



Product Developer and
Manufacturer of NME
for the Road Industry

About Us



GeoNano Technology is a well-established South African based company operating Nationally as well as Internationally.

Our Head Quarters are based in Germiston, Gauteng, South Africa which is home to our Research and Development facility for Product and Materials Research. This facility also houses our Soil and Materials testing laboratory as well as our Modified Emulsification Plant.

We have been and continue to be the Pioneers in the development of scientifically proven and cost-effective solutions for flexible Road Pavements, incorporating a variety of design specific and compatible 'New Age Emulsions' and mineral conversion techniques and technologies.

By the introduction of these techniques and technologies, we can successfully and with a high degree of confidence, build more affordable moisture resistant structures which are stronger, longer lasting using 'naturally' available materials WITHOUT the use of cementitious products, thereby creating greater pavement flexibility.

Our team has combined experience in the fields of Civil Engineering, Geotechnical and Minerology, Chemistry, Bitumen and Emulsion, Polymers and Nano Science.

Our philosophy is not in 'The re-invention of The Wheel', but rather in the innovative adaptation and remodeling of traditionally accepted Road Pavement designs and construction methods by incorporating proven Nano Science and Chemistry.

We are proudly involved with the Highest ranked Faculty of Engineering in Africa, having sponsored several final and post graduate students, which enables us to build the foundation for a strong and sound engineering background to all our products.

Through the involvement of both students and academics, we have identified the best available 'New Age', Modified Emulsions (NME) using Nano Science and mineral conversion technologies, thereby continuously improving products and developing optimal design procedures and methods based on fundamental scientific principles, making them universally applicable, therefore adding value and contributing to the greatly needed service delivery of transportation infrastructure at a **considerable reduction in Road unit costs**.

Registered Member of



Product Technology and Design

Once materials have been tested and the mineralogy of the material has been identified, we are then able to provide a 'material compatible' modified emulsion. NME technology is NOT based on a 'Trial and Error' approach, but on the identification of the inherent material mineralogy and material particle size. Once identified we can safely incorporate the modifying agents that chemically modify traditional stabilising agents, such as Bitumen Emulsion. This modification enables the stabilising agent to chemically attach to the naturally available stone/ gravel/ soil materials.

The chemical attachment that is absent in normal bitumen emulsion products (that relies on electrical and mechanical forces, through interlocking and absorption to gain strength) considerably improves bond strengths.

These high chemical bond strengths enable the use of naturally available materials in all pavement layers of roads, meeting (usually exceeding by some margin) the engineering requirements in terms of stresses, strains and durability in any pavement layer. These modified emulsions are not 'Load sensitive' and can therefore be used for all pavement designs from Low Trafficked Roads to Super Highways.

Through the advancement of these technologies, they can now successfully be introduced into other areas, including, primes, bituminous layers, gravel road seals, labour intensive slurry seals, Pot Hole Repair solutions, various types of fog sprays and dust suppressants, structural protection as well as the re-capitalisation of waste materials i.e slag, slime, coal etc and even the re-pelletising of coal dust. 'Notably, all these applications are applied cold', negating the need for special heating requirements and expensive machinery.

This Environmentally Green technology contributes immensely to the conservation of the natural environment and limited resources and further curbs the negative impacts of human destruction.



New-Age Modified Emulsion (NME) stabilised materials prepared for testing

Water forms beading on top of sample with no penetration (Hydrophobic)

Material sample stabilised with un-treated modified bitumen emulsion

Water penetrates sample immediately

Product Range

- Soil Stabilisation
Ge-NANO NME – Modified Bitumen Emulsion
- Seals and Rejuvenators
Ge-NANO CLEARSEAL
Ge-NANO SLURRY SEAL
- Dust Suppressants
Ge-NANO DUST
Ge-NANO CRUST
- Structural Waterproofing
Ge-NANO CEMSEAL
- Road Maintenance
Ge-NANO ROADFILL

Soil Stabilisation

Ge-Nano NME (Modified Bitumen Emulsion)

The proven concept of these New- Age modifying agents in emulsions (NME) has been demonstrated with the scientific testing and use of NME stabilisation of in- situ materials (ranging from G5 to G8 materials) in the design and construction of several roads. Accelerated pavement testing (APT) or HVS (Heavy Vehicle Simulator) have also been completed on these roads.

