ROAD DEVELOPMENT AGENCY

PLANNING AND DESIGN DEPARTMENT

RESEARCH AND DEVELOPMENT UNIT

Guidelines for the Introduction of New Technologies and Non-Conventional Soil Stabilizers/Additives for Road Construction and Maintenance and Road Safety in Zambia

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Contents

1. BACKGROUND

Road construction and maintenance worldwide have always and continue to face a number of challenges regarding sourcing of construction materials and Zambia is no exception. So often, soils and gravels (for earth works) that meet specifications are not readily available in the vicinity of road alignment corridors. This has often led to sourcing of construction materials from far distances at great expense to the projects. Consequently, delivery of road projects at high unit costs due to costly importation of construction materials led to the development of technologies that would enhance the properties of poor in-situ materials. Thus, conventional soil stabilization with additives such as cement, lime and bitumen, was introduced and has since been the practice where unsuitable local soils and gravels are encountered.

With the fast speed at which technology is emerging and changing worldwide, the road construction sector in Zambia has seen the entry in the market of "Non-Conventional" road construction and maintenance technologies and soil stabilizers or additives from various promoters, agents and manufacturers. To this effect, the Road Development Agency (RDA), through its Research and Development (R&D) Unit, intends to conduct trials on some of these technologies and products, which continue to come in various forms and brand names. Similarly, the Agency has in the recent past seen development of new technologies aimed at enhancement of road safety which include use of web-based applications and unconventional road marking paints.

RDA is committed to embracing technological advancements that could see an overall reduction in the cost of construction and maintenance of roads and enhancement of road safety in Zambia. Further, RDA being a member of the Association of Southern African National Road Agencies (ASANRA) which was established in March 2001 in line with the SADC Protocol on Transport, Meteorology and Communication upholds the ASANRA research and development strategic objectives on new technologies. Therefore, these guidelines have been developed to define the terms of engagement with agents, promoters and manufacturers of non-conventional road construction technologies and soil stabilizers or additives. The guidelines also recognize the ASANRA research and development objectives whose expected outcome is maintenance and updating of an efficient and effective research environment in the region which minimizes duplication of effort and maximizes the benefits from the utilization of improved road technology. The guidelines further outline the procedure for the Agency's admittance of software applications intended to enhance safety on public roads and road infrastructure. The rationale being that RDA only engages if there is a reasonable level of confidence in the end result in terms of time and cost efficiency, safety and environmental friendliness. The words "supplier", "promoter" and "agent" are used interchangeably in these guidelines.

2. PRELIMINARY REQUIREMENTS BEFORE TRIALS

The following are the guidelines that RDA must apply prior to conducting trials on any new technology (e.g equipment/software) or non-conventional soil stabilizer/additive for road construction and maintenance. Should the supplier not agree to these guidelines, RDA will be at liberty to reject the product or technology without any liability whatsoever even in a case where such a product or technology has been accepted by any of the ASANRA member country.

2.1 Product Introduction

Introduction of any new technology or non-conventional soil stabilizer/additive to be used on public roads shall only be done through RDA, and only products or technologies with valid certification for usage from recognized research or certification institutions shall be subjected to laboratory tests and field trial by the Agency.

2.2 Product Documentation

The product must have detailed accompanying documentation including, but not limited to, production quality control procedures, technical specifications, design manual, construction methodology, equipment requirements, safe handling, application catalogue and environmental compliance (e.g. contamination of nearby water sources, dust contamination, etc.). For ICT applications documentation shall include system installation, user manual, technical specifications, system accessories/compatibility etc.

2.3 Certification Requirement

In addition to certification from an internationally recognized research and, or certification institution, the product must also have a valid certification for use in Zambia by the Zambia Bureau of Standards (ZABS) and/or the Zambia Environmental Management Agency (ZEMA). The foreign certificate will be verified with the issuing institution or affiliated institutions. Where a product is patented, RDA will insist on evidence of manufacturer's authorization and certification. Where the product is ICT related, the supplier should provide sufficient proof of ownership of the software product. This shall be a license of the software or company documentation allowing the supplier to develop or supply the application.

