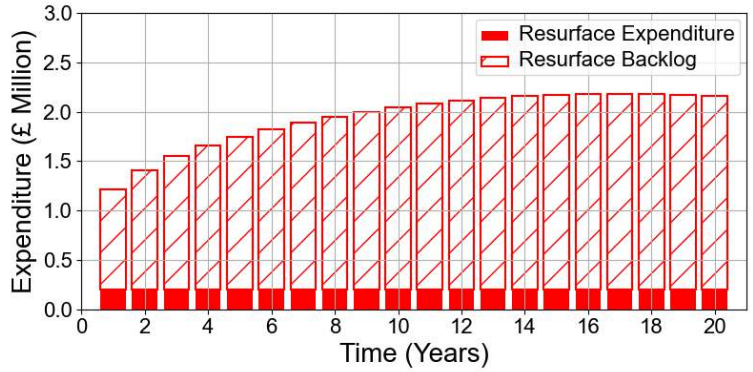


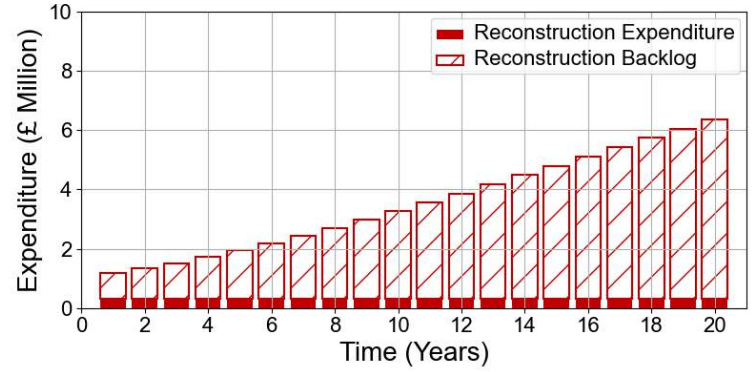




Scenario 2

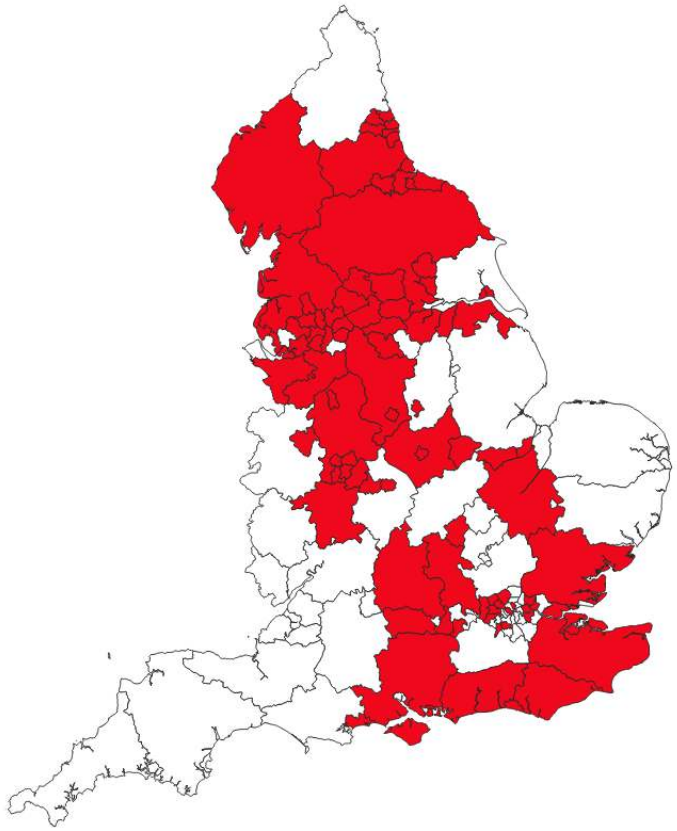






Ongoing Research

- Primary Objective: Develop deterioration models that support Life-Cycle planning and informed decision-making on maintenance treatments.

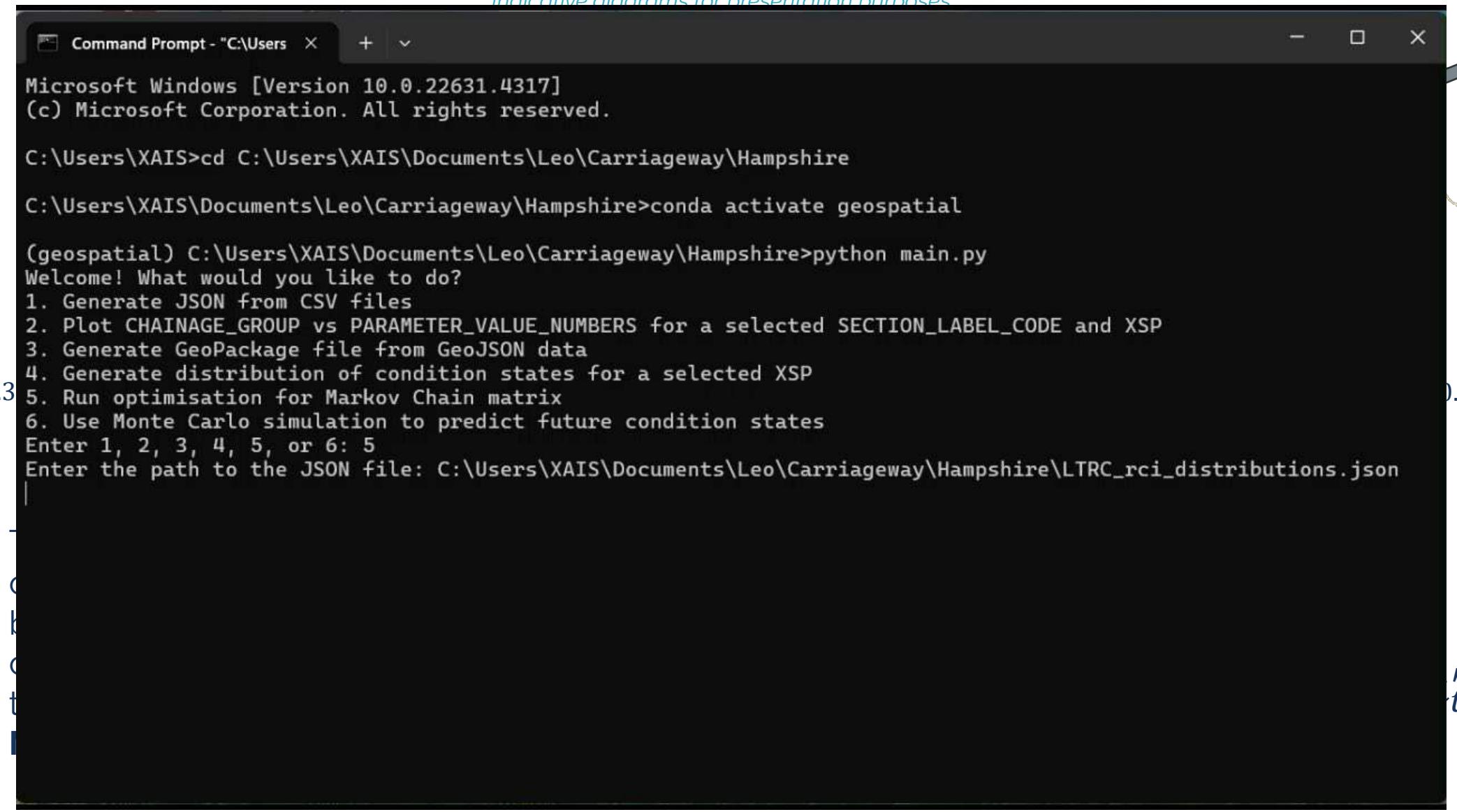


- **Scanner data** available with measurements for several defects, including **Rutting** (LLRT & LRRT), 3 m **Longitudinal Profile Variance** (LPV3), 10 m Longitudinal Profile Variance (LPV10), Whole Carriageway **Cracking Intensity** (LTRC), **Texture** (LLTX).

Ongoing Research

XAIS-PTS
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A PHENNA GROUP COMPANY

Indicative diagrams for presentation purposes

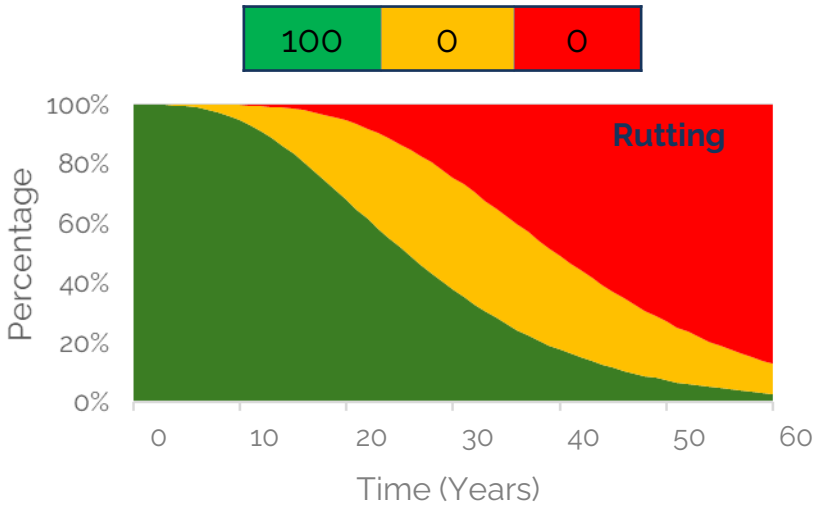


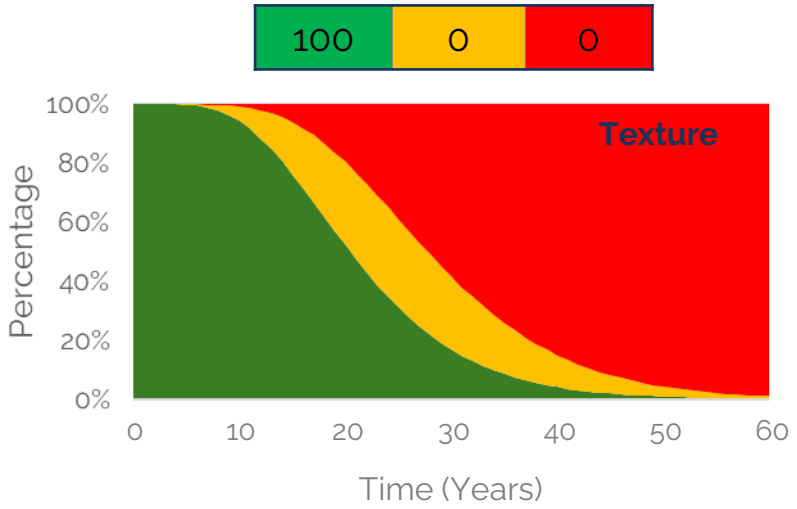
$a_0 = \{0.3$ … $.11\}$

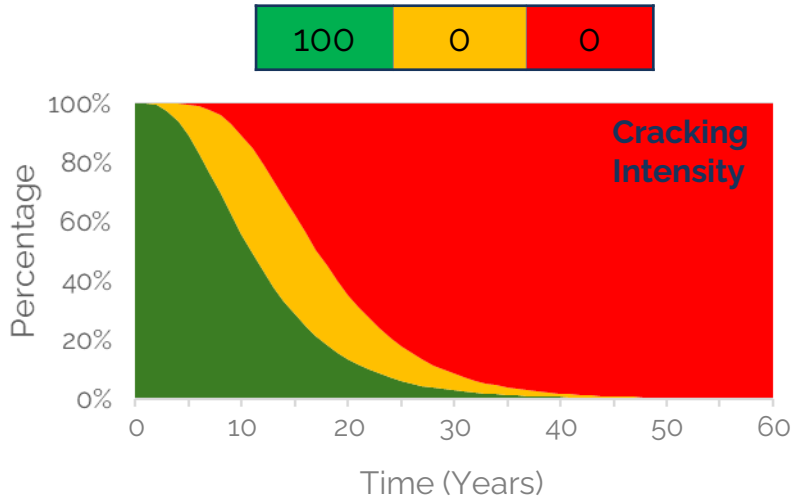
- …

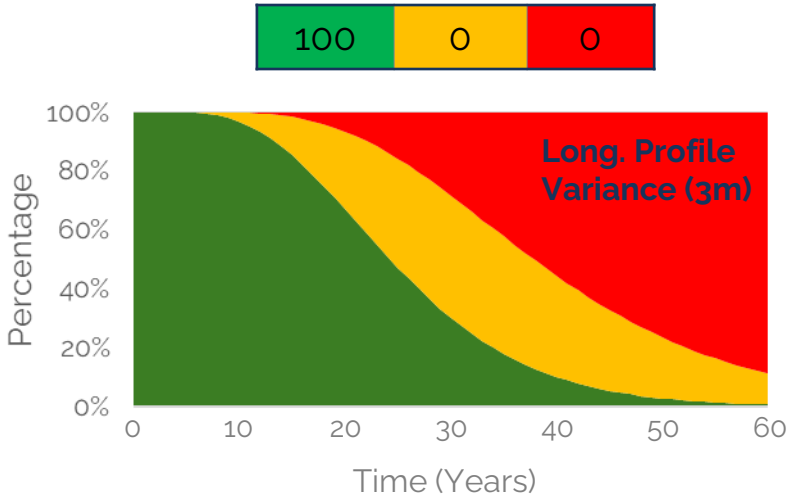
$[t'(i)]^2$

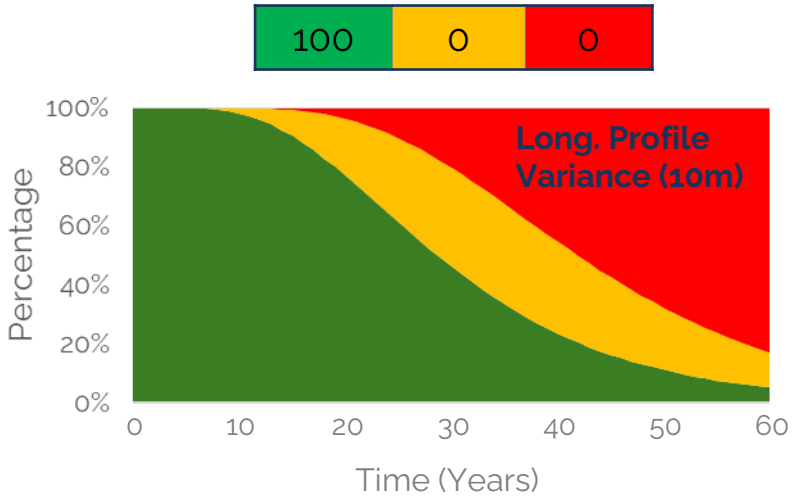
Ongoing Research



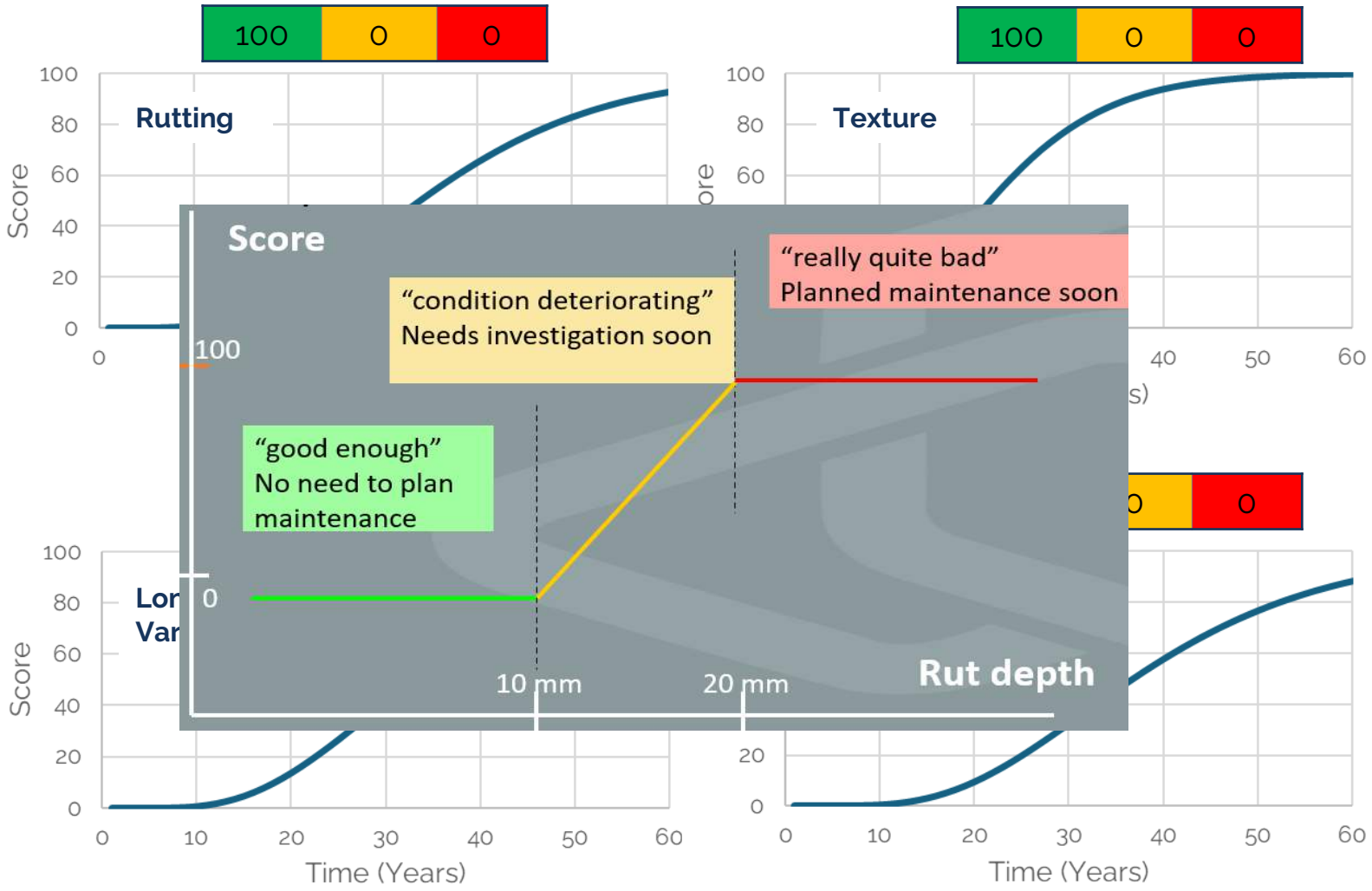


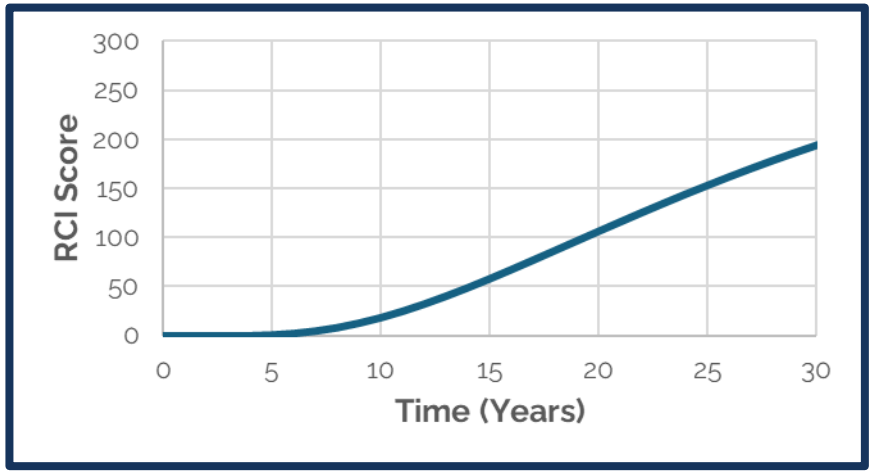




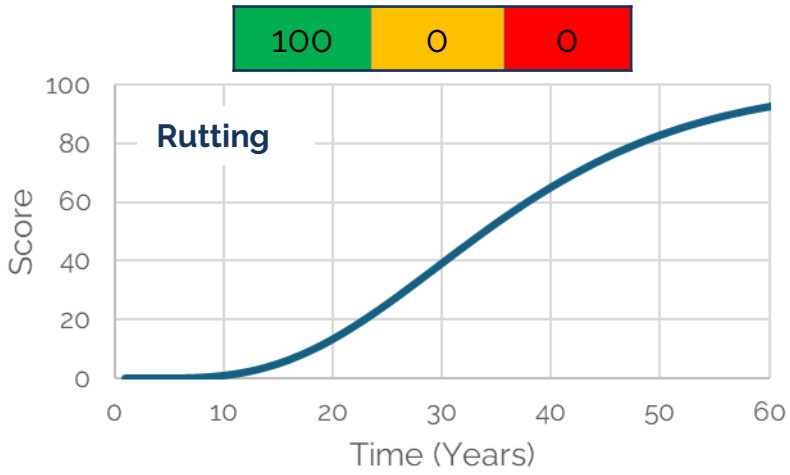


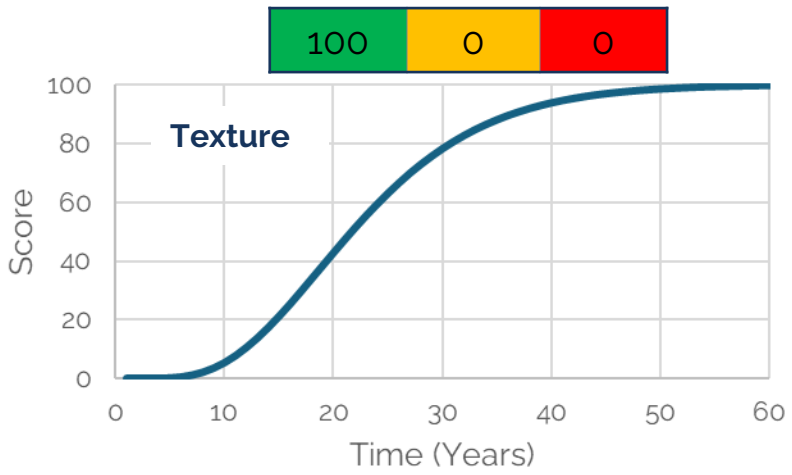
Ongoing Research

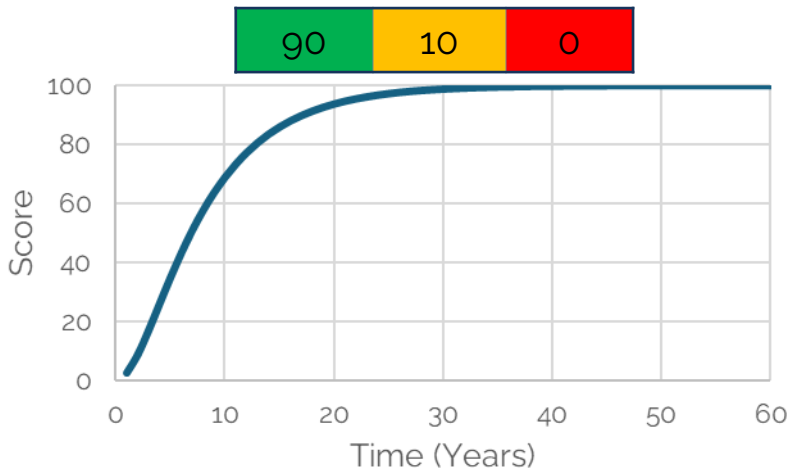


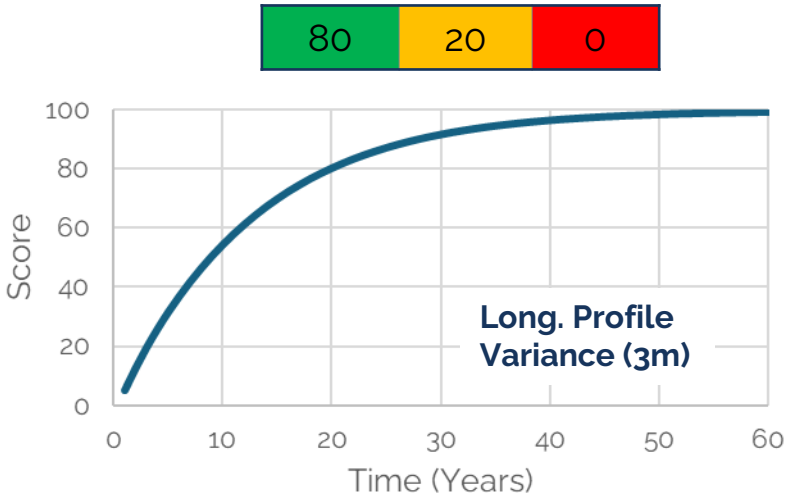


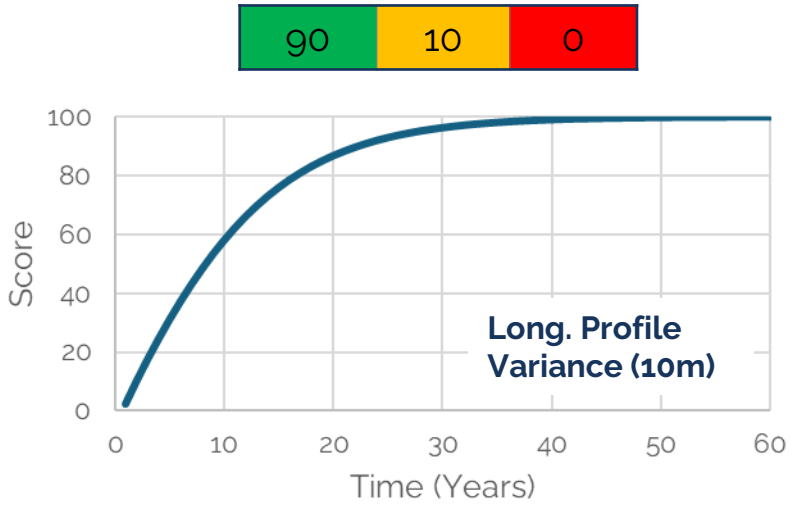
Ongoing Research

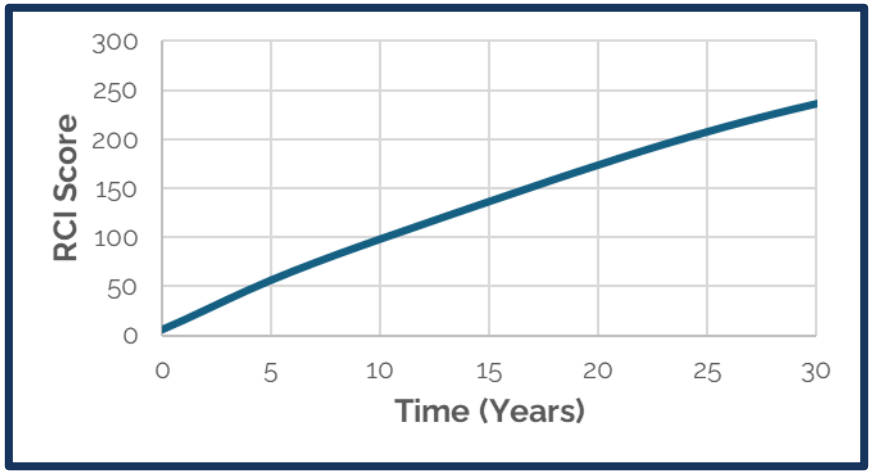








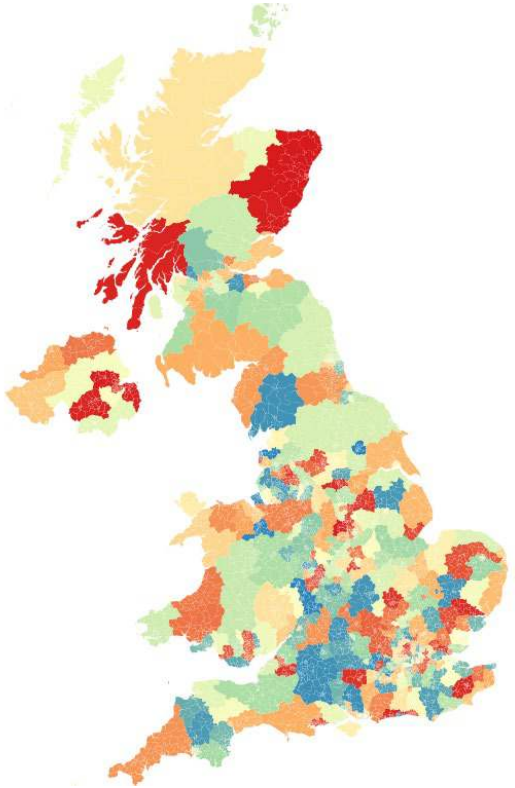




Conclusions & Final Remarks

- Life-cycle modelling includes predicting pavement deterioration and evaluating different strategies for maintenance planning involving carbon reduction measures.

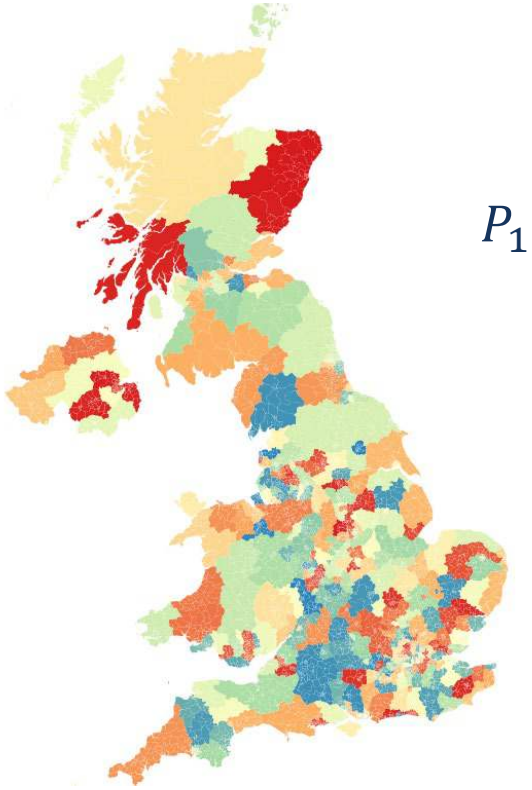
- Value for Maintenance Planning: Maintenance can be planned proactively by predicting deterioration patterns, optimising budgets, reducing carbon emissions, and improving road quality.



Conclusions & Final Remarks

- Life-cycle modelling includes predicting pavement deterioration and evaluating different strategies for maintenance planning involving carbon reduction measures.

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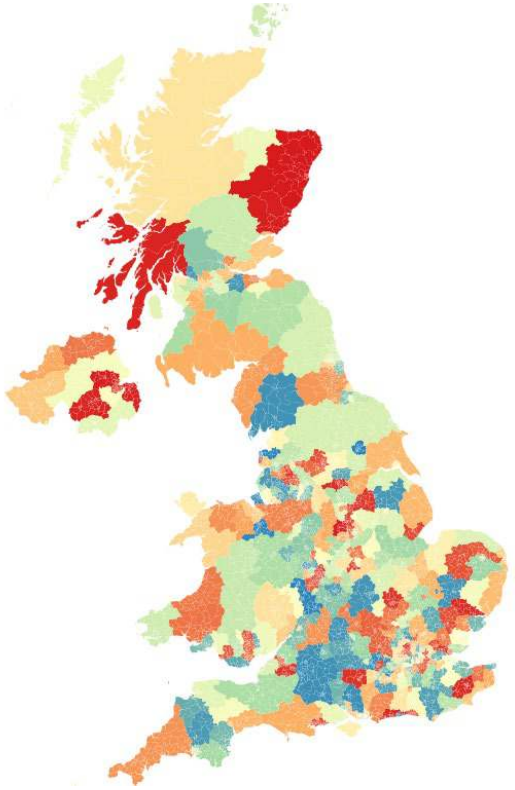
$$P_1 = \begin{bmatrix} 0.95 & 0.05 & 0 & 0 & 0 \\ 0 & 0.9 & 0.10 & 0 & 0 \\ 0 & 0 & 0.86 & 0.10 & 0.04 \\ 0 & 0 & 0 & 0.85 & 0.15 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

Conclusions & Final Remarks

- Life-cycle modelling includes predicting pavement deterioration and evaluating different strategies for maintenance planning involving carbon reduction measures.

