

# TIPES Guide for Applicants Suppliment

## Non-traditional Chemical Stabilisation Binders



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## 1. Introduction

The Transport Infrastructure Product Evaluation Scheme (TIPES) is administered by ARRB. Applications for registration of products under TIPES must be made on the application form in Attachment A. Applications are subject to the terms and conditions set out in the TIPES Guide for Applicants and Terms and Conditions. ARRB reserves the right to amend the terms from time to time as it sees fit.

Intending applicants should read the terms to familiarise themselves with the requirements and procedures before making an application.

FURTHER INFORMATION CAN BE OBTAINED FROM:

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## 2. Background to the supplement

TIPES is a national program endorsed by all Australian state and territory road agencies as well as the Queensland division of the Institute of Public Works Engineering Australasia and the Queensland Local Roads Alliance. The TIPES process delivers an independent technical assessment of road pavement construction and maintenance products that fall outside the scope of established standards and specifications. Products include innovative technologies, materials, equipment and/or processes. The foundation of the scheme is the validation of performance claims nominated in the application for TIPES assessment. The outcome of the evaluation is an autonomous expert technical opinion on the merit of new products with the potential to reduce the need for separate assessment by multiple agencies.

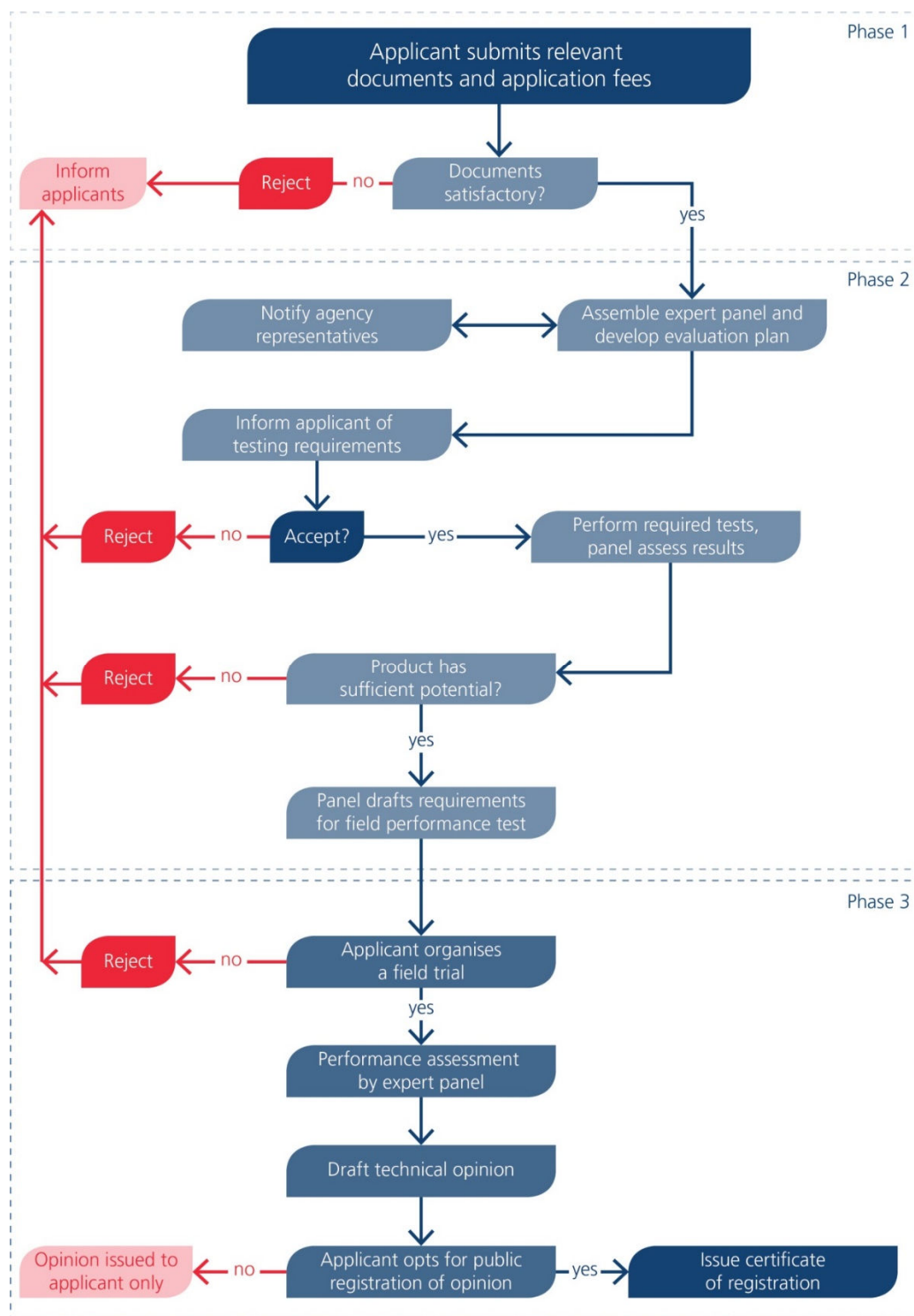
The *TIPES Guide for Applicants and Terms and Conditions* (Guide) provides an overview of the general scheme, technical assessment process, documentation requirements, in addition to representative assessment durations and costs. A flowchart of the TIPES assessment process is provided in Figure 1.

This supplement to the Guide (Supplement) provides additional guidance specific to the assessment of non-traditional chemical stabilisation binders for the construction and maintenance of road pavements. Detail is provided for the evaluation of products associated with constructability enhancement, fines preservation/dust suppression and strength improvement/all-weather accessibility of sealed and unsealed roads. Specifically, this Supplement is intended to:

- provide prospective applicants with greater detail on the assessment process
- document specific requirements of each assessment phase, above those established in the Guide

- define requisite considerations for product evaluation plan development to ensure consistency in the assessment of similar products
- indicative assessment durations
- facilitate road agency consultation and approval of the assessment scheme, rather than seeking acceptance of individual product assessment plans.