2.4 Product Track Record and References

Suppliers or promoters shall show evidence of successful performance of the product in other countries, and that reference should be endorsed and ratified by a formal road authority or government institution. If necessary RDA may carry out a due diligence for verification purposes on the credibility of the product or technology.

2.5 Back-up Support Services

The supplier or promoter should detail the back-up support services that will be at the disposal of RDA during usage of the product or service (be it on trial basis or full-scale usage). In cases where the supplier, agent or promoter are not the manufacturer of the product, the former shall provide evidence of manufacturer's authorization and certification.

2.6 Marketing Team Composition

When the product is being marketed with the RDA, the marketing team (Manufacturer/ Agent/ Promoter/ Supplier) shall include at least one person with experience in use of the product being promoted/marketed who will ably respond to any queries that shall arise during the team's engagement with RDA.

2.7 Equipment Specifications and Limitations

Where a product is a state-of-the-art equipment developed for a specific road maintenance operation such as pothole patching, the supplier shall provide that product's specifications, operation manual including statements on its capabilities (e.g work rate and quality control) and limitations. However, the vetting of such a product shall be based on the quality of work done be it road maintenance or construction.

3. LABORATORY TESTS AND FIELD DEMONSTRATIONS

a) The promoter/manufacturer shall provide at their own cost the required materials for the new technology or the non-conventional soil stabilizer/ additive and suitable soil samples in appropriate quantities to be used in carrying out laboratory tests or field demonstrations, whichever is applicable. Laboratory tests may be conducted at the Central Materials Laboratory (CML) of RDA, or any other approved laboratory.

b) The CML shall carry out necessary laboratory tests or coordinate the tests done by other approved laboratory on the non-conventional soil stabilizers/ additives provided by the promoter/manufacturer to verify and prove their efficacy. The CML or any other approved laboratory shall follow the manufacturer's prescribed testing procedure if so required when testing the non-conventional soil stabilizers/ additives.

c) In cases where the RDA observes some inadequacies in the manufacturer's prescribed testing procedure or determines that additional tests on the non-conventional soil stabilizers/ additives are required, the CML or any other approved laboratory shall carry out the additional tests using standard procedures.

4. CONSTRUCTION OF A TRIAL SECTION

a) The Agency shall proceed to construct a trial section using the new technology when RDA has determined so, or the non-conventional soil stabilizers/additives after laboratory tests carried out by the CML show significant improvement in the soil properties. **The length of the trial section shall not exceed one kilometer (1km) and this includes 500 meters trial section and 500 meters control section. For pothole patching materials or technology, a minimum of twenty-five square meters (25m^2) of potholes shall be considered for the trial.**

b) The promotor or supplier shall be required to submit a Project Life Cycle Cost analysis if the product under promotion is used on the project, considering the construction process and maintenance when compared with conventional technologies or soil stabilizers and/or cases where no conventional stabilizers are used. This shall be done by constructing an adjacent section within the 1Km trial section using untreated or conventionally treated materials and shall be used as a control section for comparison purposes. For pothole patching materials or technology, an equivalent area to the non-conventionally patched area shall be patched using conventional methods which shall serve as a control section for comparison purposes (preferably on the same road section/portion). The construction of trial sections shall be carried out under the supervision of RDA or its appointed representative.

c) The supplier shall comply with any specific requirements of RDA, in addition to the length of trial and control sections and duration of trial section monitoring and evaluation.

