

# A Stich In Time Saves Nine



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**IPWEA**

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How do you prevent going from this ...



To this?



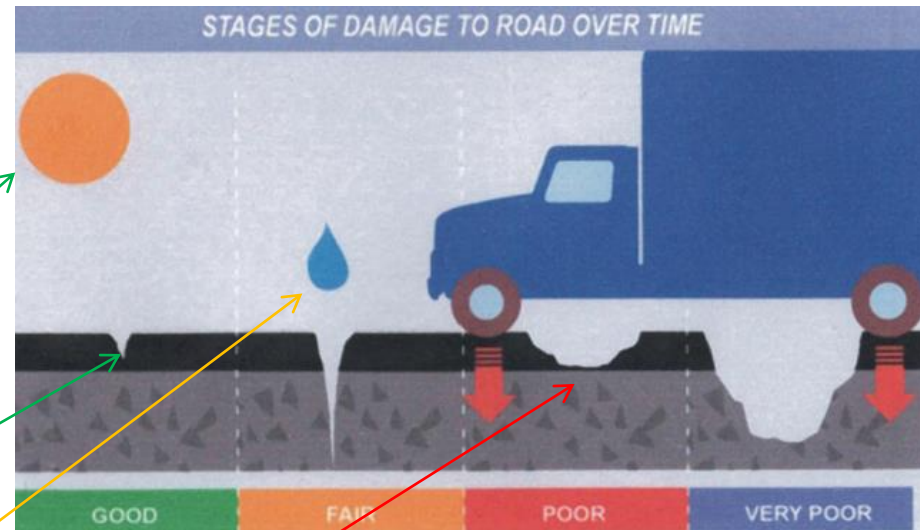
# Economic and political challenges to maintaining surfaced road network

- **Limited funding** for road maintenance
  - Not sexy with Politian's only interested in ribbon cutting projects
  - Should be resurfacing 10% of road network per annum
  - World Bank recommends 2% of net asset value of road network
- **Increasing traffic volumes** and axle loadings
  - 5% growth in road freight expected
  - This will outstrip growth in funding which is driven by GDP growth~ 2%
  - Accelerated damage to pavements – 20 times more than a car
- Road Authorities tend to be more **reactive**
  - Fix it when its broken
  - Most expensive and poor use of scare funds



# Engineering challenges to maintaining a surfaced road network

- Premature surfacing failures leading to reduced pavement life because
  - Bitumen oxidises rapidly in our climate as a result of high UV radiation
  - Causes binder embrittlement & aggregate loss
  - Surface cracking leads to ingress of moisture in underlying pavement layers
  - Formation of potholes due to loss of strength and materials



Cause	Effect	Consequence
Environment effect	Oxidation	Loss of volatile and oils in the bitumen
	UV radiation from sun	
Binder	Hardening	Fatigue cracking
	Loss of adhesion	Aggregate loss
Surfacing	Surface cracks	Leads to water entering and weakening the base
Pavement	Potholes	Expensive repairs