The provisions, terms and conditions of the Guide take precedence over this Supplement, except where explicitly stated otherwise. The definitions of terms used in this document are as presented in the Guide or as defined herein.



**Figure 1: Flowchart of TIPES process**

### 3. Non-traditional chemical stabilisation binders

Non-traditional stabilisation binders are classified for the purpose of this Supplement as proprietary chemical products introduced in measured quantities to aggregate or soil to modify the parent material properties. Generally, stabilisation technologies are considered in applications where available materials are of a marginal standard or enhanced material properties are necessitated by design constraints. Non-traditional chemical stabilisation binders are typically selected where traditional cementitious, lime or bituminous stabilisers are technically or economically ineffective or as a supplementary binder to enhance the use of traditional binders. Non-traditional chemical stabilisation binders may exist in granular, powder or liquid form and can be applied directly to the formed pavement surface, blended with the parent material or diluted in compaction water. Product origins are generally classified as:

- natural lignin extracted from organic materials
- organic petroleum compounds
- synthetic polymers and emulsions
- biological secretions
- chemical salt compounds
- natural organic oils.

The categorisation of these alternative products for use in road pavement applications is according to the primary function, either constructability enhancement, fines preservation/dust suppression or strength improvement/all-weather accessibility chemical stabilisation binders. This Supplement provides guidance for the assessment of products that fall within these three general categories as described in greater detail below.

#### Constructability Enhancement

Non-traditional chemical stabilisation binders are commonly utilised to enhance the compactability of road pavement materials. Constructability enhancement products are also known as ‘compaction aids’ or ‘wetting agents’ and improve the surfactant nature and viscosity of compaction water, resulting in better mobilisation of fine particles during the field compaction process. Chemical stabilisation binders within this category are generally considered for hydrophobic aggregates and subgrade soils to increase the compacted density, in lieu of applying heavier compactive effort or introducing additional compaction water.

#### Fines Preservation/Dust Suppression

Fines preservation and/or dust suppression chemical stabilisation binders are typically considered for unsealed pavement surfaces, mine access and haul roads, in addition to cleared areas left uncovered for extended periods. Products within this category work in a variety of ways to minimise the transport of fine particles from the exposed surface via air or water. Chemical stabilisation binders associated with fines preservation and dust suppression generally provide improved particle surface tension, absorption, waterproofing or binding attributes.



## Strength Improvement/All-weather Accessibility

Non-traditional chemical stabilisation binders can be used to improve the material strength properties of selected layers in sealed pavements and to improve climatic and environmental resilience in unsealed pavements. Products within this category typically promote interparticle bonding and/or waterproofing to increase strength and/or decrease moisture-induced strength loss.

### 4. Review of application (Phase 1)

Review of the Application will be conducted in accordance with Section 8 of the Guide. The focus of the Phase 1 assessment is examination of the completeness and adequacy of the submitted Application. The Phase 1 review begins upon receipt of both the Application and Application Fee. A completed *TIPES-Product Application Form* presented in Attachment A of this Supplement and sufficient documentation to address the 18 items of the *Supporting Information Checklist* (see the Guide) constitute the Application.

Upon receipt of the Application and Application Fee, as outlined in Attachment A and the Guide, respectively, ARRB will commence the Phase 1 assessment. Where a Technical Opinion is desired for a range of similar products, a single Application can be submitted. However, a separate assessment (Phases 2 and 3) will be required for each product for which registration is sought. The Technical Opinion and registration are issued for specific products only.

Where an incomplete Application is received or insufficient supporting information is provided, ARRB will notify the nominated contact person of the deficiency and any additional fee required to offset the increased administrative costs due to the omission. Once the completeness and adequacy of the Application is verified, the nominated contact person will be notified and a Product Evaluation Panel composed of 3 to 5 suitably qualified and experienced Independent Technical Experts assembled.

The Product Evaluation Panel will be comprised of persons having expert technical training, experience and knowledge in the relevant fields as determined by ARRB. As a guide, the Product Evaluation Panel will typically include one representative of:

- potential users of the product (road agencies)
- the product industry (independent trade association)
- experts in the field of practice (ARRB or other scholars).

As outlined in the Guide, an independent subject matter expert may be designated in the Application to serve on the Product Evaluation Panel, subject to review by ARRB. The nominated contact person will be notified of the composition of the Product Evaluation Panel prior to initiation of the Phase 2 assessment.

Application elements requiring particular emphasis include the product description, specific applications, design process, quality control/assurance system, utilisation practices and product management. A revised Attachment A (Application Form for Non-traditional Chemical Stabilisation Binders) is attached and replaces Attachment A in the Guide).

## Product Description

The description must provide the Product Evaluation Panel with an understanding of the product's chemical composition, target use (i.e. constructability enhancement, fines preservation/dust suppression, or strength improvement/all-weather accessibility), stabilisation mechanism (i.e. chemical modification processes, stabilisation effects, and specific criteria for selection), and expected benefits of the product (e.g. technical and economic advantages of utilisation). Consideration of social and environmental benefits is also encouraged. Products that can be classified in multiple pavement application categories may be declared as such, but will be subject to evaluation according to all relevant standard assessment schemes (see Section 5).

### *Technical Benefits*

Technical benefits include measureable improvements to the properties of the parent material or pavement structure (e.g. increased dry density, shear strength improvement, decreased permeability, improved durability, reduced moisture susceptibility, etc.) or to the performance of a road (e.g. reduced dust, reduced rate of gravel loss, longer intervals between maintenance) as a result of incorporating the product. The utilisation of an otherwise unsuitable material can also be considered as a technical benefit.