Based on the scientific design approach followed through the analysis of the mineralogy of the materials and designing of a material-compatible modifying agent, the results of these tests far exceeded the engineering requirements. This further resulted in considerable cost savings (materials as well as time of construction).

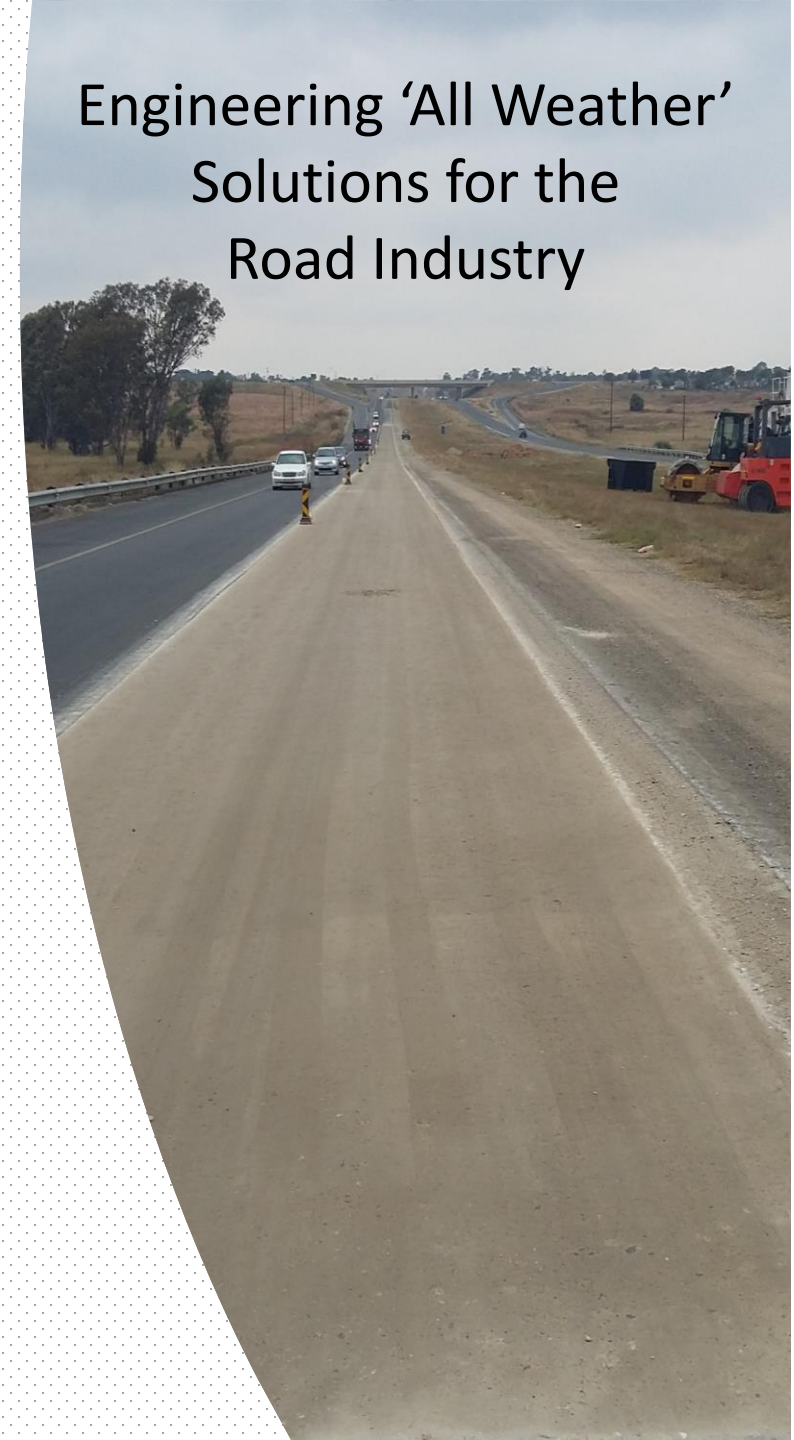
The general acceptance of new technologies lies in both the value for money and the ease of use, lending themselves to be used to maximise labour-enhanced construction.

