Notes on Completion: Please refer to the appropriate NIA Governance Document to assist in the completion of this form. The full completed submission should not exceed 6 pages in total.

NIA Project Registration and PEA Document

Date of Submission

Mar 2015

Project Reference Number

NIA_SHET_0015

Project Registration

Project Title

Controlled Backfill for Peat Land

Project Reference Number

NIA_SHET_0015

Project Licensee(s)

Scottish and Southern Electricity Networks Transmission

Project Start

March 2015

Project Duration

1 year and 7 months

Nominated Project Contact(s)

SSEN Future Networks Team

Project Budget

£125,000.00

Summary

To find suitable alternative backfill materials, conduct TR tests in the lab and in close HV cable proximity in order to identify the material which is most technically suitable, environmentally friendly and cost-effective for use in peat land.

Nominated Contact Email Address(es)

transmissioninnovation@sse.com

Problem Being Solved

SHE Transmission has a number of high profile cable routes planned which pass through peat land. Peat poses a number of problems for cable installations. It cannot effectively dissipate the heat produced by the cable therefore the cable could run hot, limiting current carrying capacity and potentially severely damaging or reducing the lifespan of the cable. Designers usually solve this problem by increasing the size of the cable at increased cost and / or backfilling cables with Cement Bound Sand (CBS). CBS offers the correct thermal characteristics but it is expensive to install, inspect and test. Furthermore there are environmental concerns with the use of CBS as it can leach and damage the surrounding peat habitat, it comes with a high embodied carbon footprint and the displaced peat has to be retained in bunds on site or disposed of as a waste.

Method(s)

This project proposes a technical method to investigate and test a new type of controlled backfill material through:

- Thermo-resistivity (TR) analysis using computer modeling and investigation of resultant TR values from various mixtures of available low TR materials with peat. The aim is to find a combination of materials with ideal TR and relatively low price.
- Lab-testing of the various mixtures in compliance with the appropriate standards.
- Monitoring the effect when using higher thermally conductive surroundings on a high voltage cable system.

Scope

To find suitable alternative backfill materials, conduct TR tests in the lab and in close HV cable proximity in order to identify the material which is most technically suitable, environmentally friendly and cost-effective for use in peat land.

Objective(s)

The objectives of this project are as follows:

- To investigate the addition of controlled backfill to existing peat land in order to increase cable load carrying capacity.
- To investigate the TR values from various mixtures of available low TR material with peat in order to find a combination of materials with effective TR, environmentally friendly and at relatively low price.
- To provide a complete test report and recommendations for effective or appropriate solutions for cable backfilling materials in peat land.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The project will be deemed a success if it can assess potential alternative materials and a conclusion drawn about their viability or lack of, as cable backfilling materials for peat land.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The scale of the project is considered adequate for the scope. It is anticipated that the outcome of this project will suffice for the network operator to accept the validity of the project outcomes. Any lesser scale of project would not be able to provide adequate resources for the quality of results expected in this project.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL7 Inactive Commissioning

Geographical Area

The research will take place within SHE Transmission's license area in Scotland

Revenue Allowed for the RIIO Settlement

No revenue has been allowed within RIIO-T1 to address the problem identified in this proposal

Indicative Total NIA Project Expenditure

£125k (90% of which is allowable NIA expenditure)

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)

The benefits of this project which will potentially accrue to the transmission system are:
• Reduced cost through identifying a controlled backfill material which is more economical than CBS
• Reduced cost for cable installations in peat land by designing projects with appropriate cable ratings and economic use of cable sizes
• Improved power flows due to increased cable ampacity gained by lowering the backfilling TR
• Improved cable lifetime by lowering the risk of cable damage or faults due to overheating
• Improved environmental performance by using a solution that is friendly to the peat land habitat

Please provide a calculation of the expected benefits the Solution

Not required

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

The project findings can be implemented anywhere in UK where peat land is involved in cable laying. It is likely that if successful, the low TR material will even be used in any cable laying applications where high TR levels result in the de-rating of cables. Since a cable's thermal rating is purely entirely dependent on current, the outcome of this project can be applied across all networks regardless of voltage.

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

The costs of rolling out this method will be determined by the volume of forthcoming GB wide network projects with cables which pass through peat land. In addition, the cost will also depend on the cost of the material that will be recommended at the end of this project. The aforementioned aspects are currently unknown hence an estimation of the costs of rolling out is not possible at the moment.

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

Any network licensee with cables which pass through areas of peat land or environments with high TR surroundings will be able to benefit from the successful outcome of this project. With increased attention towards minimizing the visual impact of overhead lines, future cable installations traversing peat land are likely to increase. Affected network licensees will be able to use the outcome of this project to make informed decisions about available cost-effective options.

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.

n/a

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

n/a

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

n/a

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

n/a

This project has been approved by a senior member of staff

☑ Yes