5. COSTS ASSOCIATED WITH TRIAL SECTIONS CONSTRUCTION

a) The Agency will construct a trial section using non-conventional stabilizers /additives upon the promoter providing an irrevocable performance bond or performance security equivalent to the cost of re-construction of the trial section using conventional methods in the event of premature failure of the trial section.

b) All costs associated with the procurement of new technology or non-conventional soil stabilizers/additives meant for pilots or trial sections shall be borne by the Supplier.

c) Where cost sharing is agreed at the Agency's discretion, the above clauses 4(a) & (b), and 5(a), shall only apply upon agreement between the Parties to

share the cost of constructing the trial on a 50% contribution to the project cost by each party and shall be subject to adequate budgetary provision by RDA in any calendar year to undertake the works. As stated in Clause 5(b), RDA shall not pay for any new technology or soil stabilizer /additives meant for the trial section. The Agency shall bear 50% costs associated with construction of the works and the other 50% shall be paid for by the supplier/promoter prior to commencement of the works. All other associated costs, such as the cost for the design, the new technology, supply of non-conventional and supervision of works shall be borne by the supplier/promoter.

6. USE OF SOIL STABILISERS/ADDITIVES AND OTHER TECHNOLOGIES SOLELY PROPOSED BY THE RDA

(a) The Agency shall assess and exclusively select new technologies or non-conventional soil stabilizers/additives on its own (non-third party selection criteria); and accordingly proceed to construct a trial section using the new technology or non-conventional soil stabilizers/additives identified after laboratory tests carried out by the RDA Central Materials Laboratory (CML) show significant improvement in the soil properties.

(b) The agency shall fund in full the construction of the trial section, subject to availability of adequate budgetary allocation. The selection and adoption of the new technologies or non – conventional soil stabilizers /additives by the RDA shall be in compliance with Clauses 2, 3, 4, 7, and 8 of the guidelines with the exception of Clause 5. The Agency shall fully fund the construction of the trial section without the requirement of Clauses 5 (a), (b) and (c).

7. PERFORMANCE MONITORING OF NON – CONVENTIONAL EQUIPMENT

(a) The Agency shall monitor the performance of the equipment that is introduced to carry out a specific operation in the road construction and maintenance or any aspect of road safety in the manner that compares to conventional methods in terms of efficiency, cost-effectives and value for money.

(b) The monitoring period for the equipment shall be determined by the environments that the equipment needs to be subjected to, to satisfy the standards for a particular operation.

(c) For pothole patching an equipment shall be assessed in terms of the quality of the patch and its durability of which the patch shall be monitored for a minimum period of six (6) months (or one rainy season) even if the equipment is accepted based on its efficiency and cost effectiveness.

8. PERFORMANCE MONITORING OF INFORMATION AND COMMUNICATION TECHNOLOGIES

(a) The Agency shall assess and monitor any new Software Application based on its intended purpose as provided by the Promoter.

(b) The product must have detailed accompanying documentation including but not limited to:

- System Installation
- User Manual
- Technical Specifications
- System Accessories/ Compatibility

(c) Supplier shall show evidence of successful performance of the product or service.

(d) Supplier should detail the backup support services that will be at the disposal of the RDA during usage of the product or service.

(e) Hosting of software, provision of hardware and connectivity and related costs should be provided by the Supplier. The software should undergo trial of not less than three (3) months.

(f) The supplier should have sufficient proof of ownership of the software product. This can be license of the software or company documentation allowing them to develop or supply the application.

9. TRIAL SECTION PERFORMANCE MONITORING

(a) The trial section shall be monitored for a period of two (2) years (two rainy seasons) for such products as soil stabilizers/additives and six (6) months (or one rainy season) for such products as pothole patching and road marking products to evaluate their performance.

(b) The relative performance of the trial and control sections will be determined by RDA through regular monitoring and evaluation using agreed standard techniques or measurement parameters such as gravel/aggregate loss, riding quality (roughness), rutting, potholing, etc.

