

SOIL SOLUTIONS
Consider it Solved.

SOIL SOLUTIONS INTERNATIONAL

ASPHALT REHABILITATION WITH EBS

A practical, engineering-driven approach to reusing existing pavement — addressing root failure mechanisms and eliminating the cycle of repeated, costly repair.

Engineered Base Stabilizer (EBS) transforms deteriorating surfaces into durable, high-performance pavements with a design life of 15–20 years.

> **"Before we replace a failing road, we should understand how much of that road can become part of the solution."**



ROAD DAMAGE

WHY ROADS DETERIORATE

The visible surface defect is only the starting point. Weak subgrade support, water ingress, and repeated traffic loading collectively determine the appropriate treatment depth and method.

Understanding the failure mechanism is essential before selecting a rehabilitation strategy.

CRACKED & OXIDIZED ASPHALT

Ageing and oxidation cause loss of binder flexibility, making the surface brittle and prone to surface cracking and raveling.

PATCHWORK SURFACES

Repeated minor repairs create inconsistent layers with varying material properties, introducing weak points and poor ride quality.

STRUCTURAL DEGRADATION

Water ingress, heavy axle loads, and deferred maintenance reduce stiffness, causing fatigue cracking, rutting, and base deformation.

DRAINAGE-RELATED FAILURE

Poor drainage allows water to infiltrate the pavement structure, saturating the base and subgrade and accelerating pothole formation and structural loss.

> **“A road rarely fails at the point where the damage first becomes visible. The surface tells us there is a problem; engineering tells us where that problem began.”**

FAILURE CAN BECOME A CYCLE

Cracks admit water. Moisture weakens binder-aggregate bonds. Reduced structural support increases deformation under load. Patching alone addresses the symptom, not the cause — and the cycle repeats, each iteration more expensive than the last.

1

OXIDISED BINDER

Ageing makes asphalt brittle, losing flexibility and ductility — the first crack opens the door.

2

WATER INGRESS

Water penetrates cracks and voids, weakening the bond between binder and aggregate.

3

LOSS OF COHESION

Inter-particle bonds break down, producing raveling, loose material, and a structurally weakened layer.

4

REDUCED LOAD CAPACITY

The weakened structure deforms under traffic, accelerating rutting, fatigue cracking, and full pavement failure.

Breaking this cycle requires treating the failure mechanism — not just the surface symptom.





THE INTERVENTION BEGINS WITH ASSESSMENT

Before selecting a treatment, a structured investigation confirms the nature and depth of distress.

Accurate diagnosis prevents under-design and ensures the chosen method addresses the actual failure mode — not just what is visible from the surface.

- **Pavement Analysis**
- **Investigation & Testing**
- **Treatment Selection**
- **Implementation**

PRESERVE THE SURFACE WHERE THE BASE IS SOUND

Where the underlying structure is intact and competent, a surface seal with EBS can cost-effectively protect the pavement against moisture infiltration and UV-driven oxidation.

This approach extends functional life without the cost of full rehabilitation — but only where structural weakness has been ruled out through proper investigation.

