Case Study: Rural Road, Victoria

Product**: RDC - Road Dust Control**

Background

This rural Road, forms part of a critical haulage corridor supporting Victoria's grain industry. The route services a major grain storage facility, that receives over 250,000 tonnes of grain in over the harvest season. It's estimated that there are over 5,750 trucks visits to the site annually.

Prior to treatment, the unsealed pavement was characterised by rapid surface degradation, loss of fines and persistent dust generation. Heavy truck traffic, coupled with variable moisture conditions, led to frequent grading, watering and re-sheeting. Resulting in high maintenance costs and unsafe driving conditions due to dust induced visibility loss. The problem extended beyond the road corridor.

A durable, low maintenance solution was required to stabilise the pavement, reduce fugitive dust and lifecycle costs.

Treatment Overview

In early November 2023, Gravel Lock's **RDC** (Road Dust Control) was applied using the grader incorporation methodology, specifically adopted to the local material and traffic loadings.

Pre-treatment Pavement Condition:
The pavement section, consisted of uncompacted new and old pavement material (GP Sandy Clayey Gravel – medium to fine grained, medium to low plasticity; red brown in colour). At no point was the road closed to traffic during the application of RDC, which demonstrated the ease of integration into routine maintenance without requiring detours. This traffic movement even facilitated the penetration of RDC into the pavement. material

Construction Process:

1. The existing wearing course was ripped and formed to expose and loosen the top layer for blending.
2. RDC was applied topically using a water cart at 1 litre/m^2 straight (undiluted) product over the formed road surface to penetrate and bind with the upper pavement matrix.
3. This layer was lightly rolled to an estimated 95% standard compaction with a multi-tyre roller.
4. A further 2 litres/m^2 of RDC was applied to the surface during final trimming.
5. Final Compaction and surface tightening was completed using the multi-tyre roller, achieving high density, minimal surface permeability and a smooth tightly bound finish.



Pre-Treatment



Second Application



Final treated surface (following day)

Geotechnical and Structural Performance

Post treatment performance has been exceptional, with no recorded surface failures or maintenance interventions after two full harvest cycles and continuous exposure to seasonal traffic loads

From a geotechnical perspective, the RDC treated layer has demonstrated a stable bound matrix with increased insitu density and resilient modulus compared to the untreated granular material. Field inspections confirmed a uniform surface texture, high degree of particle interlock and negligible moisture induced deformation.

Feedback from both operators and residents reinforces these technical results. Local truck drivers reported a noticeably smoother and more stable running surface, eliminating wheel corrugations and tyre bounce which is common on untreated sections. Both residents and transport operators commented on the reduction in dust and also the condition of the road after heavy rain events.

Overall, the RDC treated layer continues to perform as a semi bound, low maintenance layer with excellent strength retention, minimal surface wear and outstanding dust control. Far exceeding initial design expectations.

Material behaviour and Pavement Response

- **Cohesion and Surface Binding**: The RDC treated layer developed strong cohesion between fines and coarse particles, creating a tight, well bound surface. This significantly reduced ravelling and loss of material under heavy truck traffic, however some minor loosening was noted on the road shoulders after the first harvest season. (Pictures of pavement layer 15 months after placement)





- **Moisture Resistance:** The RDC treated layer shed water effectively, reducing soft spots and surface deformation during wet weather. While runoff was well controlled, some minor ponding was observed in low lying sections where drainage grades were already poor.
- **Load response and Rutting:** The RDC treated layer performed with semi flexible behaviour, dispersing wheel loads evenly and preventing rut formation. The smoother running surface reduced vehicle bounce and vibration, improving ride comfort for operators.
- **Surface Condition and Dust Control:** Even after two years of continual haulage, the surface has remained firm, uniform and virtually dust free (a major improvement over the untreated road). While the treated surface often appears shiny or slippery in appearance, in practice it offers enhanced skid resistance due to the firm interlock of the aggregate, which prevents loose fines from acting as a lubricating layer. This locked-in surface has improved both traction and driver confidence, particularly under braking.

Operational And Environmental Benefits

The treatment of this Road with RDC has delivered substantial operational and environmental advantages that extend well beyond the road itself.

- **Zero Pavement Repairs:** No grading or re-sheeting has been required over the 24-month period. The surface was lightly watered once prior to the 2024 harvest to reactivate the treated layer. This was a precautionary measure rather than a performance requirement, with no further maintenance needed since the initial treatment.
- **Improved Fleet Utilisation:** With maintenance demands on the Road eliminated, Council was able to redeploy crews and machinery to other priority projects, including sealed road rehabilitation and storm-damage recovery works. Instead of repetitive maintenance grading. This improved plant utilisation rates and productivity across the the shire.
- **Environmental Benefits:** Water consumption for dust suppression has been almost eliminated, easing demand on local water supplies and preventing sediment runoff into adjoining farmlands. Residents and regular users of the road have reported noticeably cleaner air, reduced nuisance dust and safer driving conditions. Following the winter period and several heavy rain events, the treated pavement remained stable and fully trafficable, showing no signs of surface deformation or material loss.

Performance Summary

Parameter	***Pre RDC Condition***	***Post RDC Condition***
Surface Integrity	Poor aggregate retention, loose, dusty	Stable surface, tight, dust free
Ride Quality	Rough, corrugated, high vibration	Smooth, reduced vibration & improved driver comfort
Moisture Variability	High daily watering	None, stable Hydrophobic surface
Maintenance Frequency	Maintenance grading and re-sheeting	None (24+ months)
Structural Strength	Marginal low CBR	Increased CBR and cohesion
Dust Emission	Severe	Negligible.

Conclusion

The Rural Road project demonstrates how **RDC** technology transforms marginal pavements into resilient, long-life surfaces capable of sustaining high tonnages with no ongoing maintenance.

Through improved aggregate retention, moisture control and load distribution, the RDC treated pavement continues to outperform traditional unsealed road construction, delivering tangible geotechnical, operational and environmental benefits.

This project sets a benchmark for rural and regional councils seeking sustainable, cost-effective pavement improvement solutions that delivers outstanding, medium to long-term performance.



(Rural Road, 24 months post treatment – Still performing)