The Application should clearly identify any performance claims with respect to the technical benefits of the product. These claims will form the basis for the assessment of the product by the Product Evaluation Panel.

### *Economic Benefits*

Economic benefits include cost savings associated with reductions in imported pavement material or layer thickness, and improved construction and/or maintenance efficiency as a result of incorporating the product. The economic benefits should provide ample justification for selection of the product in lieu of traditional materials and stabilisation binders.

## Specific Applications

The specific applications must provide the Product Evaluation Panel with an understanding of the materials, traffic conditions and environments where the product is optimally employed. They should also identify specific situations where the product should not be used.

### *Parent Material*

The properties of the parent or receiving material significantly impact the effectiveness of stabilisation efforts. Depending on the nature of the material, some stabilisation binders may have minimal or even a negative effect. Optimal parent materials for stabilisation with the product should be defined according to Unified Soil Classification System (USCS) designation, particle size distribution and plasticity properties, in addition to any properties specifically required for effective stabilisation with the product (pH, cation exchange capacity, etc.).

### *Pavement Configuration*

The configuration of the pavement and the location of the stabilised layer within the structure have a significant impact on the effectiveness of the stabilisation technology. The appropriate pavement type (sealed/unsealed), composition (number and type of layers) and treated layer

(wearing course, base, subbase, or subgrade) should be designated. Where the treated layer is covered by a bituminous surfacing, any issues affecting selection/design of the surfacing should be noted.

### *Environment*

Variations in temperature, humidity and moisture conditions can significantly impact the performance of some stabilised materials. If applicable, the optimal climatic ranges required for effective application, construction and performance of the product should be designated along with specific environmental conditions under which the product will not be effective or performance will be diminished.

### *Traffic*

The performance of pavement structures is significantly influenced by the type, volume and speed of vehicular traffic. The applicant is required to nominate the maximum traffic category for which the product is deemed suitable in the Application. Traffic type can be categorised according to Austroads classification, where Classes 1 and 2 are light vehicles, Classes 3 to 9 are heavy vehicles and Classes 10 to 12 are large heavy vehicles. Traffic volume can be categorised according to number of equivalent standard axle (ESA) loads throughout the design life, where < 105 ESA is lightly trafficked, 105 to 107 ESA is moderately trafficked and > 107 is heavily trafficked. Trafficking speed can be categorised according to kilometres per hour (km/h), where < 40 km/h is low speed, 40 to 70 km/h is moderate speed and > 70 km/h is representative of a high speed facility.

## Design Process

The design of stabilised pavement layers includes both proportioning of constituent materials and selection of structural layer type and thickness. The mixture proportioning process seeks to optimise the relative amounts of constituents in an effort to balance long-term performance and cost. A standardised mix design procedure for determining the optimal proportions of the product and other constituent materials must be detailed in the Application. The structural design process seeks to optimise the thickness of the stabilised material layer to ensure the design life is achieved at minimal whole-of-life cost. The procedure for selecting the design layer thickness must be detailed in the Application, in addition to the treatment of product stabilised layers within the Austroads pavement design system (where applicable).

## Quality System

Evidence should be provided that a quality system is in place, which covers the manufacture, storage, transport and application of the product. Where certification of compliance with an established quality standard, such as ISO 9001, is not available, documentation of the procedure and two to three examples of utilisation of the quality system should be provided with the Application. Where applicable, the approved manufacturer(s) and/or approved contractor(s) should be identified to ensure compliance with the quality system.

## Utilisation

Guidance on the construction/application process, including preparation of the construction platform, construction of the stabilised pavement layer and/or topical applications of surface



treatments, in addition to recommended retreatment intervals and maintenance activities should be provided in the Application. Guidance on the preparation of the construction platform should include any pulverisation (pre-milling), pre-treatment (surface shape, additional material, moisture, etc.), management of fixed structures (kerb and gutter, bridge approach slabs, etc.) and treatment of existing patching materials (bituminous or cementitious). Construction guidance should include incorporation of the chemical stabilisation binder (methods, plant and equipment, timing, etc.), compaction and trimming, in addition to curing procedures.

## Product Management

Review of product management documentation, including occupational health and safety (OH&S) and environmental management plans, is required to ensure that the product is safe for workers and environmentally compatible during construction and service.

### *Occupational Health and Safety*

Evidence should be provided that an OH&S management system is in place. The Application must demonstrate that sufficient controls exist to prevent harm to personnel as a result of the manufacture, storage, transport or installation of the product. A current valid Australian materials safety data sheet (SDS) issued for the product and any hazardous product components must be included with the Application. Overseas SDS may be supplied for imported products or components, but must comply with Australian SDS requirements.

### *Environmental Management*

Evidence should be provided that an environmental management system is in place that covers the manufacture, storage, transport and application of the product. Where certification of compliance with an established quality standard, such as ISO 14001, is not available, documentation of the procedure and, where available, two to three examples of utilisation of the environmental management system should be provided with the Application.

## 5. Initial assessment (Phase 2)

The initial assessment will be conducted in accordance with Section 9 of the Guide. Determination of the technical merit of the product, based upon information supplied with the Application, is the focus of the Phase 2 assessment. The Phase 2 assessment begins upon receipt of the Initial Assessment Fee, as outlined in Attachment B of the Guide. The Product Evaluation Panel will review and evaluate the Application. Products are assessed relative to the specific applications and benefits presented in the Application. The technical opinion and registration will focus on the validation of these claims. Application elements receiving particular scrutiny include laboratory testing results from a Registered Testing Authority and historical performance data supporting the application and benefit claims. The Product Evaluation Panel will provide a written opinion, based on the supplied information, as to whether the product has sufficient potential to be considered for inclusion in a field performance trial.