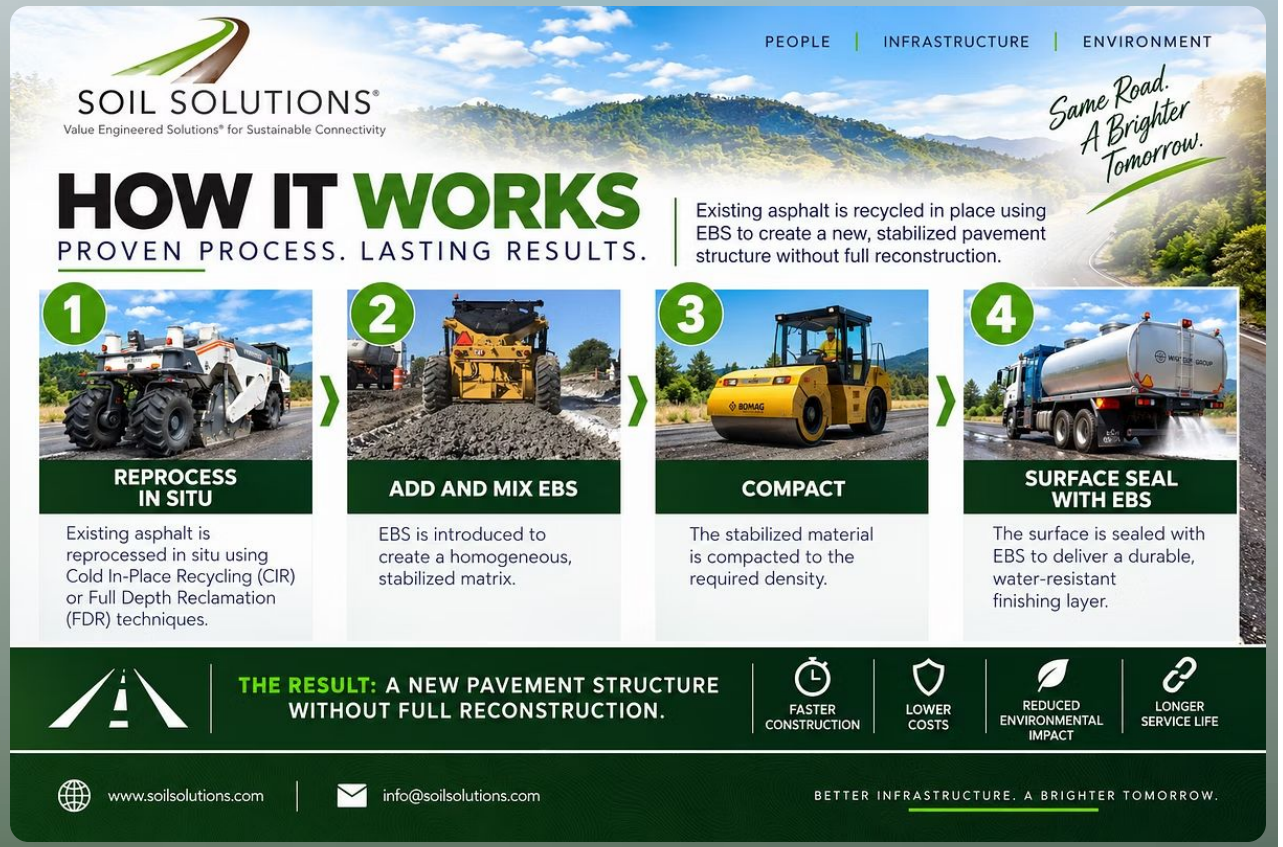
When Preservation Is Appropriate

- Surface shows minor cracking or oxidation only
- Base and subgrade are stable and well-drained
- Deflection testing confirms adequate structural capacity
- Traffic loading within design parameters

When a Deeper Treatment Is Required

- Alligator cracking or rutting present
- Evidence of base or subgrade saturation
- Core samples reveal loss of bond or layer delamination
- Repeated patching has failed to hold





RECYCLING USES THE EXISTING ROAD

Cold in-place recycling with EBS processes the existing asphalt material in place — eliminating haulage, reducing imported aggregate, and delivering a new stabilized pavement structure without full reconstruction.

The process is continuous, fast, and minimizes disruption to traffic and surrounding communities.

1

REPROCESS IN SITU

Existing asphalt is milled and reprocessed to design depth using Cold In-Place Recycling (CIR) or Full Depth Reclamation (FDR) equipment.

2

ADD AND MIX EBS

EBS is introduced at the specified dose rate, blended with water to create a homogeneous, uniformly stabilized matrix throughout the layer.

3

COMPACT

The stabilized material is compacted to the required density, achieving the target strength and structural performance.

4

SURFACE SEAL WITH EBS

The surface is sealed with EBS to deliver a durable, waterproof finishing layer — completing the new pavement structure without full reconstruction.

COLD IN-PLACE RECYCLING (CIR)

CIR targets the existing asphalt layer, processing it to its designed depth — typically 75–150 mm.

The recycled material is blended with EBS stabilizer and water in a single continuous train, then compacted and shaped.

Mix design and achieved compaction density are the primary determinants of the recycled layer's long-term structural strength and fatigue resistance.

