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

Oct 2014

Project Reference Number

NIA_NGGT0065

Project Registration

Project Title

Pipeline and Farm Equipment Loading Review

Project Reference Number

NIA_NGGT0065

Project Licensee(s)

National Gas Transmission PLC

Project Start

October 2014

Project Duration

0 years and 7 months

Nominated Project Contact(s)

Paul Ogden

Project Budget

£100,000.00

Summary

At the time that much of the NTS was constructed, agricultural equipment was relatively small and lightweight and pipeline design and construction standards of the time reflected this. Some 40-50 years later it is commonplace to see very large scale farming equipment being used, as farms, access tracks and field sizes have dramatically increased along with farm management arrangements. In addition to the change in equipment, many agricultural techniques such as deep ploughing, land drainage etc., have all changed.

Whilst no known adverse effects have been recorded to date, it is appropriate to initiate a review of modern farming techniques to identify the potential scope of the problem, any associated risk and the validity of current specifications.

Review of implications and potential solutions to modern heavier agricultural equipment crossing steel pipelines. As part of the review, consideration will need to be given to; the change of ground conditions, weather, the change of pipe and coating systems, changes in construction and other factors to be determined during the course of the first phase of research and review.

Third Party Collaborators

WSP UK Limited

Nominated Contact Email Address(es)

Box.GT.Innovation@nationalgrid.com

Problem Being Solved

Modern farming techniques are placing larger and heavier equipment, and hence heavier loads, on fields and farm crossings of high pressure (HP) pipelines which were laid to former editions of the industry accepted standard for HP pipelines, UK IGE/TD/1. This

document originally published in 1965 by the Institution of Gas Engineers (IGE now IGEM – Institution of Engineers and Managers), is recognized as good practice guidance which should be used to meet the requirements of the Pipelines Safety Regulations 1996. The document is now in its fifth edition and was last updated in 2008. The changes in agricultural equipment have the potential to introduce increased risk to the National Transmission System (NTS) but this issue does not appear to have been taken into account during the 5 reviews since 1965. We are not aware of any future plans to review TD/1 for this issue. It was therefore identified that a review was required on the implications of current and projected farming equipment and techniques to identify the potential scope of any problems, the validity of current specifications, any international best practice, and to propose any further investigations and field testing that may be required.

Method(s)

This research project will investigate the impact of current agricultural loading on pipes in the ground, to identify and understand the potential scope of risk and the validity of current specifications.

Phase 1 - A full review of potential pipeline risk areas.

Desktop review report detailing the outcome and conclusions from;

- Review of implications of current agricultural methods for all key risk areas including; design, loading, construction, climate affects, operation & maintenance, etc.
- Workshops with risk area specialists
- Research of international custom and practice
- Field work proposals for a potential subsequent Phase 2

Presentation and facilitated discussion with National Grid, IGEM and other Gas Networks

Phase 2 - Based on outputs from phase 1 it is anticipated that further work will be required (eg field trials, review and revision of associated specifications). Learnings on the associated risk will feed into potential mitigation measures relating to the protection of existing pipeline, and the specification for future pipelines, where they may be impacted by modern agricultural equipment and techniques.

Scope

At the time that much of the NTS was constructed, agricultural equipment was relatively small and lightweight and pipeline design and construction standards of the time reflected this. Some 40-50 years later it is commonplace to see very large scale farming equipment being used, as farms, access tracks and field sizes have dramatically increased along with farm management arrangements. In addition to the change in equipment, many agricultural techniques such as deep ploughing, land drainage etc., have all changed.

Whilst no known adverse effects have been recorded to date, it is appropriate to initiate a review of modern farming techniques to identify the potential scope of the problem, any associated risk and the validity of current specifications.

Review of implications and potential solutions to modern heavier agricultural equipment crossing steel pipelines. As part of the review, consideration will need to be given to; the change of ground conditions, weather, the change of pipe and coating systems, changes in construction and other factors to be determined during the course of the first phase of research and review.

Objective(s)

A review of implications and potential solutions to modern heavier agricultural equipment crossing steel pipelines.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

To either confirm that current standards, construction and protection practice remain valid despite changes to modern agricultural practice, or propose changes and further work that may be required to validate current pipeline management and protection arrangements or actions required to mitigate any future risks to the NTS.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

Phase 1: desk based with implications for the entire National Transmission System (NTS) and potentially Gas Distribution Networks Operators (DNO).

Phase 2: (not funded at this stage) – potential for onsite testing on the NTS as well as further desk based work.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL3 Proof of Concept

Geographical Area

The study and research will be led from the Manchester office of the Consultants. The outcome will be applicable to the UK Gas Transmission System and may require further work undertaken on site (phase 2).

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

£100,000

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)

It is anticipated that a savings of approximately £10m could be realised within the RIIO T1 period.

If damage to pipelines is prevented, the very significant cost of repairs would be avoided. On the basis that £10m is taken as the typical insured cost of a pipeline; excavation, repair and associated disruption, it provides some indication of the potential savings that can be made if just one incident is avoided. Within the last 10 years that has been one known near miss incident of agricultural equipment sinking and becoming stuck near to the NTS gas pipeline, a significant factor in the incident is reported as being the weight of the equipment. As agricultural equipment and practice changes and heavier equipment is used, the risk of damage to the NTS pipelines is increasing.

Additionally extensive and widespread minor damage could quickly occur to shallower lengths of the NTS in the event of just one farm changing its equipment and practice, the results of which would remain unknown until the next in-line inspection, which could be up to 5 years following the damage.

Please provide a calculation of the expected benefits the Solution

N/A - research project.

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

The learnings will be applicable to the UK Gas Transmission System and the UK Gas Distribution Network. To ensure learnings are shared, outputs include production of a final report and presentation by the consultants. Subsequently by presentation to relevant industry working group and conferences.

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

It is anticipated that these costs, if any are required, will be ascertained as part of the review during phase 1.

If required, typical mitigation works could include re-assessment of older and shallower pipelines with a view to consideration of the need to restrict agricultural use or/and construction of concrete protection slabs and crossing point slabs in certain areas. Minor measures could include publicity campaigns to increasing awareness by farmers and landowners of the risks, potentially including the provision of permanent signs at field gateways. Such measures could cost from £50k for a targeted publicity campaign through to £100k for extensive protection measures.

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

Gas Network Licenses will benefit by having an understanding of risks and potential mitigation measures relating to the protection of existing and the specification for future pipelines where they may be impacted by modern agricultural equipment and techniques.

The Gas Distribution networks have shown an interest in participating as non-financial collaborators on the project and depending on the outcome they are likely to engage further in Phase 2.

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

This project fits with the Safety theme, specifically regarding third party interference and methods of protecting our underground assets from third party damage.

☑ 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