This section identifies some 'typical' performance properties to be assessed for various types of non-traditional chemical stabilisation binders. The performance properties and test methods

listed in this document are intended as a guide for potential applicants and Product Evaluation Panel members. The evaluation plan will differ depending on the nature of the product and the specific applications and benefits nominated in the Application. The specific testing and reporting requirements will be selected and documented by the Product Evaluation Panel in the initial assessment evaluation plan.

## Evaluation Plan

The scope of the initial assessment is limited to evaluation of the information submitted with the Application. An initial assessment evaluation plan will be developed by the Product Evaluation Panel in consideration of the specific applications and benefits of the product, as identified in the Application. The objective of the evaluation plan is to validate the claims made with respect to the technical performance of the product and to establish whether the product has sufficient technical merit to warrant further assessment in a field performance trial. The initial assessment evaluation plan will outline the applicable materials, standard testing methods and performance criteria. In finalising the evaluation plan, the Product Evaluation Panel will solicit comments from both the nominated contact person for the product and TIPES participating road agencies.

## Material Selection

Parent materials selected for the initial assessment of the product should be representative of the range of Australian materials for which stabilisation with the product is appropriate. Where possible, material types from existing projects incorporating the product and with documented in-service performance history should be selected. A typical assessment would include testing on three different parent materials. Parent materials previously utilised for the assessment of similar products should be selected (where applicable). Representative materials selected for inclusion in the initial assessment should be characterised in accordance with the methods listed in Table 1.

Table 1: Standard testing methods for characterisation of parent materials

Properties	Standard <sup>1</sup>	Test method
Liquid limit, plastic limit & plasticity index	AS 1289.3.3.1	Calculation of the plasticity index of a soil
Linear shrinkage	AS 1289.3.4.1	Determination of the linear shrinkage of a soil-standard method
Particle size distribution & fines ratio	AS 1289.3.6.1	Determination of the particle size distribution of a soil-standard method of analysis by sieving
Maximum dry density & optimum moisture content <sup>2</sup>	AS 1289.5.4.2	Assignment of maximum dry density and optimum moisture content values

<sup>1</sup> Standards Australia (AS) test method available from: [www.standards.org.au](http://www.standards.org.au).

<sup>2</sup> Determined using modified compactive effort in accordance with AS1289.5.2.1.

## Testing Methods

This section presents standard test methods to be used in the assessment of products, where claimed benefits include engineering property improvement. Standard testing methods, and associated sample preparation techniques, testing conditions and number of replicates, selected for the initial assessment should allow for quantification of the specific applications and benefits of the product. The Product Evaluation Panel will refine the testing protocol in consideration of the typical applications and claimed benefits of the product. Engineering property improvements commonly assessed for non-traditional chemical stabilisation binders include:

- dry density
- permeability
- abrasion resistance
- fines agglomeration
- shear strength
- modulus
- waterproofing and/or moisture affinity.

In addition to testing of product treated specimen, the initial assessment evaluation plan will typically also include testing of an untreated control sample. In certain circumstances comparative testing of samples stabilised using traditional stabilisation agents may also be warranted.

The appropriate testing methods for inclusion in the initial assessment evaluation plan are determined by the designation of the product as a constructability enhancement, fines preservation/dust suppression or strength improvement/all-weather accessibility chemical stabilisation binder. Recommended test methods for assessing the compactability of parent materials treated with constructability enhancement products are shown in Table 2.

**Table 2: Standard testing protocol for constructability enhancement products**

Properties	Standard <sup>1</sup>	Test method
Maximum dry density & optimum moisture content <sup>2</sup>	AS 1289.5.4.2	Assignment of maximum dry density and optimum moisture content values
Permeability	AS 1289.6.7.1	Determination of permeability of a soil
Absorption, swell & capillary rise	AS 5101.5	Absorption, swell and capillary rise of compacted materials

<sup>1</sup> Standards Australia (AS) test method available from: [www.standards.org.au](http://www.standards.org.au).

<sup>2</sup> Determined using modified compactive effort in accordance with AS1289.5.2.1.

Recommended test methods for the durability and erodability of parent materials treated with fines preservation/dust suppression products are shown in Table 3.

**Table 3: Standard testing protocol for fines preservation/dust suppression products**

Properties	Standard <sup>1</sup>	Test method
Bulk mass loss	RMS T133	Durability of road materials modified or stabilised by the addition of cement
Rate of mass loss	RMS T186	Erodibility of stabilised road construction materials

<sup>1</sup> New South Wales Roads and Maritime Services (RMS) test method available from: [www.rms.nsw.gov.au](http://www.rms.nsw.gov.au).

Recommended test methods for quantifying strength improvement/all-weather accessibility of parent materials treated with non-traditional chemical stabilisation binders are shown in Table 4.

**Table 4: Standard testing protocol for strength improvement/all-weather accessibility products**

Properties	Standard <sup>1</sup>	Test method
California Bearing Ratio <sup>2</sup>	AS 1289.6.1.1	Determination of the California Bearing Ratio of a soil-standard laboratory method for a remoulded specimen
Permeability	AS 1289.6.7.1	Determination of permeability of a soil
Indirect tensile resilient modulus <sup>2</sup>	AS 2891.13.1	Determination of the resilient modulus of asphalt-indirect tensile method
Unconfined compressive strength <sup>2</sup>	AS 5101.4	Unconfined compressive strength of compacted materials
Absorption, swell & capillary rise	AS 5101.5	Absorption, swell and capillary rise of compacted materials

<sup>1</sup> Standards Australia (AS) test method available from: [www.standards.org.au](http://www.standards.org.au).

<sup>2</sup> The Product Evaluation Panel will endeavour to require only one strength measure selected in consideration of chemical composition and stabilisation type.