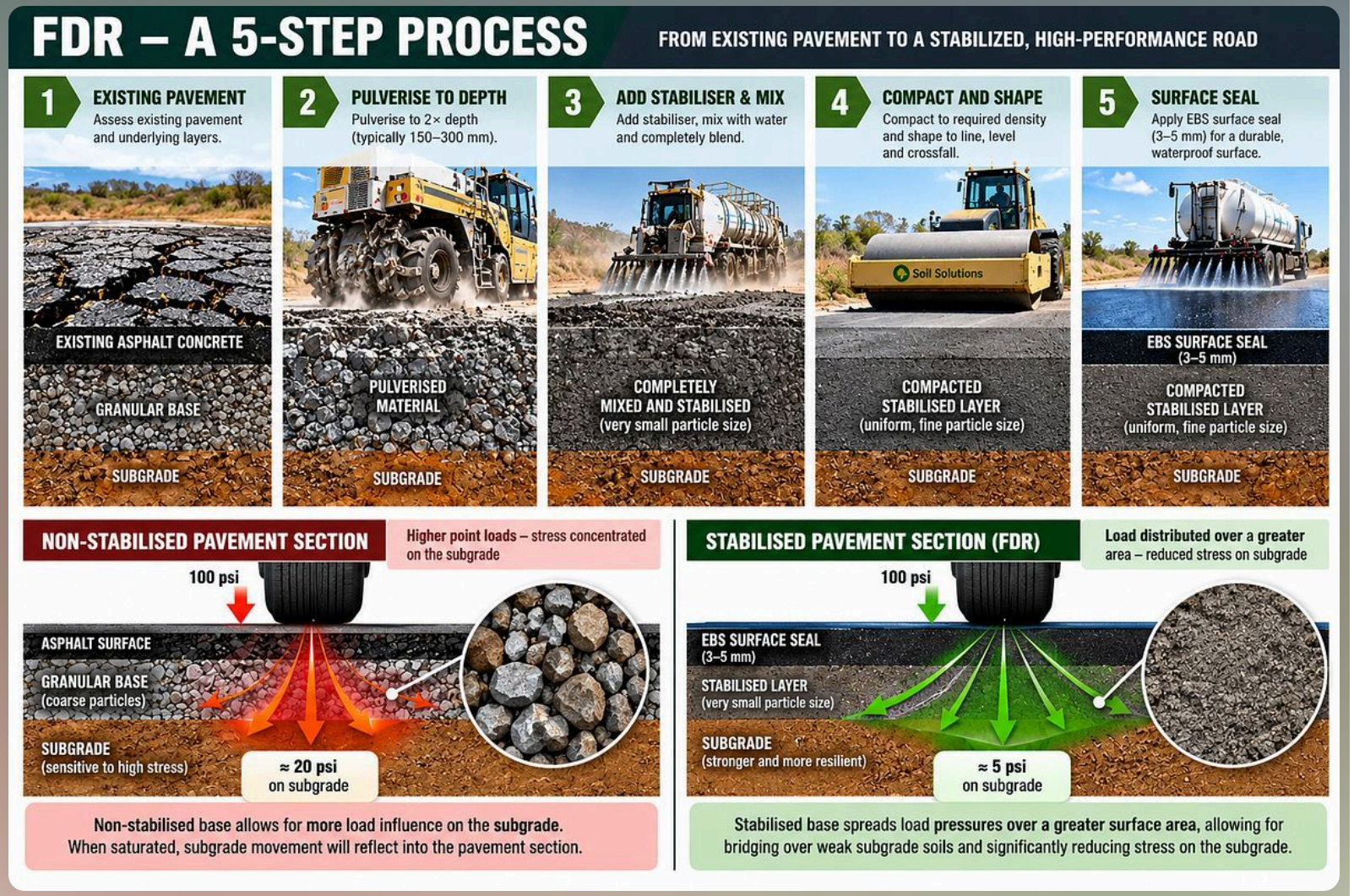
KEY CIR DESIGN INPUTS

- Existing asphalt gradation and binder content
- EBS stabilizer dose rate (lab-determined)
- Optimum moisture content for compaction
- Target density and compaction method
- Overlay requirements based on traffic loading

RESULTING PAVEMENT BENEFIT

The stabilized layer distributes load over a broader area, significantly reducing stress concentration on the subgrade — improving fatigue life and long-term ride quality.





FULL DEPTH RECLAMATION (FDR)

When distress extends through the asphalt and into the underlying aggregate base, **Full Depth Reclamation** is the appropriate response.

FDR combines the full asphalt layer with selected base material, treating the combined mass with EBS to produce a single, stronger stabilized layer.

Drainage correction and subgrade preparation must accompany FDR to prevent recurrence of the original failure.

TREAT THE FULL DISTRESS DEPTH

FDR processes asphalt plus granular base — typically 150–300 mm total — ensuring treatment reaches and corrects all structurally deficient layers.

