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NIA Project Registration and PEA Document

Date of Submission

May 2019

Project Reference Number

NIA_SPEN_0041

Project Registration

Project Title

Proof of concept Tarmac Reinstatement Tester

Project Reference Number

NIA_SPEN_0041

Project Licensee(s)

SP Energy Networks Distribution

Project Start

June 2019

Project Duration

2 years and 7 months

Nominated Project Contact(s)

Ralph Eyre-Walker

Project Budget

£65,000.00

Summary

The objective of this project is to develop a technique that will determine the depth of surface and binder layers but also whether the air void density falls in between the acceptable minimum and maximum tolerances.

Nominated Contact Email Address(es)

innovate@spenergynetworks.co.uk

Problem Being Solved

Currently, when the quality of asphalt reinstatement is investigated no non-destructive on-site analysis is used. Instead, core samples of 100mm diameter are extracted from the site and sent for laboratory analysis. The core sample analysis will give an indication of the depth of surface and binder layers but also whether the air void density falls in between the acceptable minimum and maximum tolerances; depending on the material, in the range of 2 to 13% respectively. This method is destructive, intrusive, labour intensive and limited in coverage. Hence, a method that is non-destructive, non-intrusive, and enables accurate measurement of the air void density and layer thickness of the pavement, would be of great interest for the industry.

Method(s)

The Project will look to develop a technique based on combining ground penetrating radar (GPR) technology with a survey technology that has been successfully used in seismology, i.e. the multi-offset antenna array method. This development work will initially be limited to proof of concept. If successful further development will be required to deliver a business as usual device.

Scope

The Project initially will be limited to laboratory work to prove the proof of concept. This research and development work will be split into four stages.

Stage 1 – A list of specifications regarding the system requirements and the samples specifications will be established. Theoretical & simulation work will be carried out to determine the conditions under which the tests will be performed, such as signal power, frequencies, number and shape of bespoke antennas and the offset distances.

Stage 2 – When the main parameters relating to the tests have been established the laboratory tests will be undertaken. Signal generators-receivers and bespoke antennas will be used to perform tests on air gaps, gypsum and concrete plates to optimize the antennas characteristics.

Stage 3 - After the optimal characteristics of antennas have been determined the next step will be to test real pavement samples provided by the Network. Possible field tests may also be carried out.

Stage 4 – The results of the project will be incorporated into a final report which will inform on whether any technique developed within the project could be taken further.

Objective(s)

The objective of this project is to develop a technique that will determine the depth of surface and binder layers but also whether the air void density falls in between the acceptable minimum and maximum tolerances; depending on the material. The technique developed should be non intrusive and such that it could be incorporated into a device that could be conveniently used on site to determine the quality of the reinstated tarmac.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

Success for this project will be the development of a technique that could be used to measure the quality of the tarmac reinstatement. The technique should be able to provide values of layer thickness and air voids density with a level of accuracy in line with the networks specifications.

The technique should also be non destructive and be a technique that could be deployed on site.

Project Partners and External Funding

NDT Consultants Ltd.

The project will be fully funded by NIA.

Potential for New Learning

The Project will potentially develop a new technique for investigating the quality of tarmac reinstatement non destructively. Extending the multi-offset survey method utilized in seismology into GPR will require both theoretical and experimental investigations that will generate new knowledge and learning. Development of bespoke antennas to work as multi-offset receivers will require simulation and testing and will also generate new learning.

All the learning from this project will be incorporated into a final report that will inform the decision on whether further developments should be progressed.

Scale of Project

The Project will primarily be laboratory based to prove the proof of concept. SPEN will support the project with tarmac reinstatement expertise and providing test samples and potentially limited trial sites.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL3 Proof of Concept

Geographical Area

The Project will primarily be limited to NDT Consultants laboratory. Tests samples or potential trial sites will be obtained from SPEN

license areas.

Revenue Allowed for the RIIO Settlement

NA

Indicative Total NIA Project Expenditure

£55,000

Project Eligibility Assessment Part 1

There are slightly differing requirements for RIIO-1 and RIIO-2 NIA projects. This is noted in each case, with the requirement numbers listed for both where they differ (shown as RIIO-2 / RIIO-1).