Applications here range from simple road construction using basic equipment (Water Cart, Grader and compaction equipment) to sophisticated equipment using recyclers or central mixing plants.

Green Technology – Environmental Benefits :

- Stable Anionic Based Technology
- Moisture Resistance, stronger, longer lasting,.
- Flexible use of Naturally available materials
- Savings of 50%+
- No Blasting or crushing of stone required.
- Water is the 'By Product' of NME technology
- Less energy and fuel used during construction.
- Less or No haulage costs required of expensive materials.
- Permanent Bonding of material therefore 'No Leaching'
- Conservation of Naturally available Materials
- Less Material wastage
- Reduction in Exhaust fume Pollution
- Reduction in Noise Pollution
- Reduced Dust emissions
- Hydrophobic Roads
- Stable Anionic Based Technology
- Less Traffic

Engineering 'All Weather' Solutions for the Road Industry



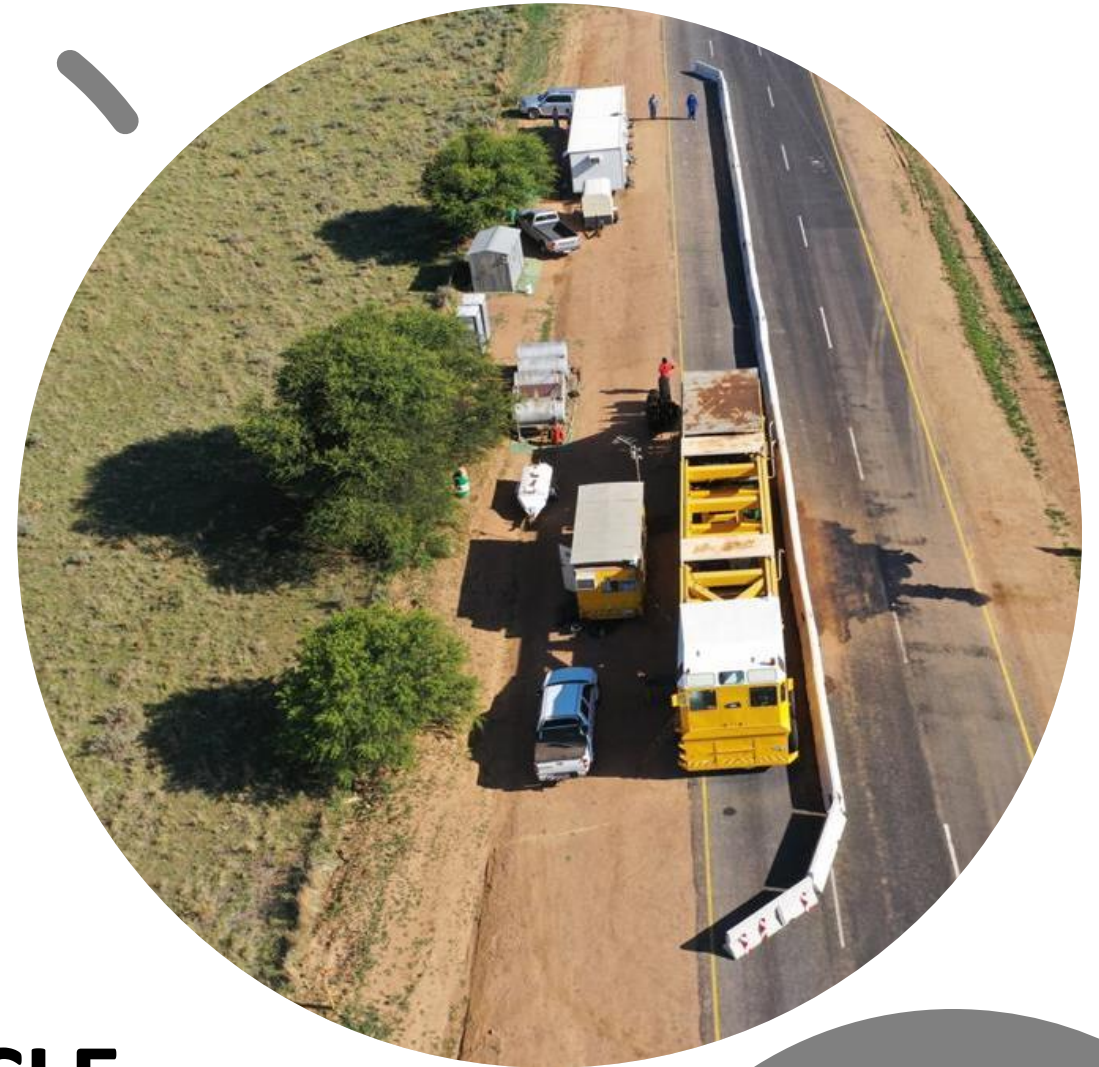
Advantages of Ge-NANO NME:

- Moisture Resistance, stronger, longer lasting, Flexible Hydrophobic Roads
- Chemical Bonding of Aggregates (Opposed to current Electrical and Mechanical Stabilising Agents and methods)
- Internationally Applicable Technology and design
- Proven Savings between 30% to 50% on current road infrastructure costs and designs
- Exceeds UCS (Unconfined Compressive Strength) and ITS (Indirect Tensile Strength) Engineering Requirements in Both WET and DRY Conditions
- Cold Emulsions – No special Heating Requirements
- Material Compatible Design (Based on Minerology of the material)
- NME stabilising Agents are not ‘Load Sensitive’.
- Can be used on ‘ALL’ category of Roads from Gravel to Super-Highways
- NO requirement for Cement or Lime Additives
- No Special curing Required.
- Ease of compaction through the lubrication (Oil in water) of the Modified Bitumen Emulsion on Aggregates.
- No Thermal or Stabilisation cracks are introduced into the pavement layer.
- Lower dosage of stabilising agent required with greater distribution of the NME agent throughout the pavement layer.
- Reduced or No’ nozzle clogging in Watercarts Sprayers or Recycler’s
- Reduced or Elimination of weathering of Pavement layers through Hydrophobicity of the stabilised Layers.
- Reduced or Elimination ‘Freeze Thaw’ in Pavements Layers by reducing or eliminating the seepage or water and rain with-in the pavement structure.

Proof of Product

Test Section built using Ge-NANO NME

APT (ACCELERATED PAVEMENT TESTING) done by :



D1884
G7/G8
base/sub-base
silicon modified anionic emulsion

CSIR
HVS test site


HEAVY VEHICLE SIMULATION – TEST SITE



20 year traffic
Dual wheel load: 40kN
1 mm deformation in base



30 year traffic
Dual wheel load: 60kN
3 mm deformation in base



40 year traffic
Dual wheel load: 80kN
8 mm deformation in base

Results of APT Test

USING A HEAVY VEHICLE SIMULATION

D1884 Original pavement structure: **Rehabilitation**
G7/G8
base/sub-base
silicon modified anionic emulsion

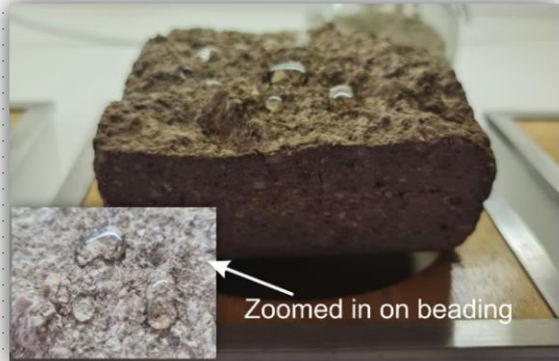


Various Soil Samples tested with Ge-Nano NME in our Laboratory

Results show soil samples are all hydrophobic.