CORRECT DRAINAGE FIRST

Saturated subgrade and inadequate side drainage must be addressed before reclamation. FDR cannot compensate for ongoing water ingress.

STABILIZED LAYER REDUCES SUBGRADE STRESS

The treated matrix distributes applied loads over a wider area — reducing subgrade stress from ~20 psi to approximately 5 psi in typical designs.

THE STABILIZED PAVEMENT STRUCTURE

The finished cross-section integrates each functional layer — wearing surface, treated structural layer, prepared base, and engineered drainage — into a coherent, load-bearing system.

An asphalt overlay is optional and selected based on traffic loading, design life, and surface smoothness requirements.

- **EBS SURFACE SEAL (3–5 MM)**

  Sealed, waterproof wearing layer. Controls surface runoff and protects the structural layers from moisture and UV degradation.

- **STABILIZED SURFACE LAYER (75–100 MM)**

  ART + EBS regenerated asphalt. Well-graded, fine particle size. Densely mixed and compacted for high strength and load-bearing capacity.

- **REWORKED BASE LAYER**

  Reworked and compacted existing aggregate base. Cold mix, well-graded material compacted for uniform support beneath the stabilized layer.

- **COMPACTED SUBGRADE**

  In-situ material compacted to specification. A 2–4% crossfall is engineered into the section to direct runoff to defined side drains.





BEFORE AND AFTER TREATMENT

The contrast between deteriorated and rehabilitated conditions illustrates the structural transformation EBS recycling delivers.

The left section shows the failure profile typical of unbound, water-sensitive material. The right reflects a fully bound, moisture-resistant stabilized structure.

Actual project performance is governed by site-specific testing and mix design — these cross-sections are illustrative.

BEFORE: DETERIORATED ASPHALT

- Cracked, oxidized asphalt surface (50–100 mm)
- Water ingress into base and subgrade
- Weakened, saturated aggregate base
- Soft subgrade with loss of structural support
- Eroding shoulder and undefined drainage

AFTER: IN-SITU REGENERATION WITH EBS

- EBS Surface Seal (3–5 mm) — sealed, waterproof
- EBS Regenerated Layer (75–100 mm) — milled, crushed, stabilized
- Reworked and compacted existing base
- Stable compacted subgrade
- Engineered side drain and 2–4% crossfall

RECLAIMED ASPHALT AND EBS

When EBS is introduced into the reclaimed asphalt matrix, the treatment targets the two primary failure drivers: loss of inter-particle cohesion and susceptibility to moisture.

By reactivating and binding the existing material, EBS improves cohesion, reduces water sensitivity, and increases stiffness — all while retaining the valuable aggregate and residual binder already present in the road.

No virgin aggregate import is needed for the structural layer.