- Value for Maintenance Planning: Maintenance can be planned proactively by predicting deterioration patterns, optimising budgets, reducing carbon emissions, and improving road quality.

$$P_2 = \begin{bmatrix} 0.90 & 0.10 & 0 & 0 & 0 \\ 0 & 0.9 & 0.10 & 0 & 0 \\ 0 & 0 & 0.80 & 0.20 & 0 \\ 0 & 0 & 0 & 0.85 & 0.15 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$



Conclusions & Final Remarks

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Sub-network Classification

- Targeted Analysis: Dividing the road network into sub-networks (e.g., highways, urban roads, rural roads) allows for tailored deterioration models that align with different usage patterns and stress factors.
- Enhanced Accuracy: Knowing the maintenance history can improve the accuracy of predictions and interventions by addressing the specific needs of each type of pavement and materials used.

Assessing Outliers

- Identification of Outliers: Identifying data points deviating significantly from predicted deterioration patterns is essential.
- Analysing these outliers can reveal specific road characteristics (e.g., location, traffic load, environmental factors, and weather) that may contribute to accelerated deterioration.

Decision Support & Lifecycle Modelling

Questions?

Thank you!

The Road Surface Treatments Association Ltd

Modern Treatments for Crack & Joint Repair

Jonathan Till
National Sales Manager – Highways
GCP Applied Technologies
07817 797608

The Problem – Fretted joints

Root causes:

- Cold joints
- Lack of compaction
- Lack of sealing
- Overbanding discontinued

Decay mechanism

- Water ingress
- Freeze thaw
- Hydraulic pumping

Typically

- Old HRA surfaces
- “Not very old” thin surfacing



The Problem – Fretted joints



The Solution -Crack & Joint Repair

What is Crack & Joint repair?

Specified for use through “Specification for Highways Works” Volume One Clause 711

Process Types & Materials covered through BBA HAPAS Approval Process

RSTA/ADEPT approved Code of Practice









BBA HAPAS - What it Covers

British Board of Agrément
Bucknalls lane
Garston, Watford
Herts WD25 9BA
Tel: 01923 665300 Fax: 01923 665301
e-mail: mail@bba.star.co.uk
website: www.bbacerts.co.uk

Details 4 Repair Types

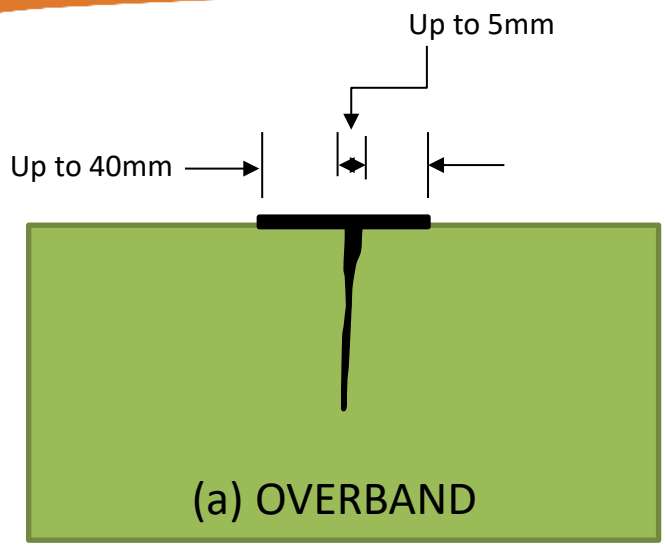
Performance Based Certification:

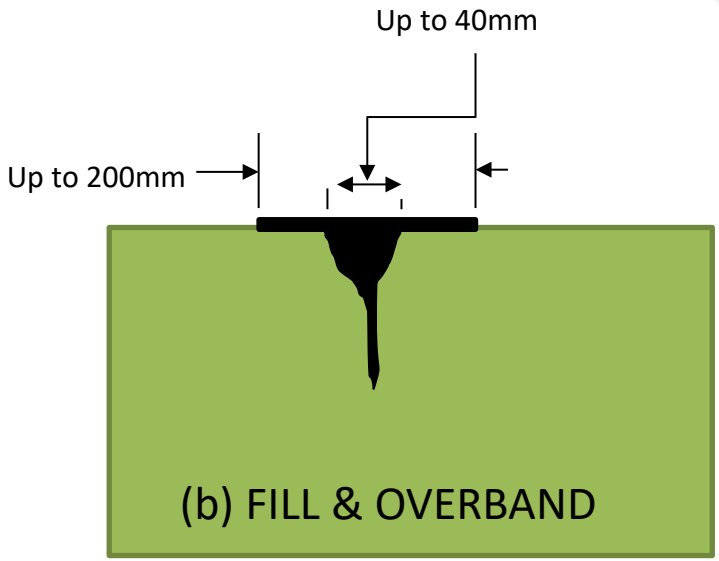
- Skid Resistance
- Texture Depth
- Rut Resistance

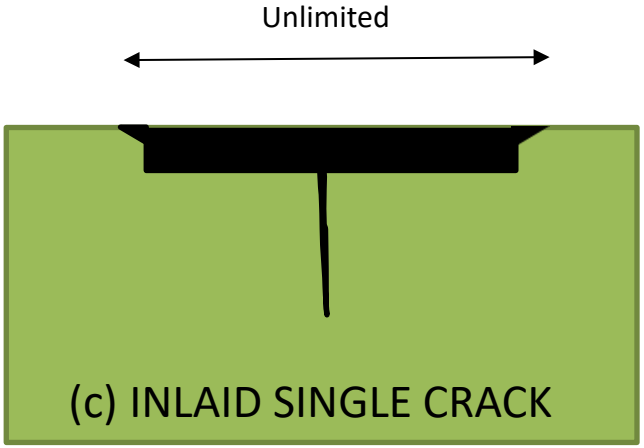
GUIDELINES DOCUMENT
FOR THE ASSESSMENT AND CERTIFICATION OF
CRACK SEALING SYSTEMS FOR HIGHWAYS

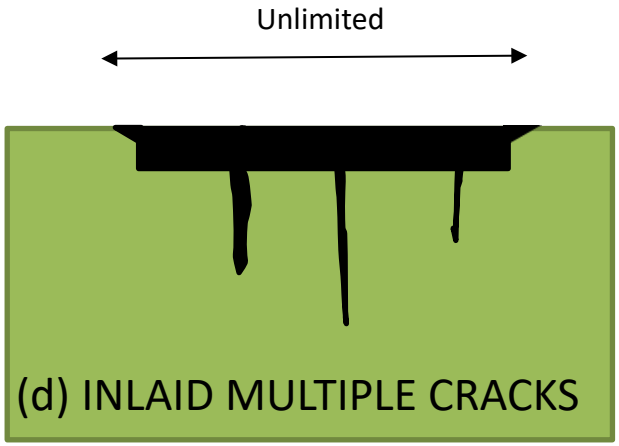
October 2010

BBA HAPAS types









Types of Approved System

THERMOPLASTIC OR HOT APPLIED

"capable of softening or fusing when heated and hardening again when cooled"

Source – Merriam-Webster online dictionary

A **REVERSIBLE** change

THERMOSET OR COLD APPLIED

"capable of becoming <u>permanently</u> rigid when cured"

Source – Merriam-Webster online dictionary

An **IRREVERSIBLE** change

Overband

Essential requirements for Overband

- Typically used on narrow cracks or ‘new’ joints
- Crack widths up to 5mm
- Overband up to 40mm wide & 3mm thick
- Seal & Prevents Water Ingress
- Initial skid resistance ≥ 60 SRV
- Retained skid resistance ≥ 50 SRV



Types of Overband

Tape (hot)



Bitumen (hot)



Resin (cold)



Fill & Overband

Essential requirements for Fill & Overband

- Typically used on fretted joints
- Crack widths up to 40mm
- Overband up to 200mm wide & 3mm thick
- Seal & Prevents Water Ingress
- Initial skid resistance ≥ 60 SRV
- Retained skid resistance ≥ 50 SRV
- Initial Texture Depth of 1.5mm



Fill & Overband

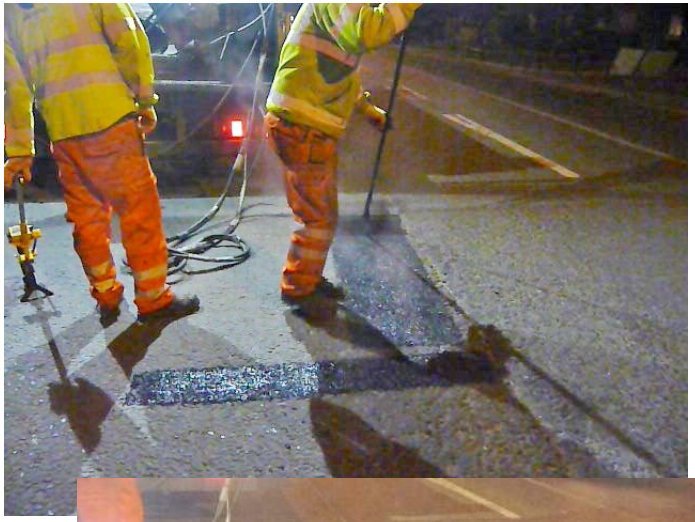






Types of Fill & Overband

Hot Applied





Cold Applied



Inlaid – Single or Multiple Cracks

Suitable for unlimited width crack repair



- Flush Road Surface Finish
- Greater ‘body’ of repair to accommodate underlying movement
- Often used in situations involving concrete in the carriageway
- Repairs pitted, spalling or broken surfaces / edges



Inlaid – Single or Multiple Cracks

Suitable for both Concrete & Asphalt Repairs





Material Durability

	Overband	Fill & Overband	Inlaid
Thermoplastic Hot Applied	3 Years	3 Years	5 Years
Thermoset Cold Applied	5 Years	5 Years	5 Years

Years = Expected Duration of System taken from BBA HAPAS Certificates

Joint Repair – A Specialist Trade

- New Materials & Specifications
- Different Types of Joint Failure
- Existing Markings & Studs
- Qualified Workforce & Training





Final Thoughts ……

Just because we have always done it that way…..

Asset management = new thinking about what we do

New materials can enable new repair and prevention techniques

Real change starts with a change of mind ….

Questions?

e - jonathan.till@gcpat.com

t – 07817 797 608

w – gcpat.uk

INSTITUTE OF HIGHWAY ENGINEERS

www.theihe.org

An Introduction to IHE &the Benefits of Professional Registration



RSTA Conference
21st November 2024

Jobert Fermilan IEng FIHE, CMgr FCMI, MCIOB
Director of Morgan Consult & Advisory Ltd & IHE

THE INSTITUTE

> Providing professional leadership by developing and sharing knowledge and with standards based on integrity, fairness and quality

INSTITUTE OF HIGHWAY ENGINEERS

WHO ARE WE?

- The Institute of Highway Engineers (IHE) was established in 1965 and has been licensed by the Engineering Council since 1972
- We are the Institute of choice for specialist highway and traffic practitioners
- We have expertise in all areas of highway engineering

IHE INSTITUTE OF HIGHWAY ENGINEERS

OUR VISION

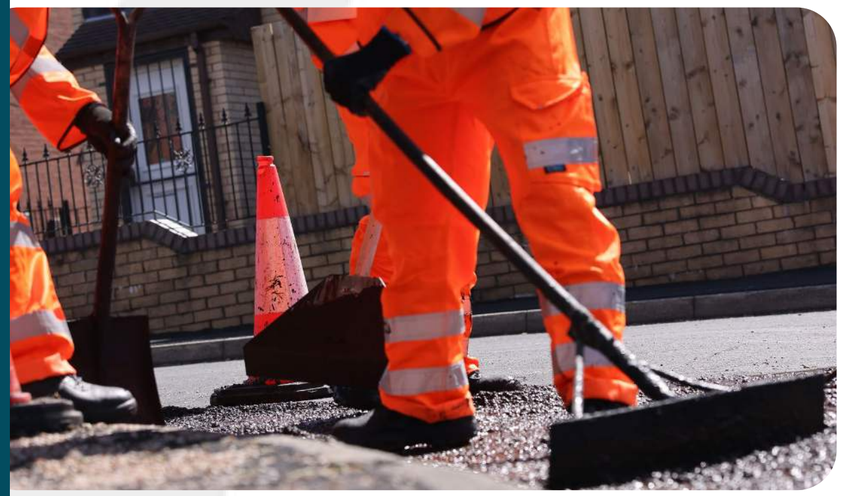
> To support Highway and Traffic Engineers at every stage of their career

We have over 3,500 members of which over 50% are professionally registered.

We are licensed by the Engineering Council & BCS, the Chartered Institute for IT to provide Professional Registration.

We are THE Engineering Council Institute dedicated to serving the needs of engineering professionals in the highways sector.





INSTITUTE OF HIGHWAY ENGINEERS

JOINING THE IHE TYPICAL DISCIPLINES



Winter Services



Contracting



Transport Planning



Road Safety



Active Travel



Road Surfacing



Maintenance



Highway Design



Signals & Signs

INSTITUTE OF HIGHWAY ENGINEERS
IHE

LICENSED TO PROVIDE PROFESSIONAL REGISTRATION

An internationally recognised standard that demonstrates engineering competence, gained through knowledge and on-the-job experience, to colleagues, employers and clients



Engineering Council

Chartered Engineer
Incorporated Engineer
Engineering Technician
ICT Technician

bcs The Chartered Institute for IT

Chartered IT Professional
Advanced Registered IT Technician
Registered IT Technician

IHE INSTITUTE OF HIGHWAY ENGINEERS

JBM JOINT BOARD OF MODERATORS

ACCREDIT COURSES

We accredit HNC, HND, degree and MSc courses

As part of the Joint Board of Moderators (JBM) with ICE, IStructE, CIHT & PWI)

Check your degree is accredited using this QR code

AWARD PROFESSIONAL CERTIFICATES & DIPLOMAS

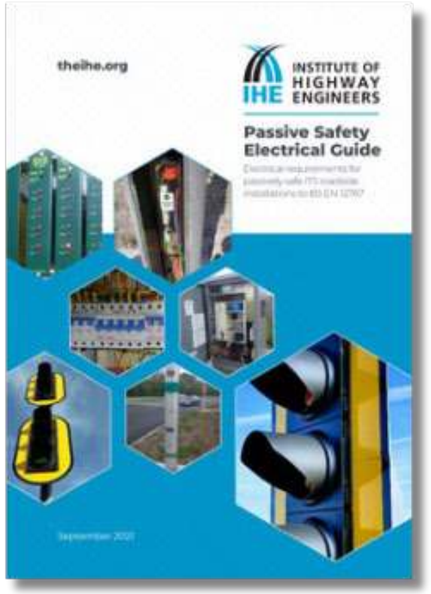
Ideal for individuals who have been working in the industry but haven't been able to obtain an academically endorsed qualification.



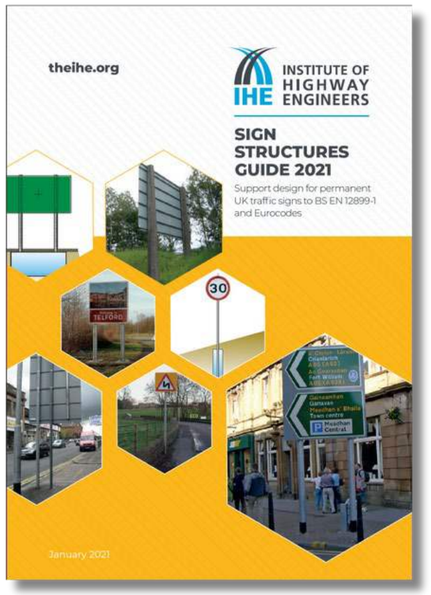




INSTITUTE OF HIGHWAY ENGINEERS



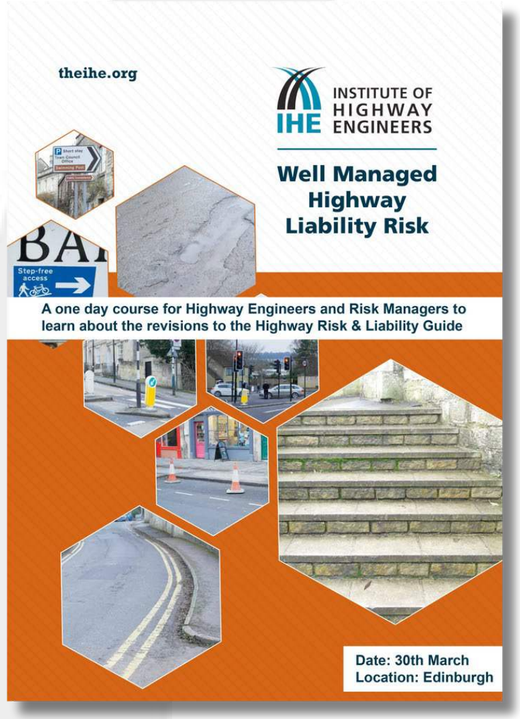






OUR PUBLICATIONS

The IHE has published several documents as well contributing to many other important documents used in the highways sector.



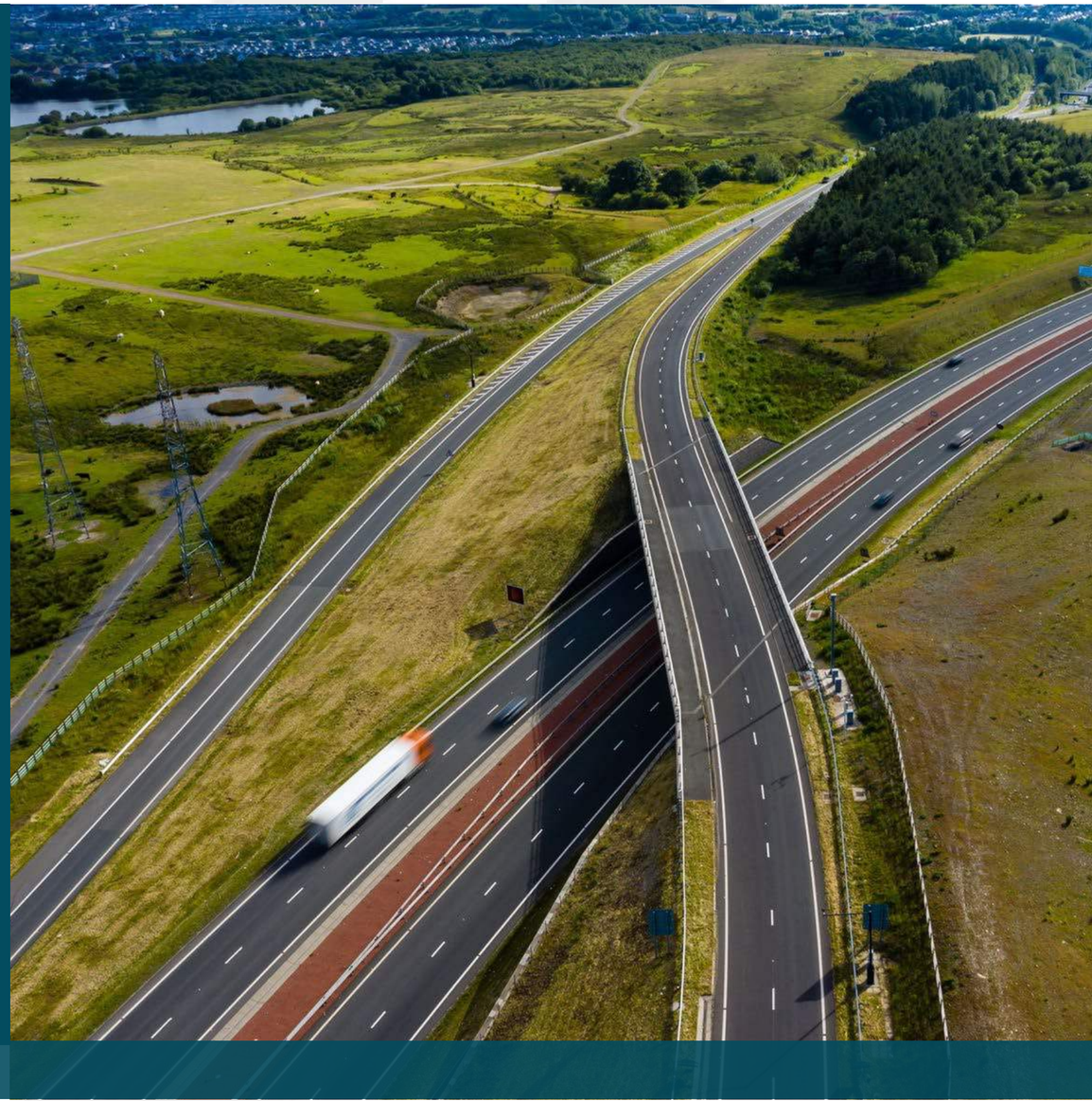
INSTITUTE OF HIGHWAY ENGINEERS

INSTITUTE OF HIGHWAY ENGINEERS

www.theihe.org

Thank you for your time

Any questions please contact membership@theihe.org or visit our website at www.theihe.org





THE ROAD SURFACE TREATMENTS ASSOCIATION

Innovative Carbon Reducing Processes

Jamie Cochran
Regional Sales Manager: Scotland & N England
Archway Roadmaster UK

Spray Injection Patching





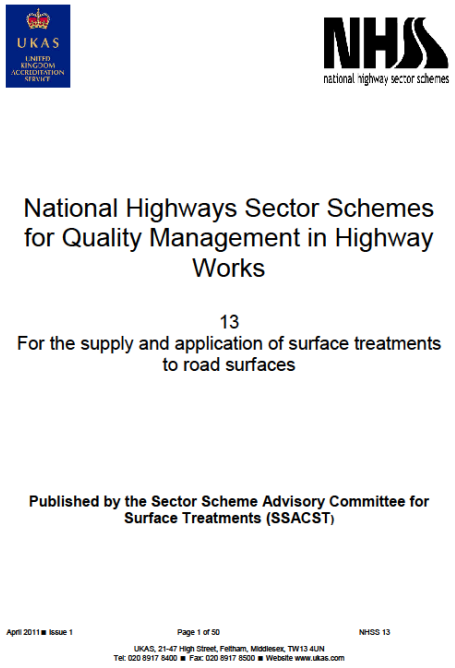


Spray Injection Patching

- Cost effective alternative to conventional patching
- Can be operated as 1, 2 or 3 operative teams
- Range of providers offering different services
- Contractors should be accredited to NHSS 13 – **Ask?**

1. **Operatives** – Highly skilled, motivated, fully trained Machine Operators.
2. **Materials** – Quality aggregates and emulsions tested to performance specifications.
3. **Machine** – Technically advanced fully self-contained road repair machine

Spray Injection Patching – The Journey



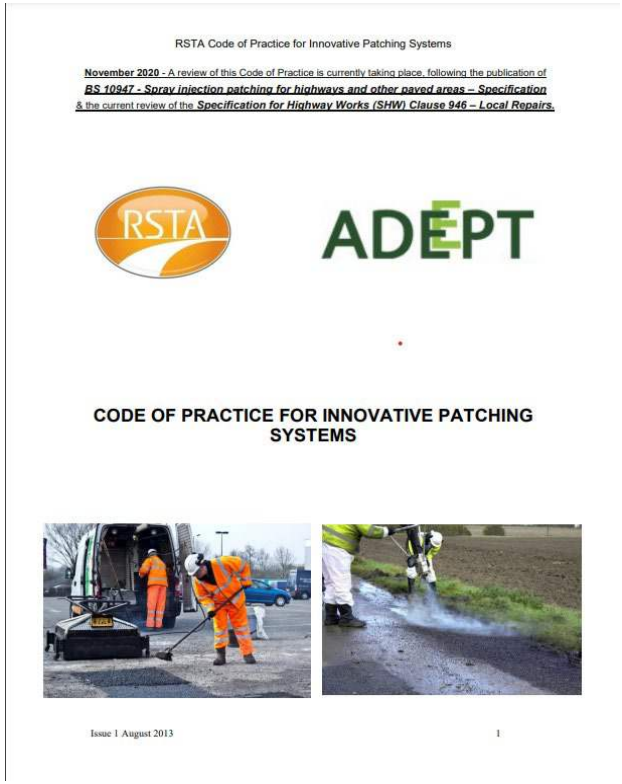
National Highways Sector Schemes for Quality Management in Highway Works

13
For the supply and application of surface treatments to road surfaces

Published by the Sector Scheme Advisory Committee for Surface Treatments (SSACST)

April 2011 ■ Issue 1 Page 1 of 50 NHSS 13

UKAS, 21-47 High Street, Feltham, Middlesex, TW13 4UN
Tel: 020 8917 8400 ■ Fax: 020 8917 8500 ■ Website www.ukas.com

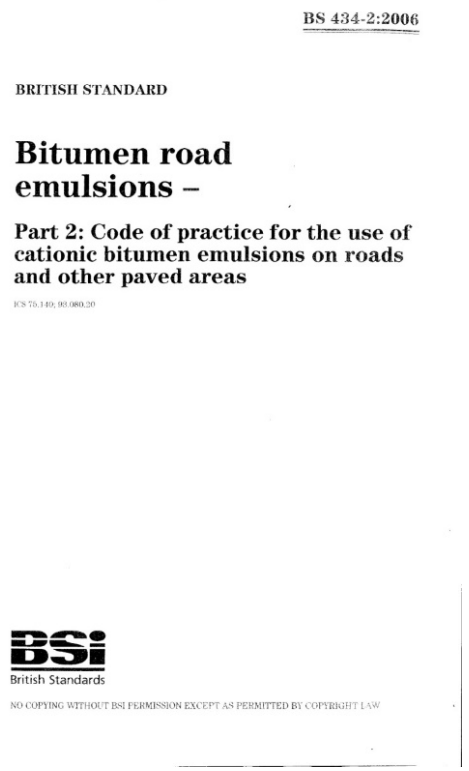


RSTA Code of Practice for Innovative Patching Systems

November 2020 - A review of this Code of Practice is currently taking place, following the publication of ***BS 10947 - Spray injection patching for highways and other paved areas – Specification*** & the current review of the ***Specification for Highway Works (SHW) Clause 946 – Local Repairs.***

CODE OF PRACTICE FOR INNOVATIVE PATCHING SYSTEMS

Issue 1 August 2013 1



BS 434-2:2006

BRITISH STANDARD

Bitumen road emulsions –

Part 2: Code of practice for the use of cationic bitumen emulsions on roads and other paved areas

ICS 75.140; 93.080.20

British Standards

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Figures: Asphalt Industry Alliance

Benefits of British Standard

Standard specification assists Local Authorities/Term Maint'ce Contractors procurement teams

Standard helps to improve consistency of product – customers know what to expect

Standard helps to improves quality of product – installers must demonstrate that product is compliant

British Standard BS:10947

Scope

Constituent Materials

Requirements

- Procedure
- Performance

Type Approval Installation Test

British Standard BS:10907

Scope

Spray Injection Patching is a product for undertaking permanent and temporary repairs to potholes and small scale pavement repairs on local and strategic roads and as a pre patching material for surface dressing and micro surfacing.

Constituent Materials – Emulsion Binders

Generally Cationic rapid setting bitumen emulsions (CRS 2)

Conforming to BS EN 13808

60-70% bitumen emulsion (applied cold or hot)

Polymer Modified Bitumen emulsions used in high stress areas

Summer and winter grades available

Traffic volume, road type, skid resistance requirements, weather, and future resurfacing plans may all affect the choice of binder

Constituent Materials - Aggregates

Aggregates should be clean, washed surface dressing grade chippings.

