Re-opener submission

Non-operational IT Capex – Enterprise Asset Management Enhancements

January 2023

nationalgrid

Non-Operational Capex re-opener business case

Enterprise Asset Management Enhancements

CONTENTS

1. EXECUTIVE SUMMARY

As the operator and owner of the gas National Transmission System, Gas Transmission & Metering (GT&M) have hundreds of assets on operational sites that need regular maintenance and care throughout their lifecycle. This requirement is managed through our Enterprise Asset Management (EAM) systems, which are critical for the planning, optimising, delivery, and tracking of maintenance changes to physical assets and to fulfil our obligation to ensure that gas continues to flow efficiently and safely.

Analysing data from operational equipment through EAM is the final part of the asset data journey, once transmitted from operational sites through the Telemetry system, we need to use the asset data to better understand how assets are performing, plan asset maintenance and optimise the running of the network. This aligns to our Digitalisation strategy[1] to complete the digitalisation of our processes and enable exploitation of data to make the right decisions. It is a key enabler in our aim to establish a hydrogen network as part of a cleaner energy system and contributing towards Net Zero.

[redacted]. This is in the process of being delivered through the Digital Asset Management (DAM) programme, which will deliver the Minimum Viable Product (MVP) of current [redacted] capabilities within [redacted]. However, this will only deliver the replacement functionality and there are essential enhancements that need to be made to [redacted] beyond the initial implementation.

We have considered three options as part of core options analysis. The first option is to do the minimum required in RIIO-2, this was discounted as it does not contribute towards the digitalisation strategy and the business strategy to enable Net Zero. The second option is delay implementation of additional features on [redacted] until further in the RIIO-2 period. A delayed start date will also impact our ability to deliver all the identified features within the RIIO-2 period and have a negative impact through not realising the benefits of optimised operations and improved asset performance.

Our recommended option is to deliver core feature enhancements within the [redacted] [redacted] to ensure assets can continue to be managed effectively within the RIIO-2 period through maximising the operational life of our ageing assets. As we look forward to the next regulatory period, this investment provides the additional benefit of providing the essential functionality for understanding asset performance in readiness for the move to hydrogen. Through delivering the recommended option in this project, we will invest in:

- Enhancing the DAM MVP to deliver essential process improvement for EAM capability and resolve specific core issues prioritised with the asset management teams.
- Remove the need to manually switch between and pull data from different systems into the EAM solution which will increase the visibility of data and enable improved decision making.
- [redacted] Improvement to inventory management will reduce the mean time to recover assets that are offline and reduce the impact offline assets have on the gas transmission network. This benefit is included in the [redacted] saved per year go live of new system.
- Enable the creation of a holistic view of ongoing asset health and historic asset health into a single location. Including operational health and previous financial investment data to see the whole asset lifecycle across equipment. So we can plan future asset interventions with increased accuracy, and a more comprehensive understanding of how the network reacts which will be crucial for the introduction of hydrogen, or blended hydrogen.

[1] *GT&M Digitalisation Strategy: https://www.nationalgrid.com/gas-transmission/document/139181/download*

- Improve knowledge and management of our operational resources through identifying gaps in training across different areas and ensuring operational staff have the right knowledge, equipment and skills when visiting sites for repairs. This is included in the CBA and estimated to save xxx per year in operational resource costs.

The allowance requested to achieve the delivery of these enhancements on [redacted] the breakdown for which has been detailed out in the subsequent sections.

Investment Request Summary

The table below shows the amount requested in **2018/19** prices.

Table 1 Enterprise Asset Management - investment request summary (2018/19 prices)

Investment (£m)	FY21/22	FY22/23	FY23/24	FY24/25	FY25/26	Totals
CAPEX	0	0	xxxx	xxxx	xxxx	xxxx

2. NEEDS CASE

[redacted] It will enable GT&M to improve the end-to-end lifecycle of asset management, from planning the maintenance schedules of our assets to viewing historic maintenance and costs, which will inform future decisions. [redacted] helps to minimise unplanned repair work, manage risks, reduce asset failure, and extend asset life without unnecessary costs.

[redacted] is our current asset management tool which is being decommissioned and replaced with [redacted] through the Digital Asset Management programme (DAM). This will deliver the minimum viable product (MVP) of current [redacted].

The DAM Programme contains three workstreams – Enterprise Asset Management (EAM), Enterprise Content Management (ECM/Document Management) and Geospatial Information Systems (GIS). Delivery of these will remove vulnerability due to systems reaching end of support.

The DAM program will deliver the equivalent functionality of current [redacted] features within [redacted] and will provide a better user experience for the user groups, improve the management of assets, demonstrate compliance & provide better insights into assets leading to more efficient business processes and quicker decision making.

Once MVP is delivered, there is a huge opportunity to build upon the capabilities that [redacted] provides and address specific needs cases within asset management. This will enable an optimised level of asset management and a comprehensive understanding of the network and how assets are performing which is a key step in introducing hydrogen to the network. Through working with delivery partners and our asset management teams we have a comprehensive list of focus areas and challenges that require specific enhancements within [redacted].

2.1 ALIGNMENT WITH OVERALL BUSINESS STRATEGY AND COMMITMENTS

In March 2022, GT&M published the Digitalisation Strategy. This sets out the path to digitalisation of our systems and processes, to enable better use of data both for internal management of the network and sharing externally. The digitalisation strategy aligns to the Energy Data Task Force[2] (EDTF) recommendations and our vision to help enable the shift to Net Zero.

This investment will help GT&M to achieve its business objectives to EDTF, through:

- ***Maximising the value of data***
  By firstly making data available in [redacted], and then also making changes to how asset data is stored within [redacted]. By ensuring asset data is discoverable, with the right data tags and flow of information between asset records and work delivered. This will deliver high quality data master data standardised in a single system and remove current data consistency issues due to storage on multiple applications and offline processes.

[2] *EDTF (Energy Data Taskforce): A Strategy for a Modern Digitalised Energy System- https://es.catapult.org.uk/news/energy-data-taskforce-makes-five-key-recommendations/*

- ***Enhancing the visibility of data***
  By consolidating asset data into a single system ([redacted]) for use between internal asset management solutions and our Data Insights Platform. Improved integration [redacted] for efficient asset location tracking and alignment of financial costs thereby enabling effective management of assets.
- ***Coordination of Asset Registration***
  By digitalising the inventory management process and ensuring a common digital approach across all locations. This will deliver value through enabling asset tracking, their effective utilisation and streamlining of the warehouse operations to improve asset lifecycle, reduce downtime, improve stock control and tracking and enable service continuity.
- ***Visibility of Infrastructure and Assets***
  By bringing more capabilities onto [redacted] in a common format and utilising enhanced reporting to query specific aspects of asset maintenance. This will deliver value by providing visibility of defect trends and repair and replacement history thereby enabling future management of assets.

As part of our RIIO-2 Final Determination submission we undertook stakeholder engagement with the four stakeholder persona groups (Enquiring Minds, Energy Industry Participants, Network and Asset Decision Makers, Policy Influences) to identify key Stakeholder Priorities and Consumer Benefits (expanded upon in NG GT Non-Operational Capex-0- Umbrella Application document). These priorities were created collaboratively with our stakeholders, to ensure that we focus on the right areas that drive value for stakeholders and consumers. The Enterprise Asset Management Enhancements investment aligns to the following:

<u>Key Stakeholder Priorities</u>

- ***Operate a safe, reliable and flexible transmission system***
  Investment into [redacted] enables GT&M to systemise the maintenance and operation of assets and reduction to associated maintenance costs. This will aid in operating the network and planning maintenance outages to have minimal wider impact.
- ***Lead the hydrogen transition for gas networks, enabling a Net-Zero future***
  EAM Enhancements will facilitate real time reporting of underlying asset data and help our understanding of how the network and assets are working which will help business readiness for the transition to hydrogen. Once hydrogen or blended hydrogen is on the network, enhanced asset management is critical to understand the impact on assets and identifying trends resulting from the change in gas composition.
- ***Have a positive impact on our environment and communities***
  The assets shall be maintained, controlled and managed more effectively which will lead to optimised health of operational assets and reduced environmental impact through decreased full overhaul of assets and extended life of assets from improved maintenance.
- ***Invest in our people***
  Investment into [redacted] with help grow our capabilities and value everyone's contribution towards our common goal. It will help understanding our workforce better, mapping experiences and identifying gaps in training.

<u>Consumer Benefits Alignment</u>

- ***Improved safety and reliability***
  We will improve the maintenance and operation of assets, making them more efficient and decrease the associated risks of failure due to poor asset health thereby improving reliability and safety.
- ***Improve quality of service***
  We will be able to better prioritise maintenance work and minimise the impact of operational assets being offline. This will improve the quality of service through making sure we can continue to safely operate the network, minimising impact of maintenance of assets on the end consumer.

2.2 DEMONSTRATION OF NEEDS CASE

Our experience working with partner resources to complete the [redacted] and subsequently start the delivery of the base platform for [redacted] has identified further challenges which are critical to address after MVP delivery to ensure success in asset management and capitalise on the benefits of using [redacted].

Scope of project

The issues within scope to be addressed are presented in the table below.

Table 2 Need case problem statements and opportunities

Item	Problem statement	Opportunities
Current Manual Processes	Engineers and Network Controllers are currently working manually [redacted]	• There is a requirement for data accuracy and availability to be centrally managed, to make data more useful and decrease time wasted on manual updates. Currently there is also no clear [redacted]
Defect Management Improvements	There is an opportunity to make improvements to how defects are managed and tracked. Currently defects can be raised against assets which are decommissioned and defects requiring recurring maintenance work require manually raising work orders every time.	• Delivering this feature will address issues captured in specific user stories for defects management: • Prevent defects being raised against disposed assets. • Set up recurring work orders linked to defects for defects requiring regular maintenance. • Visibility of existing defects linked to assets and clear identification of duplicate defects. • Enable categorisation and location tagging (site, zone, area) of defects, to make finding specific defects easier (supports visibility of data EDTF commitment) • Consolidated investment requests within defect forms. • Remove manual defect processes, for example work order to automatically complete once all defects are closed. • Enhanced reporting on defects to identify trends and predict future defects.
Fragmented geospatial Asset Tracking	Enhancements to the two-way integration between [redacted] and layering of historical data to enable comparison between readings after an asset change.	• Engineers cannot search for specific assets using specific criteria, change between map views to help locate desired system or asset, or produce reports with [redacted] on specific geographic parameters.

Item	Problem statement	Opportunities

Fragmented asset financial investment tracking	There is a fragmented view of asset financial information and users are required to find previous asset investment information in [redacted], and then match it to the asset information in [redacted].	• No direct alignment to financial costs for asset faults or replacements makes it challenging to understand the asset whole life cost, this requires:
		  • Access to comprehensive data for investment planning.
		  • Visibility of outage data.
		  • Traceability between master asset data and investment data.
		• Delivering will show clear alignment to ISO 55001 standard for effective management of assets and is important retain safe and reliable supply of natural gas and planning the potential introduction of blended hydrogen.

Centralise Job Planning with historic work orders	We lack the capability to centrally provide entire historic detail of completed jobs. Any future work (e.g. maintaining an asset) can be planned appropriately if the system gives a holistic view of the past job details e.g., competencies of technicians, any special tooling requirements, time required.	• Delivering this feature will address issues captured in specific user stories: • Ineffective aligning of jobs to skills and no cross flexing of workforce between locations. Certain maintenance activities require special training, so need to correctly align job to technician however it is not immediately clear who has the best skillset, most experienced, and where they are located. • Sites with specific job information are not captured, which makes it hard to ensure that any special tools required to complete the work are provisioned in time for the maintenance activity to be completed. • Accurate view of time required per job and location will allow for more efficient planning and cost savings in shorter job duration. • Through the Cost Benefit Analysis, delivery of this feature is estimated to save circa [redacted] per annum from date of implementation in saved operational resource time.

Manual Inventory management	The current inventory management process is managed via an asset stock register which is maintained manually across different locations either through paper-based solution or spreadsheets. This raises the likelihood of human error and overstocking or understocking of assets. Understocking of critical spares can impact critical operations and	• This will address:
		  • Some aging assets require spares to be prefabricated (bespoke or no longer made) so long lead time.
		  • [redacted]
		  • Requirement for holistic view of spares management, including cost

Item	Problem statement	Opportunities
	continuity of service if a spare is not available at short notice.	of spares to input into asset lifecycle cost and aid in planning future work. • Through the Cost Benefit Analysis, delivery of this feature can save circa [redacted] per annum from date of implementation.
Enhanced reporting	In order to meet compliance and regulatory reporting requirements we need to have a system that can process asset data and asset investment information and records efficiently. Current reporting is completed through bespoke tooling and requires vendor engagement to run reports [redacted]. Requiring manual effort to bring data together whilst ensuring consistency.	• This will provide the ability to run a wide range of reports, which will aid in meeting regulatory compliance, and requirements from audits. We will be able to easily report on who completed maintenance activities, what the script results were and other job details through layering multiple data sets.

The current controls in place will not be adequate as the current investment into delivering the DAM MVP will only deliver core functionality to enable decommissioning of [redacted]. It is essential to build up our EAM capability further on [redacted] to support the business strategy of enabling the use of hydrogen on the network and the move to Net Zero. Without further enhancements to [redacted] we will not be able to comprehensively plan management of asset health and utilise collected asset data to improve our understanding of assets.

Out of scope

There are projects within the Operational Technology (OT) Cyber team which we have identified as having potential dependencies with this re-opener submission. This section sets out two potential areas for overlap and the scope of the OT Cyber PCDs.

[redacted]

Any ongoing potential dependencies will be managed through communication between the two delivery teams to ensure no overlap.

3. OPTIONS

Details of the preferred option, the list of options considered, and the selection process undertaken to reach the preferred option are set out below.

3.1 CONSIDERATION OF OPTIONS AND METHODOLOGY

The short list of options considered were selected through working with key internal business stakeholders and our internal Enterprise Architecture team to understand the requirement. Which were then assessed against a broad range of parameters common across the four re-opener projects which we can be grouped as follows:

- ***Criteria 1 - Strategic and customer alignment***
  How does the option align to our business strategy to keep the Gas flowing efficiently and safely. And our future business strategy of enabling hydrogen on the network, and Net Zero. Does it support our Digitalisation Strategy and stakeholder priorities.
- ***Criteria 2 – Cost***
  How does the chosen option perform against the other options in the Cost Benefit Analysis (CBA). The CBA includes the Do Nothing option as the baseline, the cost of delay, and the cost/benefits of the options in this business case. This also considers that some options will realise a larger benefit if delivered sooner.
- ***Criteria 3 – Timeline***
  The possible implementation timelines, when accounting for ongoing internal project dependencies, separation of GT&M from National Grid, and other external factors, such as Government changes in priority and new policies.
- ***Criteria 4 - Other dependencies***
  Does the option depend on a specific vendor or external factors outside of our control.

Following these criteria we identified a list of options, two were discounted and three were shortlisted for consideration for EAM Enhancements.

Table 3 Options comparison on shortlisted options

Options	Option 1	Option 2	Option 3 *preferred
Option Type	Do Minimum	Delay Proposed Capex	Market Based
Option name	Do minimum	Delayed implementation	EAM Enhancements on [redacted]
Description	Deliver a limited number of features to resolve the issues identified in the Needs Case.	Delay the implementation of EAM Enhancements to later in RIIO-2 (2025).	Deliver all the identified enhancements on [redacted] for Asset Management.
Key Features	• Post MVP go-live, we will revisit the prioritisation of the features, and only deliver the top priority ones.	• Delivery of the features identified in this paper will be deferred to later in RIIO-2, either 2025 or 2026.	• Delivery of all identified features to resolve core issues identified in Needs Case, which will be prioritised to deliver highest value first.
Performance against assessment criteria	• Strategic Alignment: This will not meet our digitalisation strategy as some of the EAM processes will remain manual. • Cost: [redacted]. The cost would be lower	• Strategic Alignment: this will not meet our current digitalisation strategy as technology will have moved on and we will potentially be implementing outdated requirements.	• Strategic Alignment: Will meet our digitalisation strategy and EDTF commitments as we will enhance the quality of asset data and enable us to maximise the usage of data

Options	Option 1	Option 2	Option 3 *preferred
	to deliver only the highest value improvements. • Timeline: as a 'do minimum' option, this will be deliverable within RIIO-2, post DAM MVP go live. • Dependencies: this option will have minimal dependencies on ongoing projects as it will have a small scope.	Substantial rework would be required to revisit requirements and evaluate what has changed since DAM was implemented. • Cost: £[redacted] Additional cost is included due to loss of efficient delivery team. • Timeline: The project will be 532 days and overlap into the next regulatory period. • Dependencies: this option will have minimal dependency on ongoing projects as DAM MVP will be delivered. • This option is not viable, as delaying the investment will result in additional cost of standing a new inexperienced team up, and cost of lost benefits as detailed in the CBA.	to full its potential. This is detailed in Section 2.1. • Cost [redacted] the costs are fully understood through the cost break down and cost benefits analysis and are within the [redacted] benchmark. • Timeline: The project is planned to start in January 2024 and will take 2.5 years (532 working days), seamlessly continuing from DAM MVP, utilising the same resources to deliver within RIIO-2. • Dependencies – This option has dependencies on the timely completion of DAM MVP.

We also considered other options which were not carried forward into the short list, this was because both are not the right strategic solution for GT&M. Neither contribute towards digitalisation and meeting our EDTF commitments and would not resolve the ongoing issues described in the needs case. The discounted options are:

- Do Nothing – discounted as it will not deliver the must have benefits outlined in the Needs Case and capitalise on the success of [redacted] DAM implementation. It also does not contribute towards the digitalisation strategy and the business strategy to enable Net Zero.
- Go out to market for new solution – this was removed from the shortlist as GT&M have recently made the strategic decision to choose [redacted] as our Enterprise Asset Management solution. This involved going to market, running a Request for Proposal (RFP) and then negotiating with the selected vendors. [redacted] was selected as the solution through this process and is the market leading solution for asset management which provides the functionality required.

Cost Benefit Analysis Summary

The table below shows a summary of the option analysis completed in the Cost Benefit Analysis.

Option	Total Forecast Expenditure (£m)	10 Year NPV	Delta to Baseline
Baseline	[redacted]	[redacted]	[redacted]
1. Do minimum	[redacted]	[redacted]	[redacted]
2. Delay proposed capex	[redacted]	[redacted]	[redacted]
3. EAM Enhancements on [redacted]	[redacted]	[redacted]	[redacted]

To assess the relative financial merits of the options under consideration we have chosen to adopt a Cost Benefit Analysis (CBA) aligned to the CBA model and guidance published by Ofgem. For an IT investment of this nature we consider a project lifetime of 10 years, the minimum term in the template, to be the most appropriate and have therefore predicated our option evaluation on the NPVs over this timeframe and their relative performance to the baseline alternative, which in this paper carries a zero cost and investment. All relevant capital costs and operating costs over the project lifetime for each option have been included in the analysis based on the source data in our cost breakdown for the preferred option and our historical experience of similar projects. Our preferred option, EAM Enhancements on [redacted], delivers the most positive NPV over the ten year timeframe. A delayed implementation is financially less favourable as additional costs of [redacted] are incurred by the loss of continuity of the experienced [redacted] delivery team leading to a loss of efficiency. The do minimum option does not deliver sufficient benefits to justify the investment.

Option Scoring

The table below shows how each of the shortlisted options performed against the assessment criteria and specific parameters [redacted]

Table 4 Options evaluation based on selected criteria

Criteria Grouping	Parameter	Option 1	Option 2	Option 3	Justification for selection of preferred option
		Do Minimum	Delay proposed Capex	Market Based* Preferred option	
Criteria 1: Strategic and Customer Alignment	Keeping gas flowing safely and efficiently (1 - Low, 5 – high)	3	2	4	The proposed option brings in more efficient asset management capability and maximises asset operational life.
	Alignment to Digitalisation Strategy (1 - Low, 5 – high)	1	3	5	[redacted] aligns with GT&M strategic direction and outcome of recent RFP. It will enable digitalisation of current manual processes.
	Does it support our stakeholder priorities (1 – meets 1, 5 – meets all)	0	1	3	The preferred option supports four of the six stakeholder priorities.
	Does it support the consumer benefits (1 – meets 1, 5 – meets all)	0	1	2	The preferred option supports 2 of the five consumer benefits.
Criteria 2: Cost	Cost Benefits Analysis score (1 – Low, 5 – High)	2	3	4	Preferred option scores better on cost benefit analysis, as it delivers earlier improvements to operational resource efficiency, and to how we manage spares.
Criteria 3: Timeline	Ease of implementation (1 – Complex, 5 – Easier)	4	3	4	Organic feature extension on top of DAM MVP and seamlessly continuing delivery, utilising the same resources to deliver within RIIO-2.
	Dependency on other projects (1 – High, 5 – Low)	3	2	3	Dependency on DAM MVP implementation for EAM Enhancements to be able to start.
Criteria 4: Other Dependencies	Vendor partners (1 – Not available, 5 – Many)	4	2	4	Vendor partners available for implementation, and depending on outcome of vendor selection, will be familiar with GT&M through DAM delivery.
	Does it have a dependency on separation from National Grid (1 – High, 5 – Low)	3	5	2	Dependency on separation office when separating [redacted] contract from National Grid.
	Total score	20	22	31	

- ***Criteria 1: Strategic and Customer Alignment***
  The preferred option will utilise [redacted] It aligns with our Digitalisation strategy through consolidating and simplifying our current IT systems and will enable easier integration with [redacted] solutions implemented in GT&M.
- ***Criteria 2: Cost***
  The preferred option is the most cost efficient, as it will utilise an existing platform within GT&M which we will have experience developing through delivery of the MVP.
- ***Criteria 3: Timeline***
  The preferred option works with our ongoing delivery timeline for DAM. The DAM MVP will go live in December 2023, and this re-opener will deliver enhancements on the basic MVP starting delivery in January 2024. The enhancements will continue seamlessly on from delivery of MVP and utilise the existing Agile delivery team to ensure cost efficiency in using a trained delivery team familiar with the solution. Chapter 3.3 sets out the project delivery timeline.
- ***Criteria 4: Other Dependencies***
  The preferred option has dependencies on ongoing projects within the RIIO-2 portfolio. The key

dependency will be on Digital Asset Management as this is delivering [redacted], which is required to be complete before making the future enhancements. However this provides the opportunity to continue from delivery of DAM on to delivery of this transformative project and avoid the cost of standing up a new team.

3.2 THE PREFERRED OPTION

Description

The proposed option is Option 3: EAM Enhancements on [redacted], as it with our Digitalisation strategy through consolidating and simplifying our current IT systems. It will bring visibility and control across the enterprise to manage assets, schedules, resources, processes, inventories and expenses. In addition, it will help meet our business objective, and provide benefits in the form of:

- Enable integration of [redacted] with EAM thereby enabling GT&M to better plan and manage the health of those assets.
- Improved safety, efficiency and performance of field operations and management of network assets in line with the IT Asset Health policy.
- Removes requirements of additional resources and investment on assets to maintain network availability and safety, in the absence of appropriate technology.
- A well implemented asset inventory management solution can bring in benefits by reducing unplanned downtime, elimination of redundancies and obsolete components, cost-effective resource usage and improved network capability.
- Comprehensive view of assets leads to improved asset management, streamlining of asset investments and improved future maintenance planning.

Technical feasibility and consumer benefit

- Technical Feasibility has been assessed as part of the options analysis in Chapter 3.1 through the option selection criteria (Timeline, Dependencies, Cost and Strategic Alignment) and the delivery feasibility is contained in Chapter 3.3 Project delivery and monitoring > Risk.
- Consumer benefits have been listed in Chapter 2. Needs Case.

Dependencies

Our re-opener projects will be delivered using SAFe Agile, this means that we will follow an iterative Agile project delivery methodology, and this also includes our approach to managing dependencies. Our transition to using SAFe Agile is captured in the Umbrella Document.

To help plan delivery of our projects we have grouped our investments into five focus areas based on the underlying capabilities they will deliver. This project falls within **Data Driven Asset Management** and so primarily has a dependency on the delivery of Digital Asset Management (DAM) which is delivering the implementation of the DAM MVP within GT&M.

Both upstream and downstream application impacts are considered, and dependencies identified before releases are committed. Our release planning process ensures that dependencies are identified and then closely monitored thus ensuring environment and change conflicts are avoided. The Umbrella document further explains how dependencies are managed through delivering the IT Portfolio using SAFe Agile.

The below depicts the dependencies between the planned programme and other activities, projects and programmes of work currently being or planned to deliver in GT&M.

Table 5 Project dependencies

ID	Title	Type	Impacted projects	Description and mitigations	Dependency year
D1	In-flight IT Projects - DAM project	Internal	Digital Asset Management (DAM) Programme	• Description: As a part of the DAM project, Asset Management is being migrated from [redacted] to [redacted]. The MVP needs to be implemented prior to delivery of the EAM enhancements. • Mitigation: Progress of DAM implementation will be regularly reviewed with impact on the EAM enhancements start date in mind.	2023
D2	Future project - Asset Performance Management	Internal	Asset Performance Management	• Description: Part of the scope of APM is looking at moving functionality onto [redacted]. Mitigation: Work with teams to plan delivery and identify key dependencies on functionality, IT resource and business resource.	2023
D3	OT Cyber	Internal	OT Cyber projects, Cyber Asset Management (CAMS)	• Description: There are ongoing projects [redacted] • Mitigation: Regular engagement with OT Cyber and bringing their projects into scope of IT Management.	Ongoing
D4	Digital Strategy and EDTF commitments	Internal & External	N/A	• Description: GT&M regularly review our own digital strategy which may lead to changes in line with current developments and updates to EDTF recommendations. This may impact which areas are prioritised. • Mitigation: The backlog will be regularly reprioritised ahead of PI planning to ensure we are delivering the best value.	Ongoing

We will monitor dependencies on an ongoing basis, and if a new dependency materialises, we will:

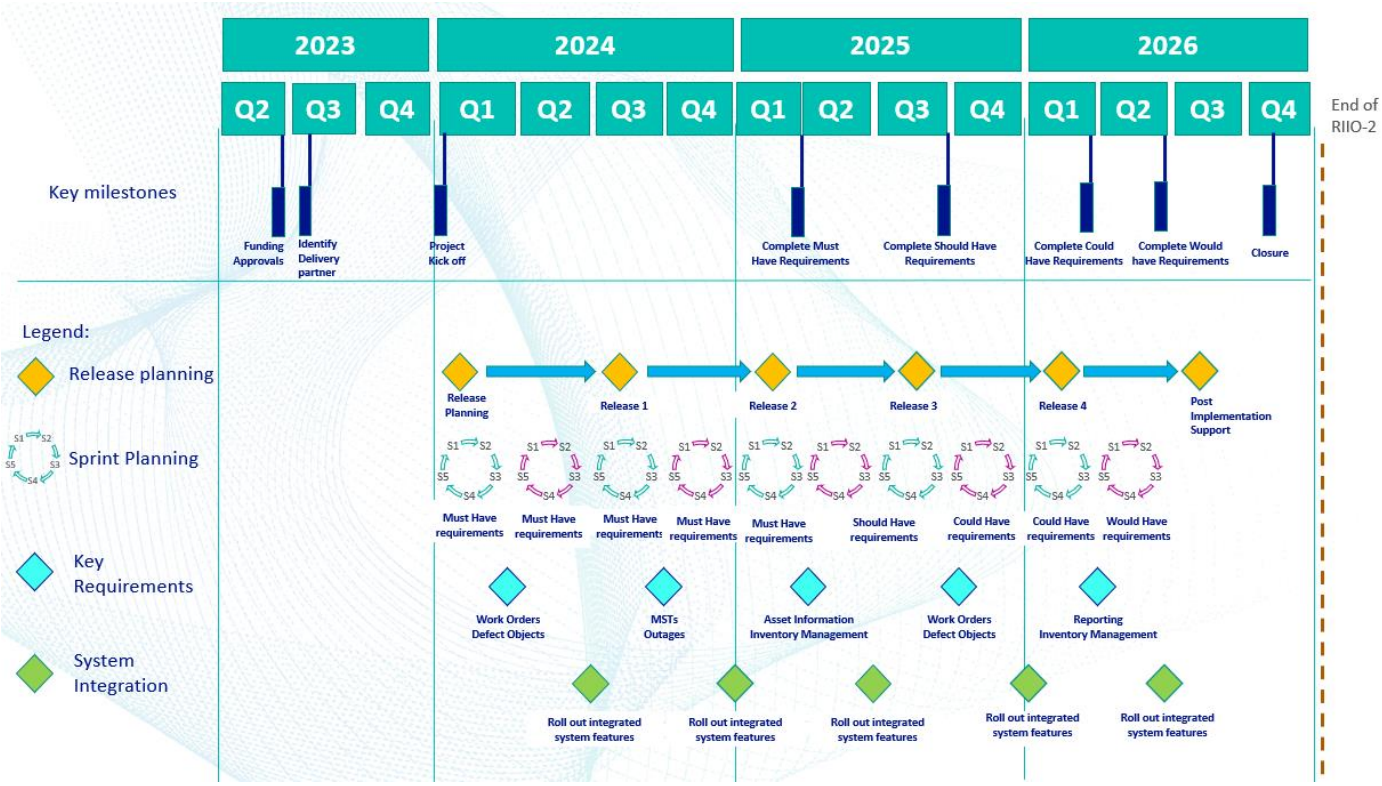
- Re-profile the delivery and project plan with critical activities and features reprioritised.
- Budget assessment – review impact of new plan on milestones and project management of budget.
- RAID log – capture in the Risks Actions Issues Dependencies (RAID) Log, and track through project delivery on an ongoing basis.
- Provide regular updates through our Governance forums (as detailed in Project Monitoring section of this document).

3.3 PROJECT DELIVERY AND MONITORING

The project delivery plans below are shown using the Agile approach of delivering EPICs in 10-week sprints. An EPIC is a large part of work that is broken down into user stories for delivery. It also calls out the key milestones in the first year, and overall milestones for the duration of the project. Our SAFe Agile delivery approach and the benefits are detailed in the NG GT Non-Operational Capex-0- Umbrella Application document. The project plan shown below shows current delivery priority of releases, however this is subject to change when we enter delivery and run the first project Programme Increment (PI) Planning session.

Project plan

Figure 1 Project Delivery Plan



The proposal is to receive funding confirmation by July 2023, in order to go out to market for a delivery partner ahead of delivery starting in January 2024. Any delay will then impact starting R&D and delivery, and the improvements that can be delivered within the identified timeline for the project. A delay will also mean that the existing team will complete delivery of DAM MVP and then start to disperse, and we will lose the cost saving associated with using an efficient and experienced [redacted] delivery team. This has been included in the accompanying Cost Benefit Analysis and is estimated at an extra [redacted] (18/19) in the first year due to standing up a new team.

The must have requirements shown in the project plan are essential improvements that will resolve issues the users face as identified in the scope. Delivering these prioritised features will result in cost savings when planning and delivering asset management and are required for understanding the foundation of the RIIO-3 submission and impact of hydrogen.

Work Breakdown Structure

The below table illustrates the effort split for each release of EAM Enhancements delivery using the lean agile approach, the number of user stories planned in each sprint is based on complexity of each story points.

The accompanying NG GT Non-Operational Capex-Summary Cost Breakdown excel shows the detailed breakdown of resources over typical stages of the project.

Table 6 Resource requirements

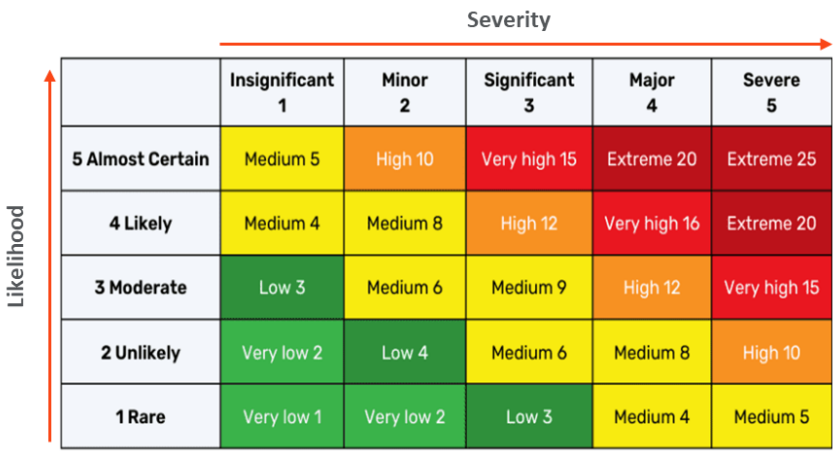
Release	Sprints	Resource type	Estimated Scale (days)
Release 1-5 (EAM enhancements related to Asset information, Work Orders, Defect objects, Maintenance Schedule Tasks (MSTs)	5 sprints per RELEASE (2 weeks per sprint)	• Business Consultant • Solution Architect • Security • Product Owner • SME 1 & 2 • Commercial • Service Transition Analyst • Project Management & support • Delivery Principal • Architect • Enterprise Data Management • Systems Integration • Testing – Functional, Performance, Automation • Principal Consultant • Functional Analyst • Other – Consultancy • Business Change • Service Transition	100 – 120 days for each release

Any deviation from the project plan will be addressed through the SAFe agile ways of working. Through Programme Increment (PI) Planning sessions we will regularly re-prioritise EPICs to be delivered to ensure focus remains on delivering stakeholder value. There is ongoing backlog management through the Product Manager working with Product Owners and SMEs.

Risks

The Umbrella Document sets out our approach to understanding and assessing risk, the table below shows the assessment of the key risks to EAM Enhancements delivery and the mitigation. This has been assessed using the following Risk Matrix, which is common across all re-open papers.

Figure 2 Risk matrix



The table below shows the risks found through assessing the options and feasibility of the preferred option. These have been scored using the risk matrix and mitigation options added to address the risks. The risks will be included in the Risk Register when the project starts delivery.

Table 7 Project risks and mitigations

ID	Title	Description	Initial Risk			Mitigation Options	Residual Risk		
			Likelihood (1-5)	Severity (1-5)	Impact		Likelihood (1-5)	Severity (1-5)	Impact
1	Stakeholder Availability	SME availability may be limited due to BAU commitments that may delay the finalisation of business requirements	2	4	8 - M	Close collaboration with stakeholders and SMEs when planning workshops and meetings. A resource plan will be created to understand SME time required.	1	1	1 – VL
2	Delivery	Delay during the build phase of the project causes project to take an additional 6 months.	3	4	12- H	Follow SAFe agile delivery process to track risks that impact timeline and prioritisation of features during build phase.	1	2	2 - L
3	Delivery	Dependency on DAM go live delays EAM enhancements build phase.	2	5	10 - H	Plan activities in close alignment & coordination with other value streams to minimise impact.	2	1	2 - L
4	User acceptance	Acceptance of using new functionality in [redacted] by users.	3	4	12 - H	Ensure user participation in design & development of new solution. Change Management initiatives to educate and train the users of the benefits of the new solution.	1	1	1 – VL

ID	Title	Description	Initial Risk			Mitigation Options	Residual Risk		
			Likelihood (1-5)	Severity (1-5)	Impact		Likelihood (1-5)	Severity (1-5)	Impact
5	Delivery	Understanding of SAFe Agile across the team.	1	4	4 - M	Team SAFe Agile Training, regular update of ways of working, retrospect's etc	1	1	1 – VL

Legends: E – Extreme, H – High, L – Low, M – Medium, VH – Very High, VL – Very Low

Project Management Structure

The diagram below shows the Governance structure of the team. The project is delivered using SAFe Agile, with a Product Owner for business input across the programme of work, and specific SMEs to input into delivery of relevant features.

Figure 3 Programme management structure

4. COST INFORMATION

4.1 JUSTIFICATION AND EFFICIENCY OF COSTS

The costs given in Chapter 4: Cost Information are aligned with the Ofgem Submission Guidance, and additional information is evidenced throughout the submitted business case, and the specific details are in the following chapters:

- Justification and efficiency of costs – refer to Chapter 3.1 Consideration of options and methodology.
- Requirement – refer to Chapter 2. Needs Case.
- Solution – refer to Chapter 2. Needs Case.
- Manage delivery – Project will be managed using SAFe Agile, as in section 3.3 and detailed in the NG GT Non-Operational Capex-Summary Cost Breakdown accompanying document.
- Monitor delivery – see Programme structure diagram above.

The detailed evidence and cost breakdown for costs provided in this chapter are in the supporting document: NG GT Non-Operational Summary Capex Cost Breakdown.

Cost base

The cost base approach followed is:

- The requested total amount is in 18/19 prices, and the yearly phasing is in 18/19 prices.
- Where figures are provided in this business case, they are clearly labelled as either 18/19 or 22/23.
- The costs in the supporting Cost Breakdown excel document are all in 22/23 prices, the conversion is shown in Conversion tab.

Costing methodology

To calculate the costs for this project we followed the Infrastructure Project Authority (IPA)[3] guidance. The following steps align to stages 3 to 6 of the IPA cost estimating process. The approach is common across the four re-openers, however the exact application differs slightly depending on specific circumstances for the project.

Step 1: T-shirt Sizing

After identifying the scope and requirements of the business case, we completed a t-shirt sizing exercise. This is a SAFe agile method to understand the time and effort required to deliver a project, the full process is covered in the NG GT Non-Operational Capex-Summary Cost Breakdown. Enterprise Asset Management Enhancements was assessed to be a ‘large’ project, which gives an indicative top-down cost of 3 to 5 million, and between 2 and 3 years estimated to deliver. The scoring for each section of the t-shirt sizing form is based on delivering IT projects within RIIO-2 (analogy), and our experience delivering complex IT systems (expert opinion from Solution Architects).

Step 2: Bottom-up costing of resources

We assessed the resources required to deliver the identified scope within the business case in a bottom-up costing approach. Specifically looking at each of the cost types below and costing how much of each to deliver, these are made of four ‘cost buckets’ that form a general IT project:

[3] *Infrastructure and Projects Authority – Cost Estimating Guidance*
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/970022/IPA_Cost_Estimating_Guidance.pdf

- ***Internal resources required***
  Who will be delivering the project, and what type of resource are they. We utilise three approaches for delivery: Internal permanent resources (IT and business) which have a set internal rate card, contractors and partner resources through our [redacted]
- ***Assumptions and sources of information***
  - Source – Internal National Grid day rates card.
  - Assumption – Low delivery resources required due to delivery sitting with external delivery partner.
- ***External resources required***
  This covers FTE costs that must be provided through [redacted] as they will be delivering the development aspect of the project.
  - ***Assumptions and sources of information:***
    - Source – Estimate from third party vendor for delivery of all features.
    - Assumption – Day rates provided by vendor will remain roughly the same.
    - Assumption – The cost of delivery of features by the current vendor is average for the market, as it was when costing [redacted] MVP.
- ***Software***
  The licence cost is based on current [redacted] licence costs, [redacted] per annum for 20 concurrent users. License cost is split over the three core stages of delivery (Build, Test, Deployment).
  - ***Assumptions and sources of information:***
    - Source – Current software licence cost through National Grid [redacted] contract.
    - Assumption – GT&M will negotiate an equivalent contract for the same cost post separation.
    - Assumption – Quantity of licences is based on existing user base not changing.
- ***Risk***
  We have completed a sensitivity analysis to understand the cost of the risks associated with each cost type and allocate a proportionate amount of risk. This approach and justification for risk amount is covered in the Sensitivity Analysis.

The supporting document ‘Cost Breakdown’ forms the Cost Estimate report, detailing the work breakdown structure (Requirements and Design through to Post Implementation Support project stages), the sources for costs, justification, and assumptions made, etc.

Step 3: Validation and Assurance

Validation is essential when completing costing, and our approach of combining top down to give the total figure estimate encompassing the whole project and bottom up providing individual costed items, which are then grouped. Three methods of validation were followed:

- The cost is within range of the original t-shirt sizing exercise.
- The cost is comparable to other similar IT projects, for example the cost of feature delivery matches DAM MVP which is ongoing.
- The cost has been reviewed through expert opinion by Release Train Engineers and Finance.
- The cost has been assessed by [redacted].

Step 4: Sensitivity Analysis

The final step is to complete a sensitivity analysis against each of the cost groups. We followed the IPA guidance to assess our confidence in each of the costs, referring to the risk log and cost sources to assign a justified risk margin that is based on quantified monetary impact if the risk is realised.

From knowing this monetary impact we able to calculate the corresponding risk percentage, and then the overall risk required on the project.

Key Cost Drivers

The key cost drivers for an IT project delivered through SAFe Agile are the resources (FTEs) required to deliver the project, the hardware required, and the software licences required. The table below shows how the costs are split across these key cost drivers, and each stage of the project.

The risk figure included in the table is based on calculating the monetary impact of the risk against each cost type, which then provides the resulting %. The basis for risk is explained in the next section, the sensitivity analysis.

The figures in the key cost drivers breakdown are provided in 22/23 prices due to directly correlating to resource day rates in the Cost Breakdown document.

Table 8 Cost distribution in project phases

(22/23)	Stages					Risk applied		Total
	R&D	Build	Test	Deploy.	PIS	Risk %	Risk	RIIO-2
Cost Type	(£m)	(£m)	(£m)	(£m)	(£m)	%	(£m)	(£m)
Resource GT&M internal / [redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Resource 3rd Party	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Hardware	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Software	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Other	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total CapEx (£m)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Sensitivity Analysis

We have completed a sensitivity analysis on each of the cost sections in the cost breakdown sheet, to understand whether the cost in the paper is optimistic, most likely or reasonably pessimistic.

- **Reasonably pessimistic**
  A position that takes into consideration pessimistic assumptions on rates, efficiency or quantities, and is therefore higher than expected.
- **Most likely**
  A position based on the best-known data and judgement of the design, delivery and cost estimating team (usually the base cost estimate).
- **Reasonably optimistic**
  A position based on assumptions of higher efficiency and therefore lower than the most likely cost.

As part of this we analysed the assumptions made and the risk to the project if a cost changed to reasonably pessimistic or reasonably optimistic. The impact of a reasonably pessimistic outlook forms the basis for the risk applied to the project in the Costs chapter and detailed in the Cost Breakdown supporting document.

Table 9 Sensitivity analysis

	Justification for current cost		Sensitivity Analysis	
Cost section	Preferred option cost explanation	Assumptions and mitigation	Risk cost (Reasonably Pessimistic)	Opportunity (Reasonably Optimistic)
Internal	Reasonably Optimistic We will have experience delivering the DAM MVP and 2 years of experience costing and delivering projects within RIIO-2 and successful SAFe agile delivery.	• It will be the same internal delivery team providing continuous delivery which will lead to more efficient delivery and lower cost. Mitigation: Complete resource planning and programme planning to ensure resource can stay aligned to [redacted].	• Delay to the build phase causes delivery to take an extra 4 months, results in increase of [redacted].	• The current cost is based on reasonably optimistic and efficient delivery.
External vendor	Most Likely We have completed an RFP for delivery of [redacted] and used our chosen delivery partner to help cost the scope of the re-opener.	• Vendor have provided an estimate on the best-known data regarding identified features. Mitigation: Use the existing estimate as a baseline when negotiating the delivery for this project.	• Going out to market for delivery partner ahead of delivery results in a much higher cost, either due to a different partner being selected or inflation, results in additional £[redacted] • Delay to the build phase causes delivery to take an extra three months, results in increase of £[redacted].	• Going out to market for delivery partner ahead of delivery results in a much lower cost. However, this is unlikely due to increase in inflation.
Hardware	[redacted] is a SAAS solution and there is no hardware cost.	• N/A	• N/A	• N/A
Software	Most Likely The software costs are based licence cost for delivery of DAM MVP and expected amount of new users based on scope.	• The estimated number of new users requiring a licence is accurate. • [redacted]	• There are [redacted]% more licences required than estimated, resulting in extra [redacted]	• There are less licences required than estimated, resulting in potential saving of [redacted]

4.2 PROPOSED PRICE CONTROL DELIVERABLES

Table 10 Proposed price control deliverables

Output	Delivery Date	Allowance (18/19)				
		FY21/22	FY22/23	FY23/24	FY24/25	FY25/26
Deliver 95% of high priority features	Q2 FY26	0	0	[redacted]	[redacted]	[redacted]

4.3 DELINEATION OF REQUESTED FUNDING

Re-opener request (22/23)

The table below shows the **22/23** phased funding requested for Enterprise Asset Management Enhancements, through this re-opener submission.

Table 11 Current investment request summary

Enterprise Asset Management Enhancements (22/23)							Benchmark Range		Rating
Investment (£m)	FY21/22	FY22/23	FY23/24	FY24/25	FY25/26	Totals	Low	High	
CAPEX	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	

Re-opener request (18/19)

The table below shows the phased funding when converted into **18/19** prices. A [redacted] benchmark has not been provided against 18/19 prices, only 22/23 prices.

Table 12 Investment request summary

Enterprise Asset Management Enhancements (18/19)							[redacted] Benchmark Range		[redacted] Rating
Investment (£m)	FY21/22	FY22/23	FY23/24	FY24/25	FY25/26	Totals	Low	High	
CAPEX	0	0	[redacted]	[redacted]	[redacted]	[redacted]	N/A		

Original RIIO-2 Submission (18/19)

The table below shows the original phased funding requested in the RIIO-2 Final Determination, which was moved into Uncertainty Mechanism. A [redacted] benchmark was not completed for this investment at Final Determination due to it being moved into UM at that time.

Table 13 Original RIIO-2 investment request summary

Enterprise Asset Management Enhancements (as originally submitted in 18/19)							[redacted] Benchmark Range		[redacted] Rating
Investment (£m)	FY21/22	FY22/23	FY23/24	FY24/25	FY25/26	Totals	Low	High	
CAPEX	0	0	[redacted]	[redacted]	[redacted]	[redacted]	N/A		

5. STAKEHOLDER ENGAGEMENT AND WHOLE SYSTEM OPPORTUNITIES

Throughout working on the re-opener business cases we have completed stakeholder engagement with key external stakeholders to assess our submissions against what they are submitting. This contributes towards meeting our EDTF commitment and identifying whole system opportunities. The table below summarises engagement activities completed to date.

Table 14 Stakeholder engagement summary

Stakeholder	Engagement Type	Summary of Engagement
Internal Engagement	Internal	[redacted]
Distribution Networks	Whole System Opportunities	There are ongoing meetings with other distribution networks (Northern Gas Networks, Southern Gas Network, etc)
[redacted]	Benchmarking	Similar to the original RIIO-2 submission, we have completed an external benchmarking exercise with [redacted] to ensure our costings are in line with the wider industry.
[redacted]	Consultancy	[redacted] has been engaged to review our re-opener submission to ensure it is suitable and in line with OFGEM guidance. They evaluated and provided feedback on whether we are meeting the Ofgem submission guidance, and whether the needs case and costs are of sufficient detail. This feedback was then reviewed internally and acted upon.
Ofgem	Regulatory	We have had engagement sessions with Ofgem to talk through the plan for our re-opener submission and share early insight into what we are doing.

6. APPENDICES

6.1 GLOSSARY OF TERMS

Table 15 Glossary of terms

Term	Description
APM	Asset Performance Management
BIM	Building Information Modelling
[redacted]	[redacted]
CNI	Critical National Infrastructure
DAM	Digital Asset Management – the programme of work delivering the minimum viable product of [redacted] features within [redacted].
EAM	Enterprise Asset Management
[redacted]	Previous asset management solution being replaced by [redacted]
Epic	Agile document that contains user stories to be delivered.
GNCC	Gas Network Control Centre
GRC	Governance, Risk & Compliance
GRSC	Gas Remote Sites Communication
GSO	Gas System Operator
GT	Gas Transmission
GT&M	Gas Transmission and Metering
GTO	Gas Transmission Owner
IoT	Internet of Things
[redacted]	Single platform for intelligent asset management, monitoring, maintenance, safety and reliability, provided by [redacted].
MVP	Minimum Viable Product
PI Planning	Programme Increment Planning
RFP	Request for Proposal
SAFe	Scaled Agile Framework
UM	Uncertainty Mechanism

6.2 LIST OF TABLES

6.3 LIST OF FIGURES