IMPROVED COHESION

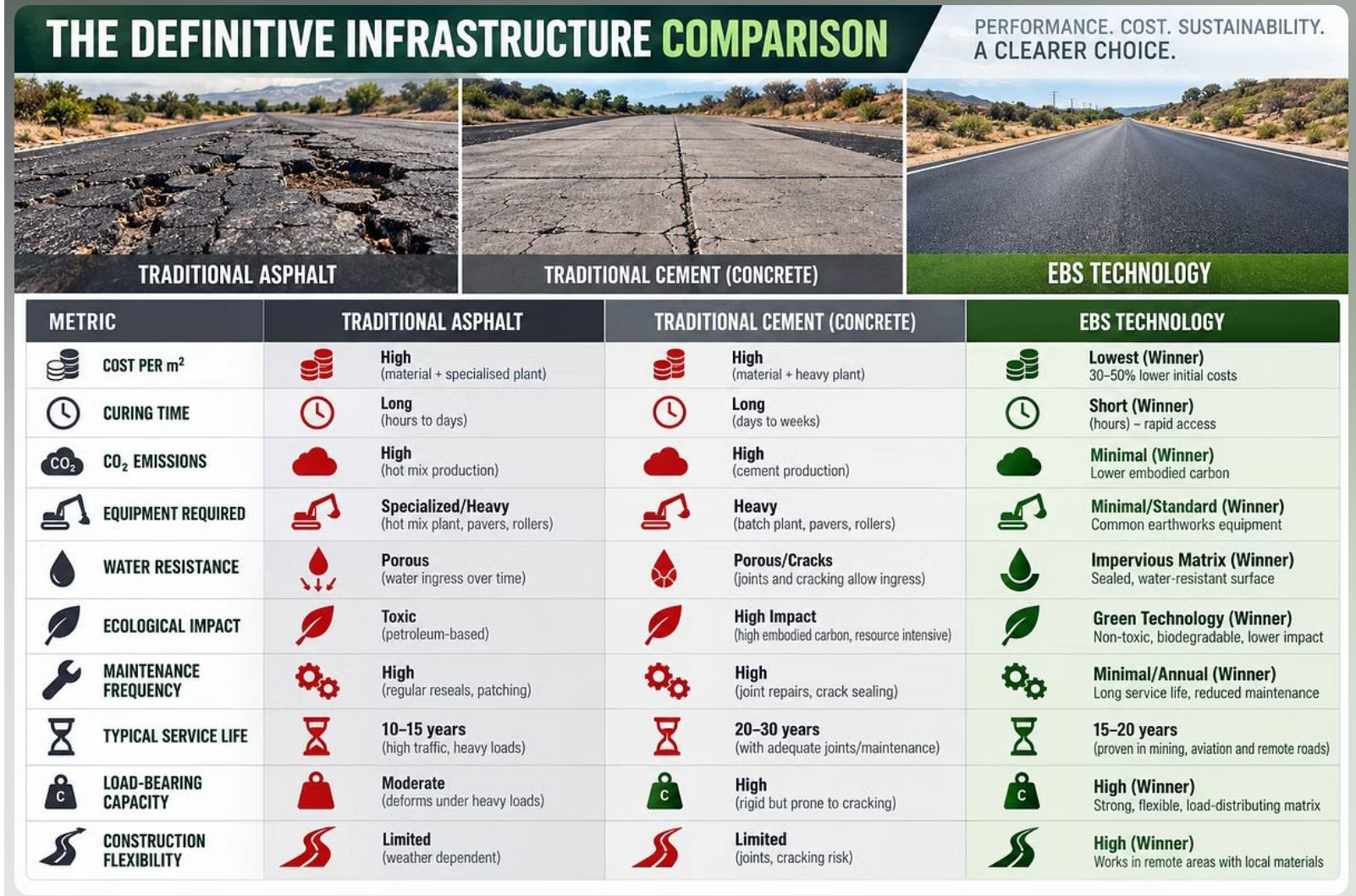
EBS re-establishes and strengthens the bond between aggregate particles and residual binder, restoring structural integrity to the reclaimed matrix.

MOISTURE RESISTANCE

The treated layer becomes significantly less water-sensitive, resisting the saturation and loss of strength that drove the original pavement failure.

MATERIAL RETENTION

Usable aggregate and residual binder from the existing road are retained in the structural layer — reducing imported material and disposal requirements.



METRIC	TRADITIONAL ASPHALT	TRADITIONAL CEMENT (CONCRETE)	EBS TECHNOLOGY
COST PER m^2	**High** (material + specialised plant)	**High** (material + heavy plant)	**Lowest (Winner)** 30–50% lower initial costs
CURING TIME	**Long** (hours to days)	**Long** (days to weeks)	**Short (Winner)** (hours) – rapid access
CO_2 EMISSIONS	**High** (hot mix production)	**High** (cement production)	**Minimal (Winner)** Lower embodied carbon
EQUIPMENT REQUIRED	**Specialized/Heavy** (hot mix plant, pavers, rollers)	**Heavy** (batch plant, pavers, rollers)	**Minimal/Standard (Winner)** Common earthworks equipment
WATER RESISTANCE	**Porous** (water ingress over time)	**Porous/Cracks** (joints and cracking allow ingress)	**Impervious Matrix (Winner)** Sealed, water-resistant surface
ECOLOGICAL IMPACT	**Toxic** (petroleum-based)	**High Impact** (high embodied carbon, resource intensive)	**Green Technology (Winner)** Non-toxic, biodegradable, lower impact
MAINTENANCE FREQUENCY	**High** (regular reseals, patching)	**High** (joint repairs, crack sealing)	**Minimal/Annual (Winner)** Long service life, reduced maintenance
TYPICAL SERVICE LIFE	**10–15 years** (high traffic, heavy loads)	**20–30 years** (with adequate joints/maintenance)	**15–20 years** (proven in mining, aviation and remote roads)
LOAD-BEARING CAPACITY	**Moderate** (deforms under heavy loads)	**High** (rigid but prone to cracking)	**High (Winner)** Strong, flexible, load-distributing matrix
CONSTRUCTION FLEXIBILITY	**Limited** (weather dependent)	**Limited** (joints, cracking risk)	**High (Winner)** Works in remote areas with local materials



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CONSTRUCTION AND MAINTENANCE VALUE

Reusing existing material in place directly reduces three major cost drivers: haulage of removed material off-site, disposal fees, and imported virgin aggregate.