Conforming to BS EN 13043 and 2.8/6.3 Gc 85/15 f1 FI20 grading Table 4 grading limits for coarse aggregate in surface treatments (table 5 for fine aggregate)

Recommended aggregate size d/D (e.g. 2/6.3)

Recommended grading categories (e.g. GC85/15)

Fines content (passing 0.063mm)

Flakiness Index (e.g. FI20 or FI30, table 7)

Constituent Materials – Product Cohesion Test



Performance

- Initial Performance:
- Treated Area (up to 1m2 and confined on all sides to maximum depth of 60mm) shall be completed such that there is:
- No depression or crowning

- No undulation in the surface exceeding +/- 10mm
- Edge tolerance shall not exceed +/- 6mm
- Temporary Repairs = Meet performance criteria after 3mths
- Permanent Repair = Meet performance criteria after 12mths

Type Approval Installation Test (TAIT)

LOCATION RECORD							
ROAD NAME:	NEW ROAD			PARISH / TOWN:	HINGHAM		
LONGITUDE:	N/A			LATITUDE:	N/A		
URBAN:	NO			RURAL:	YES		
ROAD WIDTH:	SINGLE TRACK			SPEED LIMIT:	60		
DEFECT DEPTH	50MM						
SHADED:	Y / **N**	PART SHADED:	Y / **N**	UN-SHADED:	**Y** / N		
INLINES:	**Y** / N	BENDS:	**Y** / N	JUNCTIONS:	Y / **N**		
ROAD – BINDER RICH:	Y / **N**	ROAD – NORMAL:	**Y** / N	ROAD – BINDER LEAN:	Y / **N**		

PLANT RECORD								
VEHICLE REGISTRATION:	V27 VPL	ROAD PRE SWEPT:	Y / **N**			REPAIR START & FINISH TIME:	11.00AM	11.05AM
TYPE OF COMPACTION:		NONE:	**Y** / N	ROLLER:	Y / **N**	VIBRATION PLATE:	Y / **N**	TRAFFIC:	**Y** / N

WEATHER CONDITIONS					
WEATHER CONDITIONS:	DRY AND SUNNY	ROAD TEMPERATURES:	12 DEGREES	AIR TEMPERATURES:	14 DEGREES

MATERIAL RECORD					
AGGREGATE SUPPLIER:	BARDON	APPROVAL NUMBER:	43	AGGREGATE SIZE:	6MM SPLIT MIX
BULK DENSITY:	1.41	PSV:	160	REACTIVITY GRADING:	INTERMEDIATE
EMULSION SUPPLIER:	COLAS	EMULSION BATCH NUMBER:	W3421	EMULSION TYPE:	100 - 200 - **300**
ACTUAL APPLICATION RATE:	233	RECOMENDID APPLICATION RATE:	201	RAR - 5% BELOW 10% ABOVE	191 - 221

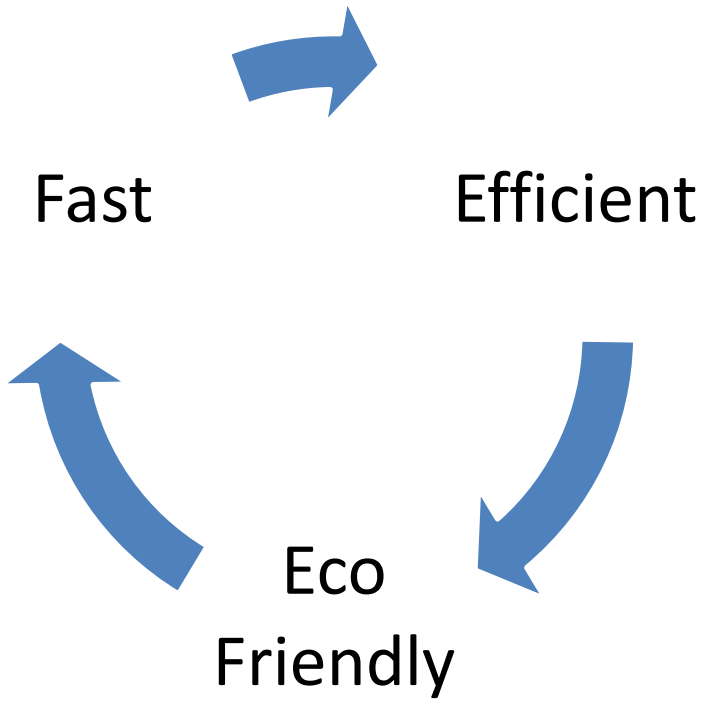
Type Approval Installation Test (TAIT)

3 MONTH CHECK:	REPORT:	AUDITOR:	NH	DATE:	25/07/18
	A good solid repair				

6 MONTH CHECK:	REPORT:	AUDITOR:	C.LAWRIE	DATE:	16.11.18
	Repair Good				

Range of Repairs (Not all provide)

- Urban and Rural
- Potholes
- Pre-surfacing treatment patching
- Depressions & Deformation
- Cracking & Crazing
- Edge Deterioration



Spray Injection Patching

- High volume low pressure air to clean the road surface defect before sealing with bond coat



Spray Injection Patching

- Aggregate is then propelled, using high volume air at low pressure, before mixing it with the bitumen emulsion moments before it is compacted as it is placed in the patch



Spray Injection Patching

Before (09:32am)



After (10:07am)



Spray Injection Patching

- **Permanent** repairs blending into the existing road surface
- Fast repairs **quickly** open to traffic
- Defects **sealed** to **prevent** water ingress and further damage
- **Improved** public perception due to speed of repair
- **Carbon savings** as all materials mixed at site with no waste
- **Mobile work**s reducing Traffic Management costs and closures
- **Reduced** insurance claims
- **proven to** make your budget go further

Cost effective

In the UK

According to the UK Asphalt Industry Alliance Alarm Report 2023

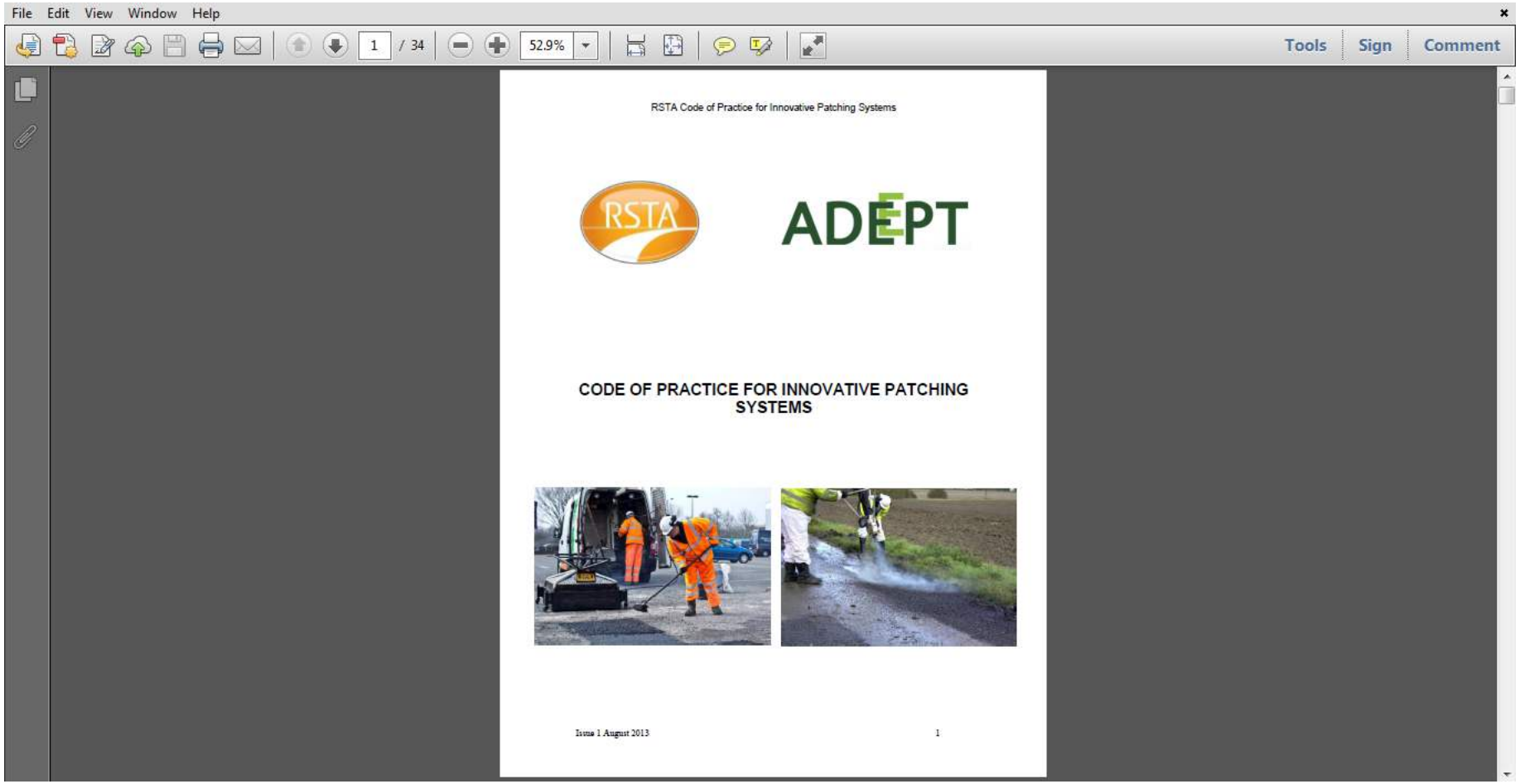
The average reactive pothole repair is £**76.71**

An average Spray Injection Repair will cost just £**23.22**

= up to ***70% cost saving***

CoP for Innovative Patching Systems

http://www.rsta-uk.org/downloads/RSTA-ADEPT-Code-of-Practice-for-Innovative-Patching-Systems-v2-July-2024.pdf



THANK YOU

jamie.cochran@archwayroadmaster.co.uk

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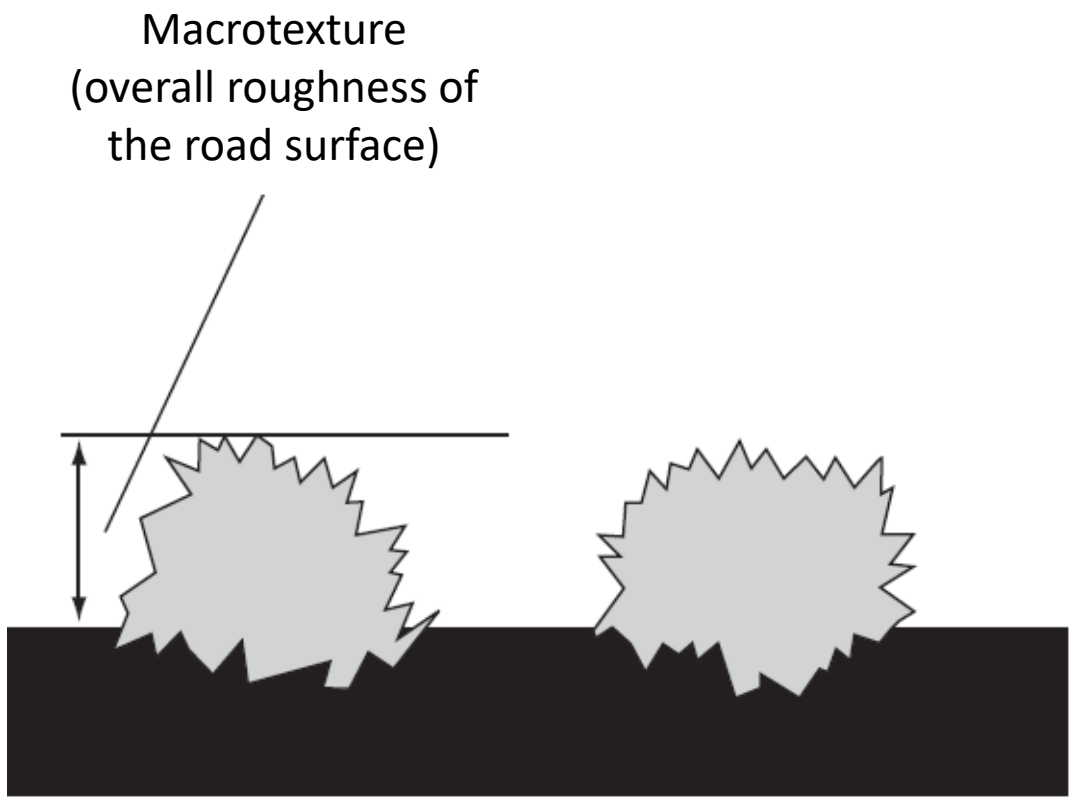
THE ROAD SURFACE TREATMENTS ASSOCIATION

Restoring Skid Resistance Without Costing The Earth

Ian Chattington
Power Plane Ltd M.D.

Factors affecting the macrotexture of a road surface

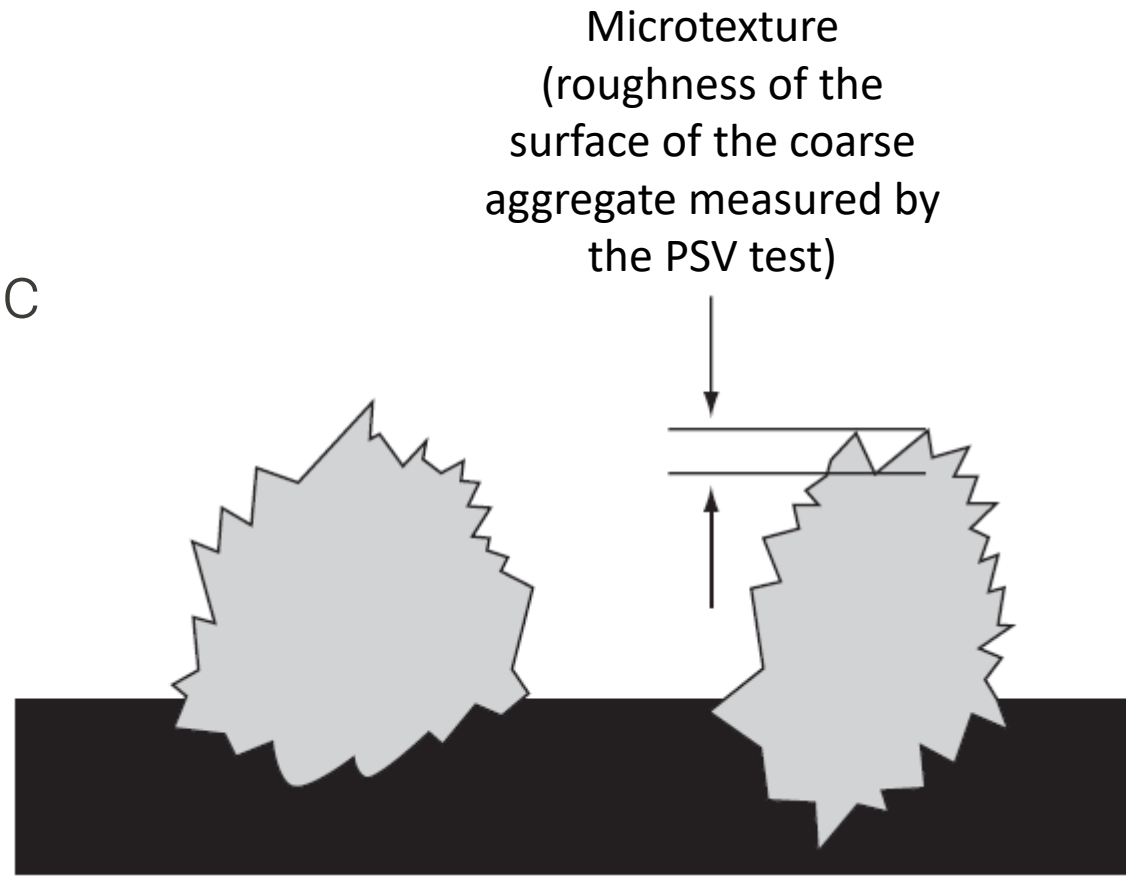
- Asphalt mix design – e.g.
  - Gap graded
  - Coarse
  - Fine
  - HRA
- Aggregate embedment - over or under compaction
- Multi-layer dressings
- High ambient temperatures can cause ‘fatting-up’
- Differential wear of aggregate and bitumen mortar
- Dirt, detritus, oil, rubber etc.



© The Road Surface Treatments Association

Factors affecting the microtexture of aggregate

- Abrasion by the action of traffic
- Microtexture blocked by e.g.:
  - Bitumen
  - Tyre rubber
  - Oil & diesel
  - Road dirt/detritus



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What is Retexturing?

Retexturing is the mechanical reworking of a sound asphalt or concrete surface to restore either skidding resistance, texture depth or both.

DMRB, CD 227 - Design for pavement maintenance

(formerly HD 30/08, HD 32/16)

© The Road Surface Treatments Association

CS 228 Skidding Resistance – Investigatory Levels

Site category and definition		IL for CSC data (skid data speed corrected to 50km /h and seasonally corrected)							
		0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65
A	Motorway	LR	ST						
B	Non-event carriageway with one-way traffic	LR	ST	ST					
C	Non-event carriageway with two-way traffic		LR	ST	ST				
Q	Approaches to and across minor and major junctions, approaches to roundabouts and traffic signals (see 4.5)				ST	ST	ST		
K	Approaches to pedestrian crossings and other high risk situations (see 4.5)					ST	ST		
R	Roundabout				ST	ST			
G1	Gradient 5-10%, longer than 50m (see 4.6)				ST	ST			
G2	Gradient >10%, longer than 50m (see 4.6)				LR	ST	ST		
S1	Bend radius <500m – carriageway with one-way traffic (see 4.7 and 4.9)				ST	ST			
S2	Bend radius <500m – carriageway with two-way traffic (see 4.8 and 4.10)				LR	ST	ST		

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Why Retexture?

- 3rd Party Claims/Litigation
- Save Money, Cost Effective
- Minimise Traffic Disruption
- Reduce your carbon footprint

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Techniques

- Captive shot blast
- Hydro-retexture
- Fine milling
- Flailing
- Diamond grooving/grinding

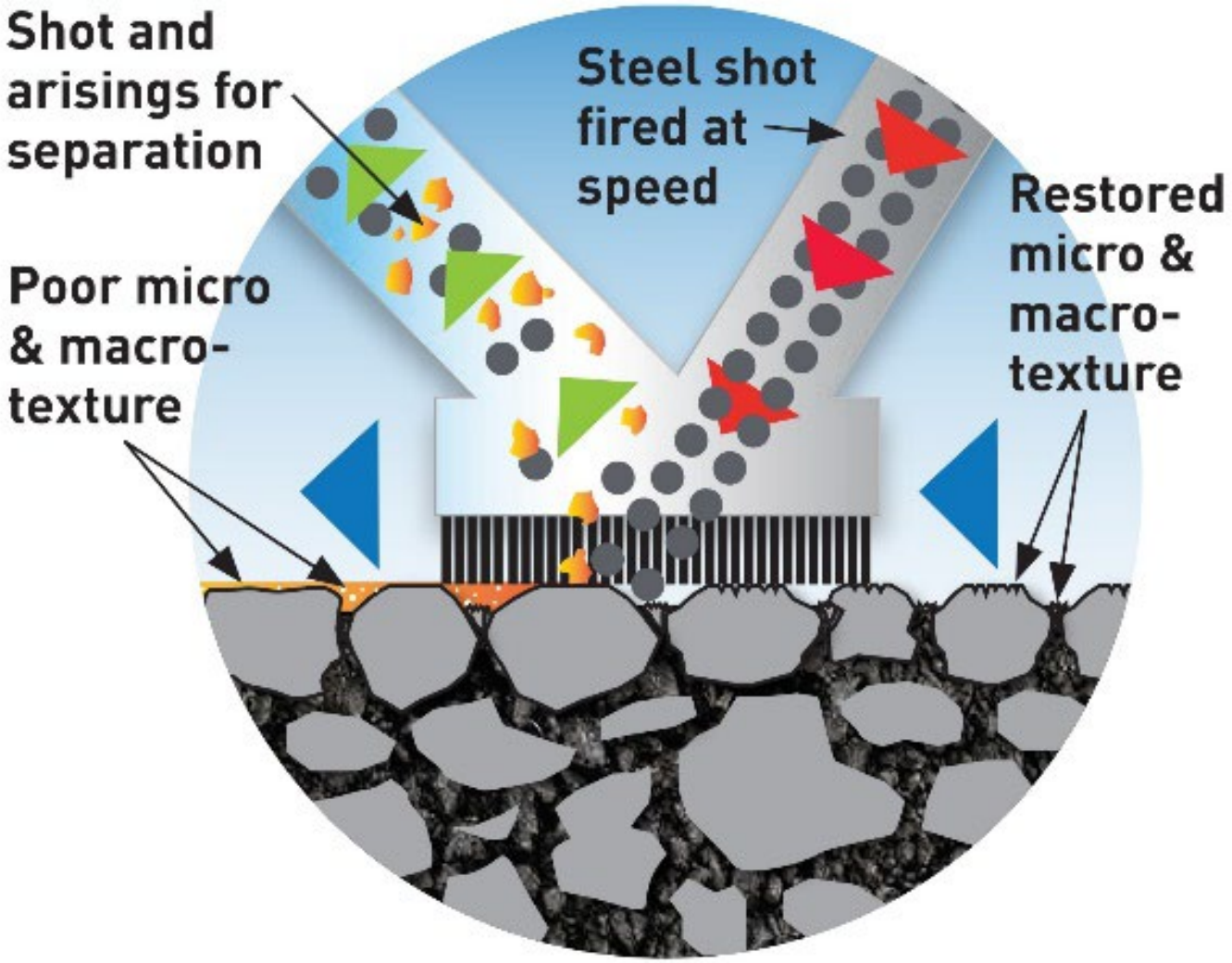
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Retexturing Considerations

- Site Selection- engage with a specialist contractor
- Surface Profile
- Micro or Macro
- Surface Type
- LANTRA approved NHSS 13 Contractor

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Captive Shot Blast



© The Road Surface Treatments Association

Captive Shot Blast



© The Road Surface Treatments Association



Asphalt



Concrete

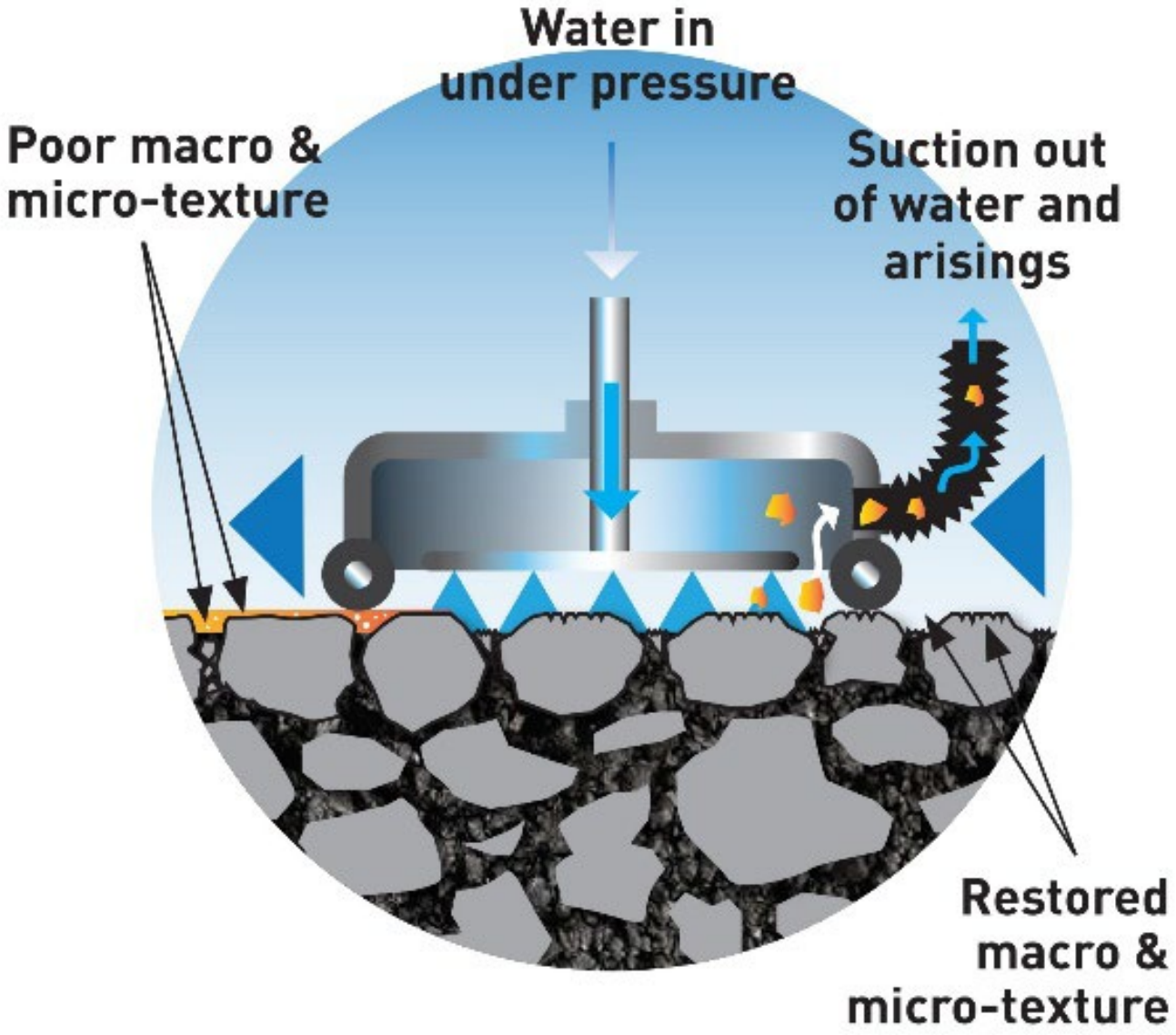
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Captive Shot Blast

- Restores macrotexture
- Restores microtexture
- Restores skid resistance
- Exposes new aggregate surface
- Removes excess binder
- Rapid process
- All arisings are removed by suction

© The Road Surface Treatments Association

Hydro-retexturing



© The Road Surface Treatments Association

Hydro-retexturing



© The Road Surface Treatments Association



© The Road Surface Treatments Association

Hydrotexture

- Restores macrotexture
- Exposes aggregate microtexture
- Restores skid resistance
- Strips off ‘fatted up’ exposed binder
- Rapid process
- All arisings are removed by suction

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Reporting and Asset Management



Test Results

Textureblast Limited

HIGHWAY CONTRACTORS

TO:

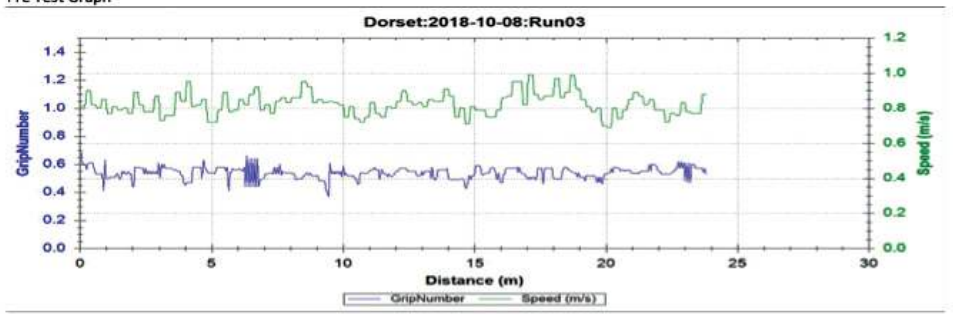
Tremayne House
Westpark
Wellington
Somerset, TA21 9AD
Tel: 01903 716358
Email: info@textureblast.net
Website: www.textureblast.net
Registered in England No. 5675801
VAT No. 878 6337 65

TEST LOCATION: Site
ROAD SURFACE: HRA
PRE TEST DATE: Monday, 8 October
POST TEST DATE: Monday, 8 October

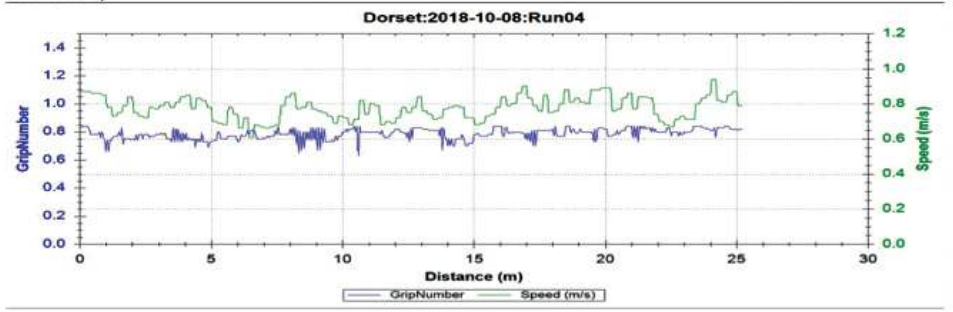
Determination of Skid Resistance on Wet Surface Using Findlay Irvine Micro GT Griptester

Distance (M)	Latitude	Longitude	Grip No.	Grip No.	Percentage Increase
0	050:55.7324N	002:30.6038W	0.60	0.85	41.67%
5	050:55.7298N	002:30.6026W	0.55	0.75	36.36%
10	050:55.7273N	002:30.6018W	0.52	0.80	53.85%
15	050:55.7246N	002:30.6014W	0.60	0.80	33.33%
20	050:55.7222N	002:30.6013W	0.55	0.85	54.55%
25	050:55.7198N	002:30.6014W	0.53	0.86	62.26%
		Average	**0.56**	**0.82**	**46.57%**

Pre Test Graph

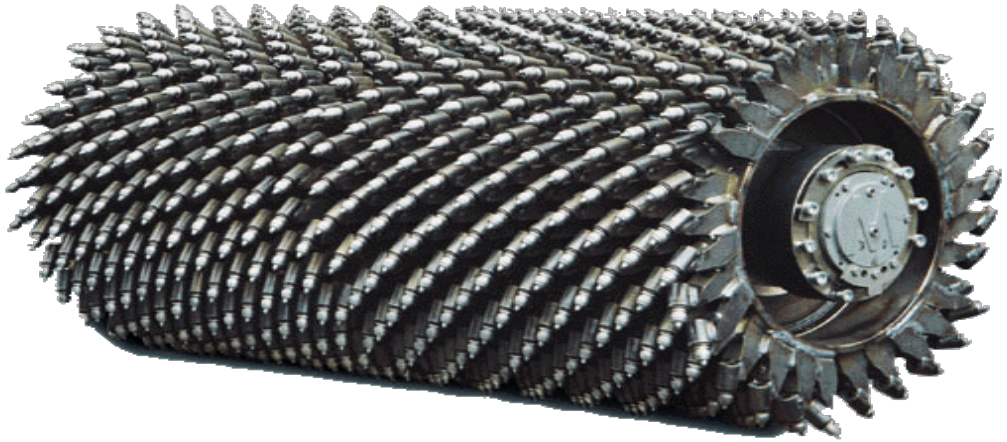


Post Test Graph



© The Road Surface Treatments Association

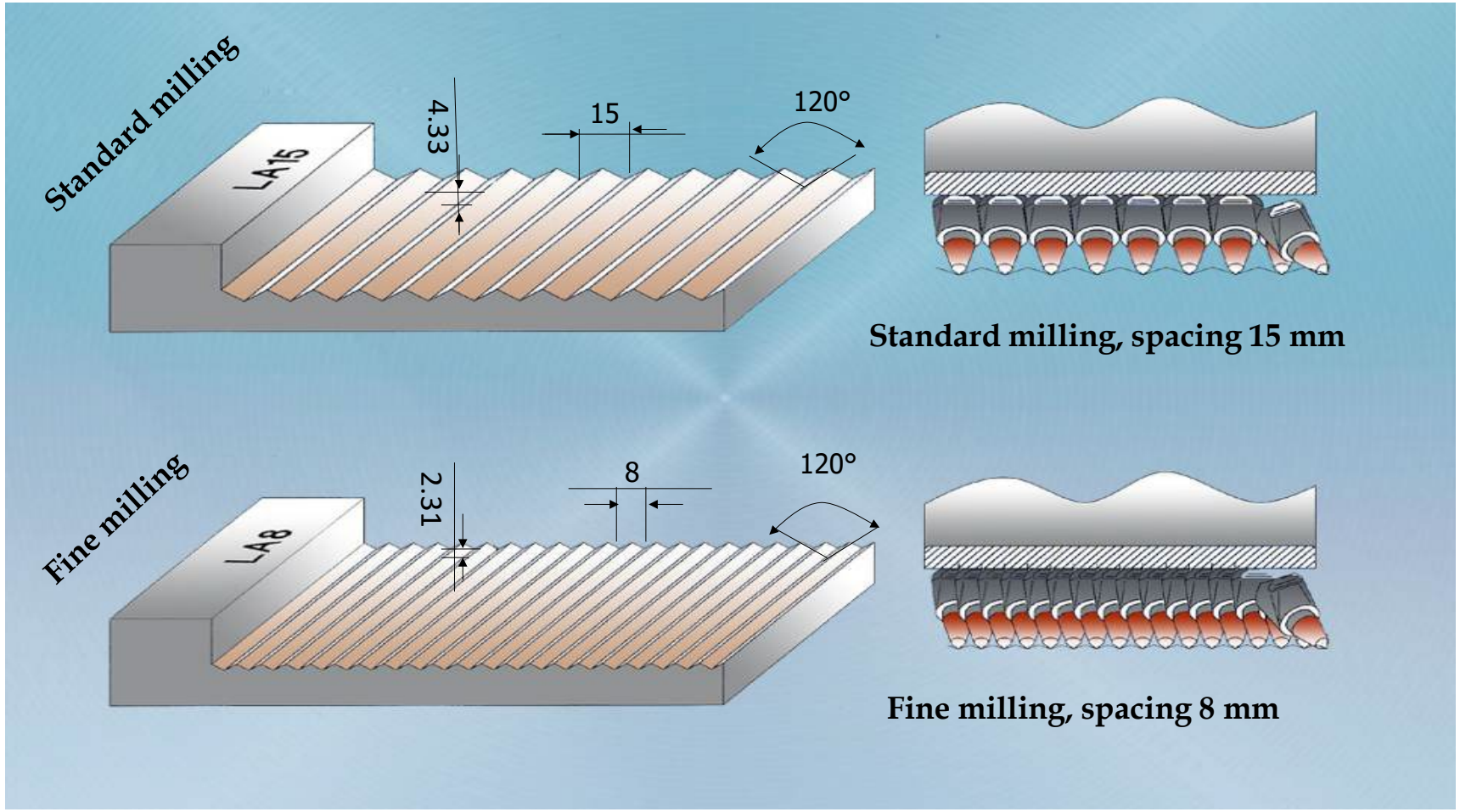
Fine Milling



An economical method for the rehabilitation of road pavements

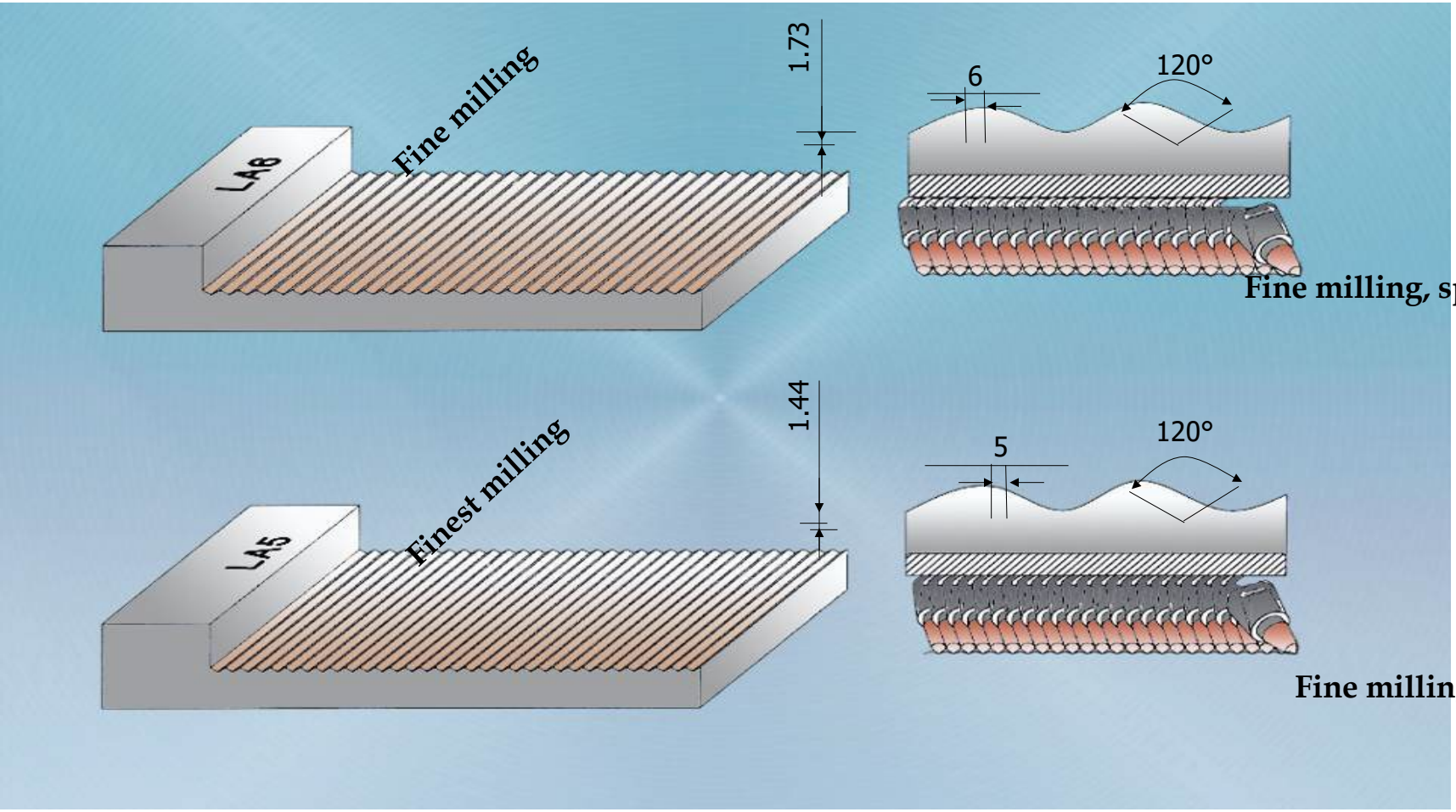
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Fine Milling - Cutting Technology



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Fine Milling - Cutting Technology



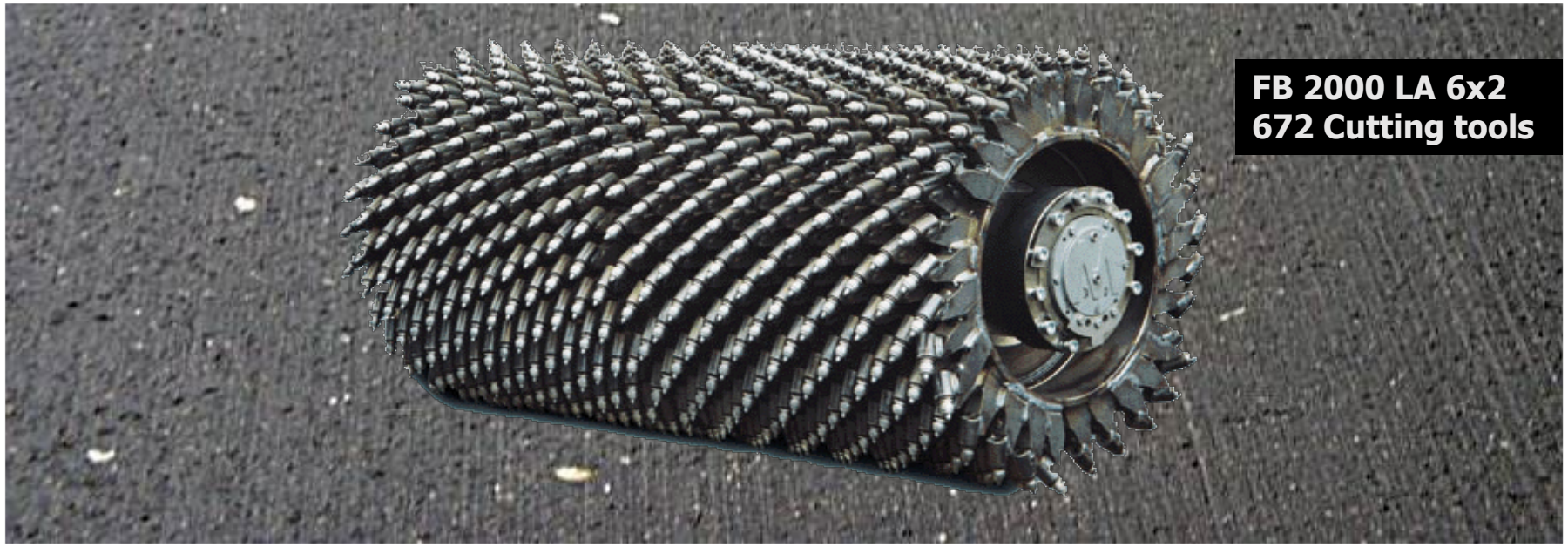
Fine milling, spacing 6 mm

Fine milling, spacing 5 mm

© The Road Surface Treatments Association

Our Fine milling drum

FB 2000 LA 6x2

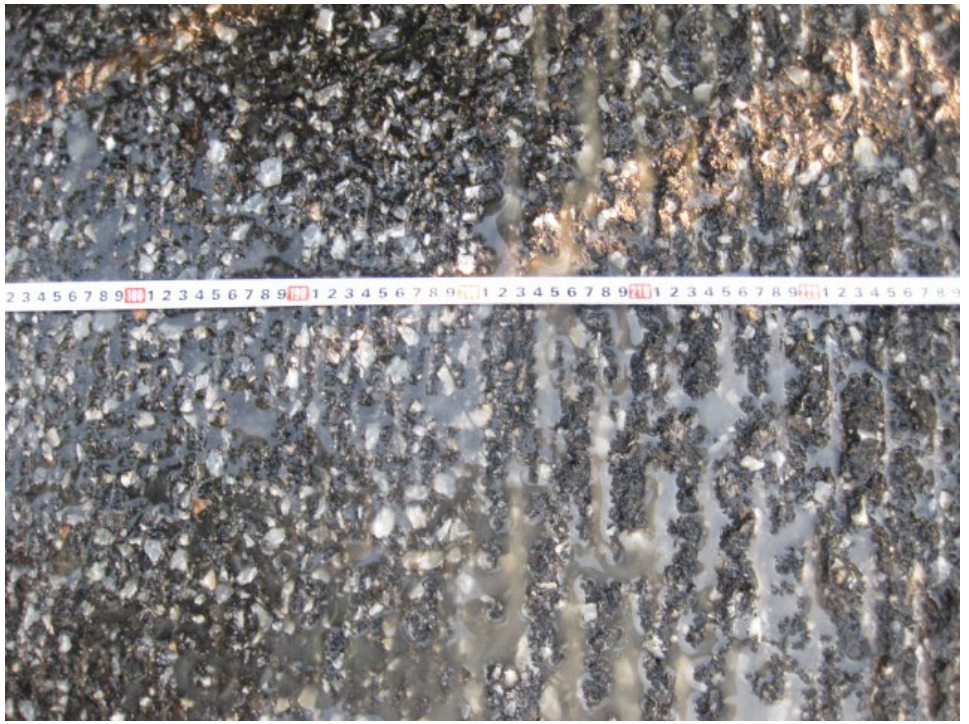


- 2 cuting tools per line (each tool exists twice, offset by 180°)
- For an even smoother surface texture
- The ideal milling drum for each application due to high flexibility and competence in manufacturing milling drums
- Milling width: 2000 mm

© The Road Surface Treatments Association

Fine milling finish compared to standard milling

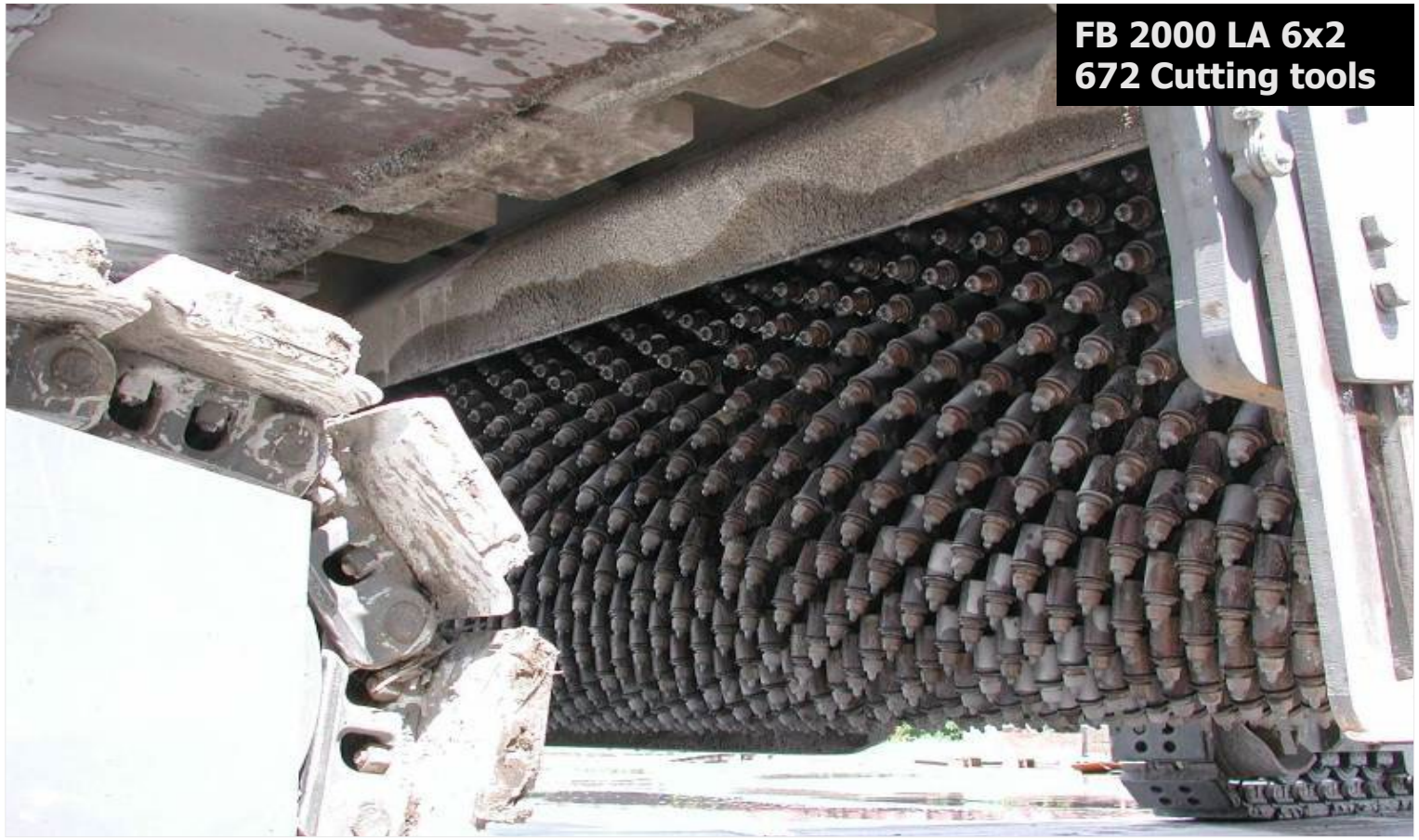




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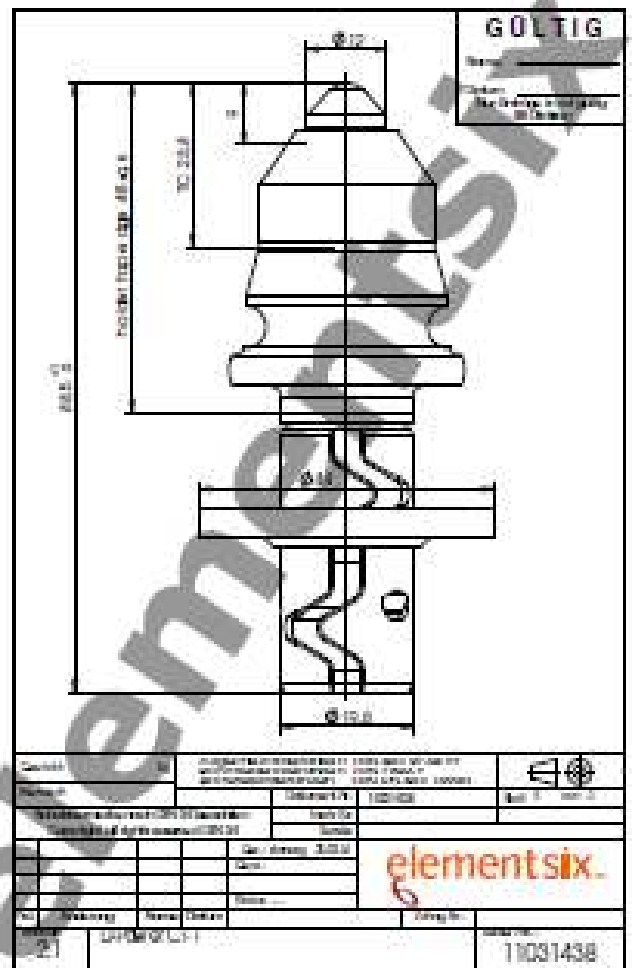
Fine milling to restore the skid-resistance asphalt and concrete roads.

FB 2000 LA 6x2 672 Cutting tools



© The Road Surface

Concrete Retexturing using synthetic diamonds



Pick D-Power CT1

Synthetic diamond is the hardest material known to man.
It scores highest (10) on the mohs scale of hardness. PCD consists of micron-sized synthetic diamond powders bonded together by sintering at high pressures and temperatures. PCD is produced on a tungsten carbide substrate. Under extreme pressures and temperatures, the cobalt from the tungsten carbide substrate infiltrates through the layer of micron synthetic diamond powder, causing neighbouring grains to intergrow. The integrally bonded carbide substrate provides mechanical support and renders the composite brazeable. Element Six has engineered the PCD material to meet the specific demands of road milling.

© The Road Surface Treatments Association

Summary

- CO2 A typical 40mm inlay 4,000 sqm produces 22 tonnes of carbon in production of material –plus laying process ?
- Retexturing this same site produces 1.2 tonnes of carbon
- £25 per sqm resurfacing compared to less than £5.00 per sqm retexturing .
- Retexturing will prevent barrier strikes with their resultant costs of £4 -6k per incident
- Immediately makes an unsafe surface safe -buying an authority time in certain circumstances
- Will maximise the use and performance of the high psv s/c originally invested in .

© The Road Surface Treatments Association

Case Study Brighton & Hove Fine Milling



© The Road Surface Treatments Association

County Oak Ave Brighton BN1 8DJ

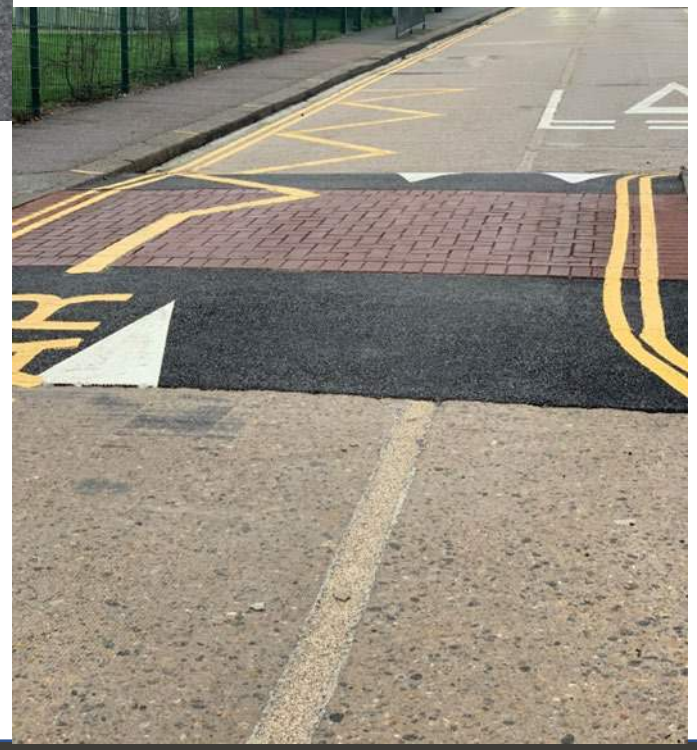
Joint project Power Plane and Roadtechs

- Removal of failed surfacing
- Fine milling old concrete surface to restore texture
- Repairs to joints
- Repair any areas of defective concrete
- Check existing ironwork and re-level if required



- Road surface failure and stripping
- Differing skid resistance
- Safety issues

- Defective surface removed
- Skid resistance increased
- Safer roads for the customer



© The Road Surface Treatments Association

A31 Alreford - Winchester

Hydro-Blast Retexturing scheme – October 21

- 2200 tonnes of high quality virgin aggregate saved
- 180 tonnes of bitumen saved
- In excess of 150 tonnes of Carbon Dioxide not produced that more traditional options would have introduced into the environment
- Over £500,000 in savings by not planing, resurfacing, relining and restudding



- Road significantly ‘fatted up’
- Skid resistance substantially reduced

- Binder removed
- Skid resistance increased
- Safer roads for the customer



© The Road Surface Treatments Association

THANK YOU

© The Road Surface Treatments Association



In-Situ Road Recycling

Latest developments driving Carbon mitigation

Is it really innovation?













SPL in the UK: 250,000 m2 per annum

- Deep
- Regen















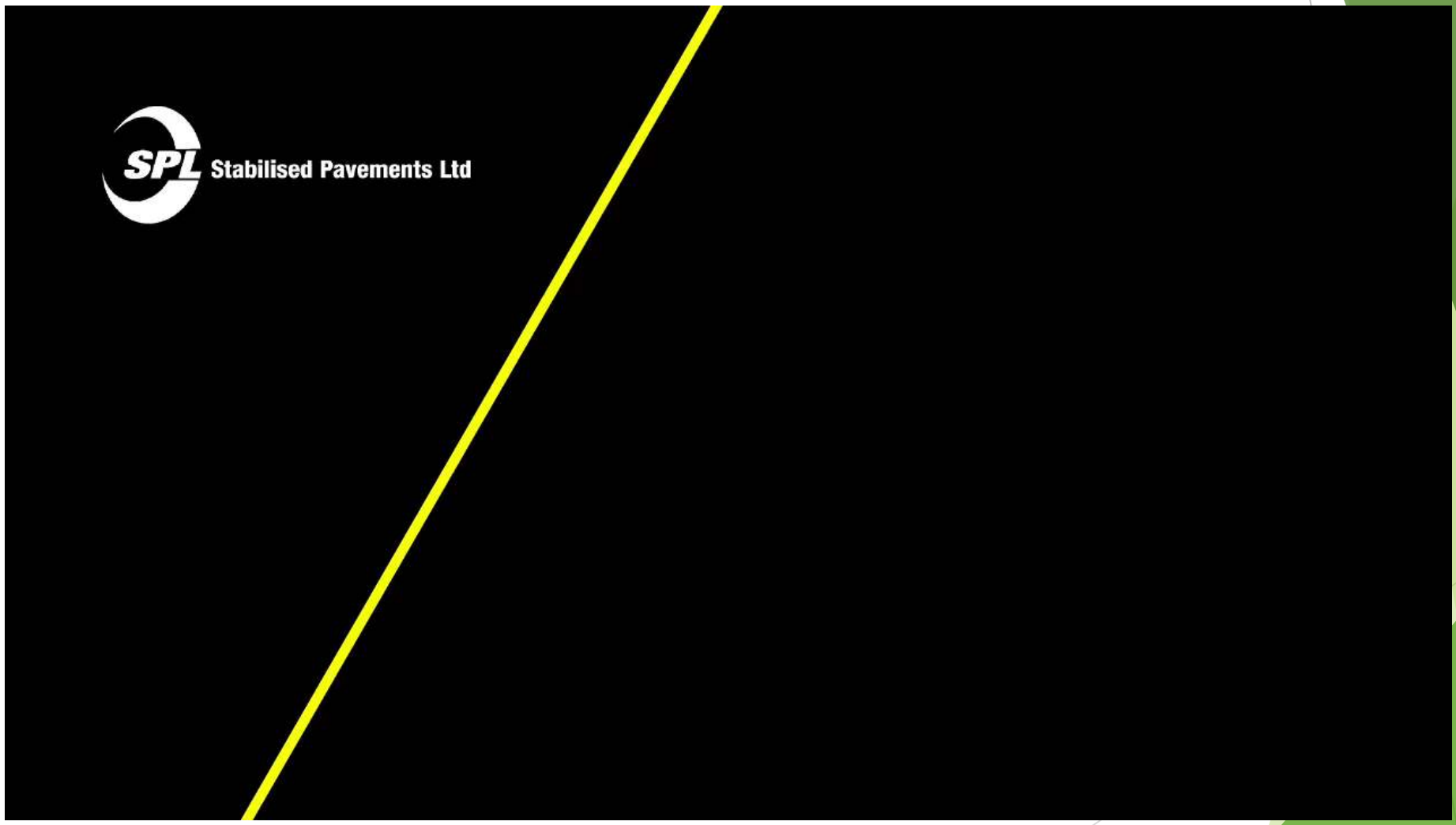








What is in-situ recycling



The mixing process





The benefits

- Recycles 100% of your existing road asset
- Cold process
- New binder addition can be as low as 2%
- Reduction in lorries: 1km of road
  - In-Situ 🚚🚚🚚 17
  - Ex-Situ 🚚🚚🚚🚚🚚🚚🚚🚚🚚🚚🚚🚚🚚🚚 336
- Faster build times

Fuel saved = Carbon Saved

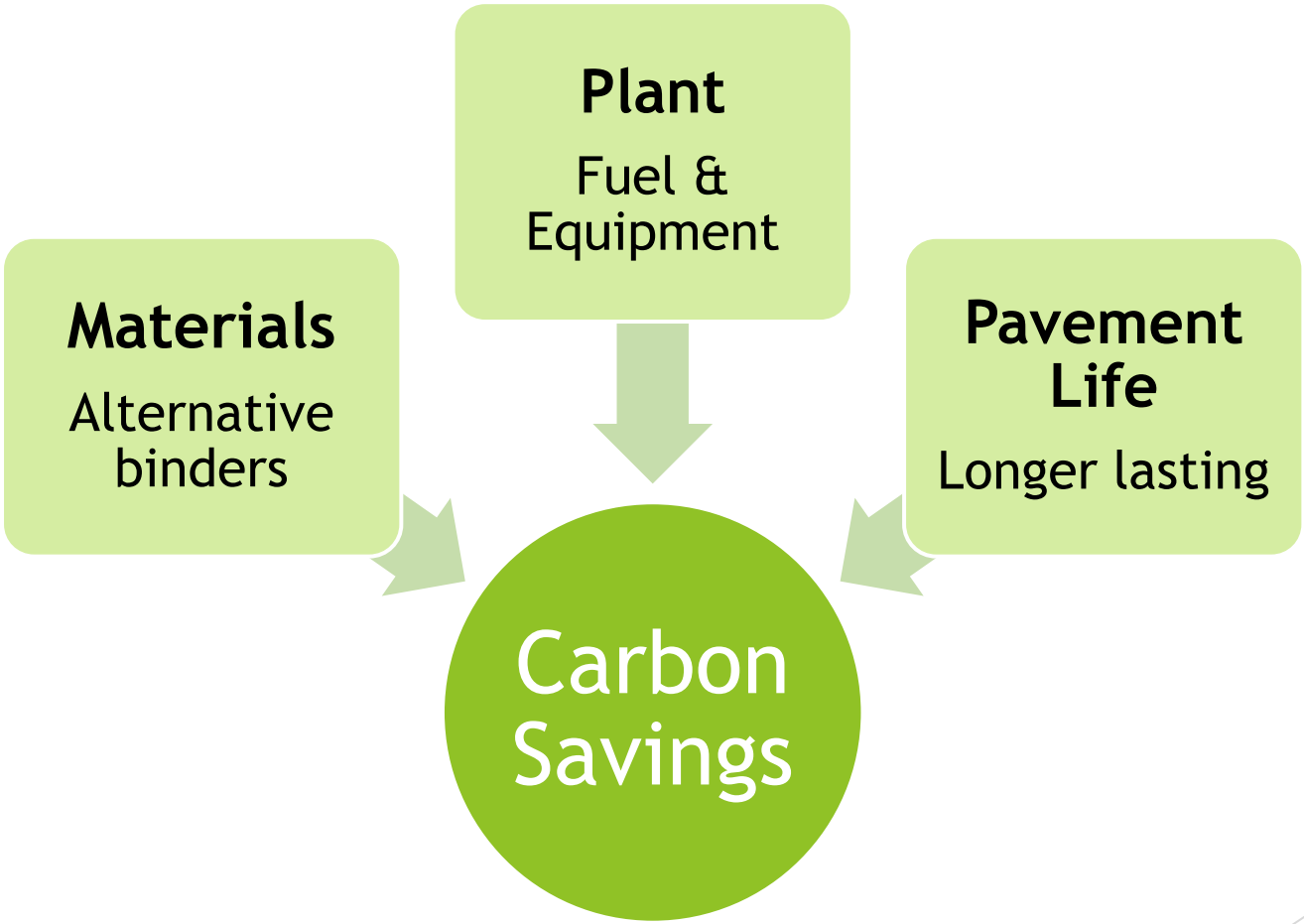
Where can it be used?



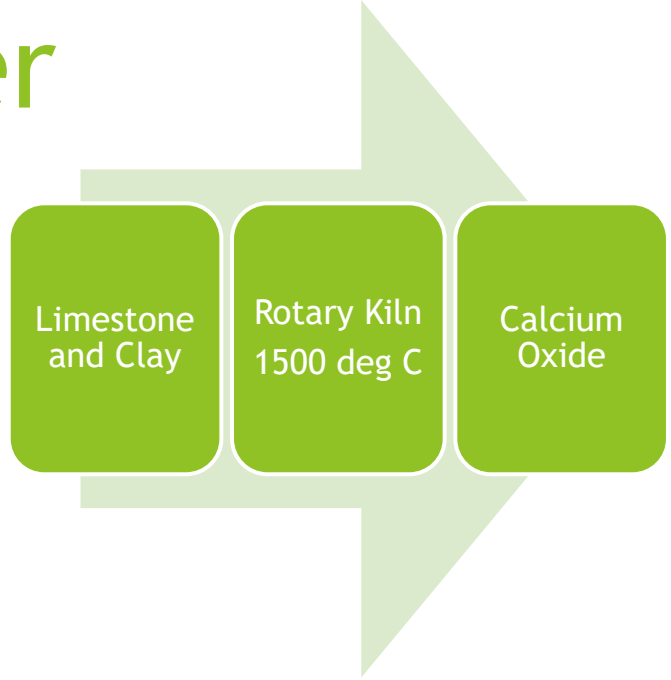




Lowering Carbon



Reducing the Clinker Factor



Process Emissions
Combustion Emissions
Reduce Temperature
Increase use of substitute industry byproducts

Cem II currently 604 kgCO2/t
Future aim <400 kgCO2/t

CEMEX
Building a better future

Cement substitute site trial (June 2023)

Norfolk County Council

Hoffmann Green's H-EVA Sol CALCINED CLAY technology Reduces CO2 by 56%* v CEM2

- ✓ Standard in-situ equipment
- ✓ Equivalent 2% binder addition
- ✓ Equivalent water consumption
- ✓ No reduction in outputs

*CEM2 604kg v H-EVA 272kg CO2eq/t







H-EVA Trial: Site testing during recycling



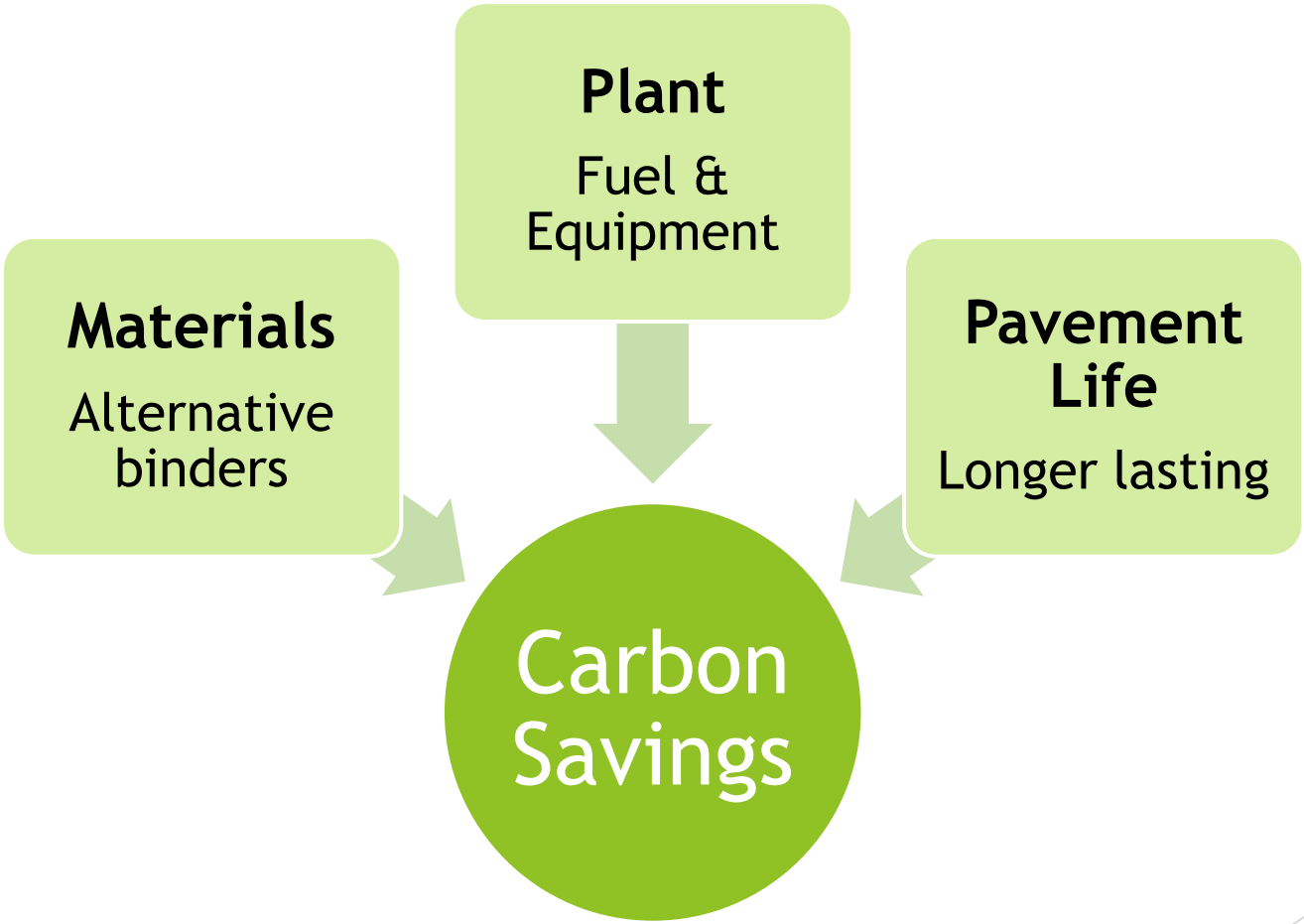


- Cylinder Strength:
  - Average: 2.5N/mm2

    + Increase of 19% over pre-testing (2.1N/mm2)

- Surface Stiffness using LWD
  - Completion: 125Mpa
  - +2mths: 225Mpa
  - +4mths: 576Mpa
  - +6mths: 610Mpa

Lowering Carbon

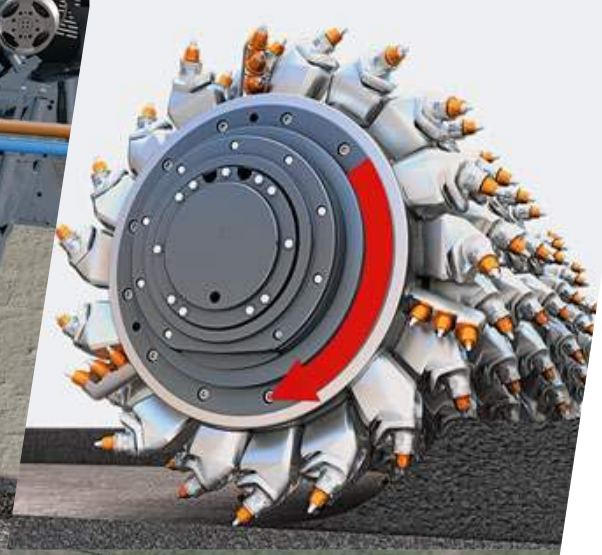


HVO Fuel for SPL Plant



- Wirtgen approve HVO for SPL CIR Plant
- Coordination through Milestone Suppliers for fueling forward programmes of work







Faster construction…

- Higher Outputs: 3.2m mixing drum in single pass
- Precise level control through Paver
- ‘Down-Cut’ process optimises material grading
- Computer control mixing and binder additions



Site efficiencies

‘Moveable mixing drum’

- Reduces turning onsite
- Safer operation
- Less idling time saves fuel



BOMAG Pivot Steered Tandem Hybrid Roller



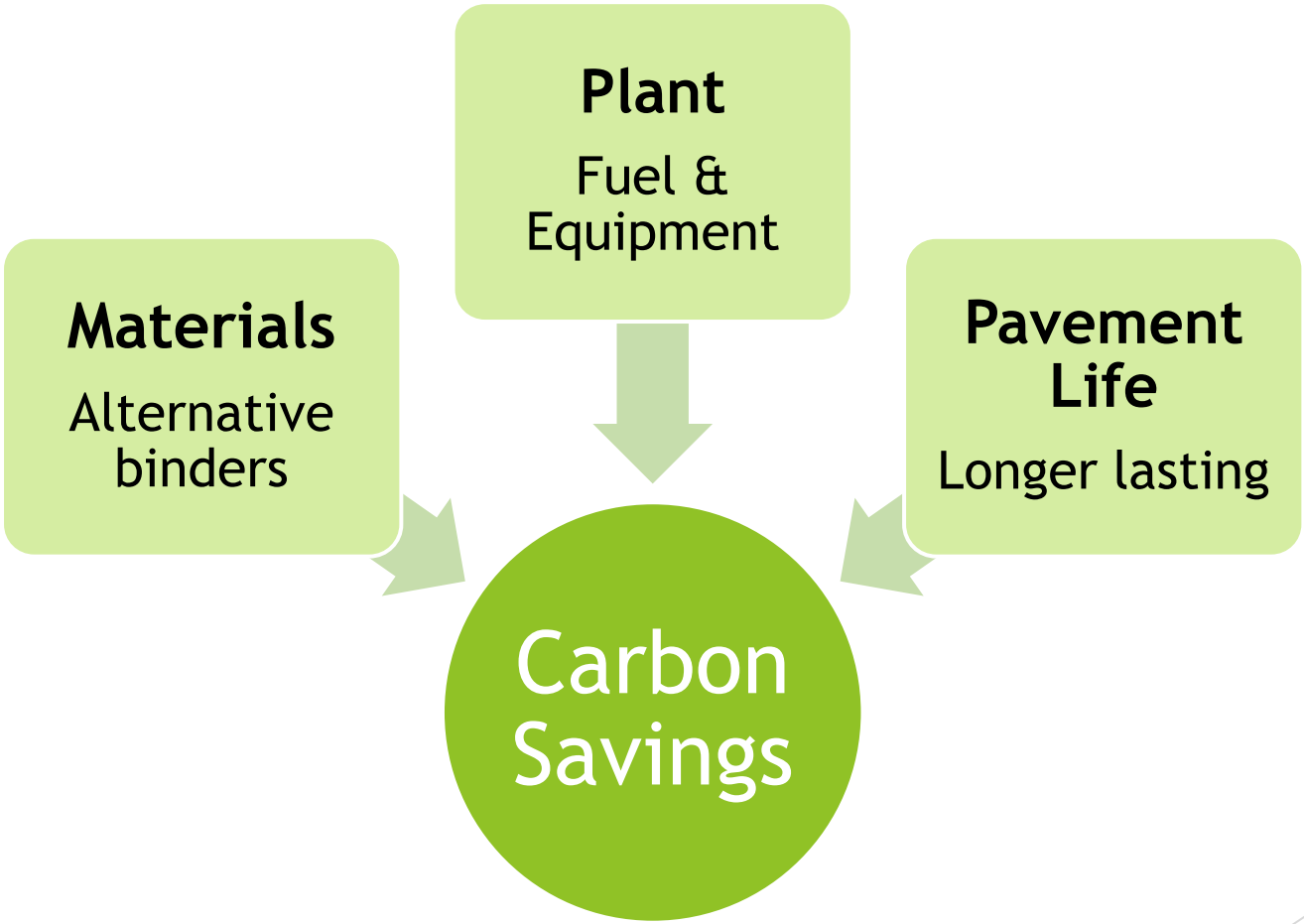
In addition to latest compaction technology From Bomag, features include:

* Accredited Back Protection by AGR – the German Campaign for Back Health

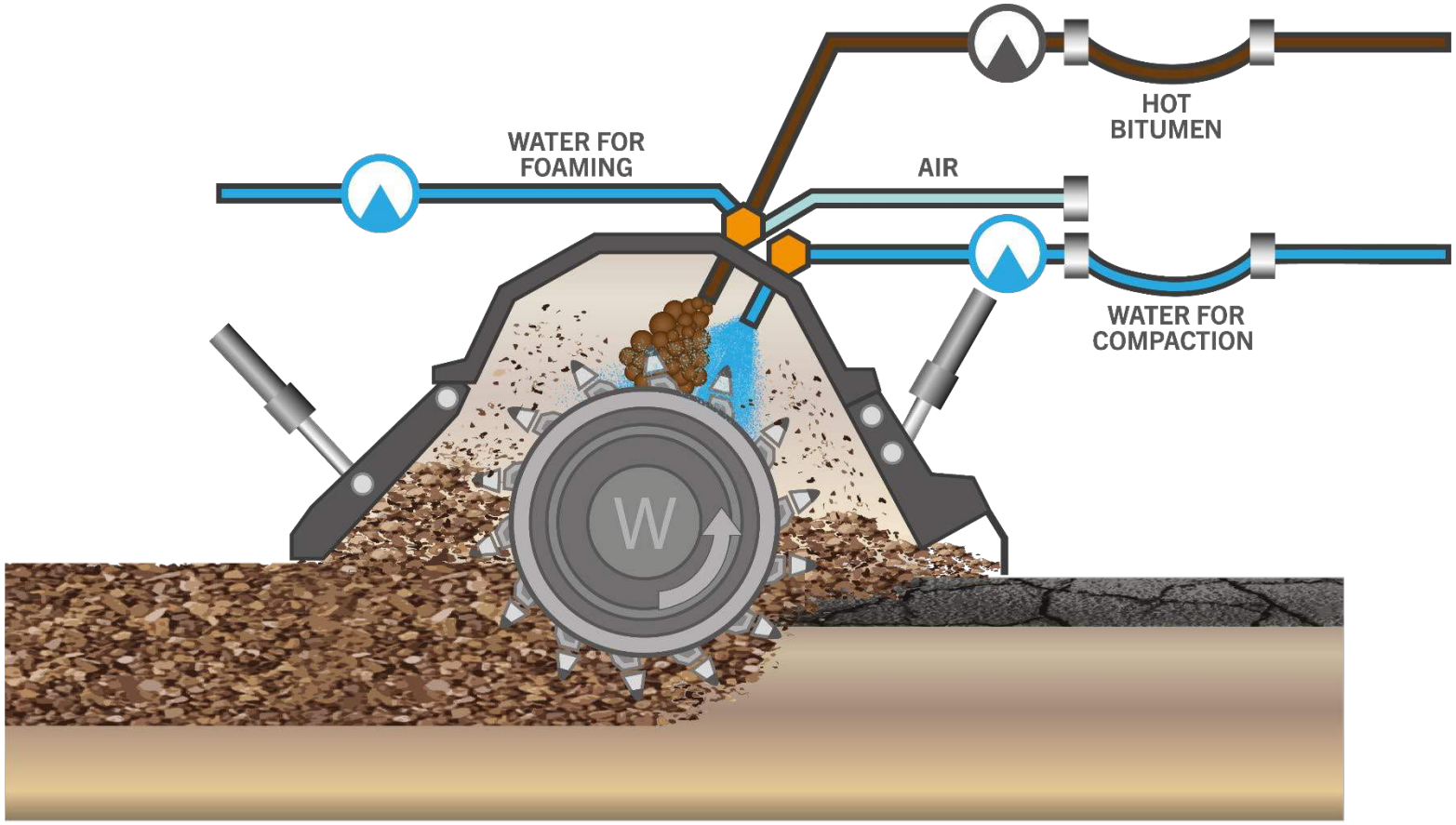
* Hybrid Technology and Ecomode/stop minimises fuel consumption

* Articulated set up mitigates risks at road edges

Lowering Carbon



In-Situ Foam Mix



Twenty-year design life with in-situ Foam



Design: 300mm Deep Foam Bitumen with Double Surface Dressing

OXFORDSHIRE COUNTY COUNCIL

- 2km of road
- Saved 227 tonnes CO2 (71% reduction)
- Saved 564 lorry movements
- 8 days faster than deep asphalt patching

In-Situ Ground Stabilisation Grid



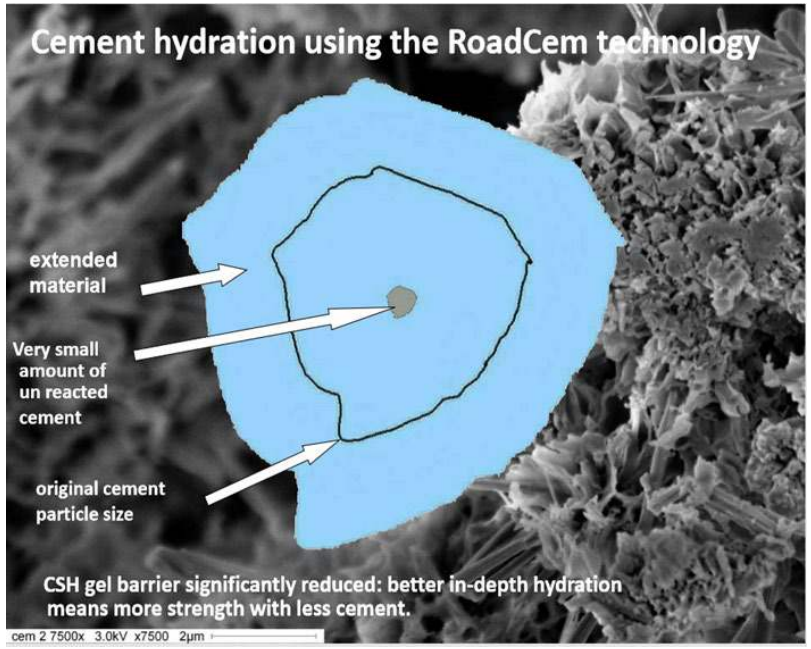




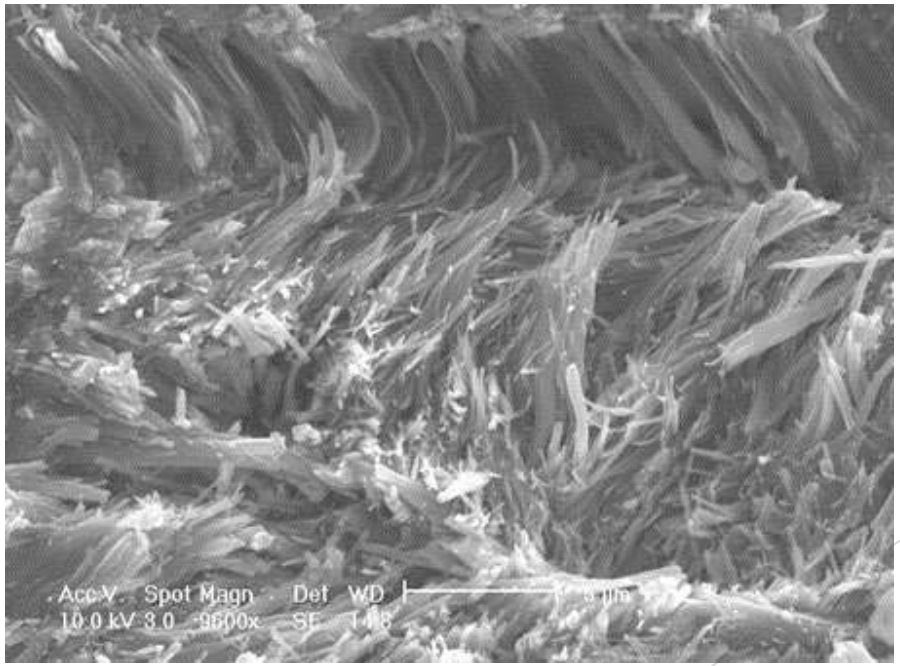
RoadCem overcomes UK challenges:

- Poor Drainage
- Shallow Clays
- High Water Table

Roadcem



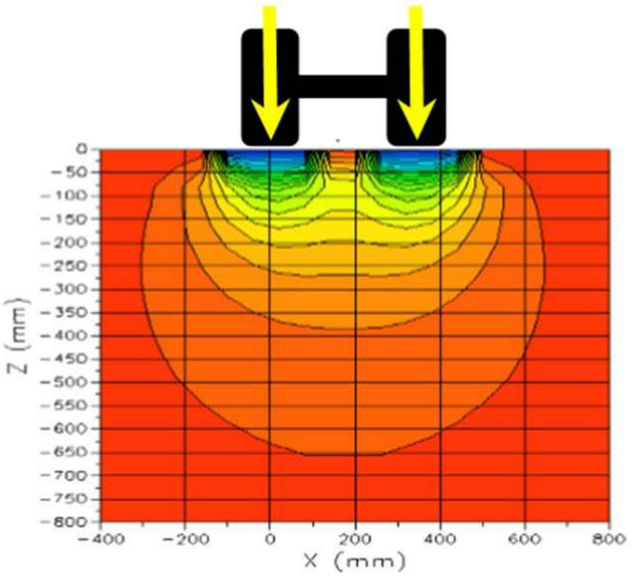
- **Enhanced cement performance**
- **Flexibility through formation of long strings wrapping particles**



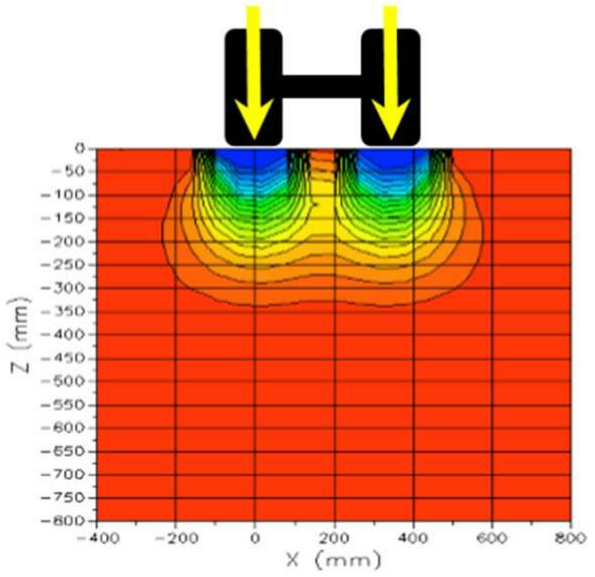
Powercem



RoadCem Smart technology creates stiff platforms with a greater modulus of elasticity…



Traditional



RoadCem

Graphene Trial – A1 for National Highways

- Graphene Nano Platelets (GNP) in powder form
- GNPs are two-dimensional carbon structure materials with single or multilayered graphite plane

- Characteristics:

- high electrical conductivity
- high modulus
- high strength
- high thermal conductivity
- high specific surface area.



Mixing on site

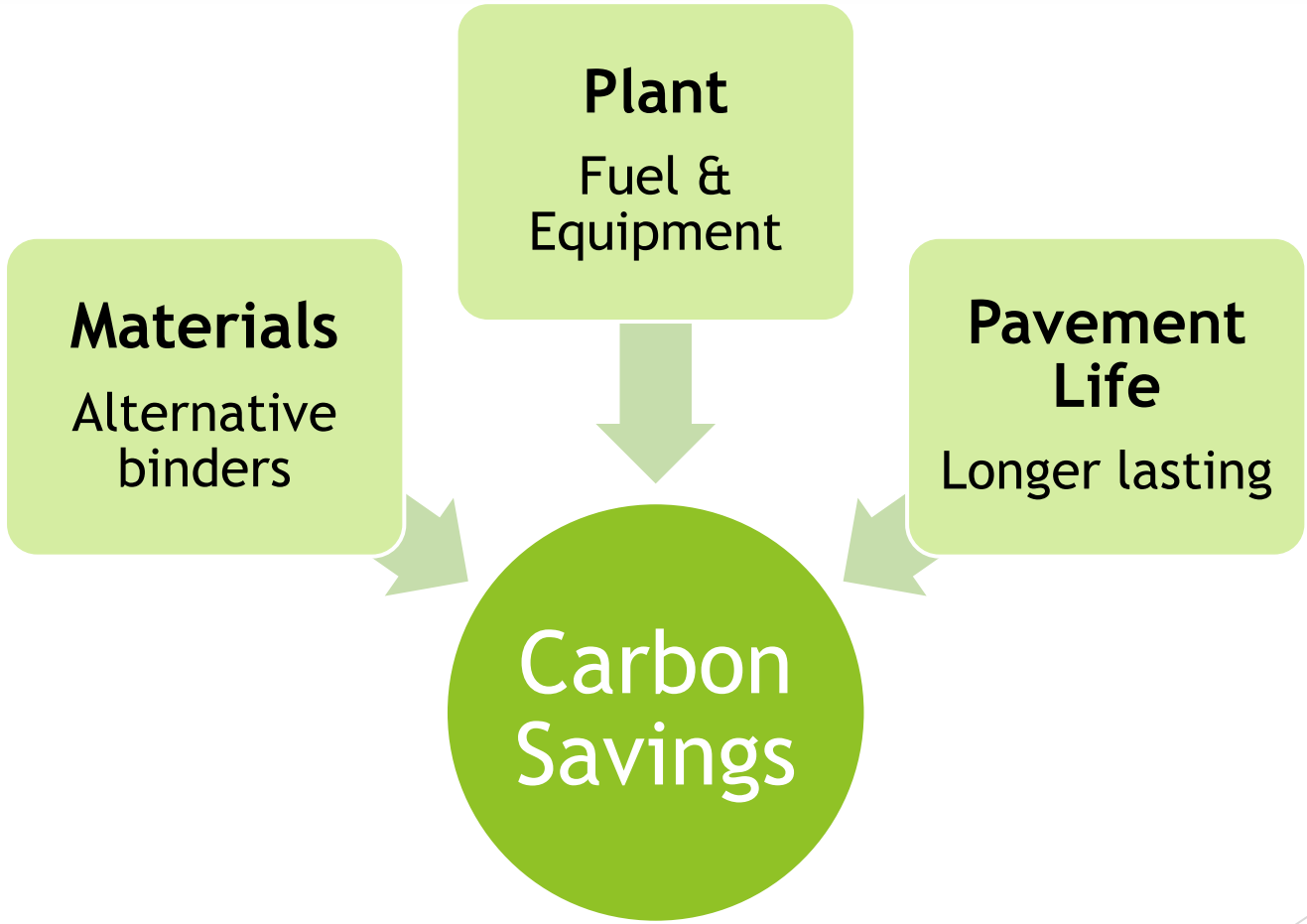




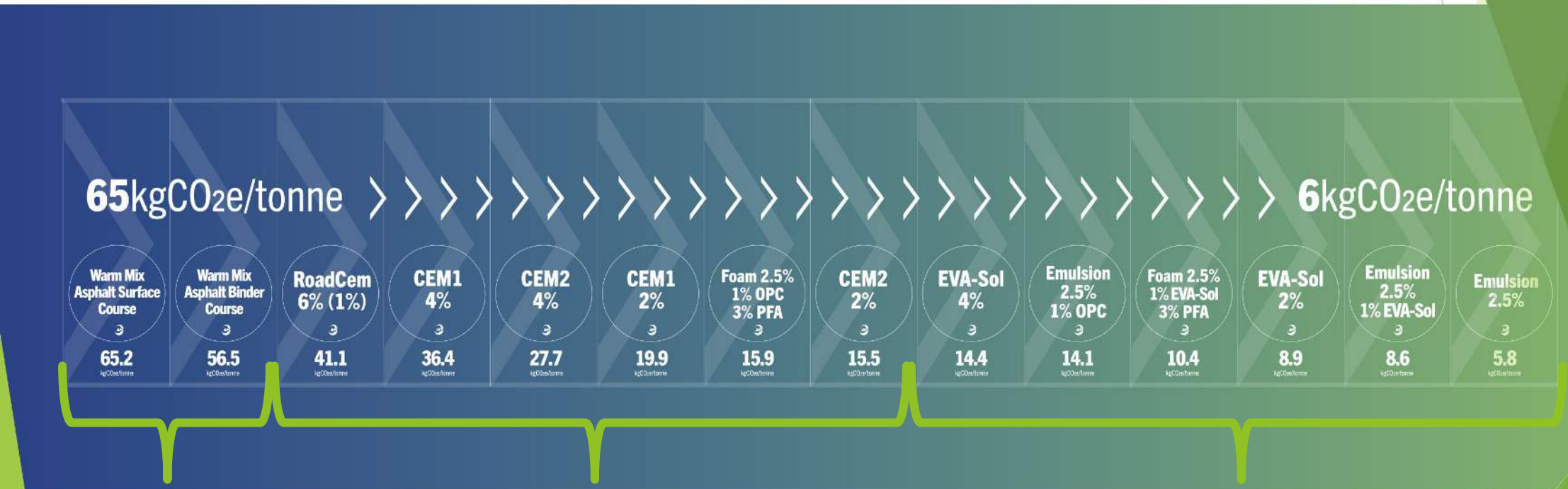




Latest developments > Lowering Carbon



SPL's Carbon Ladder



Collaboration – How we get there

Communication through Industry Events

Client adoption and SPL's role in early uptake

Provide Laboratory evidence for design adoption

Provide commercial benefits

Developing Collaborative Partnerships crucial for innovation and future improvements to Highway Maintenance



LGTAG Technical Advisers Group

lcrig

RSTA

INSTITUTE OF HIGHWAY ENGINEERS

CIHT

iat



Thanks for Listening

Latest Developments on Pavement Recycling

Hayden Davie
Business Development Manager
Stabilised Pavements Ltd
h.davie@stabilisedpavements.co.uk

RSTA Technical Training Day

Where does Highway Maintenance fit in a carbon lifecycle?

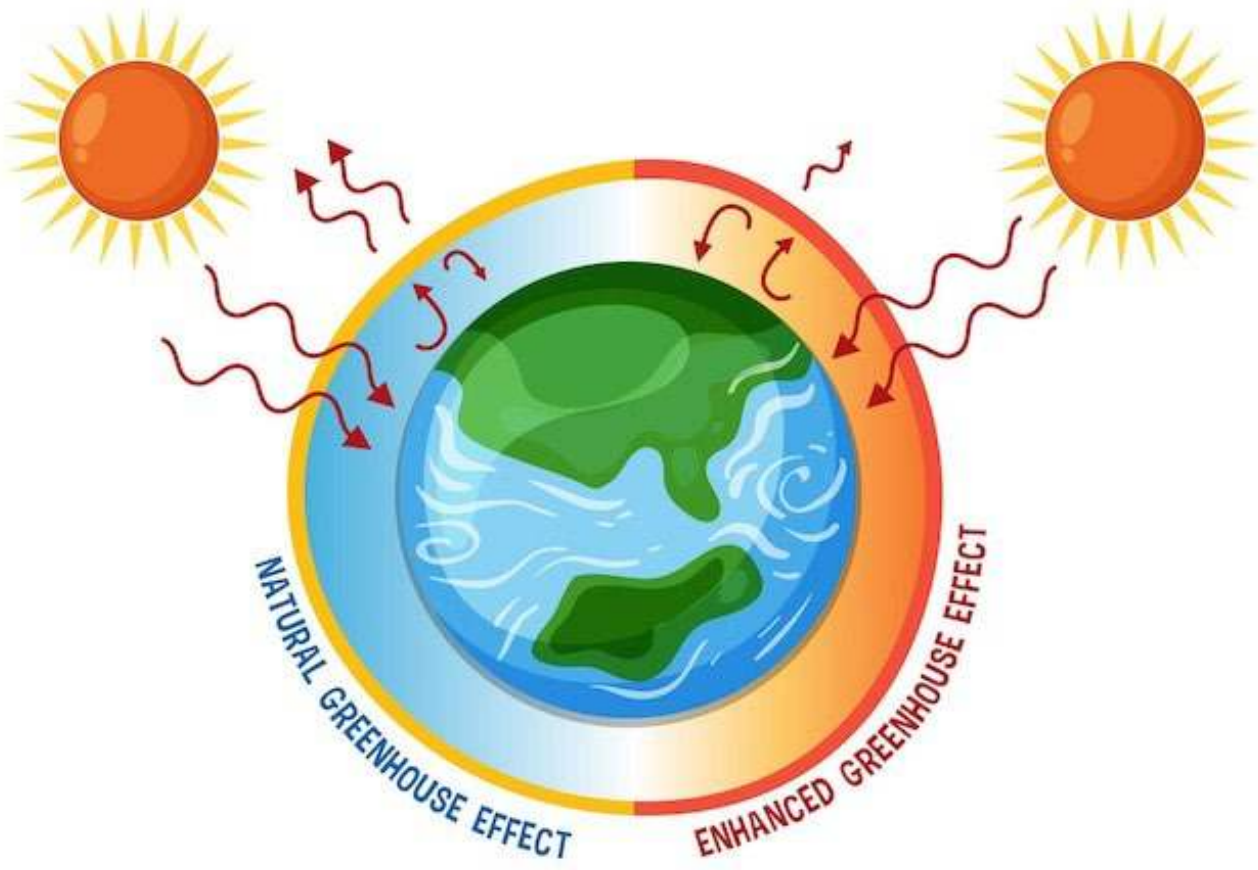
Emma Pye

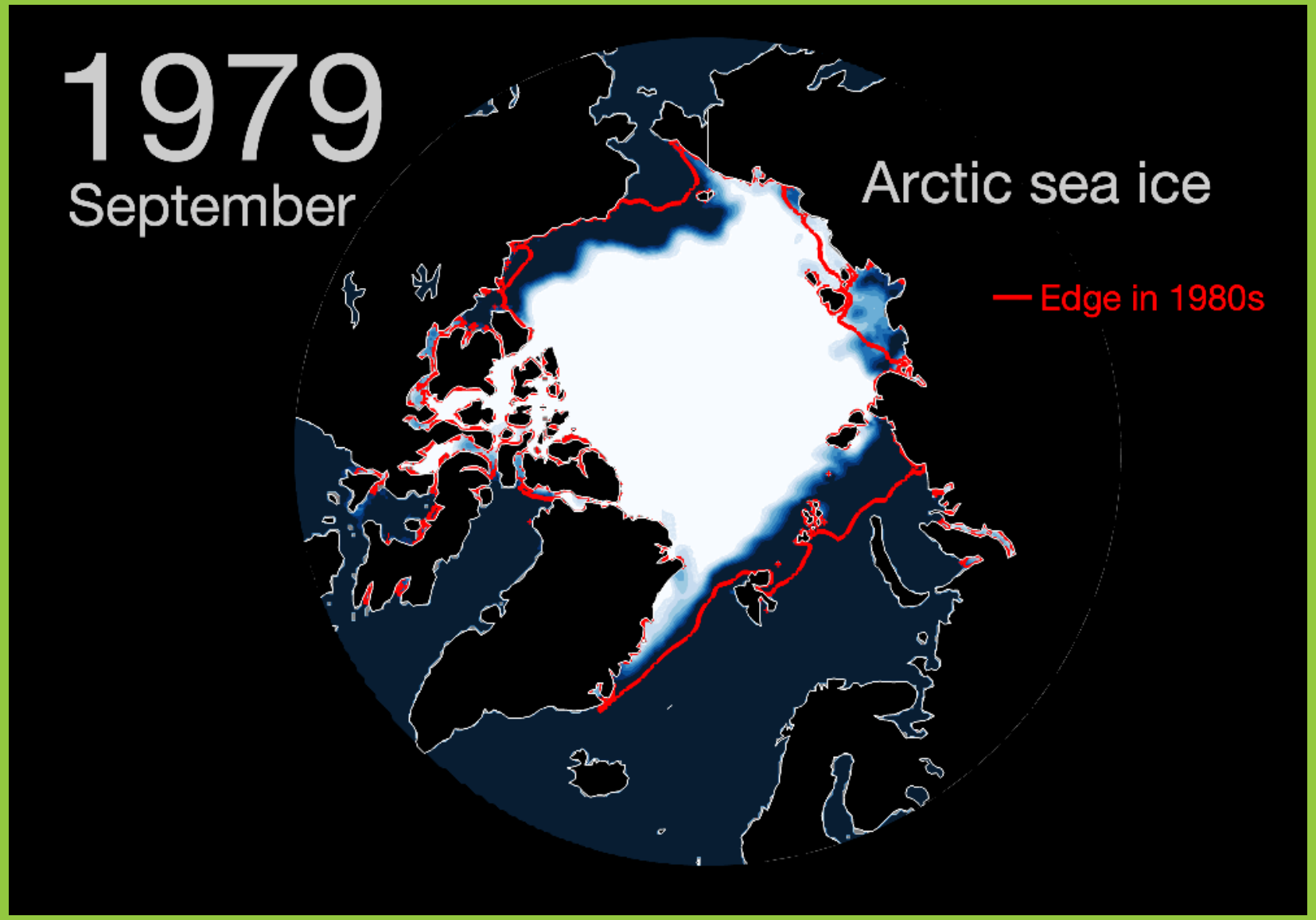
November 2024

PYE MANAGEMENT
SUSTAINABILITY CONSULTANTS

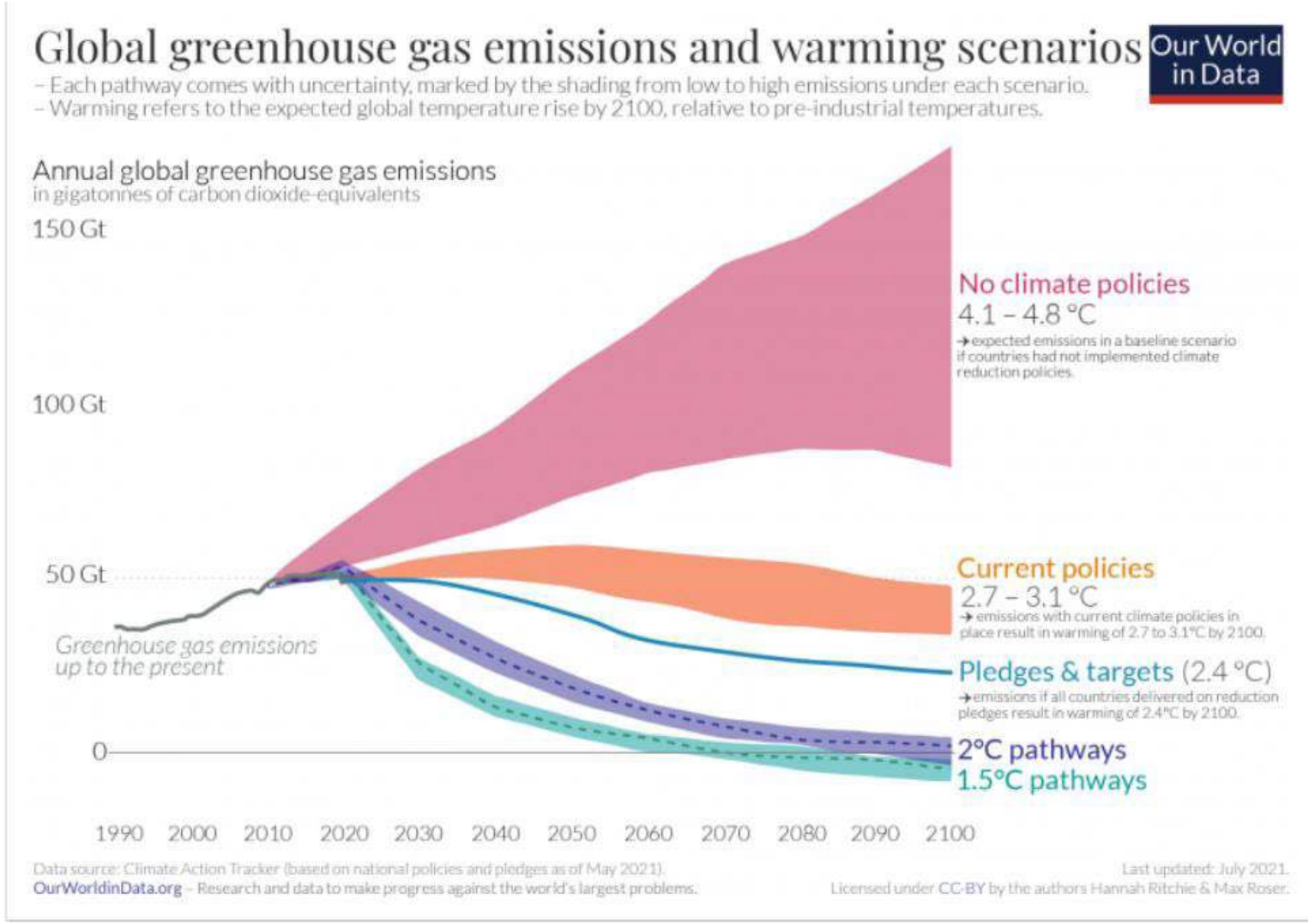
Carbon, what, why, how?






1979
September
Arctic sea ice
— Edge in 1980s

What if we do nothing?



Paris Climate agreement

UNITED NATIONS
PARIS CLIMATE AGREEMENT
SIGNING CEREMONY
22 APRIL 2016





The UK's Climate Change Act, 2008

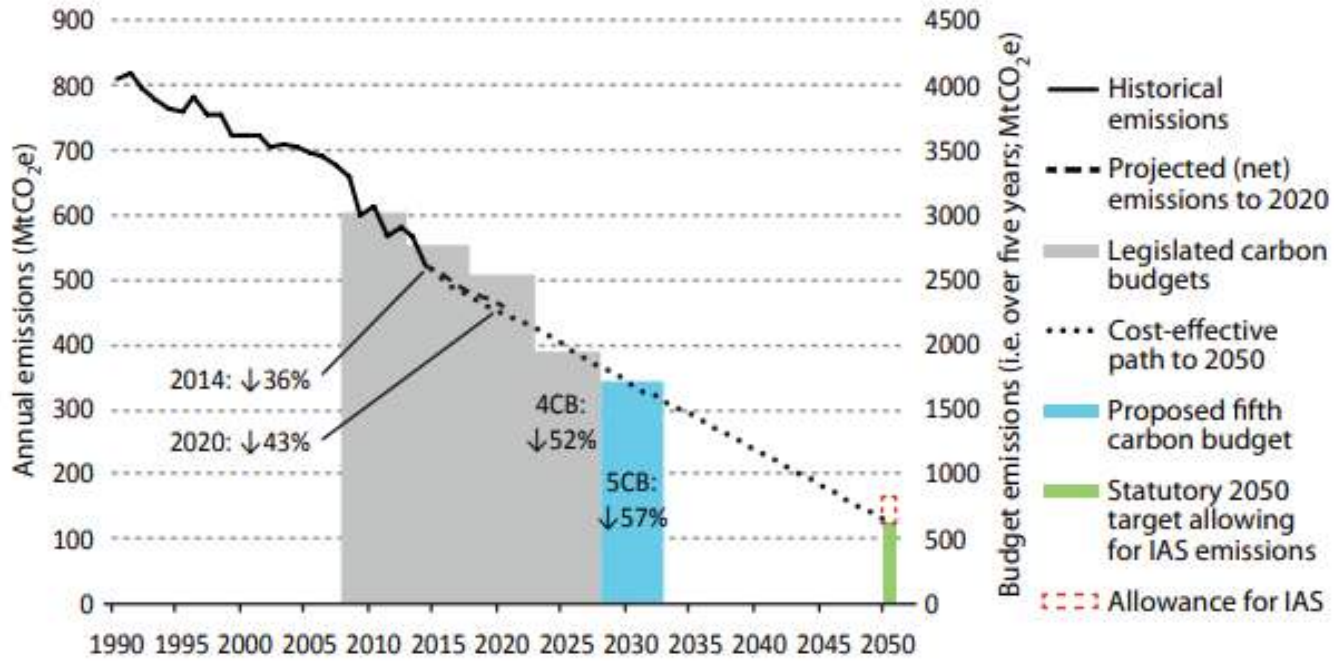
- World-leading in legislation against climate change

- 80% reduction in emissions by 2050, vs 1990 baseline

Committee on Climate Change

Climate Change Act 2008

Figure 1: The recommended fifth carbon budget would continue emissions reduction on the path to the UK's 2050 target




Flood

What is the Carbon Lifecycle?



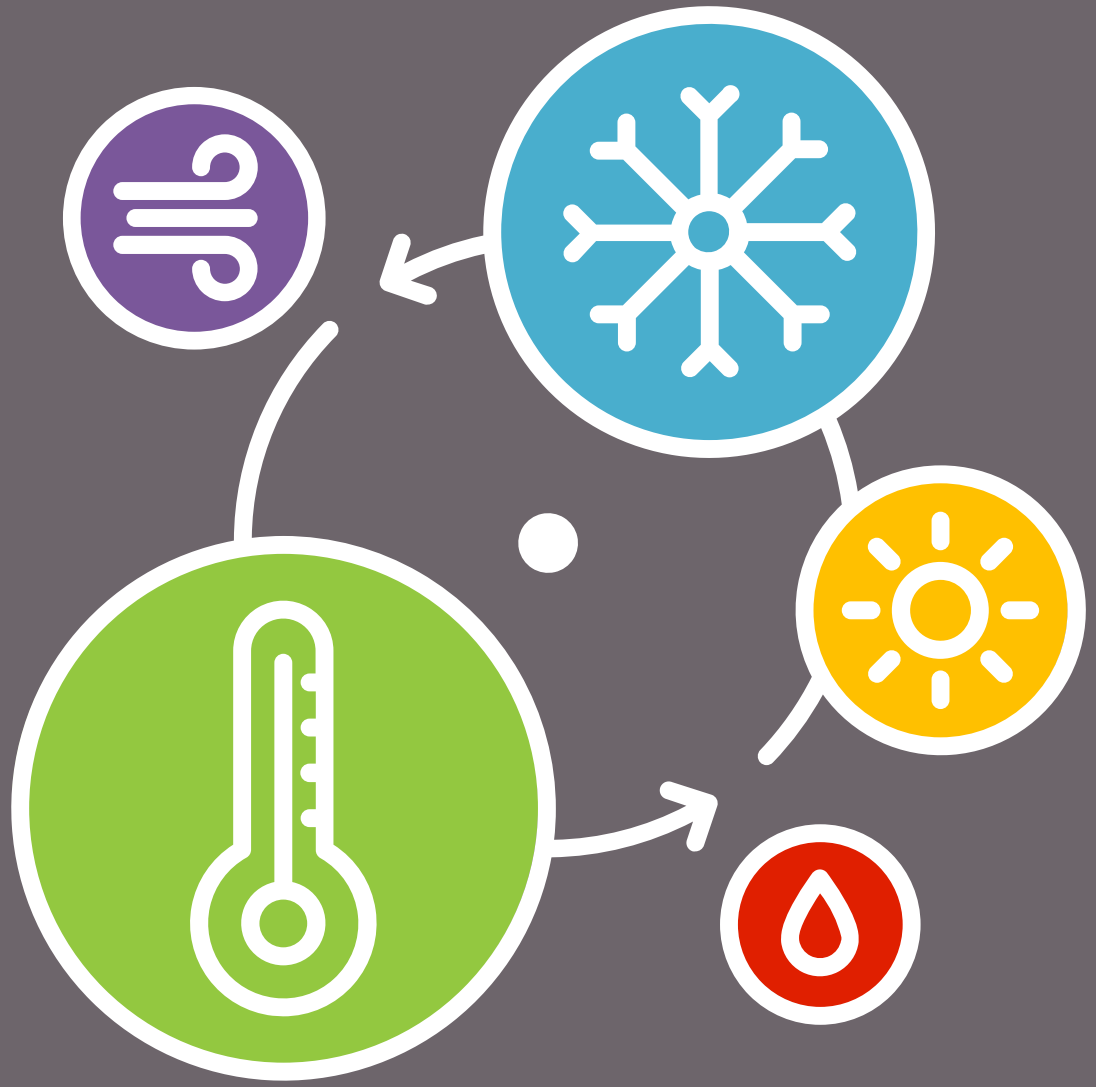
8



Greenwashing

The GCC (Green Claims Code) is based on six overarching principles. Environmental claims must:

- 1. be truthful and accurate
- 2. be clear and unambiguous
- 3. not omit or hide important information
- 4. be substantiated,
- 5. consider the product or service's full life cycle, and
- 6. comparisons must be fair and meaningful



BS EN 15804

Standard for whole life of infrastructure

- Whole life stages
  - A1-A5 Manufacturing and construction
  - B – Is use
  - C – end of life
- Provides core product category rules
- Problem - examples are related to buildings and not linear infrastructure

Where does highway maintenance fit in BS EN 15804?

— **B2 Maintenance**

The module "Maintena
administrative actions d
construction works or its
performance, as well as
and regular maintenance
of worn, damaged or d
maintenance shall be incl

NOTE 2 Maintenance, re
programme for the building

The boundary of "mainte

— the production and t
including cleaning;

— transportation of a
transportation;

— the end-of-life proce
any part of the compo

EXAMPLE 2 Painting wo
the (oil or gas) boiler, replac

— **B4 Replacement**

The module "replacement" covers the combination of all technical and associated administrative actions during the service life associated with the return of a construction product to a condition in which it can perform its required functional or technical performance, by replacement of a whole construction element.

Replacement of a broken component or part due to damage should be included as "repair", but replacement of a whole construction element due to damage should be considered as "replacement". Replacement of a whole construction element as part of a concerted replacement programme for the building should be considered as "refurbishment".

The boundary for "replacement" shall include:

— the production of the components and of ancillary materials used for replacement;

— replacement process, including related water and energy use and the production aspects and impacts of any waste of materials used during the replacement process;

— the transportation of the component and ancillary materials used for replacement, including production aspects and impacts of any losses of material damaged during transportation;

— A2 the end-of-life processes of any losses suffered during transportation and the replacement process and the components and ancillary materials removed. A2

EXAMPLE 4 For a carpet being replaced at the end of its service life, this includes the production and transportation of the new carpet and packaging, and all impacts due to the replacement process (adhesive, vacuum cleaning etc.), and the end of life stage of the original carpet, any waste from the installation of the replacement carpet, packaging waste and adhesive.

of materials during the repair

terials, including production
l transportation;

repair process, including the

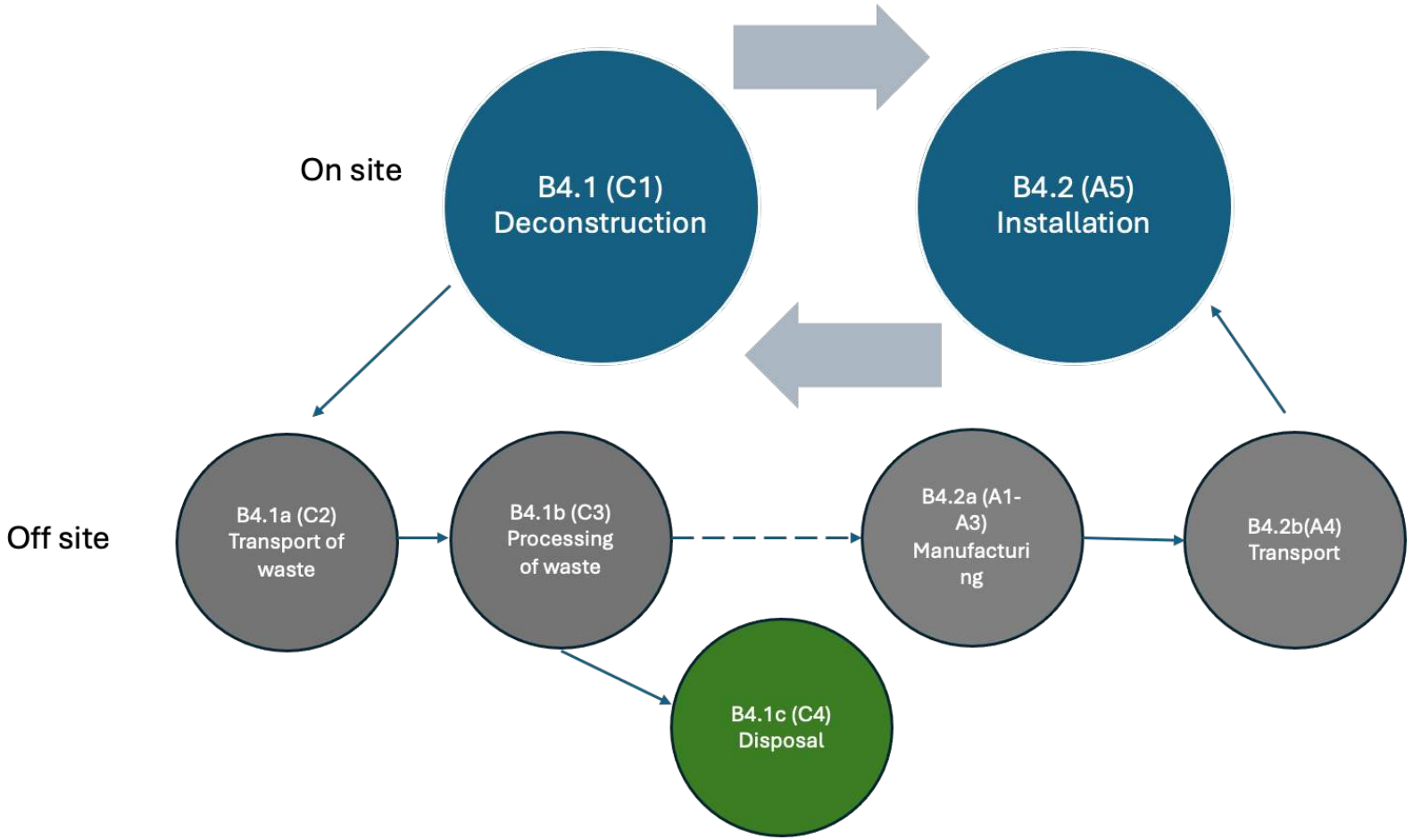
transportation of new glass and
g, etc), and the end-of-life stage

Where does highway maintenance fit in BS EN 15804?

B1	Use	N/A
B2	Maintenance	Surface treatments i.e. preservation, surface dressing.
B3	Repair	Pot hole repairs
B4	Replacement	Resurfacing
B5	Refurbishment	Major maintenance i.e. resurfacing, gully replacement, grass cutting combined



What the highway maintenance life cycle should look like

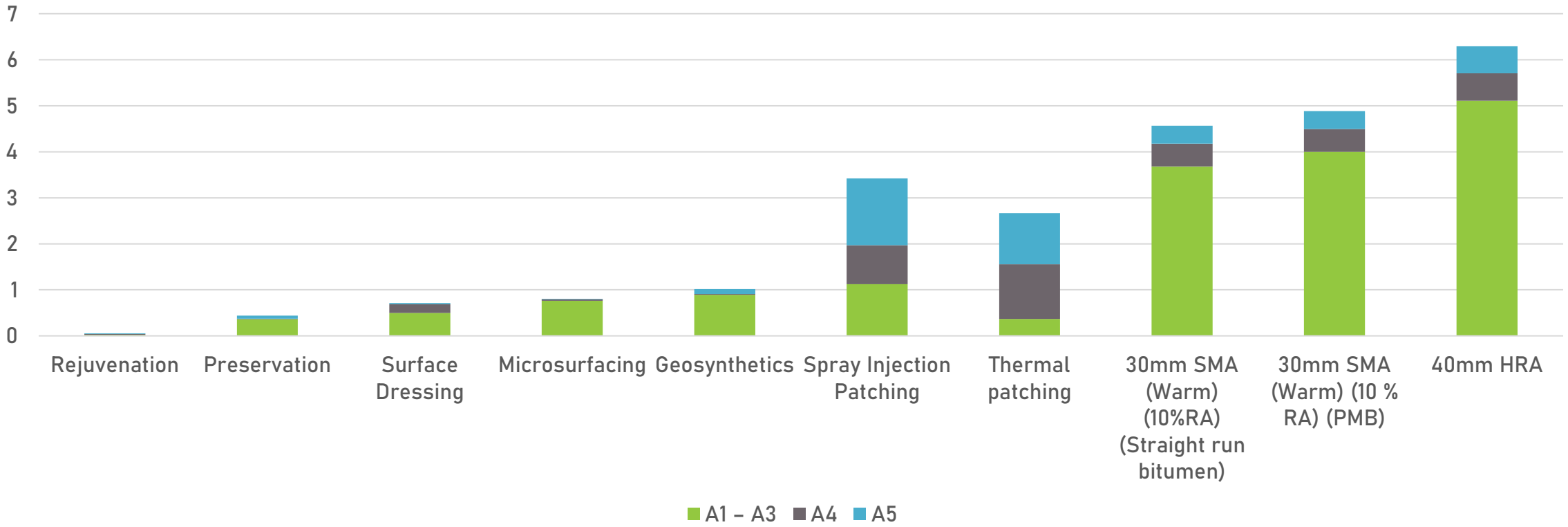


RSTA Carbon Emissions report Rev 1

- Produced in 2023
- Available free from the RSTA website
- Figures are presented broken down :
  - A1-A3: Product
  - A4: Transport to site
  - A5: Installation
- The figures are presented in m2
- Report includes examples against traditional methods



The results



Units: Kg CO2 e/m² - Please note that the figures do not include break out or removal of existing road surface.

RSTA Carbon emissions 2nd Edition

- Look at ‘maintenance’ carbon footprints
- Include whole life project examples over 60 years
- To be launched at RSTA conference in April 2025



Questions?

PYE MANAGEMENT
SUSTAINABILITY CONSULTANTS


PYE MANAGEMENT
SUSTAINABILITY CONSULTANTS



THE ROAD SURFACE TREATMENTS ASSOCIATION

Surface Dressing – A cost effective preventative maintenance technique

Dave Rigby

Technical Manager – Road Maintenance Services Ltd

What is Surface Dressing … What Does it Do?



Surface Dressing is the most efficient and cost-effective process for maintaining and preserving carriageways.

The purpose of surface dressing is to extend the service life of a carriageway by sealing the road surface which in turn prevents water ingress and oxidisation of the surface.

© The Road Surface Treatments Association

…and the history?



- The technique is over 100 years old
- The method of application remains very similar, but the materials, designs and equipment have changed.



© The Road Surface Treatments Association

Why Surface Dressing?



- Seal the road surface to prevent water ingress and stand up to the hydro pressures.
- Prevent the formation of potholes

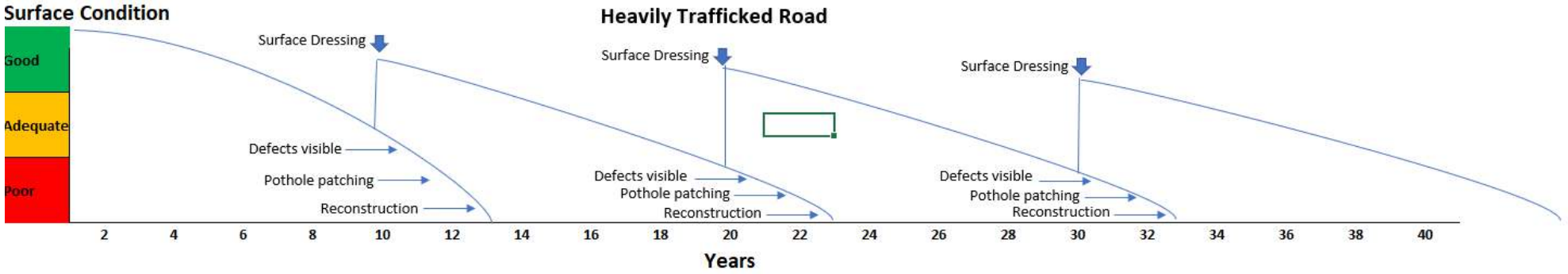
But also..

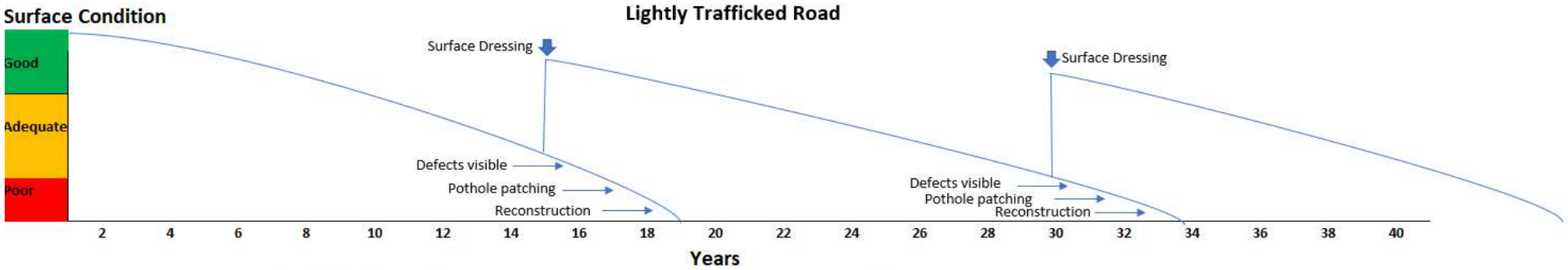
- Restore skid resistance by improving both micro and macro texture.

Need to get in there early…

© The Road Surface Treatments Association

Prevention is Better than Cure





Source data: ADEPT / RSTA: *The Surface Life of Road Treatments for Asset Management Purposes. T1 Page 3, 2nd Edition July 2017.*

- Extend the overall life of the carriageway.
- Prevent the formation of potholes leading to potential claims.
- Avoid long-term carriageway reconstruction costs.

© The Road Surface Treatments Association

RSTA / REA Surface Dressing Video



© The Road Surface Treatments Association

Surface Dressing Applications









- Dual Carriageways
- Single Carriageways
- Cycleways
- Footways
- Canal Towpaths
- Sub-bases
- Recycling (Retread)
- Private Road
- National Trust

© The Road Surface Treatments Association

Types of Surface Dressing

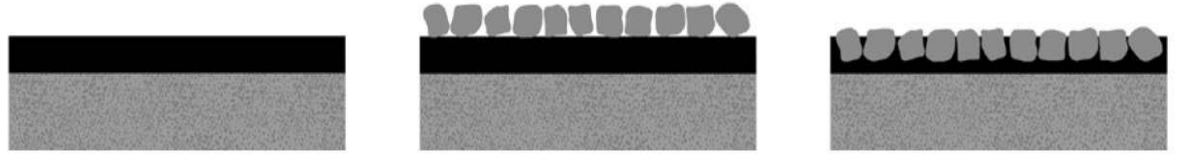


Figure 2.1 – Schematic Representation of Single Surface Dressing

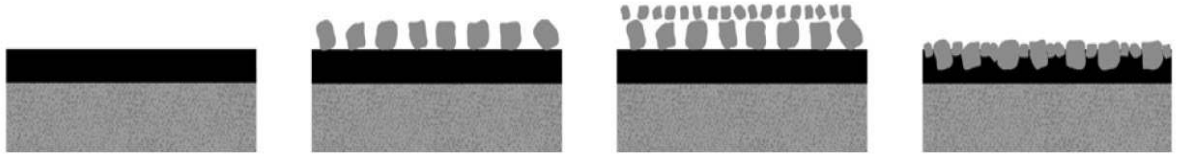


Figure 2.2 – Schematic Representation of Racked-In Surface Dressing

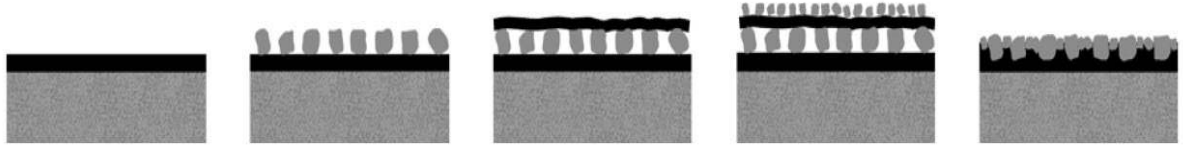


Figure 2.3 – Schematic Representation of Double Surface Dressing

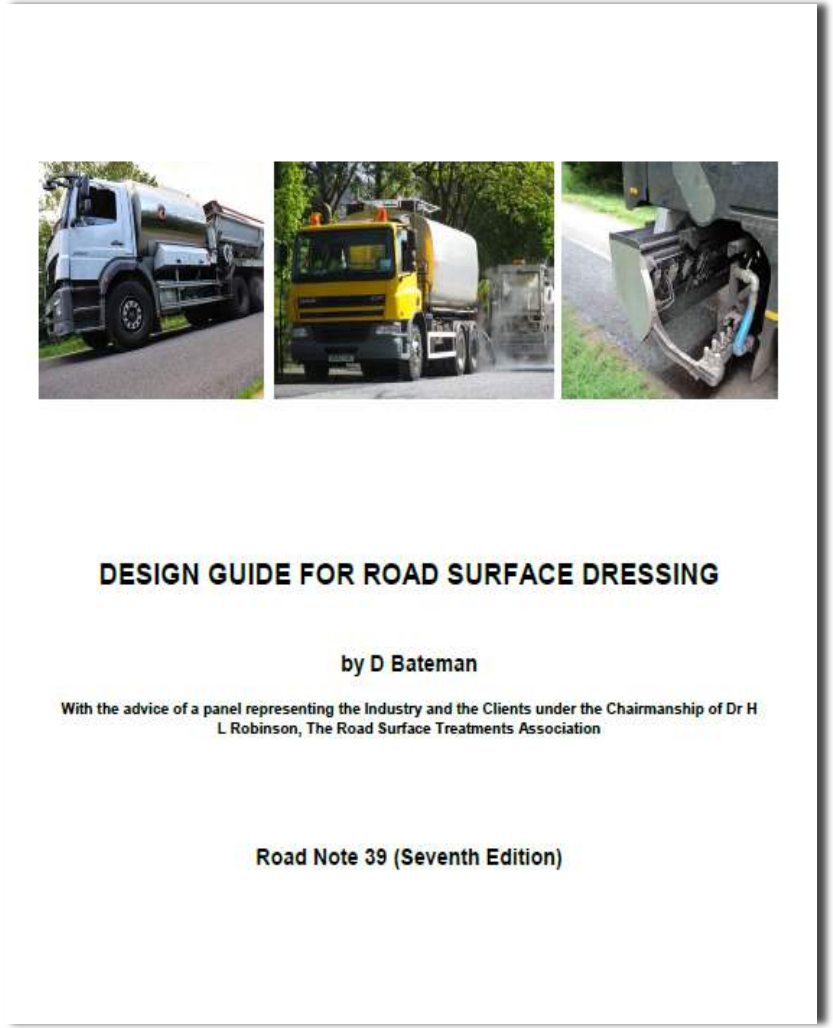
What types are there?

- Single
- Racked-in
- Double

Details of all the various types of dressings can be found in Roadnote 39 (7th Edition)

© The Road Surface Treatments Association

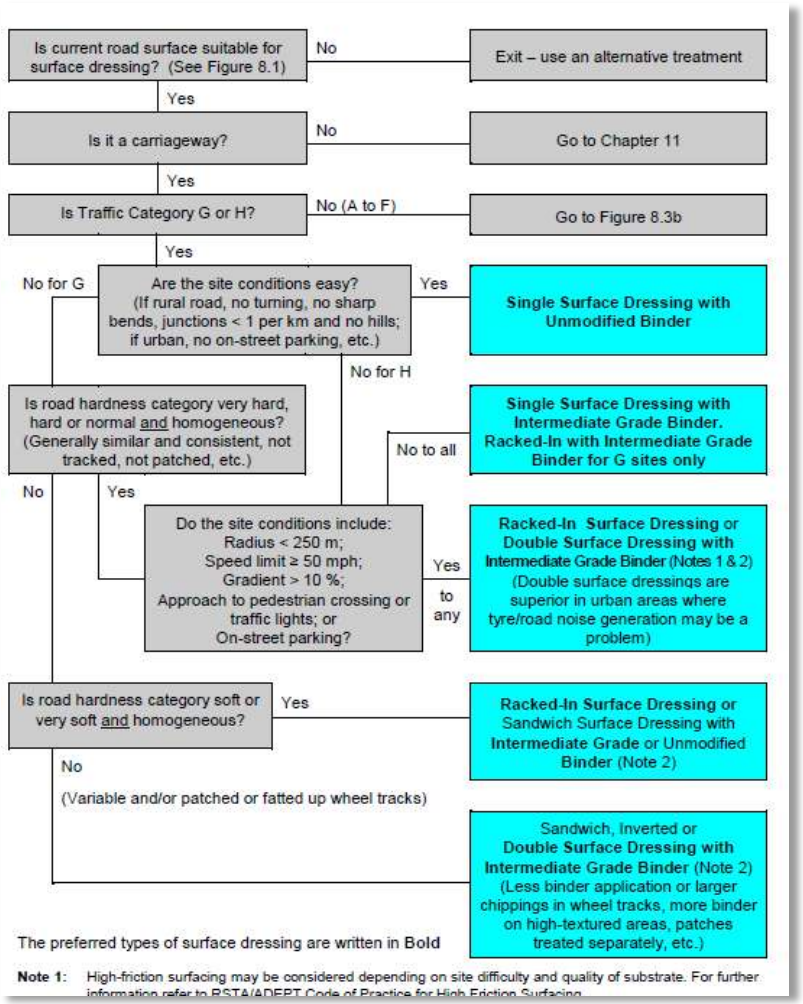
Road Note 39



- TRL Road Note 39 is a technical guide for the design of surface dressings throughout the UK.
- Written by a committee of members from - RSTA, ADEPT, REA, National Highways, TAG Mouchel, EBUK, Transport Scotland, Mineral Products Association.
- The 7TH Edition contains legal updates and changes in environmental conditions.
- Road Note 39 is not a specification document but merely a guidance.
- Road Note 39 is currently under review & is due to be published for 2026 season.

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Road Note 39



Input Parameters for Each Site:

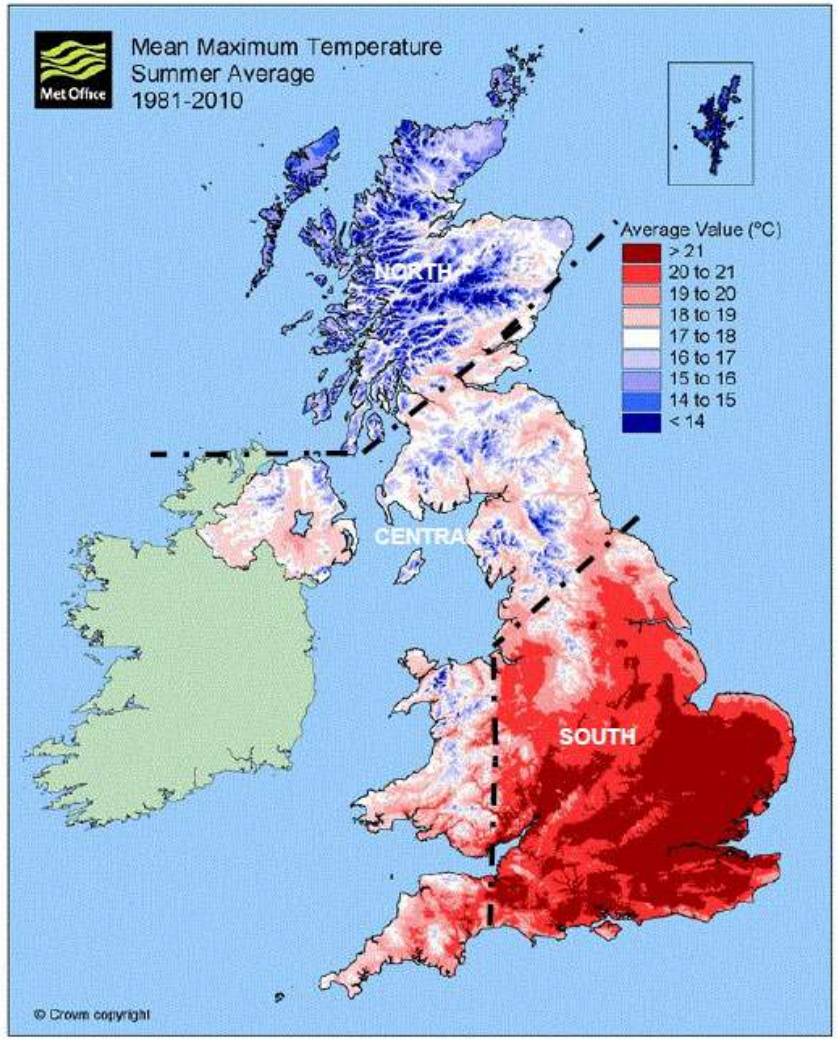
- Surface Temperature Category
- Road Hardness – Probe testing 15-35 degrees.
- Traffic - Flows & Speed
- Traffic Categories – A – F or G - H
- Geometric Features – Bends, Gradients & Junctions
- Chipping Properties – Type, PSV, AAV & Shape
- Types of Dressing
- Binder Rates of Spread – include local adjustments
- Chipping Spread Rates

Allows us to establish:

- Type of surface dressing to be applied.
- Binder type and the required rates of spread.
- Aggregate size and PSV.
- Any necessary local variations in rates of spread required.

© The Road Surface Treatments Association

When to Surface Dress



This is very important

Approximate Location	Altitude above sea level	Surface Temp. Category
South – England, south of Liverpool to Middlesbrough, excluding Devon and Cornwall	200 m or less	A
	Over 200 m	B
Central – England north of Leeds to Middlesbrough, Devon, Cornwall, Wales, Northern Ireland and Scotland south of Glasgow to Aberdeen	200 m or less	
	Over 200 m	C
North – Scotland, north of Glasgow to Aberdeen.	200 m or less	
	Over 200 m	D

© The Road Surface Treatments Association

When to Surface Dress

Surface Temperature Category A & B (refer to 7.2.1)

Size & Type of Surface Dressing	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
8/14 mm single S14												
6.3/10 mm single S10												
8/14 & 2.8/6.3 mm racked-in R14	Early									Late		
2.8/6.3 mm single S6	Season									Season		
6.3/10 & 2.8/6.3 or 2/4 mm racked-in R10												
8/14 & 2.8/6.3 mm double D14												
6.3/10 & 2.8/6.3 double D10												

Surface Temperature Category C & D (refer to 7.2.1.)

Size & Type of Surface Dressing	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
8/14 mm single S14												
6.3/10 mm single S10												
8/14 & 2.8/6.3 mm racked-in R14		Early								Late		
2.8/6.3 mm single S6		Season								Season		
6.3/10 & 2.8/6.3 or 2/4 mm racked-in R10												
8/14 & 2.8/6.3 mm double D14												
6.3/10 & 2.8/6.3 double D10												

- Start early.
- Don’t work outside the recommended dates.
- Choose carefully when to work on the higher stressed roads.
- Early dressing gives better embedment.

© The Road Surface Treatments Association

Site Selection

Existing surface characteristic	Traffic Category H	G	F	E	D	C	B	A
Very Hard and homogeneous	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hard and homogeneous	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Normal and homogeneous	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Soft and homogeneous	Yes	Yes	Yes	Yes	Texture	Texture	E	
Very Soft and homogeneous	Yes	Yes	Yes	Texture	E	E		
Fatting up in wheel tracks	Yes	Yes	Texture	Texture	E	E		
High macro-texture or fretted	Yes	Yes	Yes	Yes	Defects	Defects	E	
Porous	Yes	Yes	Yes	Defects	Defects	E		
Very variable	Defects	Defects	Defects	Defects	Defects	E	E	
Extensive patching	E	E	E	E	E			
Severe bleeding & extensive blackening								

Yes	The surface dressing can be designed to meet the most onerous performance requirements in terms of macro-texture and levels of defects to BS EN 12272-2 (BSI).
Texture	It is difficult to maintain high macro-texture, especially in the wheel tracks and for high-speed roads. Texture requirements for low speed roads may be achievable.
Defects	It is difficult to design a surface dressing that will meet the most onerous requirements for the test method of visual assessment of defects to BS EN 12272-2 (BSI) and the requirements should not be specified.
E	In some circumstances, a suitable surface dressing may be designed by an expert to meet less onerous performance levels. Extra care in execution is required.
	Surface dressing is not an appropriate treatment.

Figure 8.1 – Effect of Existing Road Surface Characteristics on Achievable Performance Levels

- Some road conditions make surface dressing not a viable option.
- This may be part of or the whole of a site.
- Use Road Note 39 as a guidance document.
- Be prepared to use an alternative treatment.

© The Road Surface Treatments Association

Preparation Works





- Preparation is the key to success.
- Pre-Patching should be carried out well before the programme starts. Ideally the year before.
- Ensure that the carriageway drains properly. Make sure the water goes to the edge & drains into gullies, ditches etc.
- Empty gullies and sweep.
- Limit bitumen over-banding.
- Trim overhead branches & side back vegetation.
- Cut hedges wherever possible.

© The Road Surface Treatments Association

Rates of Spread



Rates of spread of bitumen emulsions will vary depending on the type of dressing designed.

- Typically, these will be Single 6mm 1.5l/m2, 10/6mm racked-in 1.8l/m2.
- Local conditions need to be applied, bends, gradients, shade etc.
- Aggregate types, crushed rock or gravels.
- Traffic conditions, road speed or heavy parking.
- Late season working.
- In addition, local adjustments can apply.

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Calibration & Rates of Spread



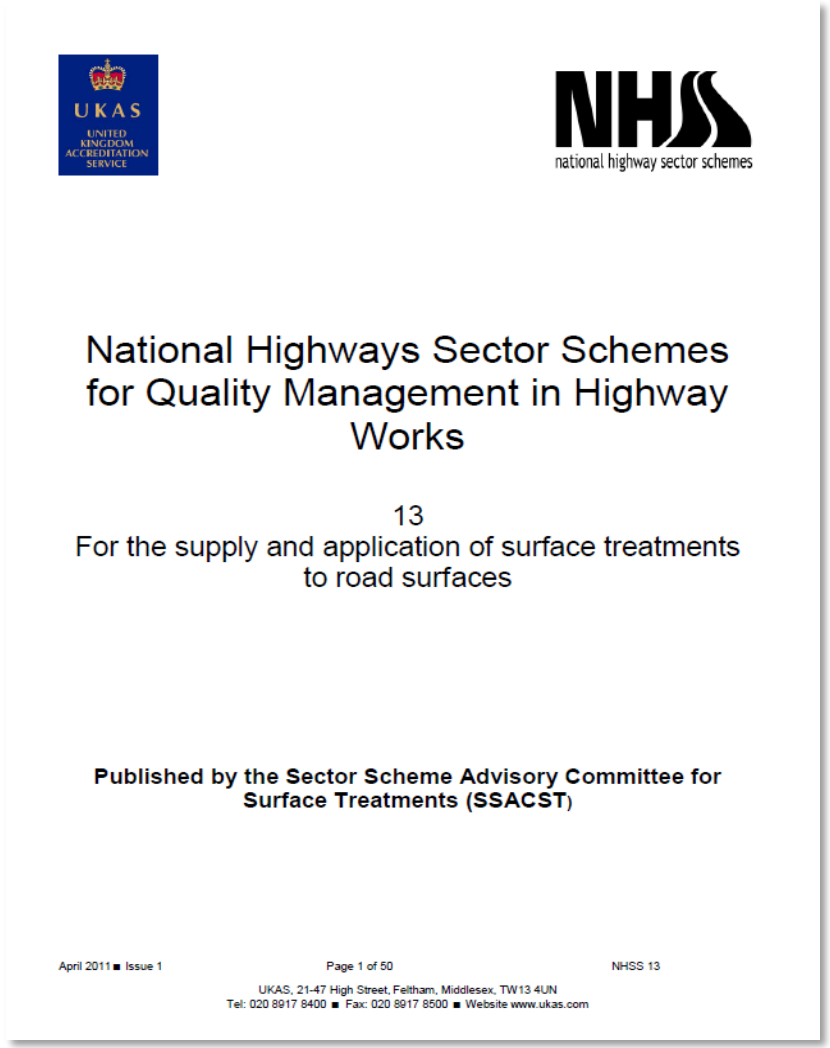




- Depot tray testing of emulsion sprayers to BS1707. Distribution conformity.
- Carpet tile testing on site.
- Chipping tray testing on site.

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RSTA Membership



UKAS
UNITED KINGDOM ACCREDITATION SERVICE

NHSS
national highway sector schemes

National Highways Sector Schemes for Quality Management in Highway Works

13
For the supply and application of surface treatments to road surfaces

Published by the Sector Scheme Advisory Committee for Surface Treatments (SSACST)

April 2011 ■ Issue 1 Page 1 of 50 NHSS 13

UKAS, 21-47 High Street, Feltham, Middlesex, TW13 4UN
Tel: 020 8917 8400 ■ Fax: 020 8917 8500 ■ Website www.ukas.com

- RSTA Membership
- ISO9001 accreditation
- NHSS13 Accreditation
- CE Marked Products

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• The Public Perception

- As part of the process to ensure that the chippings are reorientated and embedded some loose aggregate will be visible for up to 48hrs.

- Sweep after 24 - 48 hours, then again within 7 days and a further sweep may be required after 30 days.

- May need to maintain active traffic management in busy or stress areas to slow traffic.

- Public information is important. Letter drops, direct contact with local industry, key road users, schools, bus routes etc.

© The Road Surface Treatments Association

What are the Cons

- Surface dressing will not re-profile or strengthen a site or improve ride quality.
- Surface dressing may increase noise levels.
- Potential inconvenience from loose chippings. New technology in encapsulation is making this better.
- May not be suitable in high stress locations. Very fast bends, acceleration lanes, roundabouts, heavy industrial entrances.
- May not be suitable for heavily parked streets, where single centralised running lanes are evident.

© The Road Surface Treatments Association

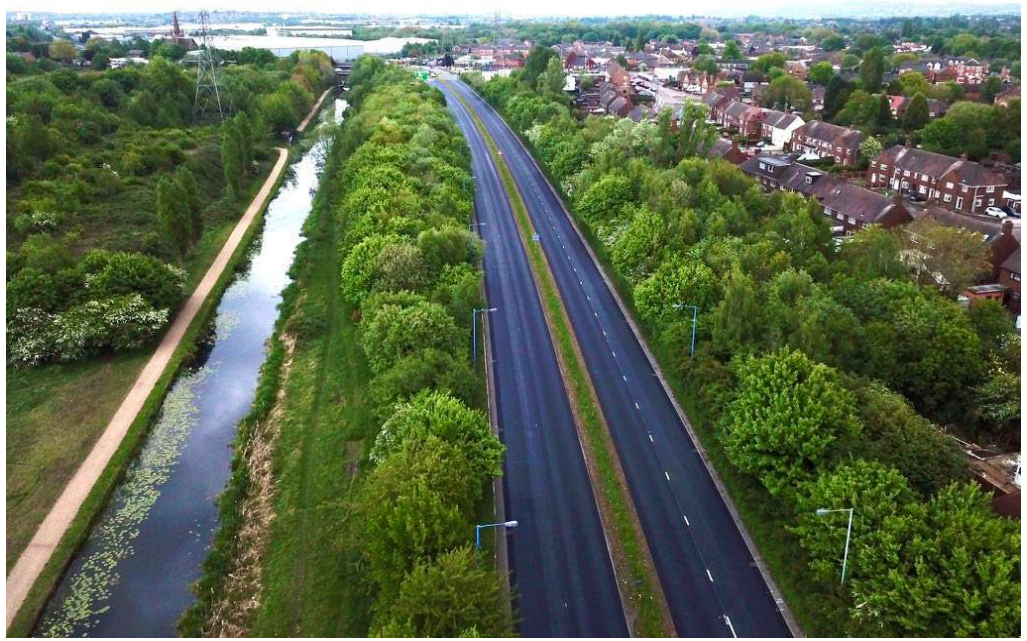
What are the Pros

Surface Dressing will:

- Waterproof the surface to prevent the ingress of water into the pavement.
- Arrest disintegration.
- Provide texture.
- Provide a skid resistance surface.
- Provide a low cost life index & high value for money.

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Asset Management – Cost Effectiveness of Surface Dressing



- Speedy installation, up to 40,000m2 per day in some circumstances.
- Cost effective treatment compared to resurfacing.
- Low carbon footprint when comparing with other surfacing options.

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Standards & Guidance

- Road Note 39 (7th Edition)
- RSTA / ADEPT CODES OF Practice for Surface Dressing.
- BS EN 12271 & 2 Series - Surface Dressing Specifications.
- PD 6689:2009 - Published Guidance Document to BS EN 12271 & 2.
- BS EN 1707 - Bitumen Sprayer distribution testing.
- NHSS13 - Quality Management Document.
- MCHW Volume 1; Specification for Highway Works Series 900
  Clause 919 – Recipe
  Clause 922 – End Performance

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An Alternative Approach – Target Dressing





- In-cab video screen allows the operative to select the area to be surface dressed.
- Binder and chippings are applied to the selected area of carriageway as the vehicle moves along the carriageway.
- Very quick and convenient.
- Low mobilisation cost.

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An Alternative Approach – Target Dressing



- Large carbon savings - selective use of resources.
- Can be used for reinstating surface dressing to NRSWA road openings.
- Seal early cracking and fretting.
- The speed and selectiveness allows the team to cover a very large geographical area in a short time period.

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Conclusion…

Surface Dressing – Sealing Your Network Against Potholes and Improving Skid Resistance Through Appropriate Design.



- Use surface dressing to seal roads against water ingress and improve skidding resistance.
- Act early before any patching is required.
- Apply surface dressings at the top of the road condition curve (Year 6–8) before oxidisation.
- Collect the necessary data for each site and use Road Note 39 for your design process.
- Stick to the guidance notes on **When** to surface dress.
- If Surface Dressing is not the right treatment choose an alternative to seal your roads.
- Ensure that the correct design, rates of spread & application are achieved on site.
- The RSTA CPD Silver Certificate 2-day course can help upskill your highways team to achieve best results

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Thank You

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Our latest steps towards asphalt decarbonisation

21 November 2024



About Me



Anthony Davies

Category Management Group Lead for:

- Sub-base and Aggregate
- Specialist Surface Treatments
- Drainage

Strategic Procurement, National Highways

Our Net Zero Plan

An ambitious programme putting roads at the heart of Britain's net zero future



Decarbonisation of asphalt

What lower carbon approaches are National Highways currently implementing?













national highways

Decarbonisation of asphalt

What are we doing to further decarbonise asphalt?







national highways

A64 Bramham to Headley Bar – Net Zero Asphalt Concept Scheme

We made a commitment in “Net zero highways: our 2030 / 2040 / 2050 plan” to deliver a Net Zero Concept Scheme in 2024

Timeline of key targets

2020

2020 - Net zero strategy development and planning, leading to implementation of action beginning in 2021

2022 - An accredited construction and maintenance carbon management system is in place

2022 - Carbon reduction is a key metric within our innovation and research programs

2022 - Strategic partnerships with other infrastructure owners and suppliers in place

2022 - We have a continually improved database of low carbon solutions by asset type in place

2024 - Our Specifications (MCHW) have integrated net zero thinking

2024 - Net zero concept scheme for asphalt

2025

2025 - Our Tier 1 & Tier 2 suppliers have certified carbon management systems

2025 - For every project we commission we will apply an ambitious and transparent reduction target set using a robust and standardised baseline

2025 - Our standards (DMRB) have integrated net zero thinking

2026 - Net zero concept scheme for concrete constructed

2030

2030 - Emissions reduced by 40-50% compared to 2020

2030 - Only zero carbon plant on our sites

2030 - First minor scheme that aims to be net zero constructed

2030 - Design (post concept stage) of all major schemes to be net zero

2035

2035 - Emissions reduced by 70-80% compared to 2020

2035 - First major scheme that aims to be net zero constructed

2035 - Design (post concept stage) of all minor schemes to be net zero

2035 - Rolled out full network connectivity solutions to support Connected and Autonomous vehicles

2040

2040 - Our schemes will be net zero. Where there are residual emissions, these will be ‘inset’ if feasible or offset using robust certified ‘removal’ offsets

2040 - Only zero carbon HGVs will visit our sites

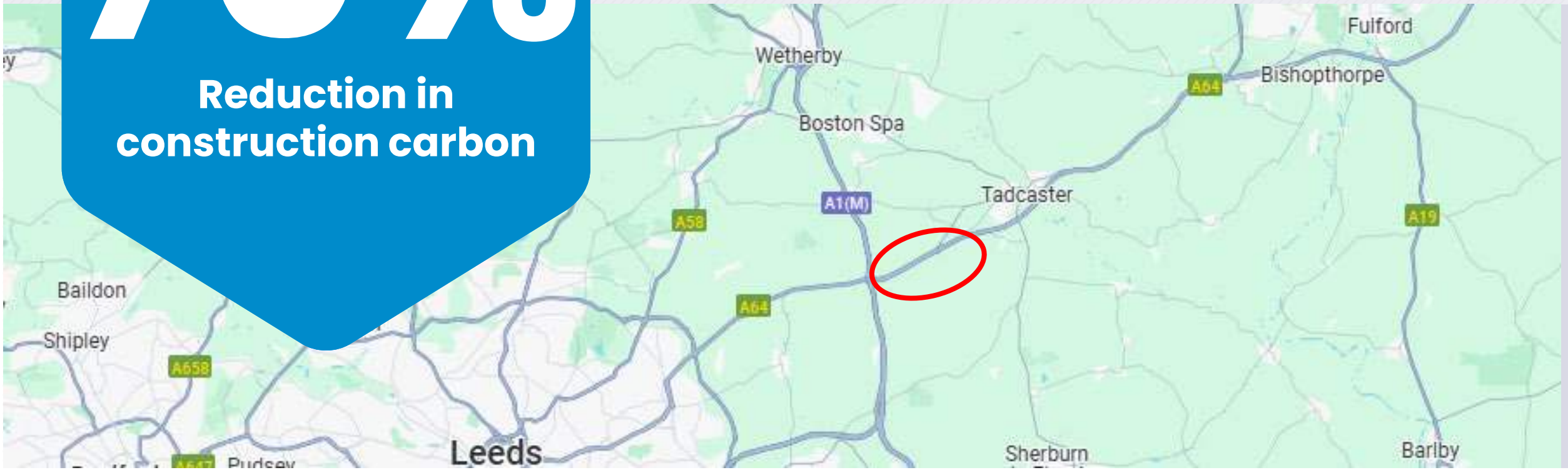
A64 Bramham to Headley Bar – Net Zero Concept Scheme

An ambitious aim:

70%

Reduction in construction carbon

- Near net-zero resurfacing scheme on A64 in Yorkshire
- Completed 18th October 2024
- Innovations in materials, equipment and working practices
- An approximate 1.5 mile section of the eastbound carriageway between Bramham and Headley Bar



What did we do?

Collaborative working

TARMAC
A CRH COMPANY

MARTIN
TRAFFIC MANAGEMENT EXPERTS

Premier
RoadMarkings Ltd

KIER

mway
COMMS



Overview of scheme components

Materials

- Warm mix asphalt with bio-binder
- Increased recycled asphalt and extended life bitumen

Equipment

- Electric rollers and HVO plant
- Electric welfare facilities



Working methods

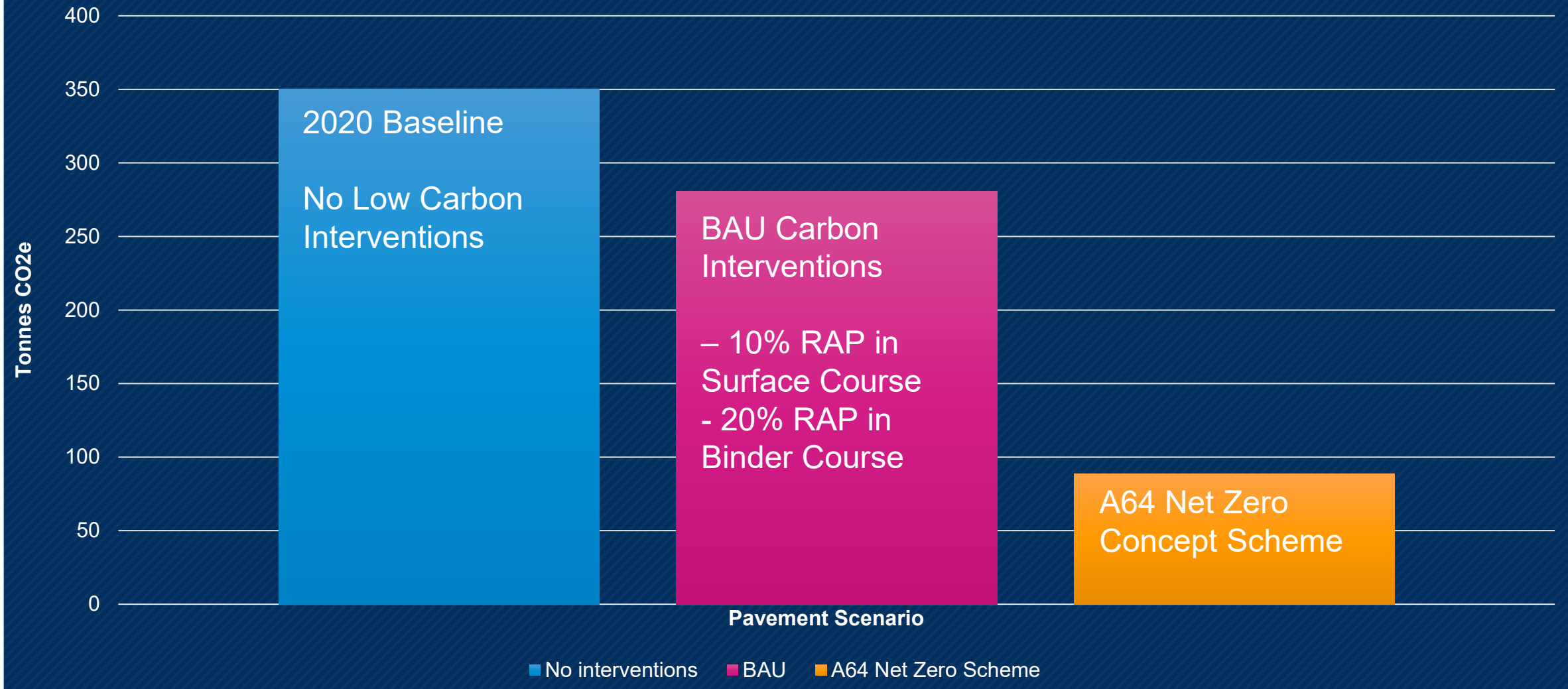
- Continuous echelon paving method
- Longer lasting road markings

Traffic Management

- Lower carbon TM solutions
- Single weekend closure

national highways

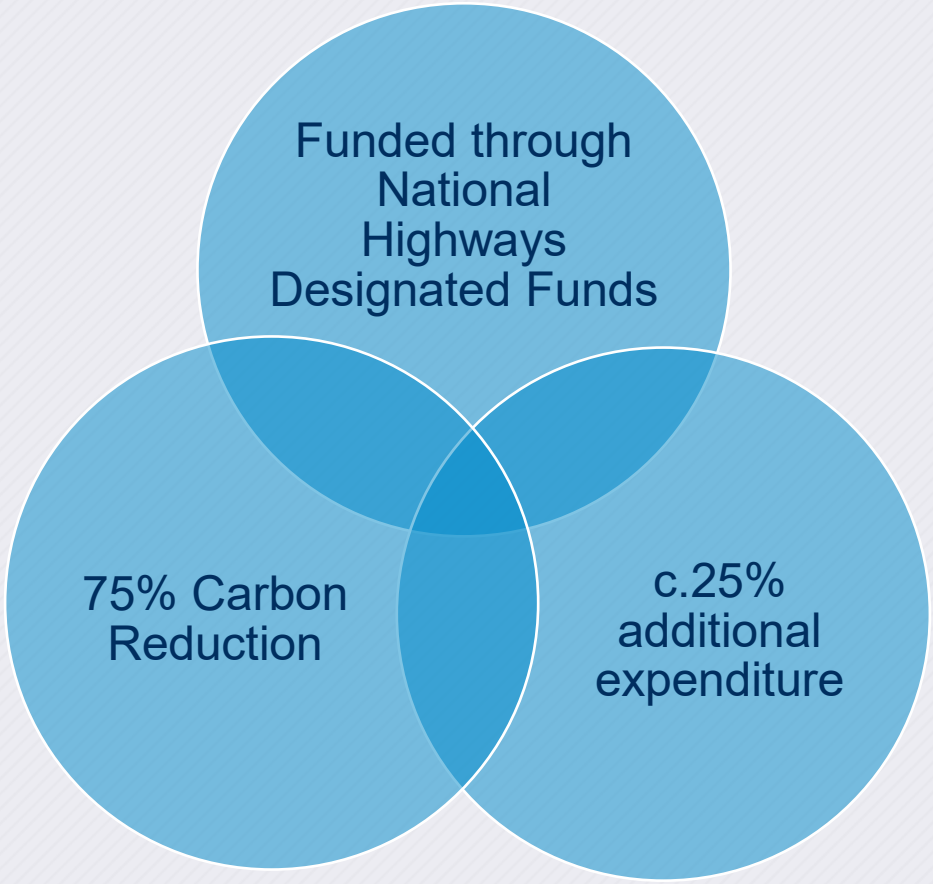
CO2e Outcomes



All emissions calculated at stages A1 through to A5

national highways

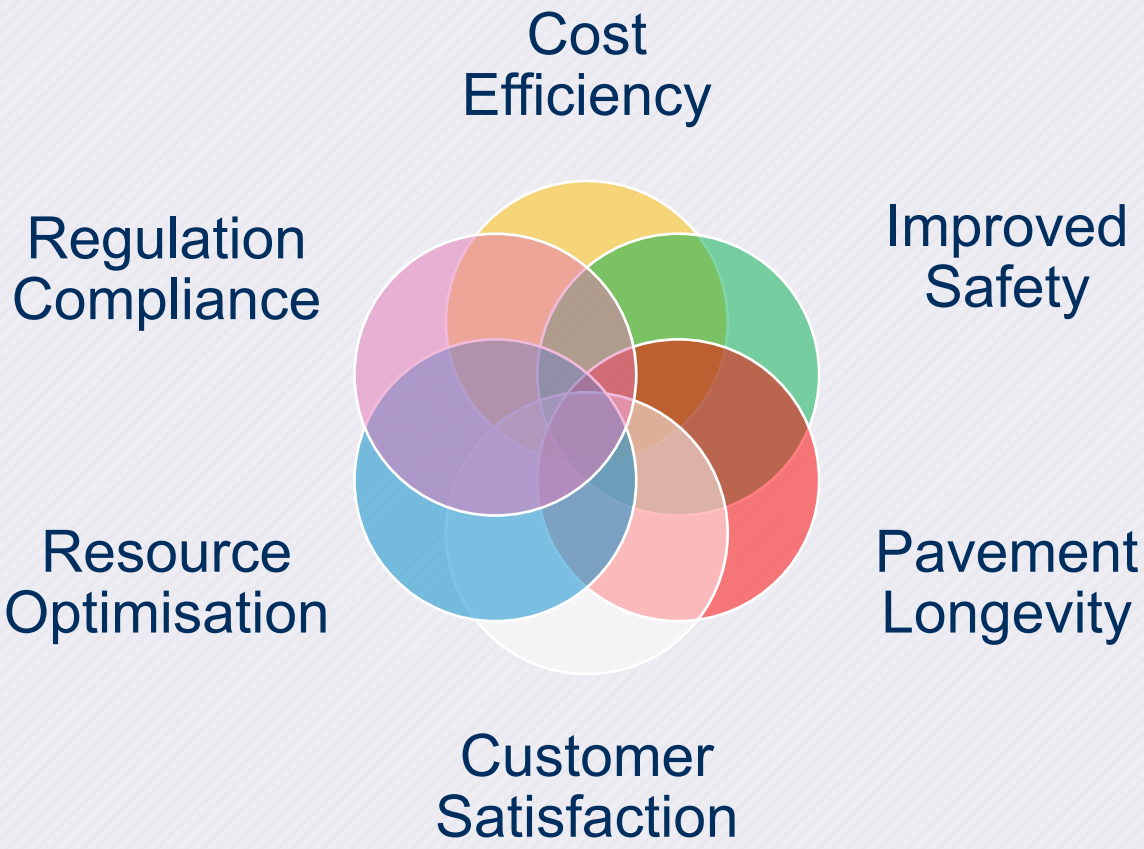
Cost Analysis



Key next step to analyse the cost/carbon ratio between the techniques delivered by the scheme to form priorities.

This is not where today's story ends because…

The following factors mean that….



…It is where appropriate asset management of asphalt begins...

national highways

Thank You

nationalhighways.co.uk

X@nationalhighways

Instagram

Facebook





DECARBONISING THE ASPHALT REPAIR INDUSTRY

THE SOLUTION

THERMAL ROAD REPAIRS



Zero Waste

100% recycled



LOW Noise Pollution

No cutting or jackhammering



Single vehicle

One self-contained vehicle



LOW Risk HAVS

No jackhammer

ELV Actual = 173 points



Efficient process

Up to 10 mins

Vs

Vs

Vs

Vs

Vs

TRADITIONAL PROCESSES



Waste produced

0% recycling. Waste product produced and disposed of



HIGH Noise Pollution

Damaging noise from cutting and jackhammering



Multiple vehicles

Multiple vehicles to and from site



HIGH Risk HAVS

Jackhammering, high danger

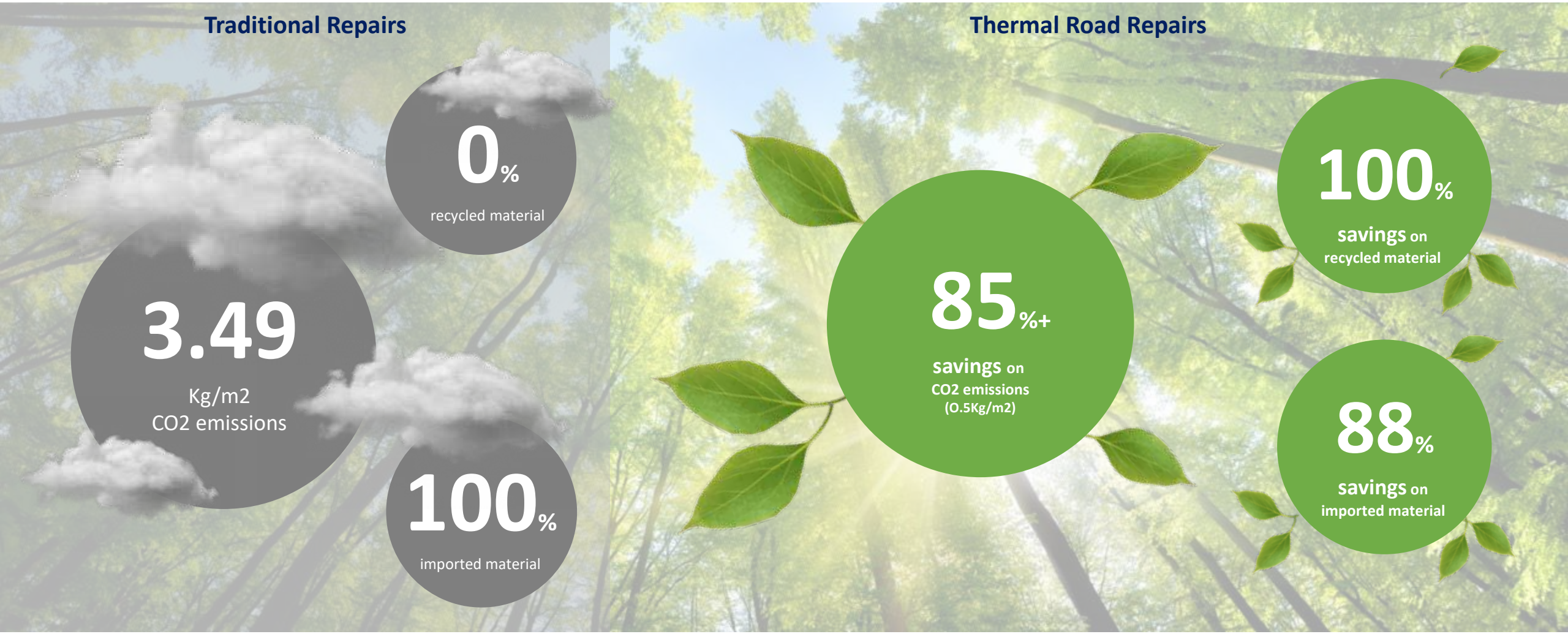
ELV Actual = 5,543 points



Inefficient process

Up to 30 mins

ENVIRONMENTAL IMPACT



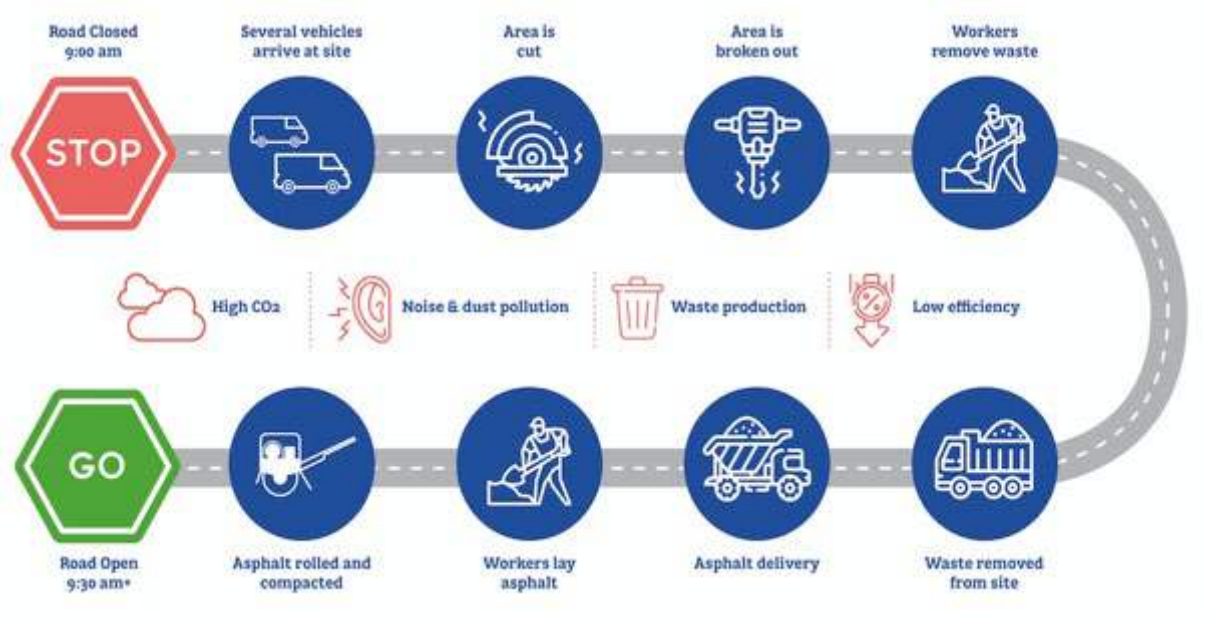
WHO ELSE CAN ACTUALLY PROVE THEIR CARBON SAVINGS?

Source: Asphalt IQ

THERMAL road repairs

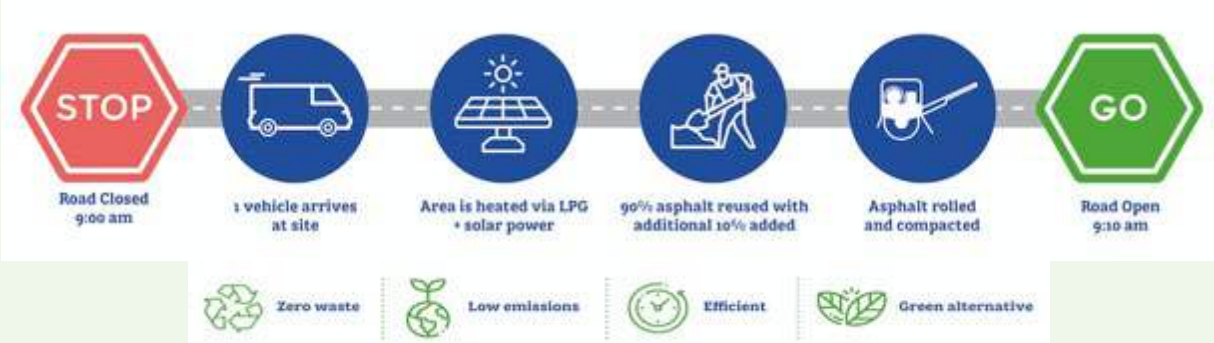
TRADITIONAL V THERMAL ROAD REPAIRS PROCESS

Traditional process



30+ minutes

Thermal Road process



10 minutes

THERMAL road repairs

OUR PROCESS



- Heat applied to defect and surrounding area
- Computer controlled heat cycles for correct temperature
- Works with any asphalt type
- Avoids oxidation of asphalt
- Area is agitated
- No cutting out or asphalt removal required



- Area is worked together
- Forms an homogenous area with defect and surrounds
- Removes any air voids
- Small amount of additional missing asphalt applied



- Area is compacted and level finished
- Removes any seams or joints
- Produces a right-first-time repair

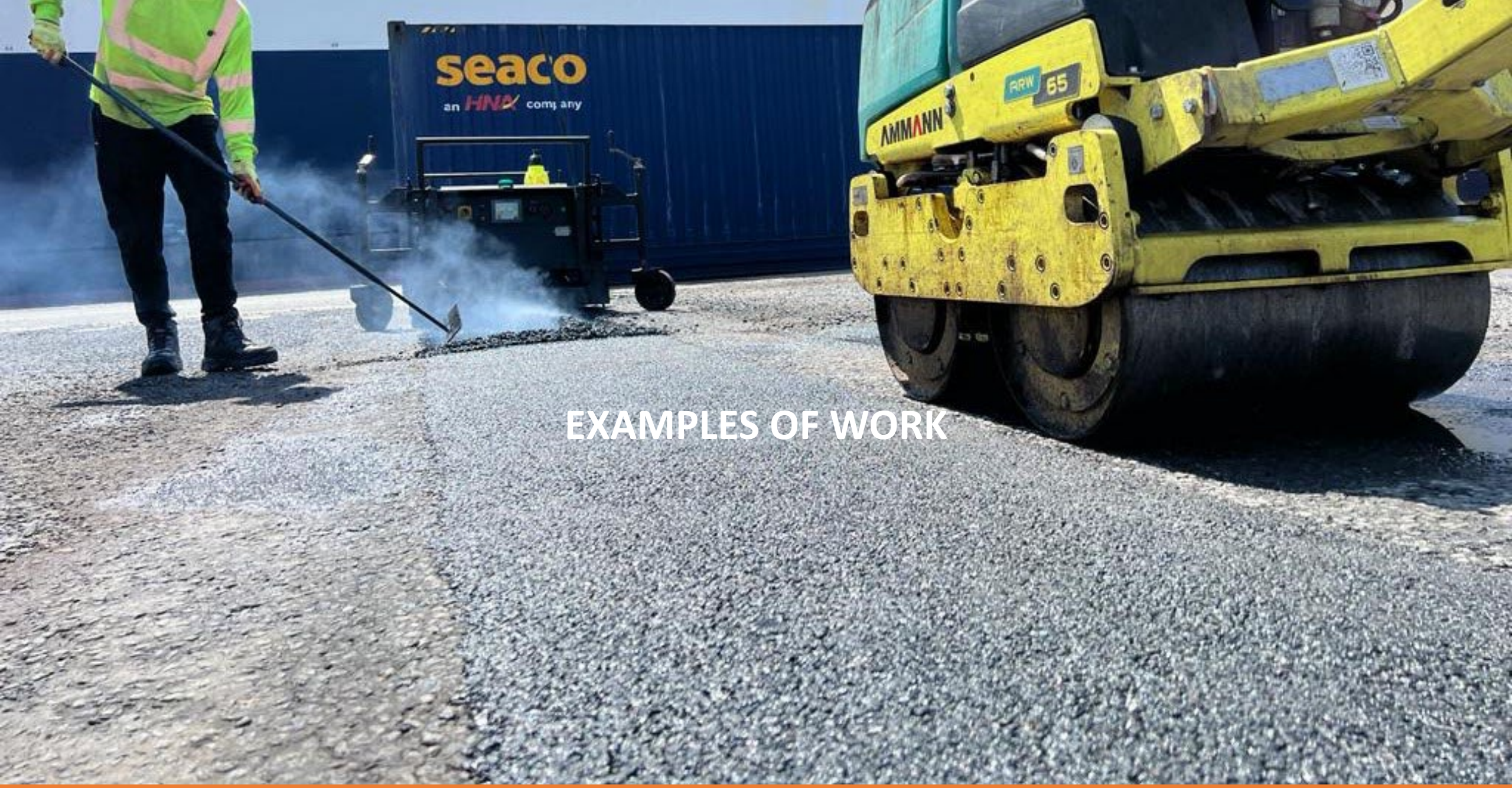
EQUIPMENT



All-in-one vehicle



Electric Roller



EXAMPLES OF WORK

THERMAL road repairs

WORK EXAMPLES

Before



After



Before



After



Before



After



Before







After









CASE STUDIES

CASE STUDY: BLACKPOOL COUNCIL

Work dates: 19th Jul to 31st Aug 2023
Area covered: 1,311m2

Before



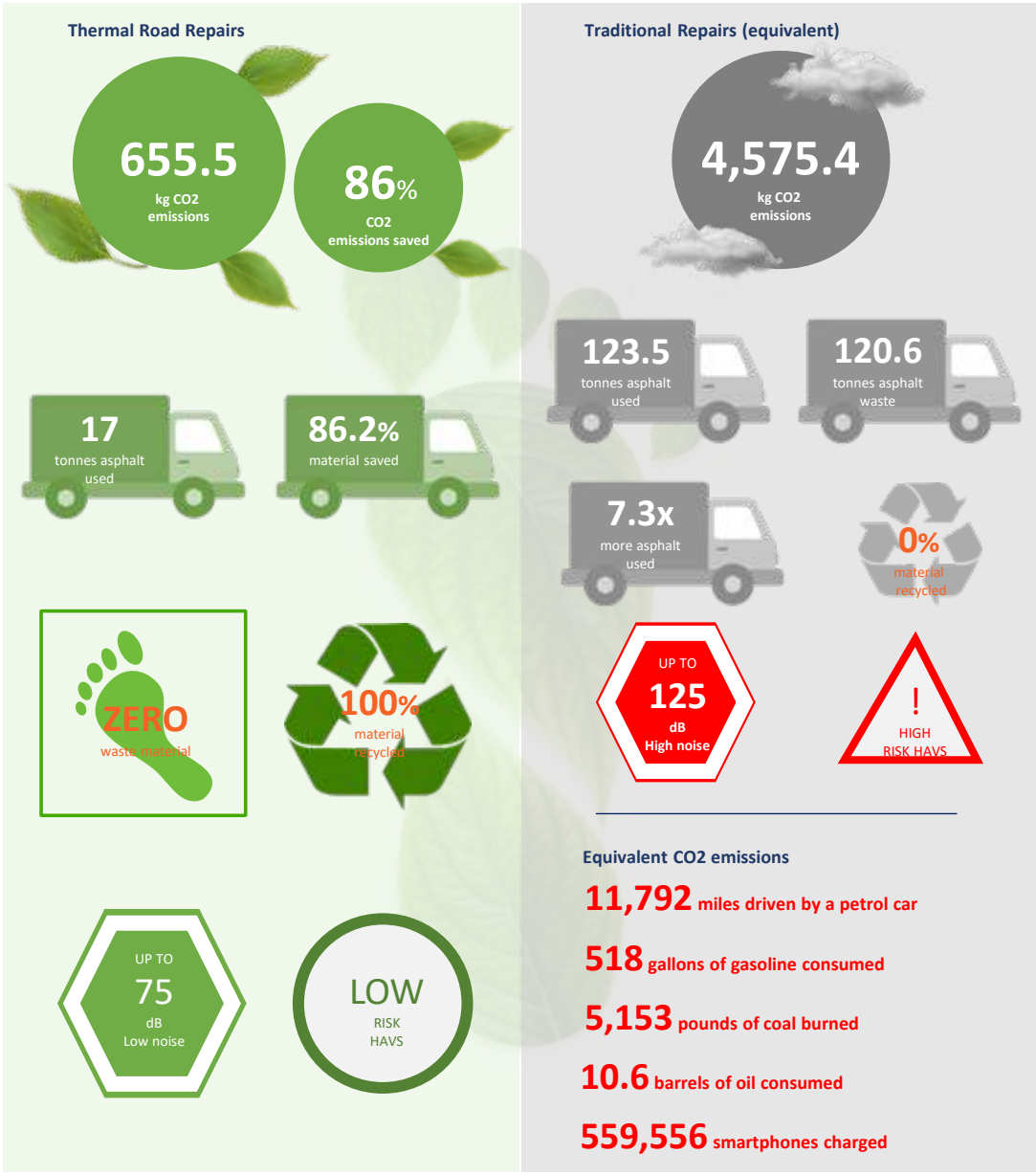


After





Environmental impact



Blackpool Council

THERMAL road repairs

CASE STUDY: LEICESTERSHIRE COUNTY COUNCIL

Work dates: 16th to 19th Oct 2023
Total area: 139 m2

Before





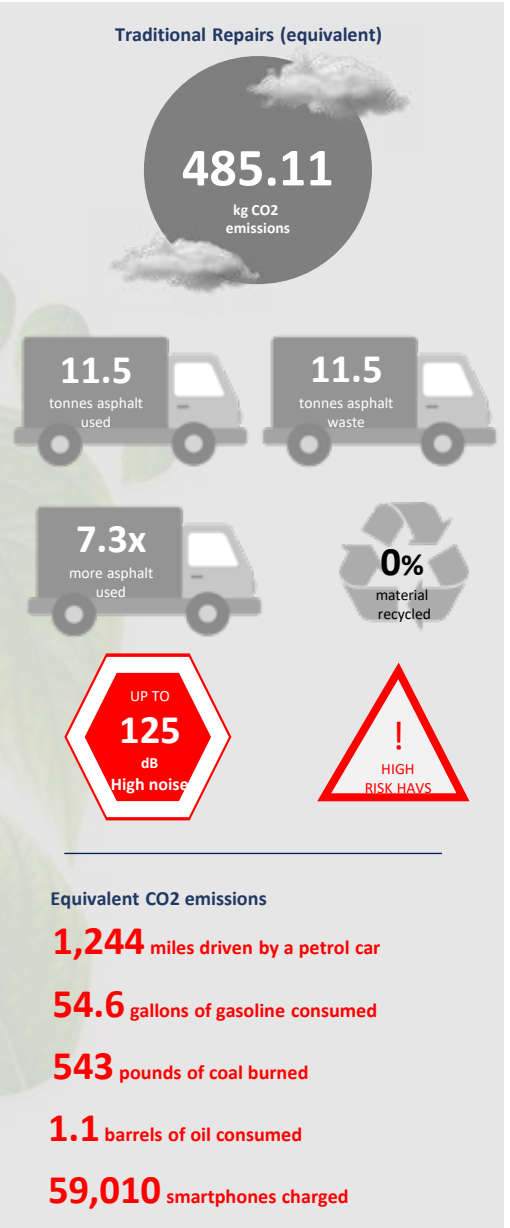
After





Environmental impact





Leicestershire County Council

THERMAL road repairs

CASE STUDY: CLACKMANNANSHIRE COUNCIL

Work dates: 23rd Oct to 10th Nov 2023
Area covered: 486m2

Before







After







Environmental impact

Thermal Road Repairs

243
kg CO2 emissions

84%
CO2 emissions saved

ZERO
waste material

100%
material recycled

UP TO
75
dB
Low noise

Low noise

LOW
RISK
HAVS

Traditional Repairs (equivalent)

1,552.14
kg CO2 emissions

0%
material recycled

177
tonnes asphalt waste

UP TO
125
dB
High noise

Damaging noise

!
HIGH RISK HAVS

Equivalent CO2 emissions

3,979 miles driven by a petrol car

175 gallons of gasoline consumed

1,739 pounds of coal burned

3.6 barrels of oil consumed

188,806 smartphones charged

Clackmannanshire Council

THERMAL road repairs

Thank you

info@thermalroadrepairs.com

http://www.thermalroadrepairs.com/

Video: TRR repair solution

THERMAL road repairs

Decarbonising the asphalt repair industry.

High output. Low emission. Zero waste. Permanent solution.

Staffordshire County Council

RSTA Technical Training Day

Asset Management in Staffordshire

Daniel Vale – Highway Asset Manager

November 2024

Staffordshire County Council

Introduction



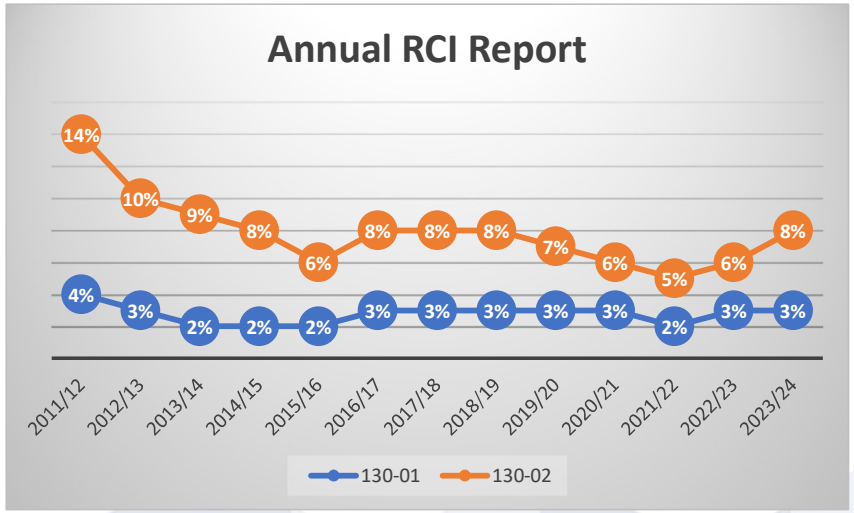
- Daniel Vale – Highway Asset Manager, Staffordshire County Council.
- 28 years in highway industry; 23 in local authority and 5 on National Highways MACs.
- Technical training day agenda – predominantly specialist supply chain presenters.
- Presentation objectives;
  - The Staffordshire approach to asset management and capital highway maintenance – esp. preventative.
  - Our role as advocates for surface treatments and other non-conventional road renewals.

Background

- The transport network is the UK's most valuable asset.
- Here in Staffordshire, we have the 13th largest road network of Local Authorities across England (3,850 miles / 6,200km).
- The Asset Management team are responsible for monitoring asset condition across a range of assets and carrying out planned capital maintenance to maximise its lifespan.
- There are two main treatment types for planned highway maintenance;
  - Structural maintenance
  - Preventative maintenance
- All operations delivered through the SCC / Amey Infrastructure+ partnership arrangement, supported by specialist supply chain partners.

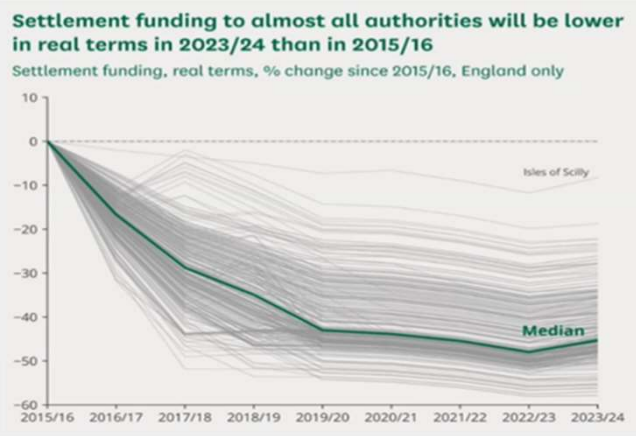
Strategy

- Commitment to preventative maintenance and a lifecycle approach.
- Throughout periods of austerity & asset sweating we protected surface treatments over structural interventions. Average of 1.7M m^2 over last 13 seasons.
- Demonstrated through lifecycle planning & deterioration modelling. Evidenced by data.
- Simplest terms; Red (Grade 4/5) can only ever remain red. Our strategy to stop green to amber and amber to red. Preventative interventions were demonstrated as most effective way of achieving this goal.
- Latest data; approx 200 miles categorised 'Red'. Therefore 3,650 miles Green/Amber.



Funding

- How did we arrest network decline?
- Over a ten-year period, core funding from Central Government fell by 63% in real terms.
- We currently treat around 150 miles of our network every year (4%).
- To secure long term stability of the network we need treat approximately 300 miles every year (8%).
- There is correlation between capital investment, network condition and public satisfaction.



Investment Decisions

- Cannot control national politics. Fortunately, internal investment by SCC has allowed us to protect preventative treatments and slow the rate of decline.

- Outside of DfT funding, not subject to asset led scrutiny through former self-assessment framework. Greater Member influence on local investment.

- Portfolio instructed included more surface treatments; recognising quality, value, network and customer benefit, plus 65-90% carbon reduction comparable to conventional resurfacing.





Investment Decisions

- What a difference a decade makes. Leadership & politicians are strong allies and advocates.
- *'Tar spray and chip rubbish'*
- Preventative strategy challenging to customers and stakeholders. Now strong organisational support.
- Change doesn't happen by chance – evidence, education, awareness, partnership working.
- **Our Role** - to educate customers and stakeholders that a preventative approach ensures greatest proportion of the network is maintained in most cost-effective way.



Partnership Working

- Success requires strong partnership and supply chain relationships.
- Infrastructure+ long term engagement with RMS. Past 20 years (last 10 via I+). Re-engaged for the next 5 years to 2029 incl. – aligned with I+ extension.
- Arrangement provides surface dressing, micro asphalt and asphalt preservation. Treatment chosen based upon the road characteristics. Change to treatment profile.
- Commitment builds relationships, provides business continuity and encourages investment, collaborative innovation, social value opportunities, drives value.

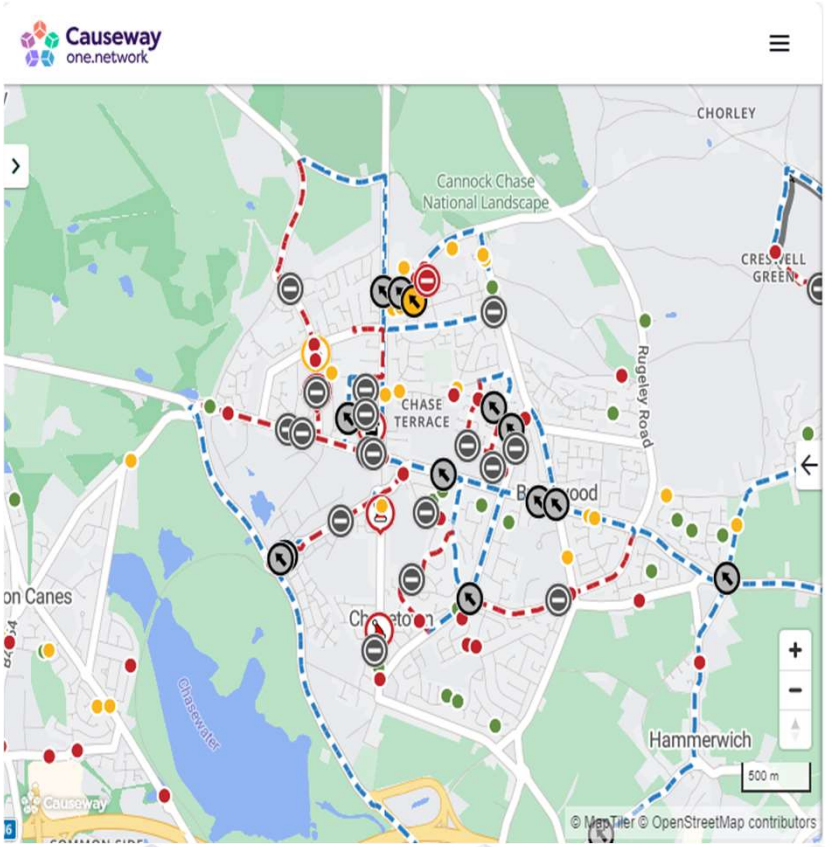
Staffordshire County Council

Amey

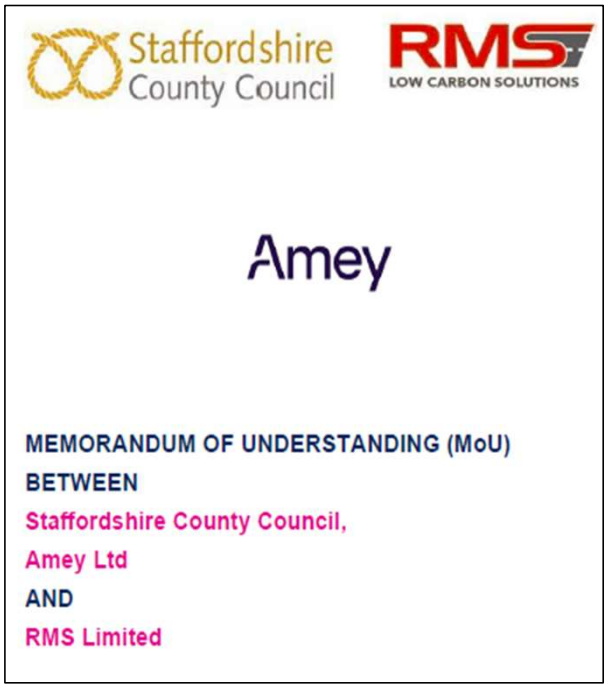
RMS LOW CARBON SOLUTIONS

Partnership Working

- Success requires collaboration with colleagues, other teams & stakeholders (£20M pa / 1.7M m^2).
- Example; SCC is a permitting authority.
- Developing area of the industry can be perceived to be in conflict with delivery;
  - Maximising output & efficiency
    vs.
    minimising disruption to customers.
- Working time restrictions = adverse impact on outputs. Rate uplifts necessary to remain sustainable.
- Forecast £750k impact in 2023 season.



Partnership Working



- It is **our duty** to demonstrate net benefits and find mutually beneficial operating terms.
- Worked with colleagues to understand one anothers function; constraints, limitations and opportunities.
- Developed MoU to establish operating environment to remove working hour restrictions for mobile maintenance works in exchange for improved communications and programme visibility.
- Created open & collaborative working environment to challenge one another.
- Avoidance of uplift facilitated an extra 25km surface treatments otherwise lost to inefficiency.

Innovation & Successes

Innovation

- 10-day permit window agreed.
- Pioneering development of plant and treatments.
- Successful trials in Staffordshire have now become standard suite of treatments.
- Commitment has added social value.

Successes

- RAC Foundation highlighted long standing under investment in local highways.
- Staffordshire recognised for treating the largest proportion of PRN of all authorities in England.
- Joint QA and governance processes.
- Considerable carbon reduction benefits over conventional processes.





Conclusion

- View into one part of the highway maintenance practice of SCC.
- Collaboration with stakeholders and supply chain is key to success.
- Ours is the responsibility to inform, educate and represent our industry.
- With understanding comes mutually beneficial working arrangements, public facing support for our service and the opportunity for inward investment.



Thank you & Questions

