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NIA Project Registration and PEA Document

Date of Submission

Sep 2014

Project Reference Number

NIA_SGN0051

Project Registration

Project Title

Olympic Rings for RIIO

Project Reference Number

NIA_SGN0051

Project Licensee(s)

SGN

Project Start

September 2014

Project Duration

6 years and 3 months

Nominated Project Contact(s)

Alex Stewart, Innovation Project Manager

Project Budget

£93,331.00

Summary

The scope of this project is the testing and development of a potential solution to enable multiple coring within highways to reduce the requirement for conventional excavation, allowing existing equipment to be used within core and vac excavations.

Nominated Contact Email Address(es)

sgn.innovation@sgn.co.uk

Problem Being Solved

Scotia Gas Networks (SGN) is currently undertaking a programme of work to replace existing cast iron mains with new PE mains. This work is undertaken in tandem with conventional abandonment works which allows the metallic mains to be decommissioned.

Both of these activities currently require large excavation works to be undertaken on the carriageway causing disruption to traffic flows for extended time periods. These excavations also impact on the environment with the disposal of excavated material and the import of either virgin or recycled backfill material.

Method(s)

Under the previous IFI initiative, SGN undertook a project to evaluate Core &Vac technology to assist in minimizing excavation sizes when carrying out joint repairs on metallic mains.

This project will look at extending the use of core and vac technology and techniques to allow larger excavations to be carried out and backfilled using multiple coring.

The use of core and vac is currently limited due to the size restrictions and the tooling available to operate within the limited space of a core excavation (600mm diameter). This means a large number of operations still involve large, time consuming excavations ranging from 2 – 4 metres in length depending on pipe

configuration and the associated delay in reinstatement.

This project would develop a technique to allow the extension of core and vac technology to include multiple cores , thereby allowing the use of conventional tooling and equipment to operate in conjunction with the core and vac technology.

The benefits of this system when compared with conventional drilling and bag off equipment are:

- Reduction in volume of excavation
- Minimise our works footprint
- Quickly reinstate the majority of the excavation works
- Reduces time both excavating and reinstating
- Reduces costs minimise excavation size and, where core and vac is used, cores can be used as final reinstatement

Scope

The scope of this project is the testing and development of a potential solution to enable multiple coring within highways to reduce the requirement for conventional excavation, allowing existing equipment to be used within core and vac excavations.

The initial work to produce a conceptual detailed design for the solution and reinstatement process showed that more analysis than originally planned was required due to the nature of the operation being carried out and the precise requirements around reinstatement of multiple cores. Additional analysis is required to gain assurance over the stresses on the road as well as work required to be carried out to determine how multiple cores can be reinstated safely and without causing long term detrimental effect to the road surface.

As a result of the requirements for additional analysis the project duration was extended from 12 months to 20 months. The change is beneficial as it allows learning to be delivered as planned with no increase in project budget or change to potential net financial benefits.

A further change was required as the project was delayed when searching for a suitable offsite area to trial the initial 12 site test. Several areas were considered initially but dismissed due to the condition of the surface and the extended length of carriageway required to complete the tests. A further search was carried out and a suitable test site identified in Glasgow which met the criteria required as part of the off-site tests. This site has been checked and initial testing completed allowing the coring trials to proceed.

As a result of the issues with location of a suitable site the project was extended by a further 8 months to 28 months duration. This change is beneficial as it allows for completion of the offsite trials and production of the evidence necessary to assess the structural strength of multiple core excavations.
A further change to the project timescales was required due to lack of suitable equipment being available and repairs to the Core and vac machine in Glasgow, where the field trial was scheduled. This, in addition to contract extensions with TRL have led to a year delay on the project

There is no increase in project budget or change to potential benefits as a result of this change.

Following this amendment, the objectives and success criteria of the project, as defined on registration, are anticipated to be met within the revised timescale and the benefits of the project outcomes realised by the GB gas consumer.

Objective(s)

The objectives of this project are to:

· Produce a conceptual detailed design solution to meet SGN and Industry standards.

· Conceptual detailed design of reinstatement process

· Off site field trials to prove conceptual design compatibility

· Technical review of impact of conceptual process across spectrum of road classifications

· Gap analysis

· On site field trials to prove process including testing and monitoring process

· Production of report detailing process and testing results.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The success criteria for this project are to trial and test the method against the traditional methods currently used to compare its performance in terms of:

- Provide a safe, efficient and cost effective solution.
- Demonstrate the effectiveness of the technique versus existing excavations
- Demonstrate the effect of multiple cores on carriageway integrity
- Provide test data to uphold conclusions
- Increase in productivity.

Project Partners and External Funding

None

Potential for New Learning

This project is expected to provide all Network Licensees with a fundamental understanding of whether it is feasible to carry out large excavations using multiple core and vac 600mm excavations to allow conventional tooling and equipment to be used within the core and vac excavations.

This project is expected to offer Network Licensees with a new solution to allow an increased scope of operations to be carried out and to reduce the disruption to their customers, provide a more efficient solution ,is more cost effective and has lesser environmental impact compared with traditional techniques.