Comparative testing should be undertaken to quantify the degree of engineering property improvement and include untreated specimens, specimens treated with the product and specimens treated with a comparable traditional stabiliser (where applicable). The additional complementary testing methods listed in Table 5 should also be considered where the product:

- may be subject to inundation as a result of flooding or watertable fluctuations
- is used in conjunction with or in place of lime
- consists of or is used in conjunction with cementitious stabilisation binders.

**Table 5: Complementary standard testing methods**

Properties	Standard <sup>1, 2</sup>	Test method
Leachate concentration	AS 4439.3	Wastes, sediments and contaminated soils-preparation of leachates - Bottle leaching procedures
Alkaline (pH) level	RMS T144	Determination of the lime saturation point of roadmaking materials by the pH method
Rate of strength loss	RMS T147	Working time for road construction materials (blended in the laboratory with slow-setting binders)

<sup>1</sup> Standards Australia (AS) test method available from: [www.standards.org.au](http://www.standards.org.au).

<sup>2</sup> New South Wales Roads and Maritime Services (RMS) test method available from: [www.rms.nsw.gov.au](http://www.rms.nsw.gov.au).

The appropriateness and utility of the recommended testing methods will be determined by the Product Evaluation Panel in consideration of the benefits and specific applications nominated in the Application. In addition to the methods presented in Tables 2 to 5, other specialised testing such as repeat load triaxial and wheel tracker should be considered, as appropriate.

#### *Sample Preparation*

Specimens should be prepared in accordance with the provisions of the guiding standard test method. Compaction should be conducted at the optimum moisture content to 95% of maximum dry density determined using modified compactive effort (AS 1289.5.2.1).

#### *Curing Conditions*

Initial curing of the product should be conducted in accordance with the provisions outlined in the Application. Where specific procedures for curing the product are not provided and for specimens treated with traditional stabilisation binders, curing should be conducted in accordance with the provisions of the guiding standard test method. Specimens prepared for assessment of strength (California Bearing Ratio, indirect tensile resilient modulus or unconfined compressive strength) should include both zero and four hour soaking periods after initial curing as shown in Table 6. Where specimens lack sufficient structural integrity for testing following the four hour soaking period, a notation of such should be included in the Application.

**Table 6: Summary of applicable pre-treatment conditions for strength assessment**

Stabilisation binder	Strength assessment method		
	California Bearing Ratio	indirect tensile resilient modulus	unconfined compressive strength
Untreated	Unsoaked + soaked	Unsoaked	Unsoaked
Product	Unsoaked + soaked	Unsoaked + soaked <sup>1</sup>	Unsoaked + soaked <sup>1</sup>
Traditional alternative	Unsoaked + soaked	Unsoaked + soaked <sup>1</sup>	Unsoaked + soaked <sup>1</sup>

<sup>1</sup> Soaked condition may be omitted where intact specimens or reliable results are unlikely to be obtained.

#### *Replicates*

Sufficient specimens should be prepared to provide a minimum of three testing results for each applicable standard testing method for both unsoaked and soaked untreated, product treated and traditional stabiliser treated specimens, as shown in Table 6.

#### **Performance Criteria**

The relative performance of the product will be determined in reference to minimum design threshold values and percentage improvement as compared to untreated specimens. The Product Evaluation Panel will establish the performance criteria in consideration of the specific applications and benefits nominated in the Application. Indicative values for the performance measures outlined in this Supplement are provided in Table 7.



**Table 7: Indicative performance measure threshold and percent improvement values**

Properties	Standard	Threshold value <sup>1</sup>	% Improvement <sup>1</sup>
Maximum dry density (t/m <sup>3</sup> ) <sup>2</sup>	AS 1289.5.4.2	-	5.0
Optimum moisture content (%) <sup>2</sup>	AS 1289.5.4.2	-	0.5
Bulk mass loss (%)	RMS T133	10	50
Rate of mass loss (g/min)	RMS T186	2.0	50
Permeability (m/s)	AS 1289.6.7.1	3.0 x 10 <sup>-7</sup>	-
Absorption (%)	AS 5101.5	2.0	50
Swell (%)	AS 5101.5	1.5	300
Capillary rise (%)	AS 5101.5	25	50
California Bearing Ratio (%) <sup>3</sup>	AS 1289.6.1.1	15 - 80	50
Indirect tensile resilient modulus (MPa) <sup>3</sup>	AS 2891.13.1	1000 - 2000	50
Unconfined compressive strength (MPa) <sup>3</sup>	AS 5101.4	1.5 - 3.0	50

<sup>1</sup> Suitable values to be selected in consideration of the benefits and specific applications nominated in the Application.

<sup>2</sup> Suitable values are pavement material specific and should be selected in consideration of the specific applications nominated in the Application.

<sup>3</sup> Testing results corresponding to soaked specimens, where applicable.

Threshold values should be reflective of minimum design standards in the nominated specific applications. The improvement in engineering properties provided by the product should be measured relative to the untreated and traditional stabiliser treated specimens. In addition to the absolute values, the variability in performance should also be considered.

## Submission of Results

The supporting information submitted with the Application will constitute the basis of the initial assessment. For consideration by the Product Evaluation Panel, testing results must be obtained through a Registered Testing Authority. Utilisation of equivalent standard testing methods from alternate issuing authorities will be considered at the discretion of the Product Evaluation Panel. Where data supplied with the Application does not sufficiently address the requirements of the evaluation plan, the Product Evaluation Panel will notify the nominated contact person for the product of additional data requirements (laboratory or otherwise) and options for attainment. Supplementary data should be submitted directly to the Product Evaluation Panel.

All information submitted to the Product Evaluation Panel is treated as commercial-in-confidence. Any proprietary information or processes should be indicated in the Application to ensure correct handling of sensitive information.

## Initial Assessment Opinion

The Product Evaluation Panel will prepare written advice on whether to recommend the product for a field performance trial. The initial assessment opinion of the product will include a description of the requirements for the field performance trial, where applicable. Where the Product Evaluation Panel considers a product to have a strong historical track record of

performance as well as promising laboratory results, interim registration may be granted. Interim registration is only considered when requested in the Application and where a significant (> 10 projects) history of past performance in Australia is available. At the completion of the field trial, products with interim registration will be issued a Technical Opinion as for any other product, with a favourable opinion moving the product to the permanent Register and an unfavourable opinion leading to the removal of the interim certification.

## 6. Field performance trial (Phase 3)

The field performance trial will be conducted in accordance with Section 10 of the Guide. Evaluation and monitoring of the in-service performance of the product is the focus of the Phase 3 assessment. The Phase 3 assessment begins upon receipt of the Field Performance Trial Assessment Fee, as outlined in Attachment B of the Guide. The Product Evaluation Panel will observe the design, construction and short-term (typically 24 months) performance of the product. Trial elements of particular interest include installation of the product and periodic condition monitoring (surface and underlying structure). The Product Evaluation Panel will provide a draft Technical Opinion, in consideration of Phases 1, 2 and 3 of the assessment, on the validity of the benefits and specific applications nominated for the product.

Where documentation of previous trials or overseas certification for the product are available, the Product Evaluation Panel will review the documentation and adjust the requirements of the field performance trial, as applicable. However, design and construction of a trial pavement section will be required as part of the Phase 3 assessment to evaluate the compatibility of the product with Australian materials and testing methods, in addition to validating the design process, quality system, utilisation and product management.

### Evaluation Plan

The scope of the field performance trial includes evaluation of the mixture proportioning, structural design, construction and quality control/assurance practices in addition to performance under traffic. A field performance trial evaluation plan will be developed by the Product Evaluation Panel reflective of the appropriate product purpose, and pavement configuration, traffic and environment conditions, as identified in the Application. The objective of the evaluation plan is to ascertain whether the product will provide satisfactory service under traffic, relative to the conditions of the trial. The field performance trial evaluation plan will outline the requirements for the trial site, design and construction practices and performance monitoring, in addition to the Field Performance Trial Assessment Fee. An indicative value is provided in Attachment B of the Guide, but the actual Field Performance Trial Assessment Fee is product specific and will depend on the particulars of the trial. In finalising the evaluation plan, the Product Evaluation Panel will solicit comments from both the nominated contact person for the product and TIPES participating road agencies.

### Site Selection

The field performance trial should be conducted at a site where the conditions are representative of the specific applications of the product, as nominated in the Application. Operational conditions influencing the suitability of the trial site include the existing pavement

configuration, traffic and environment. The location of the trial site, in addition to the construction and maintenance program must be negotiated between the nominated contact person for the product and a TIPES participating road agency. The Product Evaluation Panel must confirm the suitability of the proposed site prior to commencement of the trial.

#### *Pavement Configuration*

The appropriate pavement type (sealed/unsealed), composition (number and type of layers) and treated layer (wearing course, base, subbase, and subgrade) should be selected in consideration of the specific applications nominated for the product.

#### *Traffic*

Materials providing satisfactory service can deteriorate rapidly when traffic loading frequency, loading magnitude, or speed are altered. The site selection should consider the predominant traffic type and suitability of the product. The anticipated traffic volume throughout the design life of the product, in addition to maintenance and rehabilitation alternatives should also be considered. The site selection should also consider both posted and typical travel speed, particularly for unsealed applications. The applicant is required to nominate the maximum traffic category for which the product is deemed suitable in the Application. The traffic conditions at the field trial must be representative of the nominated maximum traffic category.

#### *Environment*

Temperature and moisture conditions have a significant impact on pavement performance. Selection of the trial site should be conducted in consideration of the likely equilibrium moisture condition, seasonal moisture variations, in addition to likely maximum and minimum temperature conditions. The combined influence of moisture and temperature (wet and cold, dry and hot) should also be considered.

### Design and Construction

Design and construction of the field performance trial should be conducted in accordance with the procedures outlined in the Application. Any modification of the design and construction procedures must be negotiated by the Product Evaluation Panel, the sponsoring road agency and the nominated contact person for the product. The trial must include an untreated control section and/or control section treated with a traditional stabilizer, constructed to sponsoring road agency specifications. The Product Evaluation Panel will review the material selection, mixture proportioning and structural design processes, and witness preparation of the construction platform, construction of the stabilised pavement layer/application of the constructability enhancement, fines preservation/dust suppression or strength improvement/all-weather accessibility treatment, and any overlying layers and/or surfacing, during establishment of the trial pavement section. Additionally, quality assurance data collected during construction should be submitted to the Product Evaluation Panel for review.

### Performance Monitoring

The Product Evaluation Panel will monitor the field performance trial throughout the agreed duration, typically long enough to understand relative field performance parameters. Field

trials of fines preservation/dust control products should include at least one re-treatment and maintenance intervention. The monitoring activities will vary in accordance with the nature of the product and the particulars of the trial site. Typically, monitoring will include initial and regular follow-up assessments of pavement surface and structural condition of both the test and control sections. The monitoring period for the field performance trial will vary and depends on the nature of the product, nominated benefits and constraints of the trial site. It is anticipated that the typical performance monitoring period will be approximately 24 months. The recommended performance monitoring protocol for constructability enhancement, fines preservation/dust suppression and strength improvement/all-weather accessibility chemical stabilisation binders are presented Tables 8 to 10, respectively.

**Table 8: Standard monitoring program for constructability enhancement products**

Properties	Standard <sup>1, 2</sup>	Test method
Ride quality & serviceability	Austroads AG:AM/T001 -	Pavement roughness measurement with an inertial laser profilometer Road roughness using ARRB Roughometer
Surface shape	Austroads AG:AM/T009 RMS T183	Pavement rutting measurement with a multi-laser profilometer Surface deviation using a straightedge
Permeability	RMS T168	Determination of in situ infiltration of water into a road pavement

<sup>1</sup> New South Wales Roads and Maritime Services (RMS) test method available from: [www.rms.nsw.gov.au](http://www.rms.nsw.gov.au).

<sup>2</sup> Austroads test method available from: [www.austroads.com.au](http://www.austroads.com.au).

**Table 9: Standard monitoring program for fines preservation/dust suppression products**

Properties	Standard <sup>1, 2, 3</sup>	Test method
Ride quality & serviceability	-	Road roughness using ARRB Roughometer
Surface shape	RMS T183	Surface deviation using a straightedge
Texture depth	Austroads AG:PT/T250	Modified surface texture depth (pestle method)
Skid resistance	RMS T231	Frictional resistance by pendulum tester
Permeability	RMS T168	Determination of in situ infiltration of water into a road pavement
Gravel loss & segregation	-	Visual assessment of loose surface material
Dust generation	EPA OTM 34 -	Method to quantify road dust particulate matter emissions (PM10 and/or PM2.5) from vehicular travel on paved and unpaved roads Visual assessment of dust generation at travel speed

<sup>1</sup> New South Wales Roads and Maritime Services (RMS) test method available from: [www.rms.nsw.gov.au](http://www.rms.nsw.gov.au).

<sup>2</sup> Austroads test method available from: [www.austroads.com.au](http://www.austroads.com.au).

<sup>3</sup> United States Environmental Protection Agency (EPA) test method available from: [www.epa.gov](http://www.epa.gov).

**Table 10: Standard monitoring program for strength improvement/all-weather accessibility products**

Properties	Standard <sup>1, 2, 3</sup>	Test method
Ride quality & serviceability	Austrroads AG:AM/T001 -	Pavement roughness measurement with an inertial laser profilometer Road roughness using ARRB Roughometer
Surface shape	Austrroads AG:AM/T009 RMS T183	Pavement rutting measurement with a multi-laser profilometer Surface deviation using a straightedge
Shrinkage & structural cracking	-	Visual assessment of cracking
Texture depth	Austrroads AG:AM/T013 Austrroads AG:PT/T250	Pavement surface texture measurement with a laser profilometer Modified surface texture depth (pestle method)
Bearing capacity	Austrroads AG:AM/T006 AS 1289.6.3.2 -	Pavement deflection measurement with a falling weight deflectometer (FWD) Determination of the penetration resistance of a soil-9 kg dynamic cone penetrometer test Visual assessment of gravel thickness
Skid resistance	RMS T231	Frictional resistance by pendulum tester
Permeability	RMS T168	Determination of in situ infiltration of water into a road pavement

<sup>1</sup> Austrroads test method available from: [www.austrroads.com.au](http://www.austrroads.com.au).

<sup>2</sup> New South Wales Roads and Maritime Services (RMS) test method available from: [www.rms.nsw.gov.au](http://www.rms.nsw.gov.au).

<sup>3</sup> Standards Australia (AS) test method available from: [www.standards.org.au](http://www.standards.org.au).

## 7. Technical opinion

Drafting, review and publication of the technical opinion will be conducted in accordance with Section 11 of the Guide. When the field performance trial is completed, the Product Evaluation Panel will produce a draft Technical Opinion on the validity of the benefits and specific applications nominated for the product. The Technical Opinion will include:

1. Contact information for the nominated contact person for the product and the manufacturer or originator of the product, as applicable.
2. Product summary including description, characteristics, details or specifications for use, handling, storage and utilisation precautions, benefits, in addition to intellectual and/or licensing rights, as applicable.
3. Objective technical evaluation based on laboratory and field measurements and/or tests relating to the performance of the product.
4. Statement of measurable benefits, construction and maintenance activities.

Where a favourable outcome is achieved, the Technical Opinion is listed on the TIPES Register and a certificate of registration is issued for the product. While the application form and supporting information are only reviewed by ARRB and the Product Evaluation Panel, the Technical Opinion is considered public information. The nominated contact person may select



not to have the Technical Opinion published (regardless of outcome). However, online registration is only available for products with published Technical Opinions. The Technical Opinion will be prepared in a format determined by ARRB and all evidence must be referenced.

### Assessment Criteria

At the conclusion of the field performance trial, the Product Evaluation Panel will endorse/highlight the measurable benefits of the product based on the outcomes of the Phase 1, 2 and 3 assessments and in consideration of the specific applications and benefits nominated in the Application. Assessment criteria receiving particular scrutiny include:

- the completeness and adequacy of technical documentation
- verification of the degree of engineering property improvement
- confirmation of satisfactory in-service performance.

### Certificate of Registration

Where the Technical Opinion is favourable to the product, following receipt of the signed Technical Opinion from the nominated contact person, ARRB will approve the issue of a certificate of registration. The certificate of registration authorises the publication and distribution of the Technical Opinion by the nominated contact person.

Where the Technical Opinion is not favourable to the product, ARRB will not approve a certificate of registration, and distribution of the Technical Opinion will be restricted to persons within ARRB and the Product Evaluation Panel.

Product registration is permanent except where the provisions of Section 15 of the Guide are applicable.

## 8. Schedule

The duration of the TIPES assessment process for non-traditional chemical stabilisation binders will vary according to the nature of the product and the requirements for Phase 2 and 3 assessments. The anticipated duration for TIPES assessment are presented in Table 11.

**Table 11: Typical duration for TIPES assessment**

Assessment phase	Duration (months)
Review of application	1
Initial assessment	6
Field performance trial	24 <sup>1</sup>
Technical opinion & registration	2
Total	33 <sup>1</sup>

<sup>1</sup> Indicative values provided for general reference only. Actual values will vary.

