

## NIA Project Registration and PEA Document

### Date of Submission

May 2016

### Project Reference Number

NIA\_NGGT0097

## Project Registration

### Project Title

Permanent PE slab protection

### Project Reference Number

NIA\_NGGT0097

### Project Licensee(s)

National Gas Transmission PLC

### Project Start

November 2016

### Project Duration

2 years and 5 months

### Nominated Project Contact(s)

Paul Ogden

### Project Budget

£199,000.00

## Summary

Increasing occurrences are being identified of longer lengths of pipeline e.g. 50m+ in field situations where the pipeline has a shallow depth of cover (DOC) e.g. 0.9m or less. In some cases the DOC has been found to be 0.5-0.6m in fields where ploughing can take place up to 0.45m deep. The number of solutions available to National Grid, to mitigate these risks are limited to; legal agreements to limit agricultural activity / buying land / relaying the pipeline / importing additional soil. All have significant costs or /and difficulties and frequently result in the loss of prime agricultural land.

As a result of an earlier innovation project the use of PE slabs has successfully been implemented as an impact protection measure for NTS pipelines which cross ditches at a shallow depth. The idea has emerged of manufacturing the lightweight PE sheets in a pre-formed 'upside down U shape' at a diameter of e.g. 100mm larger than the pipeline, which could be installed over the pipeline where DOC is a problem. The field trials would need to examine the worst case scenario of deep ploughing hitting the PE sheet with a view to deflecting the ploughshare such that it rides over the slab. Ploughs riding over obstructions is a relatively 'normal' occurrence when hitting stone slabs etc. that ploughs sometimes encounter in fields.

### Nominated Contact Email Address(es)

Box.GT.Innovation@nationalgrid.com

## Problem Being Solved

When line walking surveys of feeders are carried out an increasing number of instances have been identified where the pipeline is at a shallower depth than the specifications allow. The risks from shallow pipes in agricultural fields may possibly increase due to farming activities been carried out (such as ploughing) as damage to the gas transmission pipes can occur; if a pipeline is ruptured this has a knock on effect to National Grid customers (distribution network operators) as it will cause a reduction in pressure, if there's significant damage National Grid may need to close the pipeline to carry out repairs which may cost £100ks.

As there are a very limited number of options to mitigate these risks it is imperative that the pipelines are protected so to not compromise the network integrity, ensuring an efficient maintenance of the transmission network.

## Method(s)

This project is to develop and install shaped PE slabs in appropriate situations. The approval will be evidenced

by an approved PE slab design, field trials to demonstrate the effectiveness of the solution for varying

diameters, depths of pipelines and ploughing depth. The project will include:

- Scoping study for in ground testing on large diameter NTS pipelines with shaped PE slabs laid at differing depths, etc.
- Field testing of large diameter PE mains using known pipeline contractors managed by an approved consultant.
- Final report on the field testing and proposed range of solutions.

Update: The completion date and phase two date have been impacted due to constraints with the manufacturers who are developing the prototype, therefore it is necessary to extend the time of project.

## Scope

Increasing occurrences are being identified of longer lengths of pipeline e.g. 50m+ in field situations where the pipeline has a shallow depth of cover (DOC) e.g. 0.9m or less. In some cases the DOC has been found to be 0.5-0.6m in fields where ploughing can take place up to 0.45m deep. The number of solutions available to National Grid, to mitigate these risks are limited to; legal agreements to limit agricultural activity / buying land / relaying the pipeline / importing additional soil. All have significant costs or /and difficulties and frequently result in the loss of prime agricultural land.

As a result of an earlier innovation project the use of PE slabs has successfully been implemented as an impact protection measure for NTS pipelines which cross ditches at a shallow depth. The idea has emerged of manufacturing the lightweight PE sheets in a pre-formed 'upside down U shape' at a diameter of e.g. 100mm larger than the pipeline, which could be installed over the pipeline where DOC is a problem. The field trials would need to examine the worst case scenario of deep ploughing hitting the PE sheet with a view to deflecting the ploughshare such that it rides over the slab. Ploughs riding over obstructions is a relatively 'normal' occurrence when hitting stone slabs etc. that ploughs sometimes encounter in fields.

## Objective(s)

To develop an approved method for the use of shaped PE lightweight slabs fitted over shallow pipelines in fields so as to provide a degree of protection from third party damage from agricultural activity.

## Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

## Success Criteria

An approved method accepted for use by National Grid in clearly defined and appropriate circumstances.

## Project Partners and External Funding

Project Partner - Macaw

External Funding - Nil

Potential for New Learning

Use of a new novel technique for the protection of high pressure pipelines in the agriculture environment for varying diameters, depths of pipelines and ploughing depth so to ensure the safety of our customers and colleagues whilst preserving the environment.

Scale of Project

To test in the working environment the concepts of using shaped PE slabs to protect pipelines.

Technology Readiness at Start

TRL5 Pilot Scale

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

National Grid sites

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

£199,000

## 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)

Estimated savings of £400k on 30 known current shallow pipeline occurrences due to:

- Reduced potential of pipe damage requiring excavation and subsequent P/11 assessment.
- Cost effective PE protection slab replacement in events of agricultural damage.
- Improved monitoring of shallow pipeline as a consequence of PE slab implementation.

The loss of pipeline infrastructure due to agricultural damage would be significant

#### Please provide a calculation of the expected benefits the Solution

N/A (costs to be identified as part of project development)

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

This is fully replicable to utility companies who operate pipelines in agricultural fields

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

PE slab protection will be deployed in areas of low pipe depth. The costs of deployment will be highly case by case specific. A generic cost of implementation will form part of the desktop Phase 1 of this study.

### 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

#### RIO-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 output will be relevant to all operators of pipes where they run in an agricultural environment.

#### Or, please describe what specific challenge identified in the Network Licensee's innovation strategy that is being addressed by the project (RIO-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.

There is no reported evidence that other network licensees are investigating this form of pipeline protection.

#### 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