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 2016

Project Reference Number

NIA_NGN_140

Project Registration

Project Title

Subline Structural

Project Reference Number

NIA_NGN_140

Project Licensee(s)

Northern Gas Networks

Project Start

March 2016

Project Duration

2 years and 4 months

Nominated Project Contact(s)

Richard Hynes-Cooper

Project Budget

£417,515.00

Summary

Subterra have researched and developed the principle of Factory Rolled Pipe and they have since filed a UK patent and commenced the development of a process at their own expense which is ongoing.

The proposal is to make a 155 SDR 21 pipe, this will be factory reduced to a 140 SDR 17 state which it retains in storage. The pipe is aimed at 6” mains renewal. Once inserted in the 140mm form it is reverted to its original dimension (which results in a nominal 140mm bore size).

The solution sites between 140 SDR 17.6 and 180 SDR 17.6, slip lining and open cut respectively. It would be expected to satisfy a percentage of the current need for 6” open cut works which we need to identify the suitability to complete the exercise. The pipe will be produced in 100m coils.

The second element of this proposal is to provide a bowser and reversion pump unit, again both in the workshop and in field testing to facilitate the reversion process within the 'Subline Structural' technique to take place using a fully automated reversion pump to deliver a close fit liner pipe.

The reversion unit design will aim to be compatible with mobile phone app software for data capture purposes, this is not available via the current method.

The use of this pump to facilitate the reversion process will simplify the physical mechanics of the operator and remove the opportunity for human error.

The project will assess suitability for the pump to be trailer mounted along with a water tank that can transported to site and the water used for the reversion process. The water will then be recycled back into the water tank. The pipe coils come in 100m lengths, the volume of water required to facilitate the reversion process for this pipe length is 1700 litres. The weight of 1700 litres of water is 1700kg, the trailer therefore must therefore be suitable to transport a ‘fluid load’ of up to that weight and volume.

The third element of this proposal is to develop a skills, training and competency matrix to enable execution of the reversion process

measured against set criteria which is linked to the NGN STC/SCO match framework.

The mobile phone app will aim to link directly into the NGN STC/SCO match framework and provide a portfolio of evidence of use and to determine competency on an enduring basis.

We have identified 5km of suitable 6" 'size for size' dead insertion work that will be used for field trials to assess the suitability of this solution throughout the project.

A report will be produced at the end of the project to assess the suitability and benefits of the proposed solution measured against the defined success criteria.

Third Party Collaborators

Subterra

Nominated Contact Email Address(es)

innovation@northerngas.co.uk

Problem Being Solved

As part of the gas mains replacement program, where iron mains are to be removed from risk are required to be replaced 'size for size' there are a limited number of options the GDNs other than open cut which is highly disruptive and also extremely expensive.

There has recently been a new product made available the to the gas networks in the form of Subline Structural technique. The technique is a valuable tool in enabling the use of the existing gas mains network for insertion, to avoid the excessive financial costs and stakeholder impact where 'size for size' pipe replacement is identified during network analysis investigations.

The current problem with this method is that the process of reducing the pipe diameter is required to be undertaken on the NGN site, this is an issue as it limits the scope for use for a number of reasons:

- Size of operation – The site conditions and available space to allow the operation to be undertaken mean that this method is only practical on a reduced number of sites.
- Customer disruption –When the operation is used on sites it increases the engineering work required resulting in traffic delays and even road closures.
- Cost of operation – this is currently only available as a bought in service so costs considerably more and our site operatives must wait on site for the pipe diameter to be reduced before work can take place.

Method(s)

Working with Subterra we will look to develop a factory based system that can replicate the pipe diameter reduction process at the time the pipe is constructed.

In addition to this we would also look to develop the technology to facilitate reversion of the pipe once this is in situ. Therefore we will look to develop a reversion pump with intelligent technology for data capture.

Also due to the large volumes of water used in the reversion process we will also need to develop a trailer unit with at least a 1700l capacity to allow water to be transported to and from site to reduce the need for water stand pipe licenses under certain conditions. We will also look to incorporate Bluetooth technology so that every process is automatically recorded.

Scope

Subterra have researched and developed the principle of Factory Rolled Pipe and they have since filed a UK patent and commenced the development of a process at their own expense which is ongoing.

The proposal is to make a 155 SDR 21 pipe, this will be factory reduced to a 140 SDR 17 state which it retains in storage. The pipe is aimed at 6" mains renewal. Once inserted in the 140mm form it is reverted to its original dimension (which results in a nominal 140mm bore size).