10. CONCLUSION AT END OF PERFORMANCE MONITORING PERIOD

(a) The RDA shall approve the new technology or non-conventional soil stabilizer/additive for use on public roads after being satisfied with the trial section performance at the end of the performance monitoring period. At RDA's discretion, a product or technology may also be accepted for use on public roads if these guidelines do not have applicable provisions for assessment of such a product or technology provided it is accepted by any of the ASANRA member countries.

(b) The RDA shall disapprove the new technology or non-conventional soil stabilizer/ additive for the poorly performed trial section or product and inform the promoter accordingly.

(c) The RDA shall disseminate the information relating to the approved new technology or non-conventional soil stabilizer/additive to all the relevant road sector stakeholders for wider uptake of the new technology or product aimed at reducing the overall cost of road construction and maintenance in Zambia.

(d) The RDA shall include in its solicitation documents for road construction, rehabilitation, and maintenance the new and approved technology or non-conventional soil stabilizer/additive as an option among other conventional methods and products.

(e) The RDA shall not, however, be under any obligation whatsoever to purchase the new technology or non-conventional soil stabilizer/additive from any supplier or promoter as full-scale usage on public roads or by the Agency will be dependent on the prevailing needs, and specification for use will be at RDA's discretion.

11. POLICY REVIEW

This policy will be reviewed every three (3) years or earlier in light of any changes in designs and specifications that may take place or due to any other prevailing circumstances.

Approved on: 15th February, 2024

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Eng. Mulchand Kuntawala

BOARD CHAIRPERSON

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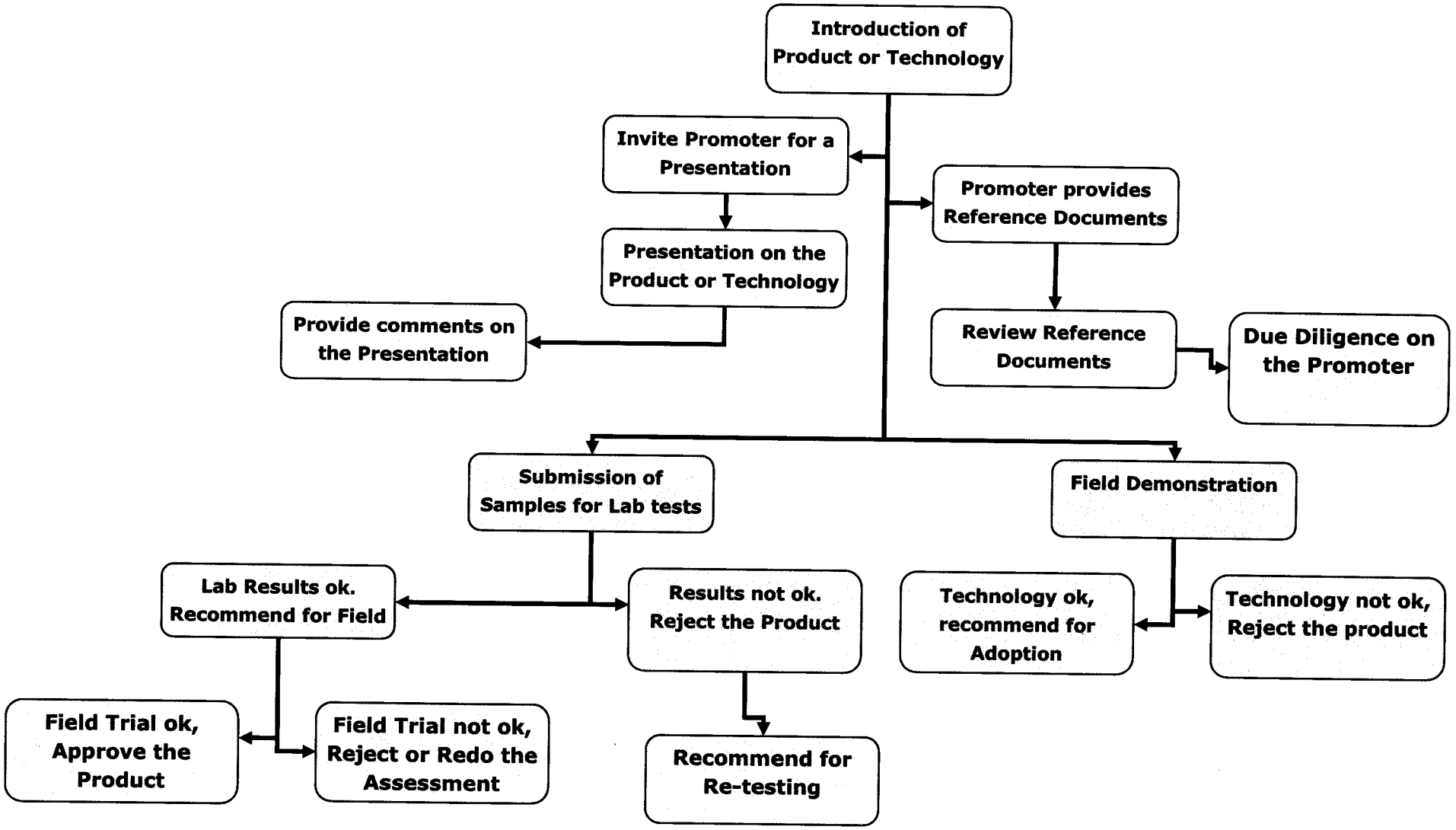
Eng. Grace Mutembo