The assessment duration presented in Table 11 are for guidance only. See Attachment B of the Guide for the fee structure. The Initial Assessment Fee includes general administration, development of the initial assessment evaluation plan and the Product Evaluation Panel review. The costs associated with generation of the supporting information, including

laboratory testing results from a Registered Testing Authority, are not included in the Initial Assessment Fee. Indicative costs for the initial assessment of constructability enhancement, fines preservation/dust suppression and strength improvement/all-weather accessibility non-traditional chemical stabilisation binders are presented in Attachment B of this Supplement as a guide only. It is highly recommended that Applicants contact a Registered Testing Authority for current rates and requirements of the test authority.

The Field Performance Trial Fee includes general administration, development of the field performance trial evaluation plan, in addition to Product Evaluation Panel oversight and review. The Field Performance Trial Fee presented in the Guide does not include the design, construction, maintenance and rehabilitation costs, nor the costs associated with surface and structural condition monitoring. The actual cost for the field performance trial will vary according to the nature of the product and the particulars of the trial site. However, indicative costs for selected condition monitoring activities are presented in Attachment B of this Supplement as a guide only and the Applicant is encouraged to validate these costs prior to submission.

## Attachment A – Application form

### Non-traditional Chemical Stabilisation Binders

(replaces Attachment A of the TIPES Guide for Applicants and Terms and Conditions)

Product Name:			
Applicant's legal entity name:			
Applicants ACN/ABN:			
Business address:			
Contact person:			
	Phone:	Fax:	
	Email:		
Manufacturer's name:			
	Address:		
	Phone:	Fax:	
	Email:		
Product description (chemical composition, stabilisation mechanisms, expected benefits, etc.)	<input type="checkbox"/> Constructability enhancement <input type="checkbox"/> Fines preservation/dust suppression <input type="checkbox"/> Strength improvement/all-weather accessibility <hr/> <input type="checkbox"/> Subgrade <input type="checkbox"/> Modified <input type="checkbox"/> Bound		
Specific applications (parent material, pavement configuration, environment, traffic, exclusions, etc.)	<input type="checkbox"/> Sealed <input type="checkbox"/> Unsealed <hr/> <input type="checkbox"/> Wearing course <input type="checkbox"/> Basecourse <input type="checkbox"/> Subbase <input type="checkbox"/> Subgrade		
Design process (mixture and structural design procedures)	Design vehicle: <input type="checkbox"/> Light <input type="checkbox"/> Heavy <input type="checkbox"/> Large heavy Traffic volume: <input type="checkbox"/> Light <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy Traffic speed: <input type="checkbox"/> Low <input type="checkbox"/> Moderate <input type="checkbox"/> High		
Quality system (certification, details, manufacturer/ contractor(s), etc.)			
Utilisation practices (preparation, construction, maintenance, etc.)			
Product management (O, H & S and environment)			

## Attachment B – Indicative pricing sheet

**PLEASE NOTE ALL COSTS ARE INDICATIVE ONLY (Ex. GST).**

Applicants are encouraged to confirm actual costs prior to submission.

**Table B1: Assessment of constructability enhancement products**

Measured properties	Method	Quantity	Indicative cost
Liquid limit, plastic limit & plasticity index	AS 1289.3.3.1	9	\$1,450
Linear shrinkage	AS 1289.3.4.1		
Particle size distribution & fines ratio	AS 1289.3.6.1	9	\$1,000
Maximum dry density & optimum moisture content	AS 1289.5.4.2	27	\$3,900
Permeability	AS 1289.6.7.1	27	\$4,300
Absorption, swell & capillary rise	AS 5101.5	27	\$4,850

**Table B2: Assessment of fine preservation/dust suppression products**

Measured properties	Method	Quantity	Indicative cost
Liquid limit, plastic limit & plasticity index	AS 1289.3.3.1	9	\$1,450
Linear shrinkage	AS 1289.3.4.1		
Particle size distribution & fines ratio	AS 1289.3.6.1	9	\$1,000
Maximum dry density & optimum moisture content	AS 1289.5.4.2	9	\$1,300
Bulk mass loss	RMS T133	27	\$13,500
Rate of mass loss	RMS T186	27	\$10,800
Leachate concentration	AS 4439.3	27	\$2,700
Alkaline (pH) level	RMS T144	9	\$1,800

**Table B3: Assessment of strength improvement/all-weather accessibility products**

Measured properties	Method	Quantity	Indicative cost
Liquid limit, plastic limit & plasticity index	AS 1289.3.3.1	9	\$1,450
Linear shrinkage	AS 1289.3.4.1		
Particle size distribution & fines ratio	AS 1289.3.6.1	9	\$1,000
Maximum dry density & optimum moisture content	AS 1289.5.4.2	9	\$1,300
California Bearing Ratio <sup>2</sup>	AS 1289.6.1.1	48	\$14,400
Permeability	AS 1289.6.7.1	27	\$4,300
Indirect tensile resilient modulus <sup>1</sup>	AS 2891.13.1	48	\$7,900
Unconfined compressive strength <sup>1</sup>	AS 5101.4	48	\$6,700
Absorption, swell & capillary rise	AS 5101.5	27	\$4,850
Rate of strength loss	RMS T147	9	\$8,750

<sup>1</sup> Only one strength measure (California Bearing Ratio, indirect tensile resilient modulus or unconfined compressive strength) should be selected in consideration of chemical composition and stabilisation type.

**Table B4: Field performance trial monitoring**

Monitoring activity	Indicative cost
Surface condition (visual)	\$900
Surface condition (NSV)	\$4,000
Structural capacity (DCP)	\$2,800
Structural capacity (FWD)	\$3,250