The solution sites between 140 SDR 17.6 and 180 SDR 17.6, slip lining and open cut respectively. It would be expected to satisfy a percentage of the current need for 6" open cut works which we need to identify the suitability to complete the exercise. The pipe will be produced in 100m coils.

The second element of this proposal is to provide a bowser and reversion pump unit, again both in the workshop and in field testing to facilitate the reversion process within the 'Subline Structural' technique to take place using a fully automated reversion pump to deliver a close fit liner pipe.

The reversion unit design will aim to be compatible with mobile phone app software for data capture purposes, this is not available via the current method.

The use of this pump to facilitate the reversion process will simplify the physical mechanics of the operator and remove the opportunity for human error.

The project will assess suitability for the pump to be trailer mounted along with a water tank that can transported to site and the water used for the reversion process. The water will then be recycled back into the water tank. The pipe coils come in 100m lengths, the volume of water required to facilitate the reversion process for this pipe length is 1700 litres. The weight of 1700 litres of water is 1700kg, the trailer therefore must therefore be suitable to transport a ‘fluid load’ of up to that weight and volume.

The third element of this proposal is to develop a skills, training and competency matrix to enable execution of the reversion process measured against set criteria which is linked to the NGN STC/SCO match framework.

The mobile phone app will aim to link directly into the NGN STC/SCO match framework and provide a portfolio of evidence of use and to determine competency on an enduring basis.

We have identified 5km of suitable 6” ‘size for size’ dead insertion work that will be used for field trials to assess the suitability of this solution throughout the project.

A report will be produced at the end of the project to assess the suitability and benefits of the proposed solution measured against the defined success criteria.

Objective(s)

Successful development of factory based, subline pipe

Successful development of a fully automated electronic reversion pump with data capture capability

Measured savings in costs using this method

Procedures created and documented via standards

Reduced excavation’s avoiding customer disruption

Successful development of an application to link the electronic reversion pump for data capture purposes

Reduced duration of works improving customer service

Successful delivery of the Subline Structural insertion and reversion technique via field trials

Define logistical constraints of factory based subline pipe variants. I.e. sunlight, temperature, timescales etc

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The availability of pipe that is modified at the factory and is available to procure via Subterra

Successful creation of a fully automated reversion pump unit that simplifies the reversion process

Development of a traceability app based on mobile phone technology to capture site data and integration into NGN systems

Successful creation of a pump device that removes the need for water standpipe licences and usage in certain conditions dependant of volumes and is compatible with water recycling post-reversion

Successful creation of a self-contained transportable water tank that removes the need for water disposal on site in certain conditions dependant of volumes and is compatible with water recycling post-reversion.

Competence training matrix and assessment portfolio creation

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The 5km of work that has been identified is spread across the entire network geography and is in a range of differing lengths and site locations. This is to allow for robust testing to ensure that the product is suitable for construction and suitable for sites where the solution would typically be discounted as a viable option due to engineering, physical available space on the site and upon cost benefit analysis.

Technology Readiness at Start

TRL6 Large Scale

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

The project will be undertaken on a range of sites spread across the NGN network.

Revenue Allowed for the RIIO Settlement

Under RIIO we forecast that we intend on spending £62m/year on replacing iron mains. In 2016/17 specifically £45.4m will be invested in HSE programme.

Indicative Total NIA Project Expenditure

£313,450 – Total External Costs

£104,065 – Total Internal Costs

£417,515 – Total Project Cost

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)

Delivering a forecasted saving of £99,900 over traditional open cut alternative measured on a 5km work basket

Please provide a calculation of the expected benefits the Solution

Cost as is, typical rolldown and project version.

Existing open cut costs for 5km - £951,050

Existing costs for dead insertion using traditional on site subline - £1,176m

Proposed costs for dead insertion using factory based subline - £851,150

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

As above x 8 for all GDN's

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

There is no direct cost for roll out across all GDN's, this project would create an 'off the shelf' product which is available for NGN and the other remaining networks to purchase.

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

To provide the other GDN's with an alternative solution as part of gas mains replacement delivery program design and construction process.

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

To facilitate 'size for size' insertion and reduce the need for open cut delivery.

- This has a positive impact on customer and stakeholder via reduction in duration of works and physical impact on site.
- There is a safety and environmental impact via reduced excataion requrement, which reduces the risk to operatives through excavation and also has a positive impact via a reduction in volume imported aggregates for reinstatement.
- The project will deliver efficiencies through inhouse delivery and an automated technique.

☑ 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