Scale of Project

In order to ensure that learning associated with this project is maximised and that the future application of this technology is well understood, it is necessary to trial a good sample of mains and sizes across a number of site locations , both in Scotland and Southern to ensure a sufficient range of scenarios are covered.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL7 Inactive Commissioning

Geographical Area

This project will be trialed in a number of depot locations using both core and vac and conventional small hole technology, in each of SGN's regional networks; Scotland, South and South East England. The purpose of the trials being carried out in a number of depots is to ensure that the new technology is used extensively in varying environments, mains sizes and ground conditions to ensure the integrity of the findings.

Revenue Allowed for the RIIO Settlement

During RIIO-GD1 it is estimated that OFGEMs proposed allowance for 2013-21 Replacement Tier 1-3 activities for all Network Licensees is approximately £5,195.2m. While no direct saving on this is expected during the Project, it is anticipated that successful completion of this Project and use of the technique could, in future, provide a significant cost reduction with regards to Tier 1 (25mm through to 180mm) replacement works as well as potentially reducing the time taken to complete our works on site.

Indicative Total NIA Project Expenditure

The total project expenditure is £80,000, 90% of which is allowable NIA expenditure (£72,000).

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)

Normally several processes require to undertake work which can currently only be carried out in conventional excavations due to the size restrictions required by the processes. This involves large, time consuming excavations depending on the operation and the pipe configuration. This project would allow similar excavations to be carried out by undertaking multiple 600mm core excavations. This process would allow reuse of the cored material, thereby, reducing both the time and costs of the operation when using conventional equipment and processes.

The benefits of this system when compared with conventional excavation processes are:

- Minimise our works footprint
- Quickly reinstate the majority of the excavation works
- Reduces time both excavating and reinstating
- Reduces costs minimise excavation size and, where core and vac is used, cores can be used as final reinstatement

Please provide a calculation of the expected benefits the Solution

On the basis mentioned above if we can reduce the use of conventional excavation required to complete the operations and replace by using a technique which maximises the use of core and vac technology it would result in significant savings on excavation and reinstatement costs.

The actual savings are difficult to quantify given the diverse nature of mains replacement work, road types, durations and mains configurations., however, an indication of the savings would be as follows:

Based on sample excavation sizes the following table gives indicative costs of the current and revised process using the new technique if successful.

Sizes

1.2 x 0.6m

1.2 x 1.2m

1.8 x 0.6m

1.8 x 1.2m

Standard Excavation

£175.00

£375.00

£275.00

£550.00

Multiple Cores

£120.00

£225.00

£250.00

£425.00

Saving

£55

£150

£25

£125

The examples above include time and material for carrying out core excavations on the revised price example and a reduced excavation length.

As can be seen from the above examples, savings can be made using this approach in combination with our current coring technology. There is also the added advantage of the quick reinstatement of the core holes. This would allow our works to occupy a minimum footprint on the footpath or carriageway, thereby minimizing disruption to traffic flow and members of the public.

These costs are based on approximations of the existing and revised excavation sizes, however, it is envisaged that as the project progresses additional data will be collated to give a more accurate saving calculation based on actual results.

At present it is difficult to extrapolate the saving due to the diversity of mains sizes, carriageway types and mains configurations. As the project progresses actual site data will give a clearer indication of overall work volumes and potential savings.

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

SGN complete approximately 1200 replacement projects across Scotland and Southern license areas per annum. Although this figure will reduce as SGN through RIIO-GD1, it is can assumed that the other Network Licensees may have identified a similar proportion of replacement projects (based on network size). Therefore, this Project has the potential to be rolled out across GB and provide future savings in the capital and operational costs associated with mains and service replacement, while improving asset integrity.

The figures mentioned are assumed based on the nature of our current mains replacement programme. Replacement activities across all Network Licensees and sites will vary, this may affect the potential to apply the method and the potential benefits associated with it. The main focus of this project is to research, design, develop and manufacture new keyhole technology solutions to minimise the excavation sizes when carrying out specific operations and to understand the potential benefits associated with the technology..

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

As the number of replacement projects is unknown across GB it is difficult to determine the exact roll out

costs. There will be costs associated with sharing the results and learning of this project. SGN will continue to share Project progress throughout the duration of the project with the other Network Licensees.

Upon successful completion, Network Licensees will make a decision on whether to implement this solution throughout their organisations. Excluding the cost of purchasing any equipment to carry out coring operations, it is anticipated that the only foreseeable costs will revolve around the training costs for operatives although since this is an evolution of an existing technique it is likely operatives may have some familiarity with both the existing technique and equipment which should be easily transferable to the new technique and equipment. This transfer should mean a minimum amount of training will be required.

At present it is unclear as to how many operatives will be trained and how Network Licensees would choose to deliver training. More accurate quantification of roll out costs will be possible once the project is underway and the changes are identified and quantified.

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

The learning from this project will allow network operators to evaluate the benefits of a process which would spread the use of the previously developed coring technology to allow similar excavations to be opened by undertaking "multiple cores". The advantage of using the coring process is the speed of excavation and reinstatement as well as the reduction in excavation size, thereby vastly reducing the impact on our customers, the environmental issues and also the associated costs.

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 review of all other Network Licensees' IFI Annual Reports has been performed and no similar projects have been identified. A similar review of current academic literature and journals has also been performed to avoid any potential overlap with the current project.

The supplier has provided clarity that no unnecessary duplication of this project is currently being undertaken in the UK.

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