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_SGN0072

Project Registration

Project Title

SynthoScope

Project Reference Number

NIA_SGN0072

Project Licensee(s)

SGN

Project Start

March 2015

Project Duration

2 years and 4 months

Nominated Project Contact(s)

Alex Stewart, Innovation Project Manager

Project Budget

£189,953.00

Summary

The scope of this project is to design, development and assess the suitability for use by field trial of a small diameter camera and live inspection system to be used to survey both individual services and rising mains and ducts. This process will support risk assessment of our Riser replacement strategy.

The project has been delayed due to failure in initial off-site tests resulting in the design concept being altered. This failure also meant a rebuild of the initial prototype which was to be tested. These alterations have led to a delay in the project program and a 9 month extension is required to allow laboratory testing and field trials of the new prototype to be completed.

On completion of the prototype, offsite testing results presented an issue in the ability to negotiate bends on a longer camera length (greater than 10 metres). This has led to a redesign of the camera control system, thus resulting in a delay to the delivery of the prototype prior to field trials. In order to fully field trial and evaluate the system it is anticipated a project extension of a further 12 months (beyond the initial change) will be required. This would allow a full evaluation of the product on both below ground services and risers to be undertaken and allow SGN to understand the capabilities of the system and assess the potential uses and savings to be made.

The change is beneficial because it allows learning to be delivered as planned with no change to the project cost or potential net financial benefits.

Nominated Contact Email Address(es)

sgn.innovation@sgn.co.uk

Problem Being Solved

SGN have on going metallic mains and services replacement programme. As part of this we require to renew a high volume of single and multiple services. These renewal can result in prolonged supply interruption and disruption to the customer depending on the method used to renew the supply pipe.

SGN are committed to minimising the inconvenience to the customer by choosing the least invasive technique to renew the services and small diameter mains. However, since there is no inspection system that would allow a service to be surveyed live to decide on the best possible solution for renewal, this decision is left to the operative on site. This could result in aborted renewal attempts and extended interruption to the gas supply and unnecessary disruption to the customer.

SGN also rely on a visual inspection technique to decide on the requirement for riser renewal works. The majority of network risers are constructed of materials and fittings that are subject to deterioration and ultimately failure. The root cause of failure can take different forms, be it from corrosion, fatigue and stress from thermal expansion, electrical fault conditions, fire or vandalism. The impact of failure varies significantly based on a number of factors, such as where on the riser it has failed, where the riser is within the building, what the building layout is in terms of access and egress, what the likelihood that escaping gas will result in a public reported escape, the occupancy level of the building, the vulnerability of the occupants and other social and environmental factors.

Approximately 572 riser supplies were cut off and replaced in 2011/12.

In order to avoid the high cost associated with traditional riser replacement, the aim of this project is to evaluate a solution to enhance our visual inspection technique as part of our replacement strategy. This may result in risers which were previously renewed due to the inability to survey, being classed as fit for purpose by improving the robustness of the survey carried out.

Method(s)

The aim of this project is to develop a camera system capable of surveying the majority of service pipes including risers and riser ducts in flatted propertyand small diameter mains without interruption to the customer's gas supply.

The process will develop a small diameter inspection camera and launch system capable of being used on a live service pipe or rising main.

Scope

The scope of this project is to design, development and assess the suitability for use by field trial of a small diameter camera and live inspection system to be used to survey both individual services and rising mains and ducts. This process will support risk assessment of our Riser replacement strategy.

The project has been delayed due to failure in initial off-site tests resulting in the design concept being altered. This failure also meant a rebuild of the initial prototype which was to be tested. These alterations have led to a delay in the project program and a 9 month extension is required to allow laboratory testing and field trials of the new prototype to be completed.

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Objective(s)

The objectives of this project are to:

1. Design equipment suitable to carry out internal survey visual inspection of live services and rising mains up to 20 meters in length and up to 2" in diameter.
2. Design a suitable deployment system to safely allow live insertion of the inspection equipment via the customers meter control valve.
3. Provide technical assessment of designs and construction and development of a prototype to carry out field trials.
4. Assess the ability to survey up to 20m of service pipe through a maximum of two elbows and one tee at pressures up to 75mbar.
5. Assess the ability to survey riser ducts.
6. Assess the ability to survey small diameter mains 1.5" to 3" and 32mm to 63mm up to 5m in length.
7. Produce all relevant documentation, reports, presentations and work instruction seminars to share the learning from this project.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The success criteria for the project are to:

- Design and assessment of both the inspection and launch systems
- Maintain gas supplies whilst carrying out inspection on rising mains and services
- Completion of successful field trials to test the equipment in a variety of scenarios to prove its performance.
- Compile report detailing all technical findings and field trial outcomes
- Improve decision making when planning service renewal activities

If successful the project will support our risk assessment when carrying out surveys on Network Risers, as well as improving performance and minimising interruption time and inconvenience to the customer when carrying our service replacement activities.

Project Partners and External Funding

None.

Potential for New Learning

SGN have identified an alternative to riser replacement by carrying out a robust inspection and risk assessment prior to renewal works being undertaken. This has led to a reduction in the requirement to renew Network Risers. In order to assist in the risk assessment, particularly when where risers are housed in closed ducts, This equipment will provide Network Licensees with a practical evaluation of an advanced visual inspection tool.

This project is expected to develop and evaluate the Synthoscope equipment. The evaluation will generate learning on the performance, including the benefits of the technology and the potential to reduce interruption time as well as the ability to provide robust visual inspection to support our Riser Risk assessment.

Once field trials are completed SGN will be in a better position to highlight the potential advantages of the technology over current working practices.

Scale of Project

This project is designed to design, develop and field trial the Synthoscope mains and service inspection system to support service replacement works and Riser Risk Assessment.

Technology Readiness at Start

TRL4 Bench Scale Research

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

The design and construction of the prototype will take place at Synthotech's offices in Harrogate with field trials being carried out in all three of SGN's regional Locations: Scotland, Southern and South East of England. The purpose of the trials being carried out in a number of regional locations is to ensure the equipment is used extensively in varying environments to ensure the integrity of the findings.

Revenue Allowed for the RIIO Settlement

During RIIO-GD1 NGN will spend approximately £85.8m on Emergency and £139.1m repairs on all mains and services. As this project is a feasibility study and development for a technology, at a currently low level TRL, it is not yet possible to determine the impact on this spend forecast. However, we believe that developing this type of equipment and this completely new approach it will assist SGN to maintain its frontier position and reduce costs across the sector, if progressed successfully.

Expected savings against specific areas will be quantified in within stage one and finally actual assessments will be delivered as part of the final report.

Indicative Total NIA Project Expenditure

The total predicted expenditure is £189,953, 90% of which is allowable NIA expenditure (£170,958).

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)

Under SGN's current Riser Replacement Policy there is a requirement to survey a minimum of 10% of a rising main to allow an assessment of its condition and carry out a full risk assessment. Unfortunately a large proportion of risers in high rise premises are housed within ducts which were constructed as part of the building. These ducts are, therefore, very difficult to access making it impossible at times to carry out the survey of the pipework. This means we cannot complete the risk assessment and are forced to replace the riser.

The introduction of Synthoscope would allow the ducted risers to be surveyed allowing the riser to be inspected, tested and transferred rather than renewed. The resulting savings are substantial. An average cost for a riser renewal in a high rise premise being approximately £20,000.

Please provide a calculation of the expected benefits the Solution

The cost for riser replacement varies depending on size, location, and the number of customers. The estimated cost to renew a riser fully for an average high rise property (greater than 4 storey and requiring welded steel pipework) is around £20,000.

The savings are based on the reduction in time it takes to renew, which directly impacts on the reduction in interruption payments, cost of labour and materials.

It is assumed if Synthoscope is successfully introduced it would allow a 1% of riser to be safely assessed, thereby removing the requirement to renew the riser.

Using the 500 riser renewals in 2013 / 2014 as a base point this would mean approx. 5 renewals at £20,000 would be avoided leading to an estimated saving of £100,000 per annum.

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

Based on SGN estimates, the total number of risers to be replaced in 2013/14 is 500, of that it is proposed that approximately 1%, % risers could be avoided due to the introduction of Synthoscope.

Based on a 4:2:1:1 split with reference to the size of the networks, It could be assumed that National Grid may have approximately 400 similar high rise properties requiring renewal and Wales & West Utilities and

Northern Gas Networks have around 200 each. Therefore, the estimated total number of high rise properties that could be renewed using this new solution on a per annum basis throughout GB is around 800.

This equates to around 13 potential renewal saved at approx. £20,000 per riser therefore, it is estimated that the potential savings across GB are around £260,000 per annum.

While this estimate provides an indication of potential riser replacement, it is important to note it is necessarily based on a number of unqualified assumptions and therefore subject to a large sensitivity margin.

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

There are no costs associated with sharing the conclusion and recommendations of this project as SGN will continue to share project progress throughout the duration of the project with the other Network Licensees, which will be the first step towards roll out across GB.

Upon successful completion, Network Licensees will make a decision on whether to implement the new Synthoscope solution throughout their organizations. Excluding the cost of purchasing the equipment, it is anticipated that the only foreseeable costs will revolve around the training costs for operatives. At present it is unclear as to how many operatives will be trained and whether Licensees would have their internal training departments carry out further training once the initial training program from Synthotech has been carried.

As this project advances the Method's TRL and quantifies its costs and benefits, these uncertainties will be reduced and enable further assessment of the costs of rolling out the method to be undertaken. This will also depend on the final equipment price.

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

All network licensees encounter water within the low pressure system, and services in particular, and will be able to use the learning generated from this project as the outcomes will be presented in a clearly defined report published on our website.

The learning will be generated by fully exploring the cause and effect of water ingress, developing strategies for planning quick resolution of these issues and adopting a technological solution that can, from a single remote operation, locate and remote unwanted water from the network.

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 technology search has been undertaken and no feasible alternative exists currently in the UK market and we are not aware of any other GDN undertaking this type of research.

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