DIRECTOR AND CHIEF EXECUTIVE OFFICER

APPENDIX 1

LAYOUT OF PRODUCT/TECHNOLOGY ASSESSMENT PROCESS



GUIDELINES FOR THE INTRODUCTION OF NON-CONVENTIONAL ROAD CONSTRUCTION SOIL STABILISERS/ADDITIVES IN ZAMBIA

ROAD DEVELOPMENT AGENCY

PRODUCT/ TECHNOLOGY COMPLIANCE CHECKLIST

Name of Product:.....

Site Location .....

Date .....

SN	REQUIREMENT	YES	NO	Comments
1	**Certification Requirement:** Is the product or technology certified for use on public roads in the country of use? Is proof of this available from recognized laboratories or recognized research institution?			
2	**Product or Technology Documentation:** Are there production quality control procedures, technical specifications, design manual, construction methodology, equipment requirements, safe handling guidelines, application guidelines and environmental compliance certificate?			
3	**Life Cycle Cost Comparison:** Is information on Project Life Cycle Cost available taking into account the construction process and maintenance requirements when compared with conventional stabilisers and/or cases where no conventional stabilisers are used?			
4	**Back-up Support Services:** Does supplier or promoter provide back-up support services during the usage of the product or Technology?			
5	**Marketing Team Composition:** Did the Marketing team include experts in Road Construction materials?			
6	**Cost Associated with Product Introduction and Trial Sections:** What Is the source of funds for the project/ trial ?(Government or Private funds)			

7	**Compliance to Road Authority Requirements:** Has the product been successfully tested in the laboratory by the RA prior to constructing the trial?			
8	**Product Track Record and References:** Were there references from former users endorsed and ratified by a formal road authority or government institution prior to constructing the trial?			
9	**Duration of the Trial:** Is there verifiable information on when the trial was constructed?			
10	**Product/ Technology Performance:** Is there information on the performance of the constructed road section, obtained during the trial monitoring period?			
11	**Performance Monitoring Criteria:** Was there any performance monitoring criteria agreed with supplier prior to construction of the trial section?			
12	**Period of Monitoring:** Is there information on dates when the trial monitoring commenced and ended?			
13	**Data Analysis and Records:** Are there records of the data collected and analysis done during monitoring?			
14	**Period of Service:** Is information available on how long the section has been in service?			
15	**Traffic Data:** Is information available on the existing traffic levels on the trial road project?			

Prepared By:

Name: Signature: Date:

Checked By:

Name: Signature: Date: