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# PURPOSE

## The purpose of this requirement is to demonstrate the value and expected benefits of investing in new technologies to support better asset management and drive positive outcomes across infrastructure sectors.

# BACKGROUND TO THE CONTRACTING aUTHORITY

## The National Infrastructure Commission (“NIC”) is an independent body (an Executive Agency of HM Treasury) which provides the government with impartial, expert advice on major long-term infrastructure challenges. All analysis and outputs in the requirement are commissioned by, and will be delivered by the Successful supplier exclusively to, the NIC. Analysis and outputs must not be shared or discussed with any party other than the NIC, without explicit NIC consent.

## The NIC was set up in an interim basis on 5 October 2015 and formally became an Executive Agency of HM Treasury on 24 January 2017. The NIC’s objectives are to support sustainable economic growth across all regions of the UK, improve competitiveness and improve quality of life.

# Background to requirement/OVERVIEW of requirement

## The NIC has committed to delivering a National Infrastructure Assessment (NIA) once in every Parliament, which will assess the UK’s long-term infrastructure needs (across a 10-30 year horizon) with recommendations to the government. The NIA covers six infrastructure sectors (transport, energy, water and wastewater, digital communication, solid waste and flood risk management), also considering their interdependencies and wider cross-cutting issues.

## The NIC has also been commissioned by the Government to report on specific infrastructure challenges, which to date have included: energy innovations, London transport, Northern connectivity, mobile connectivity and the Cambridge-Milton Keynes-Oxford corridor.

## At Autumn Statement 2016, the Chancellor of the Exchequer requested that the NIC undertake a study on how new technologies can improve infrastructure productivity.

## The Chancellor of the Exchequer asked the NIC to:

### Identify which emerging technologies have the most potential in terms of optimising the management, performance and maintenance of existing and future infrastructure assets to support economic growth;

### Make recommendations to government on what actions it should consider to support the deployment of those technologies across infrastructure areas and sectors, including identifying where trial approaches may be appropriate.

## Successful suppliers should read both the NIC’s [February 2017 Call for Evidence](https://www.nic.org.uk/news/nic-launch-technology-study-call-evidence/) for the technology study, and subsequent [July 2017 Second Call for Evidence](https://www.nic.org.uk/publications/new-technology-study-second-call-for-evidence/), as well as HM Treasury’s [Terms of Reference](https://www.nic.org.uk/our-work/tech-study/) for the study, in order to understand the broader context for this requirement and inform their response.

# definitions

|  |  |
| --- | --- |
| Expression or Acronym | Definition |
| Infrastructure sectors | The sectors which fall under the NIC’s remit, namely: transport, energy, water & wastewater, digital communication, solid waste and flood risk management. |
| Infrastructure productivity | The performance of infrastructure systems, determined by the management, operation and maintenance of these systems. |
| New technologies | Digital and data driven technologies already at a level of readiness to allow for full deployment, i.e. realising the maximum gains from implementation, over the next 10-30 years. |

# scope & Overview of requirement

## The NIC requires the services of a potential supplier to undertake economic analysis that can demonstrate the value and expected benefits of investing in new technologies to support better asset management and drive positive outcomes across infrastructure sectors. Evidence gathered through this analysis will be used to inform policy recommendations in the New Technology Study which has been requested by the Chancellor of the Exchequer.

## The NIC has chosen to demonstrate the value and expected benefits of investing in new technologies to support better asset management by focusing on two parts:

### **Part A**: An assessment examining the value and expected benefits of rolling out monitoring technologies for structural rail assets to support improved maintenance processes, reduced disruption and other benefits.

### **Part B**: An assessment examining the value and expected benefits of rolling out monitoring technologies in the water sector, to support better asset management and increased efficiencies.

## Technical support is required to undertake economic analysis for each of these assessment areas. The potential supplier will be required to work with the NIC and other relevant stakeholders to develop a methodology for undertaking analysis, developing a set of assumptions, and identify data requirements, which combined can support a high level identification of value that can be unlocked through investment in new technology.

## The NIC wishes to draw out some of the key findings resulting from the above assessments and develop a set of recommendations and relevant conclusions that may apply to other infrastructure sectors – such as energy, digital, waste, or other forms of transport e.g. highways. This will form **Part C** of the analysis.

## The expectation is that the successful supplier will have a strong understanding of how infrastructure assets are managed (particularly in terms of monitoring and maintenance), an understanding of emerging technologies relevant to asset management and monitoring, and an ability to develop a methodology and set of assumptions that can support an economic analysis that will shape policy recommendations.

## The NIC requires a concise report, finished to a publishable standard and delivered by 3 November 2017, which demonstrates the value and expected benefits of applying new technologies to support better asset management. This report will be published on the NIC website.

# The requirement

## This chapter is broken up into a number of sections. Sections 6.2, 6.3 and 6.4 provide a detailed background and overview of the requirements for each of the parts /areas of analysis. Section 6.5 deals with specific requirements for the report itself. Section 6.6. provides an overview of project management requirements. All of these should be addressed in the response to this statement of requirements.

## **Part A: Examining the benefits of monitoring technology to support Better Asset Management in the rail sector (allocate 50% resourcing)**

### **Background:**

### The University of Cambridge’s Centre for Smart Infrastructure & Construction has developed a range of monitoring technologies to support better management of railway assets. The technology includes drones, fibre optic sensors and laser scanners which can collect data that has potential to support an improved understanding of the behaviour of assets such as masonry arch bridges, and allow for better targeted maintenance. As a starting point CSIC have installed prototype technology on a masonry arch railway bridge at Marsh Lane near Leeds, and have proposed to install additional technology at a number of other sites. In a similar but separate context, the technology has also been incorporated into the design of two new bridges in Staffordshire. Further information on the project can be obtained by reading the [CSIC 2017 annual review – see p 14 -15](http://www-smartinfrastructure.eng.cam.ac.uk/files/csic-annual-review-2017-single-page-spread/at_download/file).

### The NIC and CSIC are working with Network Rail to understand the potential impact and value that could be generated from the installation of monitoring technology across the railway network to support better asset management. This is being done through the collation of a range of data on aspects such as maintenance budgets, railway operations and gathering information on asset classes across the network. The assessment of also looking at the costs of installing technology and the inputs required to monitor and evaluate the data that results from the technology. As a hypothesis, the NIC and CSIC expect value to be generated in the areas of more efficient railway operations (less disruption caused by failing assets and unnecessary speed restrictions), and better targeted maintenance programmes which reduce labour costs and the scale of certain interventions. In addition unforeseen value may also be uncovered by simply having a better understanding of assets in general.

### **Part A requirement:**

## Technical support is required to review data collected (and suggest further data inputs) and make an assessment on what potential value could be unlocked if the technologies applied at Marsh Lane are rolled out more widely across the national railway network to additional structures, and other locations. The NIC can provide an overview of data collected and/or proposed to be collected to date.

## The key aspect of the analysis is valuing the potential ‘size of the prize’ for Government/Network Rail/ passengers if better monitoring could reduce or avoid operational costs of disruption, speed restrictions, unplanned maintenance, and support better targeted maintenance (e.g. predictive maintenance rather than reactive).

## The potential supplier will need to work with a range of stakeholders, including Network Rail, the NIC and CSIC to understand what kind of value can be unlocked through investment in new monitoring technologies, however as a starting point there is a need to understand the key baseline costs in the areas of asset monitoring, disruption, speed restrictions, unplanned maintenance and what kind of change could be influenced through the new technologies.

### *In particular technical support is required to*:

## Identify the data inputs required to make a robust value assessment for investing in new technologies to support better asset management;

## Develop a methodology for extrapolating the results from a single case study (at Marsh Lane) to a value-based judgement of potential impact if a similar approach was rolled out across the network, accounting for a variety of variables (that will need to be justified and agreed with Network Rail and CSIC). The potential supplier should clearly set out their methodology for estimating these impacts, including any caveats and assumptions made in the report.

## Make a valuation of impact with commentary that has potential to act as a precursor to a more detailed business case as a subsequent phase of work. This calculation will need to be based on assumptions that formed part of the methodology above. The potential supplier should set out a potential range for the estimates in their specification that they would be comfortable arriving at.

## It will be necessary to draw on a wide range of resources to calculate reasonable estimates. The study team will share information provided by Network Rail and CSIC and the potential supplier is expected to source any additional information required to make the calculation.

## **Part B: Smart infrastructure for better management of infrastructure assets in the water sector – allocate 25% resourcing**

### **Background:**

###  The NIC is currently working with a number of water companies reviewing the benefits and impacts that monitoring technologies can play supporting and driving positive outcomes for the water sector, particularly in the context of better asset management and efficient operations.

###  In this regard, the NIC is considering a range of new technologies including smart meters, noise loggers, transient monitoring, smart valves, ground and pump sensors. These technologies have potential to influence considerable change, in terms of managing assets and supporting new efficiencies.