LATERITE G10



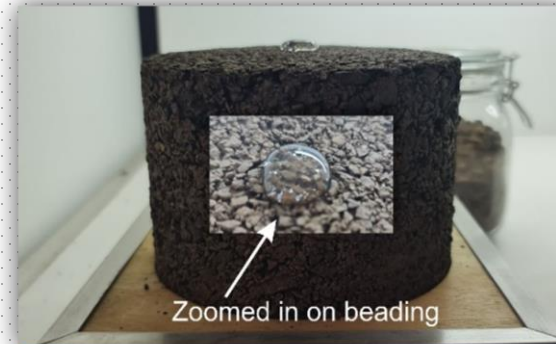
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CALCRETE



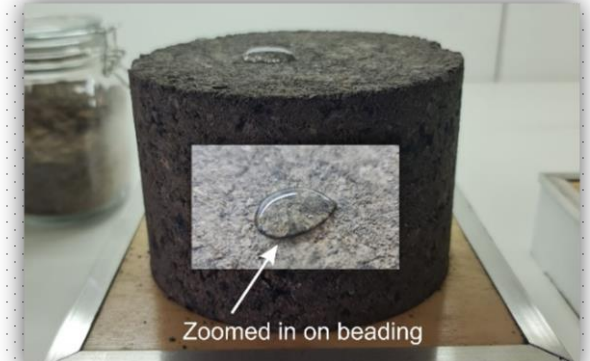
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COAL DUST WASTE



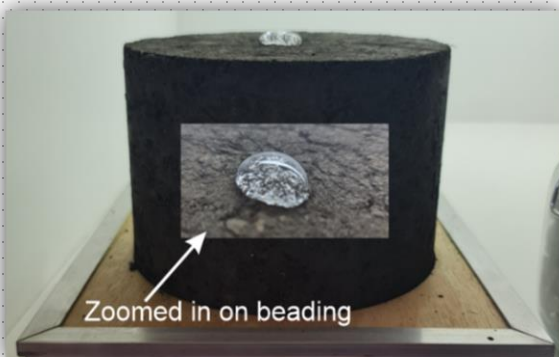
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DOLOMITE



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WASTE SLIME



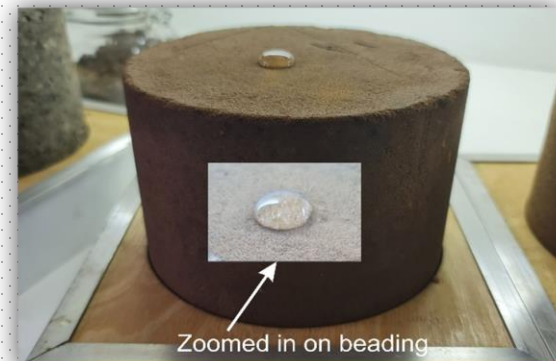
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ASSMAG SLAG



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GOEIHOEK G8



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KALAHARI SAND G10 +



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BLACK CLAY G10+

Seals and Rejuvenators

Overview

GeoNano have developed various advanced pavement seal technologies. All of which have been specifically designed and tested. The design aspects have been based on the 'Understanding' of the limitations of traditional seals. These seals are 'Multi particle' size that penetrates deeper into the area providing a longer lasting and water-resistant surface.

All seal technology is water soluble and 'Cold' applied, so no special heating is required and is therefore 'Labour Intensive'.

These Modified Seals and rejuvenators combine a series of particle sizes ranging from Nano to Micro, to create penetration as well as surface mastic.

Ge-Nano Clear Seal

Modified 'Clear Setting' Emulsion that can be used on existing distressed Bituminous layers and Gravel roads for 'Preventative Maintenance'.

Dilution: 1 Part Ge-Nano 'Clear Seal', 20 Parts Water

Due to the combination of particle sizes used, a water-resistant and high penetrative UV stable protective layer is achieved. The application is quick drying (+/- 1 hour) with 'NO' Type pick-up or contamination of vehicles and NO repainting of road markings required.

Can be easily applied with Hand Sprayers or via a Water Cart, with little training required. This sealant is also ideally suited for the priming of an exposed base, protecting the base layer against water damage and vehicle trafficking.

For a 'Gravel Road Seal' a double application of this seal can be applied to protect the gravel layer. It provides a surface with a 'Natural' Aesthetically pleasing look while protecting the layer from water damage, achieving a high depth of penetration on an existing compacted layer.

Ge-Nano Slurry Seal

GE-Nano 'Slurry Seal' is a Modified Anionic bitumen emulsion, that can be successfully placed above and below 20°C, that acts as an effective aggregate adhesive which 'permanently' binds the bitumen to the aggregate and renders the aggregate hydrophobic and repels water from the mix.

With the improved distribution and stability of the bitumen particles, effectively reducing the percentage of binder required to achieve the same engineering properties in terms of Tensile and Compressive strength.

Can be easier applied and mixed using a concrete mixer and applied **'labour Intensively'** by hand in one simple application using squeegees.

Gravel Road treated with Ge-NANO CLEARSEAL
A - Treated with CLEARLSEAL B - Not treated



Dust Suppressants

Ge-Nano Dust

GE- Nano 'Dust' provides a major advancement from traditional road dust suppression due to the multi-size particles size, chemical bonding and the lipophilic nature of these product. Only a small amount of liquid is required to cover large surface area.

Due to the multi-size particles inherent in GE-Nano 'Dust', it is now possible, not only to suppress dust, but simultaneously create a deep penetrating 'Hydrophobic' layer deep with-in the substrate.

GE-Nano 'Dust' can be supplied in 2 forms:

- 1) Modified Anionic Bitumen Emulsion
- 2) Modified Clear Emulsion that provides a clear setting solution

Benefits & Advantages

- Deep penetrating and hydrophobic wearing coarse with particle sizes ranging from <1nm to Micrometres.
- Cost Effective
- Hydrophobic
- The coverage area is greatly increased due to particle size and dispersion of the liquid through increased carrier fluid
- Little to no nozzle blocking due to increased dispersion of the liquid.
- The products chemically bond to the wearing course to create superior binding.
- Easily Applied
- 'Labour Intensive'. Applied with traditional watercarts, hand sprayers or Distributors.
- Quick drying (+/- 1hr)
- No tyre pick-up
- The product is environmentally non-hazardous.
- UV stable

Ge-Nano Crust

Dust has huge negative impacts to the environment and agriculture, including reducing crop yields, burying seedlings, loss of plant tissue, reducing photosynthesis, increased soil erosion, hazardous to humans, carrying of infectious diseases, affecting river and stream water quality, poor visibility as well as damage machinery and plant equipment, to name but a few...

Benefits & Advantages

- The coverage area is greatly increased due to particle size and the ability to create better dispersion of the products through the increased carrier fluid i.e water (25lts-200lts).
- Hydrophobic (Water resistant)
- No nozzle blocking due to increased dispersion of the liquid.
- The products chemically bond to the wearing course to create superior binding.
- Deep penetration of liquid (between 50mm)
- Environmentally Safe
- UV stable
- Labour Intensive
- Limited skills or training required.
- Can be applied with various types of hand sprayers or distributed via a watercart.



Kanshansi Mine - Zambia

Ge-NANO DUST

Ge-NANO CRUST



Structural Waterproofing

Ge-Nano CEMSEAL

A Nano modified Organic Solvent and serves as a High-Quality, general-purpose water repellent for impregnating and priming cementitious materials.

Suitable for application and treatment on the following :

- Brickwork
- All kinds of concrete
- Aerated concrete - sand-lime brickwork
- Cement fibre boards - mineral plasters
- Mineral-based natural and artificial stone
- Mineral paints
- As a primer for exterior paints

Special Features

- High depth of penetration
- High resistance to alkalis
- Tack-free drying
- Effective even on damp substrates
- Rapid development of water repellency
- Breathable technology with no pore or capillary clogging



Cement Brick treated with GeNANO CEMSEAL

Brick was left in the rain

* Treated section shows no water penetration

* Non-Treated section shows complete water penetration



Stepping stone



Slate stone

Road Maintenance

Ge-Nano Road Fill 'Skrik vir Niks

GE-Nano 'Road Fill' is a cost effective, high strength, pre-packaged, ready to use Pot-Hole repair kit. The advanced aggregate modification offers superior aggregate binding that far exceeds 'standard' specifications for road maintenance. The result is a stronger, longer lasting, weather resistant, Hydrophobic (water resistant) Pot-Hole repair that is simple to apply.

No special machinery or heating equipment is required.

GE-Nano 'Road Fill', has been specifically designed to be labour intensive in order to create employment with nominal capital Investment. Tools required: Hand compactor or stamper, broom, pick and shovel.

Ge-NANO
ROAD FILL
POTHOLE REPAIR KIT



Before



After



Ge-NANO ROAD FILL

POTHOLE REPAIR KIT





For Further information please contact us and we will gladly assist you.

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