Requirement 1

Facilitate the energy system transition and/or benefit consumers in vulnerable situations (Please complete sections 3.1.1 and 3.1.2 for RIIO-2 projects only)

Please answer **at least one** of the following:

How the Project has the potential to facilitate the energy system transition:

n/a

How the Project has potential to benefit consumer in vulnerable situations:

n/a

Requirement 2 / 2b

Has the potential to deliver net benefits to consumers

Project must have the potential to deliver a Solution that delivers a net benefit to consumers of the Gas Transporter and/or Electricity Transmission or Electricity Distribution licensee, as the context requires. This could include delivering a Solution at a lower cost than the most efficient Method currently in use on the GB Gas Transportation System, the Gas Transporter's and/or Electricity Transmission or Electricity Distribution licensee's network, or wider benefits, such as social or environmental.

Please provide an estimate of the saving if the Problem is solved (RIIO-1 projects only)

Reinstatement issues can cost the company dearly both financially and reputational

Please provide a calculation of the expected benefits the Solution

n/a

Please provide an estimate of how replicable the Method is across GB

n/a

Please provide an outline of the costs of rolling out the Method across GB.

Currently unknown.

Requirement 3 / 1

Involve Research, Development or Demonstration

A RIIO-1 NIA Project must have the potential to have a Direct Impact on a Network Licensee's network or the operations of the System Operator and involve the Research, Development, or Demonstration of at least one of the following (please tick which applies):

- A specific piece of new (i.e. unproven in GB, or where a method has been trialled outside GB the Network Licensee must justify repeating it as part of a project) equipment (including control and communications system software).
- A specific novel arrangement or application of existing licensee equipment (including control and/or communications systems and/or software)
- A specific novel operational practice directly related to the operation of the Network Licensees system
- A specific novel commercial arrangement

RIIO-2 Projects

- A specific piece of new equipment (including monitoring, control and communications systems and software)
- A specific piece of new technology (including analysis and modelling systems or software), in relation to which the Method is

unproven

- A new methodology (including the identification of specific new procedures or techniques used to identify, select, process, and analyse information)
- A specific novel arrangement or application of existing gas transportation, electricity transmission or electricity distribution equipment, technology or methodology
- A specific novel operational practice directly related to the operation of the GB Gas Transportation System, electricity transmission or electricity distribution
- A specific novel commercial arrangement

Specific Requirements 4 / 2a

Please explain how the learning that will be generated could be used by the relevant Network Licensees

The learning from this project could be used to develop a system that could be used to measure the quality of tarmac reinstatement without having to core the reinstated tarmac. All energy networks will conduct street works where the carriage or footpath surfaces will be removed and then reinstated.

Or, please describe what specific challenge identified in the Network Licensee's innovation strategy that is being addressed by the project (RIIO-1 only)

n/a

- Has the Potential to Develop Learning That Can be Applied by all Relevant Network Licensees

Is the default IPR position being applied?

- Yes

Project Eligibility Assessment Part 2

Not lead to unnecessary duplication

A Project must not lead to unnecessary duplication of any other Project, including but not limited to IFI, LCNF, NIA, NIC or SIF projects already registered, being carried out or completed.

Please demonstrate below that no unnecessary duplication will occur as a result of the Project.

A review of all other Network Licensees Innovation Funding reports has been performed and no similar Projects have been identified or any registered since these reports were published.

If applicable, justify why you are undertaking a Project similar to those being carried out by any other Network Licensees.

n/a

Additional Governance And Document Upload

Please identify why the project is innovative and has not been tried before

No device currently exists in the marketplace.

Relevant Foreground IPR

n/a

Data Access Details

n/a

Please identify why the Network Licensees will not fund the project as apart of it's business and usual activities

This is a Proof of concept with no guarantee of success.

Please identify why the project can only be undertaken with the support of the NIA, including reference to the specific risks(e.g. commercial, technical, operational or regulatory) associated with the project

This is a Proof of concept with no guarantee of success.

This project has been approved by a senior member of staff

Yes