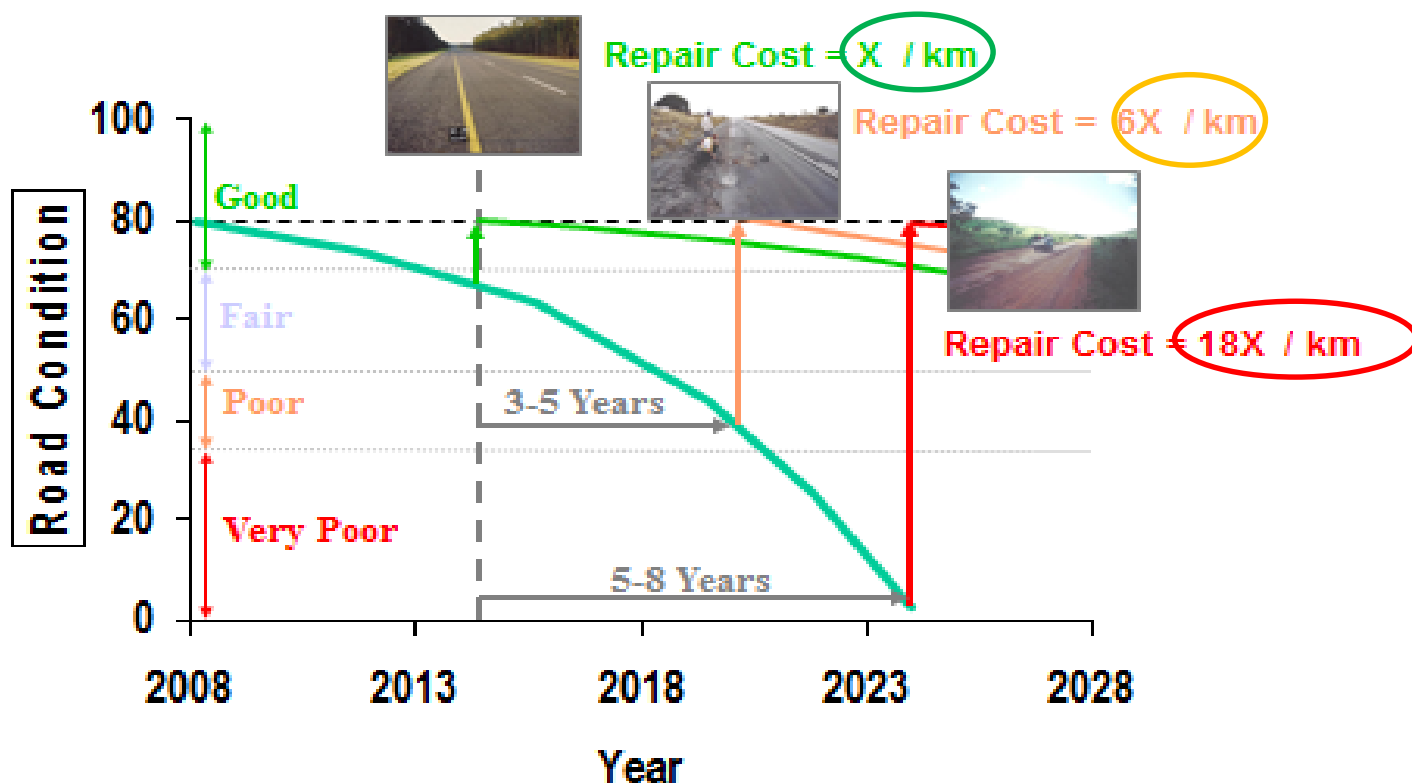
# The solution - Defy the ageing process

- Change from reactive maintenance philosophy to preventative maintenance
  - Regular monitoring of network condition
- Make use of more cost effective surface preservation techniques to extend surface life and increase coverage of financial spend
  - Use rejuvenators to extend life of aged surfaces
  - Use crumb rubber modified bitumen reseals



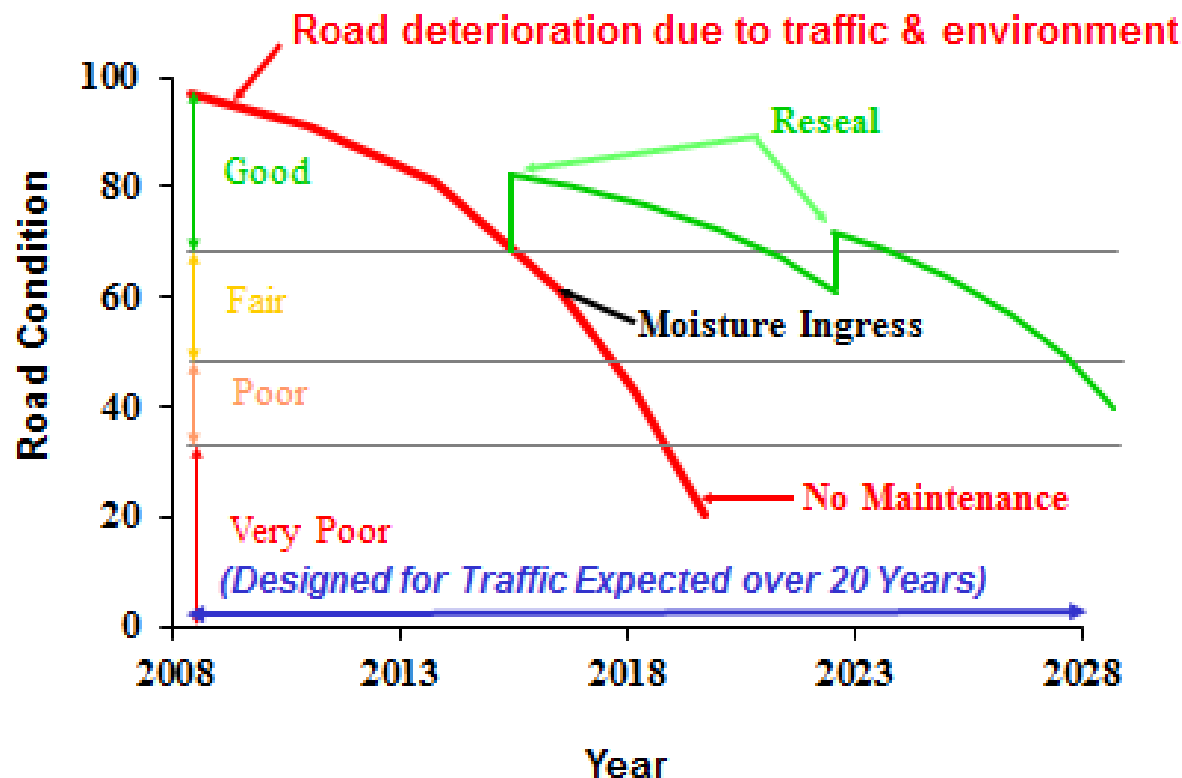
# A case for asset preservation

## Cost of road repairs

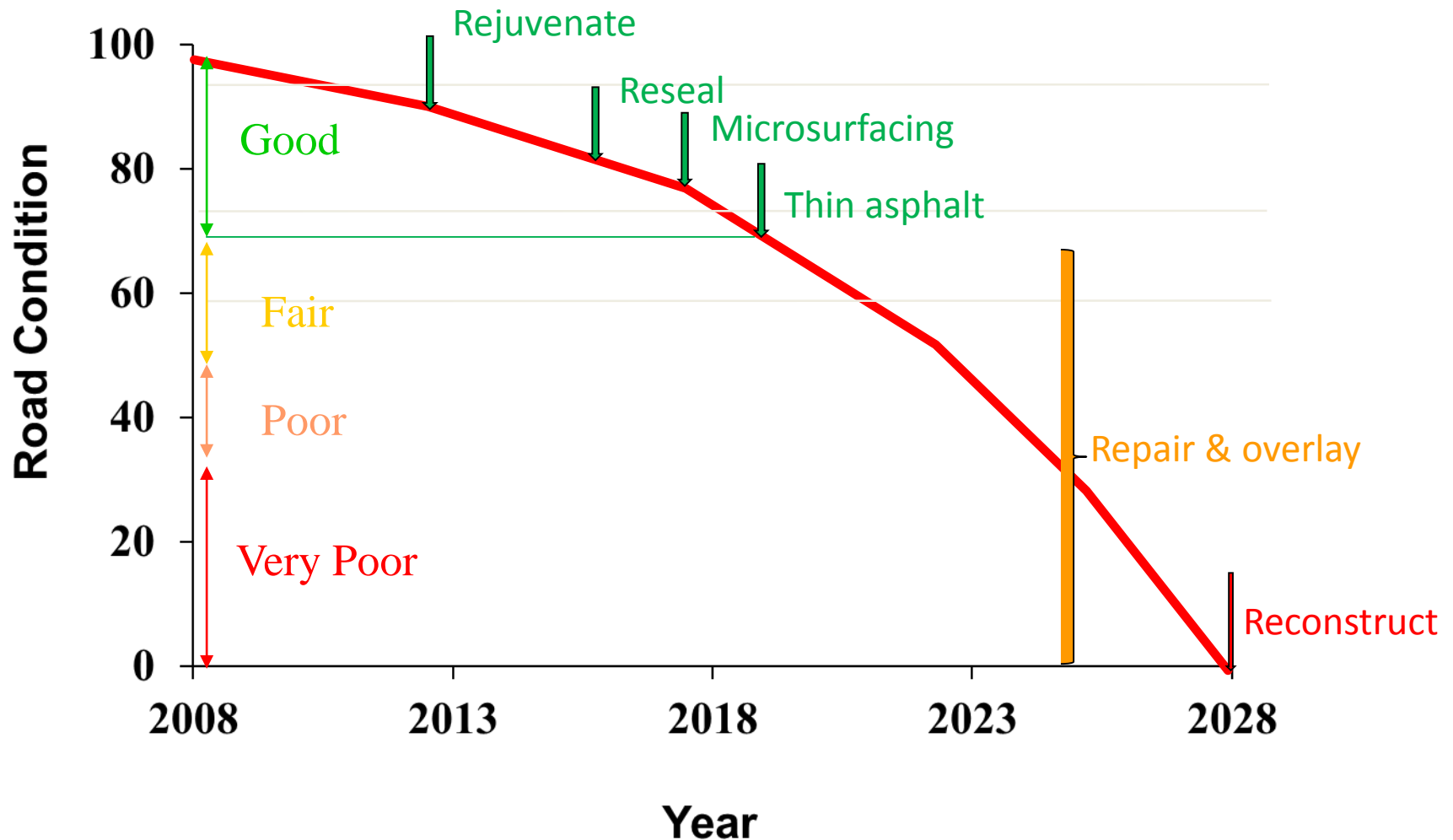


# A case for asset preservation

## Extending pavement life with resealing



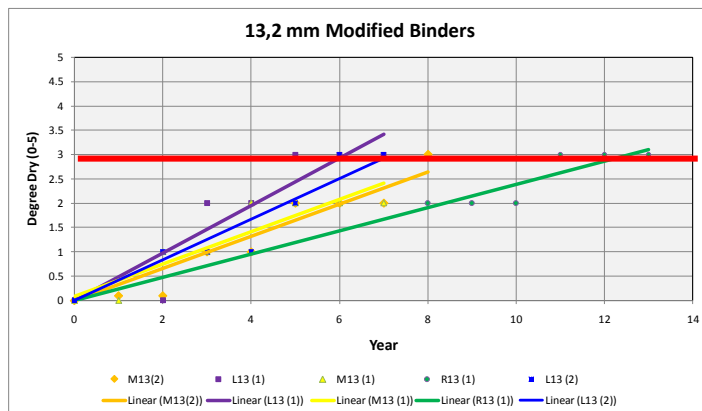
# Preventative maintenance solution





# Resurfacing design considerations

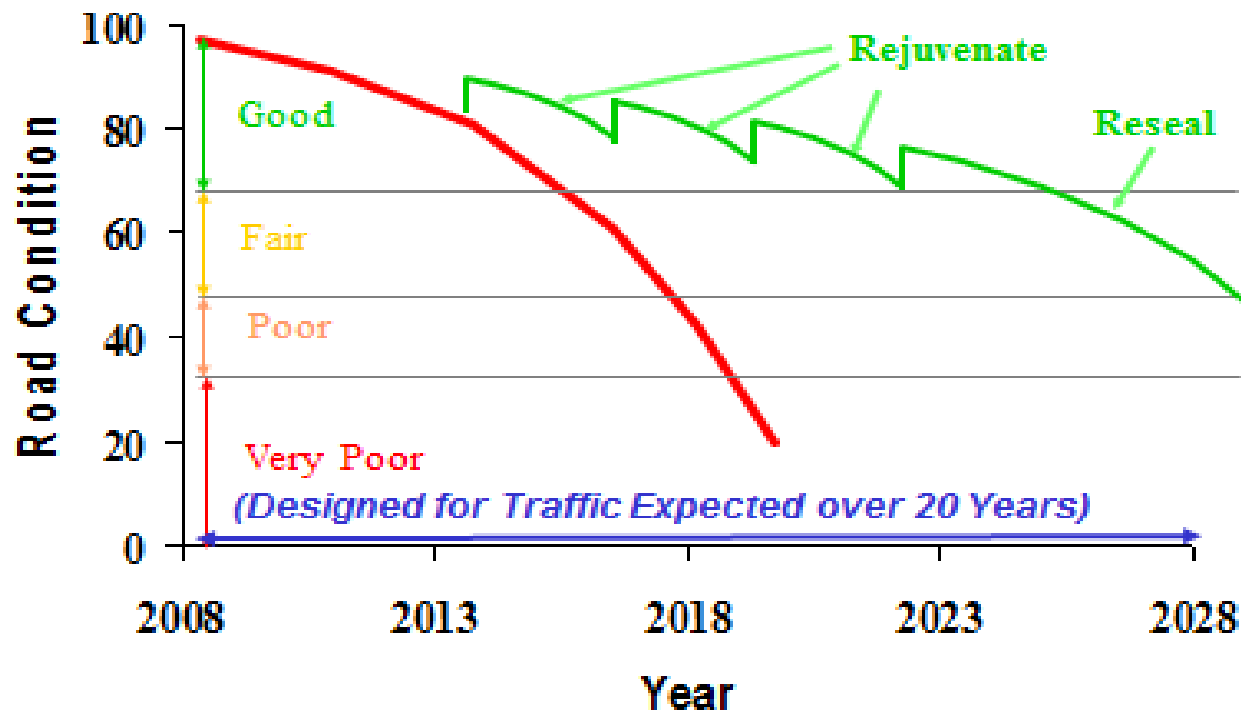
- The **type and design of the surfacing materials** used can increase the durability of the surfacing used on lightly trafficked roads carrying AADT of up to 500 vehicles
- Some of these measures will incur a marginal increase in cost but will render a substantially **longer maintenance free service life**



Treatment	Measure	Reason
Asphalt	Use a softer binder	Change from C320 to C170 will reduce binder hardening
	Use warm mix asphalt	Lower mixing temperature will reduce binder hardening
	Increase binder content	Increases film thickness
	Reduce air voids	Reduces oxidation in asphalt layer
Spray seal	Use crumb rubber modified bitumen	Rubber contains carbon black which is an anti-oxidant
	Use larger stone size	Allows increase in binder application rate resulting in higher film thickness

# A case for asset preservation

## Extending pavement life with rejuvenating

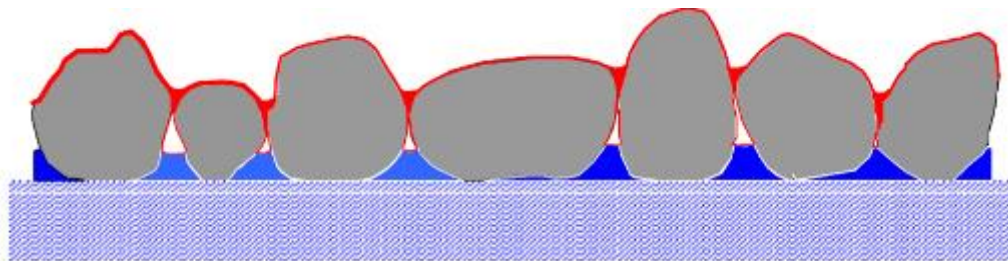


# Surface rejuvenation

- Most cost effective way to retard binder ageing and prolong life of a seal or asphalt
- Delay need for resealing by up to 3 years per treatment
- Can apply up to 3 times before resealing
- Products range from dilute emulsions to proprietary polymer modified emulsions
- Can be applied with conventional sprayers or specialised equipment

# Factors to consider when rejuvenating

- Texture of aged surface
  - to accommodate dilute emulsion without runoff
- Skid resistance
  - Some proprietary products contain mineral fillers which provide skid resistance or
  - Special high friction sand can be applied during spraying
- Traffic accommodation
  - Drying time before opening to traffic
- Weather conditions
  - Avoid wet weather or extreme road temperatures



# Asset preservation techniques

Treat aged surfaces to prevent moisture ingress by using emulsion based rejuvenators

- GSB-88 with sand spreader



Waga airport Feb 2015



Canberra Feb 2015

# Case study: Penrith Council

- Situated due west of Sydney
- Since 2000 has been applying between 100,000 to 150,000 m<sup>2</sup> of rejuvenators per annum
- Permeability tests showed that it gave them addition 3 to 4 years life
- With same financial budget it freed up 20% more funds for expensive repairs
- Use PMS system to identify roads for rejuvenation
- Need to treat every surface between 3 – 7 years



# Case study: Penrith Council

**Before rejuvenation**

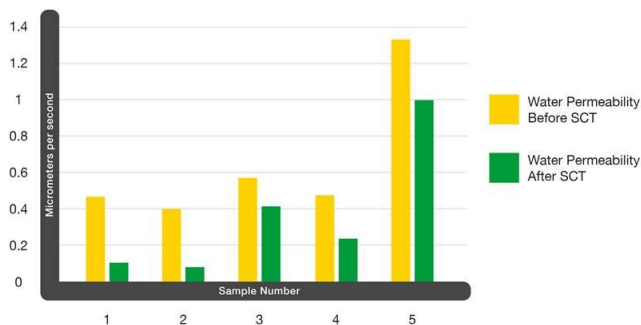


**After rejuvenation**



# Case Study: Port Macquarie cycle track

- ❑ The existing asphalt surface was a 40mm-thick layer that had been in-service for seven years.
- ❑ 5,000 square metres was treated with diluted SCT and sand
- ❑ SCT was diluted 50:50 with water and applied at 0.5 litre per square metre
- ❑ The special sand was spread at 250 grams per square metre on the freshly sprayed emulsion
- ❑ The average road temperature at time of application was above 28°C
- ❑ The SCT took two hours to dry before it could be trafficked.



Boral Surface Coat Treatment Water Permeability





# Conclusion

- The type and design of the surfacing materials used can increase the durability of the surfacing used
- Rejuvenation sprays can retard binder ageing and prolong the road in a good condition before more expensive periodic maintenance is required
- Need to actively monitor ageing of surfacings and include a trigger in PMS for rejuvenating aged surfacings
- The use of these treatments offers the following benefits:
  - Helps seal road pavement from the ingress of water and thus delays the expenditure of more expensive reseals and overlays
  - No need to change road profile or lift manhole covers
  - Improves sustainability of your pavements and helps preserve non-renewal raw materials like aggregates
  - Provides a uniform black colour to the road surface which increases community acceptance

For more info consult 'Oxidation of bitumen seals', Information Sheet IS-01 (February 2009), IPWEA (NSW)