These savings compound when maintenance costs over the design life are included.

Compare treatment options using local material rates, haulage distances, and life-cycle maintenance assumptions to establish a project-specific cost basis before selecting a method.

30–50%

LOWER UPFRONT COST

Typical cost saving vs. conventional full reconstruction, driven by reduced haulage, disposal, and aggregate import.

15–20 YRS

DESIGN LIFE

Expected service life with proper mix design, compaction, and drainage — reducing frequency of major rehabilitation interventions.

↓ MAINT.

REDUCED MAINTENANCE

Fewer potholes, patches, and reactive repairs over the life of the treated pavement compared to repeated surface-only treatments.

ENVIRONMENTAL AND COMMUNITY EFFECTS

In-situ recycling fundamentally changes the logistics of a pavement project.

When material is processed in place rather than removed and replaced, the number of heavy vehicle movements drops substantially.

Quantify the fuel consumption, waste volume, and emissions reductions against a defined baseline — conventional mill-and-fill or full reconstruction — to support environmental reporting and community engagement documentation.

FEWER TRUCK MOVEMENTS

Eliminating haul-away and aggregate import trips reduces heavy vehicle traffic near residential and commercial areas — lowering road damage, noise, and community disruption during construction.

REDUCED MATERIAL WASTE

Existing asphalt is reused rather than landfilled. Less disposal volume means lower tipping fees and reduced demand on local waste facilities.

LOWER CARBON FOOTPRINT

Reduced haulage distance, lower plant energy requirements, and retained materials collectively reduce the embodied carbon of the treatment compared to full reconstruction.





SELECT THE RIGHT PROJECT

Not every distressed road is an ideal candidate for in-place recycling.

The strongest candidates have structurally reusable material and a clearly identified, treatable failure mechanism.

Project screening should confirm that traffic loading, moisture conditions, drainage, layer thickness, and material chemistry are all within acceptable ranges before committing to an EBS recycling approach.

STRONG CANDIDATES ✓

- Asphalt cracking or oxidation with intact base
- Base failure with correctable drainage
- Sufficient layer thickness for design depth
- Material gradation within stabilization range
- Traffic loading compatible with recycled layer design

FACTORS REQUIRING FURTHER REVIEW

- Very thin asphalt layers (<50 mm) with heavy loading
- Highly contaminated or organic subgrade
- Drainage problems that cannot be corrected within scope
- Binder chemistry incompatible with EBS stabilizer
- Utility conflicts preventing design treatment depth

A PILOT MAKES THE DECISION MEASURABLE

Testing a representative road segment before committing to a full program converts engineering judgment into measured performance data.

Select a section that reflects the worst-case conditions of the broader network. Record compaction density, layer strength, and surface ride quality during construction.

Then monitor for rutting, cracking, moisture response, and maintenance frequency over the first 12–24 months.

- **SELECT REPRESENTATIVE SEGMENT**

  Choose a section with conditions typical of — or slightly worse than — the broader project to ensure results are transferable.

- **RECORD CONSTRUCTION DATA**

  Document density, EBS dose rate, moisture content, compaction passes, and surface profile at time of construction.

- **MONITOR PERFORMANCE**

  Track rutting depth, crack initiation, moisture infiltration, and any maintenance interventions over 12–24 months of service.

- **MAKE THE GO/NO-GO DECISION**

  Use measured outcomes to confirm design assumptions and justify the full rehabilitation program with documented evidence.





REHABILITATE. STABILISE. EXTEND.

A deteriorated road does not always need to be replaced.
Sometimes the greatest value is already in the pavement beneath your feet.

With EBS, existing pavement materials can be **reprocessed, stabilised and reused** to create a stronger, more durable pavement structure while reducing the need for imported materials, transport, disposal and repeated rehabilitation.

Reuse what exists.
Engineer what is needed.
Address the cause of failure.
Extend infrastructure life.

BUILD BETTER ROADS BY REBUILDING SMARTER.

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