###  **Part B requirement:**

### Technical support is required to undertake a high level assessment of the cost and benefits of investing in new monitoring technology in order to support better management of water assets and drive efficiencies.

### Through a desktop review performed by the potential supplier, the NIC wishes to understand general trends in terms of ROI, costs and benefits for water companies who are implementing new technologies.

### Some of the technologies that the NIC would like to consider include; smart meters , noise loggers, transient monitoring, smart valves, ground and pump sensors, mapping for identifying new assets, utilisation of big data and any other new technologies being explored for the water and other sectors, that could support and drive better asset management decisions/deliverables for the water sector.

### Given the fractured arrangements for innovation and responsibility in the water sector, it will be necessary to look at what a number of water companies are doing throughout the country, in order to understand the types of technology available and benefits that are accruing.

### In undertaking the analysis, a range of factors will need to be considered to inform the evaluation, including: technology cost, installation and operational cost (both within the water company and external), reduction in consumption and leakage, customer engagement, installation and rollout cost, technology cost, reductions in consumption and leakages, and other regulatory incentives.

### The NIC will support the analysis by sourcing data and bringing together relevant stakeholders. The NIC can provide an overview of data collected or proposed to be collected to date.

### In particular, technical support is required to:

### Undertake a desktop review of water companies and source relevant data around costs and benefits of installing monitoring technologies in the water sector.

### Develop a methodology for taking the findings from the desktop review and making some high level assumptions and calculations around the costs and benefits of investing in new monitoring technologies to support better asset management. The potential supplier should set out a potential range for the estimates in their specification, which they would be comfortable arriving at.

### It will be necessary to draw upon a wide range of resources (as mentioned above). The potential supplier should provide in their response detail on the number of water companies they would be able to assess.

## **Part C: Drawing out lessons for other sectors – allocate 25% resourcing**

### **Part C requirement:**

### In addition to the two areas of analysis discussed above (Part A, Part B), the NIC would like the potential supplier to make recommendations and provide commentary on lessons-learned from the two parts that could be relevant to other sectors which are a focus for the NIC: including other transport modes, energy, water and wastewater, digital communications, flood risk management and waste.

### This section should reach some high level conclusions around:

### General costs of rolling out new technology to support better asset management

### The benefits that potentially could be accrued (in general terms)

### An estimate of the impact of new technology to the Government’s budget and maintenance spend.

### Methodologies for valuing the impact of new technology on a sector more widely.

### The potential supplier, in their response to this requirement should outline how they

### would address this requirement.

## **Report requirements**

## The final report should be delivered to a publishable standard and provide an overview of the three key areas of analysis discussed in this statement of requirements. The intention is for the report to be concise, clearly demonstrating key findings. It should include an executive summary, overview of each of the key areas of analysis, key findings and a conclusion, as well as supporting appendixes outlining data inputs and methodologies used, stakeholders engaged etc. to arrive at key assumptions/findings.

## The final report should be delivered no later than 3 November, and will be published online at the time of release of the New Technology Study.

## **Project Management requirements**

## In the early phase of this project a project inception meeting will be held, following which, an inception report/project plan is to be provided, agreed by the NIC, clarifying the approach to be taken, along with a plan setting out key milestones and dates for deliverables, risks and how these will be managed.

## In responding to this statement of requirements, a project plan for the 6 weeks of analysis should be provided.

## In terms of engaging with stakeholders, two series of engagement workshops will be required. The first phase of workshops with stakeholders will take place in week 2/3, whilst the second phase, presenting and refining key findings will take place in week 5.

# key milestones

## The Successful supplier should note the following project milestones that the NIC will measure the quality of delivery against:

| **Milestone** | **Description** | **Timeframe** |
| --- | --- | --- |
| 1 | Project inception meeting with the NIC, to agree the milestones for the project and immediate next steps | Within week 1 of Contract Award. Target week commencing 25 SeptemberTarget w/c: 18 September, but no later than 25 September 2017  |
| 2 | Inception report/project plan to be providedA list of key data requirements to support the analysis across the assessments Part A – inception workshopPart B - inception workshop | Weeks 2 and 3 of Contract Award |
| 3 | Second round of workshops (x2) for Parts A and B to refine findings | Within week 5 of Contract award |
| 4 | First draft of final report to be shared with the NIC, including key findings | Within week 5 of Contract Award  |
| 5 | Final version of the report suitable for publication, taking on board second round workshops | Within week 6 of Contract Award Target date: 3 November 2017 |
| 6 | Update meeting / phone call on the project including any findings or assumptions to agree upon. | Weekly basis |

## The above timetable is subject to change, and is dependent upon key gateway points being met in terms of receiving information from the customer and obtaining all required approvals. It is also contingent on project start date.

# authority’s responsibilities

## The NIC will share pertinent information received through relevant stakeholders and introduce the Successful supplier to relevant stakeholders, which can offer valuable advice on the requirement.

# reporting

## As set out in Section 7 (Key Milestones). Additionally, the Successful supplier will be expected to update the NIC on project progress on at least a weekly basis via a meeting or phone call, including to flag any issues or early findings.

# volumes

## This is a substantial piece of work – the expectation is that the key outputs and related materials will be both extensive and of publishable standard.

# continuous improvement

## The Successful supplier will be expected to give due consideration to the way in which the required Services are to be delivered throughout the Contract duration and can be continually improved.

## Changes to the way in which the Services are to be delivered must be brought to the NIC’s attention and agreed prior to any changes being implemented.

# Sustainability

## N/A

# quality

* 1. The NIC will be looking to cite this report’s findings in its study on new technologies. Outputs should therefore be to a publishable standard, with all assumptions and caveats clearly highlighted.
	2. The source of data and assumptions, as well as advice on its robustness, should be clearly set out, and it will need to be demonstrated how the findings have been suitably quality assured. The report will need to be a self-standing piece that can set out its analysis and justify its conclusions to leading experts in the fields of digital technologies and infrastructure.

# PRICE

## Prices are to be submitted via the e-Sourcing Suite Appendix E, excluding VAT.

## The value of this Contract shall not exceed more than £99,999.99 (excluding VAT). Any bids above this shall be deemed as non-compliant.

## Prices should be inclusive of all expenses and exclusive of VAT.

# STAFF AND CUSTOMER SERVICE

## The NIC requires the Successful supplier to provide a sufficient level of resource – with sufficient but not excessive senior involvement and oversight – throughout the duration of the Contract in order to consistently deliver a quality service to all Parties at value for money.

## Successful supplier’s staff assigned to the Contract shall have the relevant qualifications, experience and expertise to deliver the Contract. The NIC does not prescribe any single set of minimum requirements in terms of skills or qualifications, but the Successful supplier must demonstrate as part of its bid that its delivery team contains staff with sufficient expertise and skills.

## The Successful supplier should not replace staff members in the team which was assembled and presented in the bidding process without informing and getting consents from the NIC.

## The Successful supplier shall ensure that staff understand the NIC’s vision and objectives and will provide excellent customer service to the NIC throughout the duration of the Contract.

# service levels and performance

## The targets set out below assume that the contract will be awarded in late September 2017. The NIC will measure the quality of the Supplier’s delivery by:

| KPI/SLA | Service Area | KPI/SLA description | Target |
| --- | --- | --- | --- |
| #1 | Agreed approach  | Clarifying the approach to be taken, along with a plan setting out key milestones and dates for deliverables, risks and how these will be managed, etc. in the form of an ‘inception report’/ ‘project plan’ | Within week 1 of Contract Award Target week commencing no later than 25 September 2017 |
| #2 | Output from draft report relative to this statement of requirements and agreed direction taken at inception meeting | Draft report | w/c 23 October 2017 |
| #3 | Output from Final report relative to this statement of requirements and agreed direction taken at inception meeting | Final Report | 3 November 2017 |

#

# Security requirements

## Due care must be taken by the Successful supplier to protect the confidentiality of all analysis and outputs (including in development and draft phases) relating to this requirement, to avoid pre-empting the NIC’s placement of the final report in the public domain. The Successful supplier must treat all data from Network Rail, CSIC and the water companies who contribute to this analysis as confidential and for the purposes of carrying out the contracted analysis only.

## All data resulting from this analysis is to be stored in the UK.

# intellectual property rights (ipr)

## All aspects of Intellectual Propoerty Rights (IPR) will be carried out in accordance with the Terms and Conditions of the Contract for this requirement.

# payment

## Payment can only be made following satisfactory delivery of the pre-agreed certified products and deliverables. Payment will be made in arrears, subject to invoice(s) being submitted for work carried out.

## Before payment can be considered, invoice(s) must include a detailed elemental breakdown of work completed and the associated costs.

# Location

## The location of the Services will be carried out at the offices of the successful supplier. However frequent meetings will need to take place with the National Infrastructure Commission at the Successful supplier’s offices, or at the NIC’s offices Eastcheap Court 11 Philpot Lane, London EC3M 8UD. There may be occasional visits to other NIC sites in the UK. Travel and accommodation will be based on NIC T&S rates.