



# **NGET Non-Operational IT Capex Re-opener Application April 2021**

**Project: IEMS life extension and Contingency Control Room [REDACTED]**

**File name: NG\_ET\_IT-RO-01\_Submission\_document\_IEMS\_TNCC\_SCADA**

**8 April 2021**

## STRATEGIC OVERVIEW

NGET and NGESO currently use a shared Integrated Energy Management System (IEMS) for the operation and safety management of the high voltage electricity transmission system. This shared arrangement also enables NGET to use the [REDACTED] as a contingency control room if the NGET Transmission National Control Centre (TNCC) becomes unavailable.

IEMS was last upgraded in 2017 and support for this Critical National Infrastructure (CNI) system will expire in 2022-23. A temporary or partial IEMS outage would result in interruption to the operation of the network for customers and stakeholders and ultimately have a significant impact on connected customers and end consumers, both in terms of cost and energy supply. Loss of IEMS would also present a serious safety risk to ET staff, supply chain and the public. This results in the need to have a separate system from ESO.

Legal Separation between NGESO and NGET in 2019 resulted in the continued shared use of IEMS and contingency control room arrangements until the point of IEMS replacement. This 'soft-separation' was assessed as part of the wider ESO separation consultation and was considered, based on the responses to that consultation, and Ofgem's subsequent decision on separation to be in the best interest of customers and consumers. IEMS replacement requires a carefully constructed and coordinated programme of work between NGET and NGESO which can be achieved by 2026.

An extension to the vendor support is required for the existing IEMS until a time when the contingency TNCC (TNCC2) function is available and a new NGET SCADA system can be installed and commissioned to replace IEMS. NGESO, as the current IEMS product owner, are leading the work to extend the current life of the IEMS system until 2026 with the current supplier GE. Under the terms of the General Service Agreement (GSA) between NGET and NGESO formalised at Legal Separation, NGET is required to fund 50% of the life extension costs.

The need for a separate SCADA system is further confirmed by Legal separation, as there is a clear functional divergence in future business requirements between NGET and NGESO with NGET utilising SCADA (supervisory control and data acquisition) to focus on remote control of assets and data acquisition to support efficient asset management, whilst NGESO focuses on enhanced situational awareness capability, real time network analysis, monitoring and simulation. With both entities currently utilising IEMS, there is a coordinated plan to transition to separate systems better tailored to the services provided by NGET and NGESO.

ESO Legal Separation and System Operator - Transmission Owner Code (STC) compliance are the key drivers for NGET to develop and deliver alternative control room capabilities to continue to deliver the safe, secure, reliable and efficient operation of the HV Electricity Transmission system.

The STC defines the high-level relationship between the national electricity system operator, NGET, and onshore and offshore transmission owners. As a Transmission Owner, NGET are required to comply with relevant requirements of the STC. STC Procedure 06-4 states '*NGESO and each TO shall establish and maintain their own Emergency Control Centre facilities and arrangements*'. More information on this requirement can be found in section 5.4 of this submission.

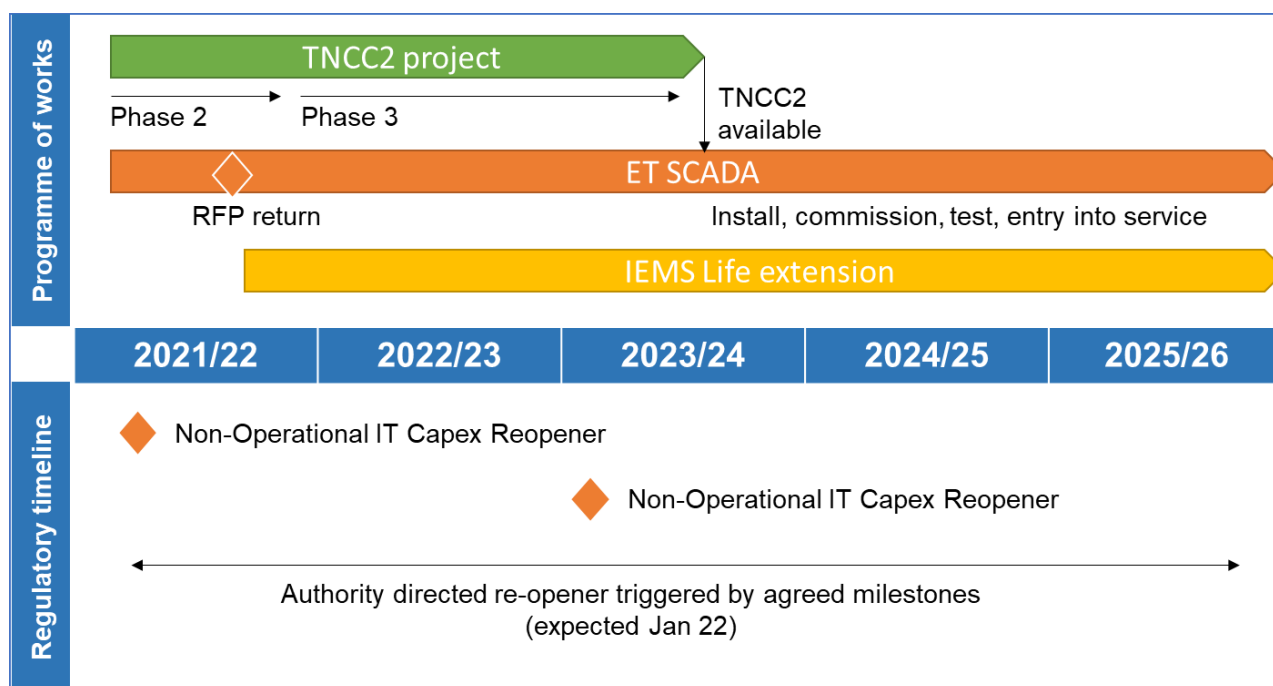
The replacement of IEMS and separation of systems to provide NGET and NGESO specific capabilities is consistent with NGET and NGESO business strategy, IT strategy and aligns with earlier decisions taken at ESO Legal Separation and would support any future decision for further separation of NGESO and NGET.

The overall network control systems landscape is summarised in the diagram below. The yellow and green outlines show current and future state systems for NGESO and NGET respectively. This illustrates the movement away from IEMS to a SCADA solution for NGET together with the introduction of the TNCC2 contingency control room facility as access to the ENCC contingency arrangement is no longer available following decommissioning of IEMS. The diagram also illustrates the fundamental role that OpTel plays in providing a safe and secure communications infrastructure and the critical role that OT Cyber investment plays in protecting CNI assets from cyber security threats. Whilst we have investments in OpTel and OT Cyber in other parts of our Final Determination, these do not address the specific requirements arising from the SCADA and TNCC2 projects considered in this IT Re-opener submission. For the avoidance of doubt, OpTel and OT Cyber capabilities and the associated funding required for SCADA and TNCC2 are included in this IT Re-opener submission and are not duplicated elsewhere.



**Figure 1 – Network Control Systems Landscape**

The workstreams to introduce TNCC2, replace SCADA and extend IEMS are all interrelated and dependent on each other to some extent as shown in the Figure 2 below;



**Figure 2 – High level plan**

Figure 2 also outlines the IT re-opener opportunities to request allowances at stages of the programme throughout RIIO-T2. Cost confidence for later parts of the programme (that start prior to the second re-opener) are currently low and therefore an additional Authority triggered re-opener has been agreed with Ofgem to allow for more flexibility around allocating allowances for this programme within T2, currently planning for January 2022. We plan to submit for further costs relating to IEMS, TNCC2 and SCADA.

## T2 baseline allowances

### 1. iEMS Extension

Allowances were secured by ESO to identify and analyse the various options available to National Grid to extend the life of the iEMS system until 2026. Due to uncertainty around scope and cost, NGET included a request for allowances within the T2 Uncertainty Mechanisms (as part of the overall SCADA replacement).

### 2. TNCC2

Provision for a second control room was not included within NGET's T2 submission but is driven by the requirement to replace IEMS, which removes the capability for NGESO to provide contingency services and is consistent with decisions taken at Legal Separation.

### 3. SCADA

**£3.55m** was allowed as baseline to fund the core SCADA project delivery team to complete the procurement stage, including:

- Completion of Vendor RFP
- Completion of Solution Integrator RFP

Both activities are currently planned to be complete by Q3 FY21/22. Completion of these activities will allow NGET to provide mature underpinning to the metrics outlined by Ofgem (project definition, resource and cost assurity).

Allowances for the subsequent phases (Delivery and Entry into Service) will be requested utilising an Authority directed Re-opener (likely to be early 2022).

## Report contents

This April 2021 Non-Operational IT Capex Reopener is split into three sections outlining the requirements as set out by Ofgem in 'RIIO-2 Re-opener Guidance and Application Requirements Document: Version 1, Appendix 2: Non-operational IT (IT) Capex Reopener Application Guidance' as far as possible at this stage in the programme of works.

The total allowances requested at this stage of the programme is £2.37m and is broken down into the three workstreams as follows;

[illegible]

We welcome further engagement with Ofgem throughout the programme to maintain transparency and support timely, efficient and effective delivery.

This document is being submitted alongside supporting documents which are as follows;

Document	File name
Assurance statement	NG_ET_IT-RO-03_Assurance_Statement
Irregular submission assurance report	NG_ET_IT-RO-04_Irregular_Submission_Assurance_Report
Irregular submission risk assessment	NG_ET_IT-RO-05_Irregular_Submission_Risk_Assessment
IEMS Cost Benefit Analysis	NG_ET_IT-RO-06_CBA_IEMS
TNCC Cost Benefit Analysis	NG_ET_IT-RO-07_TNCC_CBA
TNCC Outline Costing	NG_ET_IT-RO-08_TNCC_Outline_Costing
TNCC RAID Log	NG_ET_IT-RO-09_TNCC_RAID_Log

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## IEMS EXTENSION

### EXECUTIVE SUMMARY

The NGESO led programme to maintain the asset health of the existing Integrated Energy Management System (iEMS) is underway. This work is essential to maintaining the resilience of Critical National Infrastructure (CNI) IEMS system through until replacement in 2026. This paper is requesting funding for the NGET contribution to shared NGET and NGESO costs as per the GSA established at Legal Separation.

IEMS Life Extension was assessed as uncertain in the 7th July 2020 draft determination, due to insufficient information being provided against the project definition and resources requirements. Given the maturity of the project, NGET determined this appropriate and re-allocated the projected costs to uncertain costs within T2 (to be requested via an Uncertainty Mechanism, which was confirmed in the Final Determination in December 2020).

The existing Integrated Energy Management system (IEMS) shared by NGET and NGESO was last refreshed in November 2017 and reaches the end of its 5-year support cycle in November 2022. The existing IEMS is a highly resilient and reliable system with high availability. The system has delivered an availability of [REDACTED]. Both NGET and NGESO have proposed separate systems to support the management of the network in their respective RIIO-2 plans, NGET focusing on SCADA and safety management and NGESO focusing on Situational Awareness products. The proposed delivery of this would be no later than 2026. This leaves a gap of potentially four years where the life of the existing IEMS needs to be extended to support the critical operations of NGET and NGESO.

NGESO and NGIT have been undertaking analysis since late 2020 to identify and assess the various options available for National Grid to extend the life of the system until 2026, when a new system will replace the current one. [REDACTED]

[REDACTED]. This paper requests allowances for FY22 where scope and costs are clear for the NGET contribution to the shared NGET and NGESO costs for the life extension work.

NGET will request the remaining required allowances at the next reopener opportunity in January 2022. The amount requested within this reopener is [REDACTED]. NGESO have already been awarded their share of costs for this work in the December 2020 final determination. This was under the '110 Network Control' business plan investment line.<sup>1</sup> Without funding NGET will not be able to contribute towards this joint project. Numbers in table below are in 18/19 prices.

Investment (£m)	2021/22	2022/23	2023/24	2024/25	2025/26	T2
IEMS Life Extension	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

<sup>1</sup> ESO RIIO-2 Business Plan Annex 4 – Technology investment report



# 1. NEED CASE / PROBLEM STATEMENT

## 1.1 Needs case

Key hardware and software components of the current IEMS require refresh throughout RIIO-2 to ensure that an acceptable level of risk is managed for the application. In order to quantify this and determine best next steps, NGESO and NGIT have completed the following:

1. Conducted a detailed technical health assessment of the existing IEMS suite of systems including hardware, software, security and networks. This also included an asset heat map for the supportability component of all assets of IEMS.
2. Identified multiple technical options applicable to extending the support of the current suite of systems to 2026.
3. Conducted a risk mitigation analysis of the various options to recommend the most suitable option available for the existing system.
4. Held multiple workshops with internal stakeholders and external vendor (including GE) to identify options to proceed with the Life Extension project.

The review confirmed that to extend the life of the existing system is our primary recommendation. It helped to identify how the various aspects of the system will behave with time (given the expected database growth) on the above factors, from now to 2026 and that with appropriate management and support, it will still be an effective, available and resilient system till 2026. Heatmaps showing the components are included in Appendix 1 of this document.

Figure 1.1.1 below provides a view of the historic performance of the system.



**Figure 1.1.1 Historic performance of iEMS**



## 1.2 Alignment to overarching business / IT strategy

IEMS is critical to the safe, secure and reliable operation of the electricity transmission system and our overarching business and IT strategies align to maintaining the integrity and resilience of IEMS. When undertaking our assessment of the current state of IEMS and required interventions we looked at the following components:

- Criticality to the overall IEMS system
- Impact on system stability
- Impact on overall system availability

A key stakeholder priority driving NGET's RIIO-T2 Business Plan is to deliver a safe and reliable network. Section 9 of this Business Plan makes specific references to our Control Centres and network management systems – this investment would directly continue to support a 'robust' control centre.

We ensure a safe and reliable network by:



Developing our people, to provide **advanced asset management capability**



Creating **advanced asset condition monitoring** techniques, to understand what needs to be done and when



**Maintenance, repair & refurbishment** of assets to ensure they operate safely



**Replacement** of our assets at the optimum time, to prevent network outages associated with end-of-life failures



Making sure our **central control and data support systems** are robust

## 2. OPTIONS ASSESSMENT

## 2.1 Options considered

Based on the insights from the review we came up with 5 potential options for life extension:

1. Manage the system with GE without an upgrade

Continue with the existing asset and engage in a managed service with GE. In flight projects – Windows 10 & Cyber security projects and other tactical projects to continue, with negotiation of extending support contracts

2. Upgrade the core components of the system - Upgrade the asset

- Partial upgrade (Upgrade IEMS core and essential components to extend the life)
- Complete upgrade

3. Manage the system with NGE SO contracting directly with the various vendors – Manage the asset directly with all 3rd party vendors

4. Do nothing

Some of the above options were eliminated based on preliminary analysis, with rationale provided in table 2.1.1 below.

[illegible]

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**Table 2.1.1 Initial options assessment for IEMS**

The CBA for IEMS can be found in Annex document 'NG\_ET\_IT-RO-06\_CBA\_IEMS'.

## 2.2 Assessment criteria

The following KPIs were finalised for measurement of remaining options:

No.	KPI	Description
1	Cost	Indication of costs
2	Complexity	Technical complexity and contract negotiation perspective
3	Supportability	Access to patching and End of Service Life (EoSL)
4	Resource	GE and NG SME Expertise Impact
5	System Availability	Indication of likelihood of system interruptions for testing/ upgrades/ DDS/ PR1/ PR2

**Table 2.2.1 KPIs for measurement of options**

### 3. PREFERRED OPTION / JUSTIFICATION

### 3.1 Preferred option

Following the initial assessment, we conducted detailed analysis on the remaining 2 options of 'Manage the asset with GE' and 'Upgrade the asset (Partial Upgrade)'.

We analysed the options and their performance across KPIs out to 2026.

[illegible]

	<ul style="list-style-type: none"> <li>• [REDACTED]</li> <li>• [REDACTED]</li> <li>• [REDACTED]</li> <li>• [REDACTED]</li> <li>• [REDACTED]</li> <li>• [REDACTED]</li> <li>• [REDACTED]</li> <li>• [REDACTED]</li> <li>• [REDACTED]</li> <li>• [REDACTED]</li> </ul>	<ul style="list-style-type: none"> <li>• [REDACTED]</li> <li>• [REDACTED]</li> <li>• [REDACTED]</li> <li>• [REDACTED]</li> <li>• [REDACTED]</li> </ul>

\*N.B. These costs would be shared approx. 50/50 with NGESO

**Table 3.1.1 Assessment of options against KPIs**

### 3.2 Stakeholder Engagement

This project is being led by NGESO who have led on stakeholder engagement. The primary stakeholders engaged have been internal.

- TNCC
  - Agreement of project deliverables, scope, cost
  - Agreement of overall risk
- IT CNI Security
  - Details of tactical and security backlog
- SCADA Replacement Project
  - Agreement on timeline and dependencies with programme
- Finance and ITBP
  - Agreement on cost sharing
- Ofgem
  - Funding

### 3.2 Projected costs

This phase (FY22)

Activity	Cost (£m)	Cost Confidence
Project Management, Solution Engineering Team Resources	[REDACTED]	High
Business Resources / SME / Product Owner etc	[REDACTED]	High
CNI Resources (Service owner, App Support & I&O)	[REDACTED]	High
Other IT Resources, Commercial, Procurement & Legal	[REDACTED]	High
LE Tactical Project Delivery activity inc. QES Resources & Service Transition	[REDACTED]	High
Risk @10%	[REDACTED]	Medium
<b>TOTAL COST FORECAST FOR SHARED LIFE EXTENSION FY22</b>	[REDACTED]	

**Table 3.2.1 Projected costs (18/19 prices)**

The internal National Grid (NG) resources, contract resources and resources costs are sourced from our four ADAM partners or utilise standard internal staff benchmark costs. Hardware and software costs are based on previous project experience.

## 4. DELIVERABILITY AND MONITORING

The project will be delivered by NGESO and NGET. NGET will play a very limited role but will maintain oversight through the shared NGESO/NGET Technical Working Group (TWG) that has been formed to manage dependencies between the two respective SCADA replacement programmes. This is chaired by the two respective programme managers from NGESO and NGET. NGET will use this forum to track the ongoing delivery, costs and risks of the life extension project.

### 4.1 Project plan



Figure 4.1.1 – Project plan

### 4.1 Resource cost breakdown (not accounting for risk)

Delivery Area	Role	FTE	Cost (£)	Resource Availability
[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Green]
	[Redacted]	[Redacted]	[Redacted]	[Green]
	[Redacted]	[Redacted]	[Redacted]	[Green]
	[Redacted]	[Redacted]	[Redacted]	[Green]
	[Redacted]	[Redacted]	[Redacted]	[Green]
	[Redacted]	[Redacted]	[Redacted]	[Green]
	[Redacted]	[Redacted]	[Redacted]	[Green]
	[Redacted]	[Redacted]	[Redacted]	[Green]
	[Redacted]	[Redacted]	[Redacted]	[Green]
	[Redacted]	[Redacted]	[Redacted]	[Green]
[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Green]
	[Redacted]	[Redacted]	[Redacted]	[Green]
	[Redacted]	[Redacted]	[Redacted]	[Yellow]
	[Redacted]	[Redacted]	[Redacted]	[Yellow]



**(18/19 prices)**

*Some constraint likely – roles that have other pressures on them (e.g. day to day business)*

#	Risk	Impact	Mitigation
1			
			1. 2.
2			
A			1. 2.

			3.	
B			1.	
			2.	
C			1.	
			2.	
3	Resource risk			
			2.	
4	Partner risk			
			1.	
5				
			2.	

Table 4.2.1 iEMS risks

## 5. WHAT DOES SUCCESS LOOK LIKE?

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<ul style="list-style-type: none"><li>• [REDACTED]</li></ul>	
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## TNCC2

### EXECUTIVE SUMMARY

ESO Legal Separation, Integrated Energy Management System (IEMS) replacement, STC and NGET Licence compliance are the key drivers for NGET to develop and deliver alternative contingency control room capabilities. The current arrangements [REDACTED] as contingency NGET sites will no longer be an option for NGET following IEMS replacement and a new remote emergency control centre (TNCC2) is proposed to maintain this essential service. This arrangement is consistent with other TOs and is aligned with any requirement for future separation of the ESO.

The TNCC2 project has been split into 3 phases:

Phase 1 - High Level Optioneering and mobilisation - complete

Phase 2 - Detailed Site Specific Optioneering, outline design and costing – requested in this re-opener submission

Phase 3 - Detailed Design, Delivery and Entry into Service – will be requested in Jan 22 re-opener

This paper seeks [REDACTED] funding via the April 2021 IT re-opener for Phase 2 work, where scope and cost certainty is high and resource is mobilised. This paper additionally outlines, but does not seek funding for, proposals and estimates for a second Authority directed re-opener following completion of Phase 2 work, which will provide a high level of scope and cost certainty for Phase 3 works.

Investment (£m)	FY22	FY23	FY24	FY25	FY26	T2
TNCC2 (Phase 2)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

(18/19 prices)

The TNCC2 Project is aligned with NGET Strategy and Business Plan as well as aligning to any future full ESO Separation and will be a key component of NGET's capability to continue to deliver a safe and reliable network and continue to deliver for our customers and end consumers.

NGET is certified to *ISO 22301 Business Continuity Management* and having a second control room contingency site for the credible temporary or permanent n-1 loss of the main NGET Transmission Network Control Centre (TNCC) CNI site is a fundamental part of NGET's critical business continuity arrangements and a fundamental expectation and requirement of our key stakeholders.

The TNCC2 project will deliver a contingency control room facility and capability with the required levels of resilience, functionality and security that will be available for use for when the ESO is no longer able to provide the facility for NGET. The TNCC2 project will also deliver the additional benefits of enabling an environment for the efficient entry into service of the new SCADA solution, significantly reducing evacuation travel time and risk, and providing more effective and flexible options for NGET in mitigation of risks from events such as pandemics.

The SCADA replacement project and TNCC2 project have time interdependencies in terms of requirements specification and TNCC2 completion and as such, the governance between the two projects will be aligned at Programme Management Board level with single point Sponsor accountability, as well as at a working level where required.

## 5. NEED CASE / PROBLEM STATEMENT

### 5.1 Needs case

Following customer and stakeholder feedback and a formal consultation process, Ofgem published its decision for the legal separation of the ESO within the National Grid Group in July 2017. Subsequent organisational changes and 'soft separation' of systems and data enabled NGET and NGESO to operate as separate businesses from 1 April 2019. Legal separation highlighted a clear functional divergence in the future business requirements between NGET and NGESO with NGET utilising SCADA (supervisory control and data acquisition) to focus on remote control of assets and data acquisition to support efficient asset management whilst NGESO focuses on enhanced situational awareness capability, real time network analysis, monitoring and simulation. Following analysis carried out in 2019-20, both NGET and NGESO mobilised programmes to deliver separate capabilities within RIIO-2 (reference: ET Investment TNSC002 - Establish Network Safety & Control value chain and ETO specific network safety and control system. (IEMS)). Note that the NGET Investment to replace the current IEMS system with a new SCADA system received [REDACTED] baseline funding in RIIO-2 to complete a set of requirements, market engagement and formal tender process. Further delivery costs will be subject to a future Authority directed IT re-opener.

The current control room contingency arrangements for both NGET and NGESO [REDACTED]

[REDACTED] At Legal Separation these mutual arrangements and costs were calculated based on evac desk requirements as a percentage of total building costs and not reflective of market rates as there was no benchmark. These current arrangements are only possible due to leveraging National Grid Group shared costs and legacy CNI infrastructure, physical security, IEMS and authorised staff.

These arrangements and per annum costs are only possible whilst NGET and NGESO share the current IEMS system. At the point that the current IEMS is decommissioned this arrangement will no longer be possible. [REDACTED]

As such, it was agreed at Legal Separation that the current contingency arrangements [REDACTED]

[REDACTED] could continue only as an interim solution.

Driven by IEMS replacement, STCP compliance and decisions taken at the time of Legal Separation, NGET now needs to deliver alternative contingency arrangements in the form of a new remote emergency control centre (TNCC2).

Note that support for the existing IEMS was due to expire in 2022-2023. Whilst NGESO, as the current IEMS product owner, are leading the work to extend the current life of the IEMS system until 2026 with the current supplier GE, under the terms of the General Service Agreement (GSA) between NGET and NGESO formalised at Legal Separation, NGET is required to fund 50% of the life extension costs associated with NGET's usage.

### 5.2 Alignment to NGET Strategy and Business Plan

A key stakeholder priority driving NGET's RIIO-2 Business Plan is to deliver a safe and reliable network. Section 9 of this Business Plan makes specific references to our Control Centres and network management systems:

We ensure a safe and reliable network by:



**Figure 5.2.1 - Section 9 - NGET National Grid Electricity Transmission's business plan 2021–26**

Description	Investment activity	T2 cost £m
<b>Control centre and network management systems</b>	The Integrated Energy Management System (IEMS) is a shared Critical National Infrastructure system with the ESO, which is used to manage and control the electricity transmission system. Investment is planned to separate the system into ESO and Electricity Transmission (ET) specific components. The ESO requires an energy management system, whereas ET requires a SCADA in line with the other Transmission Owners and DNOs. This will benefit customers and stakeholders by; assuring physical separation of ET and ESO data, reducing ET system costs, and creating process efficiencies in the management and control of network access and safety.	■

**Table 5.2.1 - Section 9 NGET National Grid Electricity Transmission's business plan 2021–26**

Whilst SCADA replacement and IEMS life extension were included in NGET's original business plan submissions, TNCC2 was not. This was due to an initial assumption within the SCADA replacement project that the interim arrangements with NGESO would be able to continue, the subsequent low level of maturity of the project and thus the need to progress through a set of re-openers to allow that cost certainty to be developed and to demonstrate value for the consumer.

### 5.3 Alignment to NGET IT Network Control Strategy

As referenced in the Strategic Overview section at the start of this paper, TNCC2 forms part of the overall NGET Network Control Systems Landscape. Other projects in this portfolio include SCADA replacement, IEMS life extension, OT Cyber Security and OpTel. These component projects collectively will deliver an integrated solution to maintain safe, secure, reliable and economic electricity network control.

NGET is developing and delivering this integrated suite of capabilities, through an integrated programme of works across the Network Control portfolio that will use different delivery approaches for different workstreams within the programme. This section of the paper is related to the funding of the TNCC2 project only.

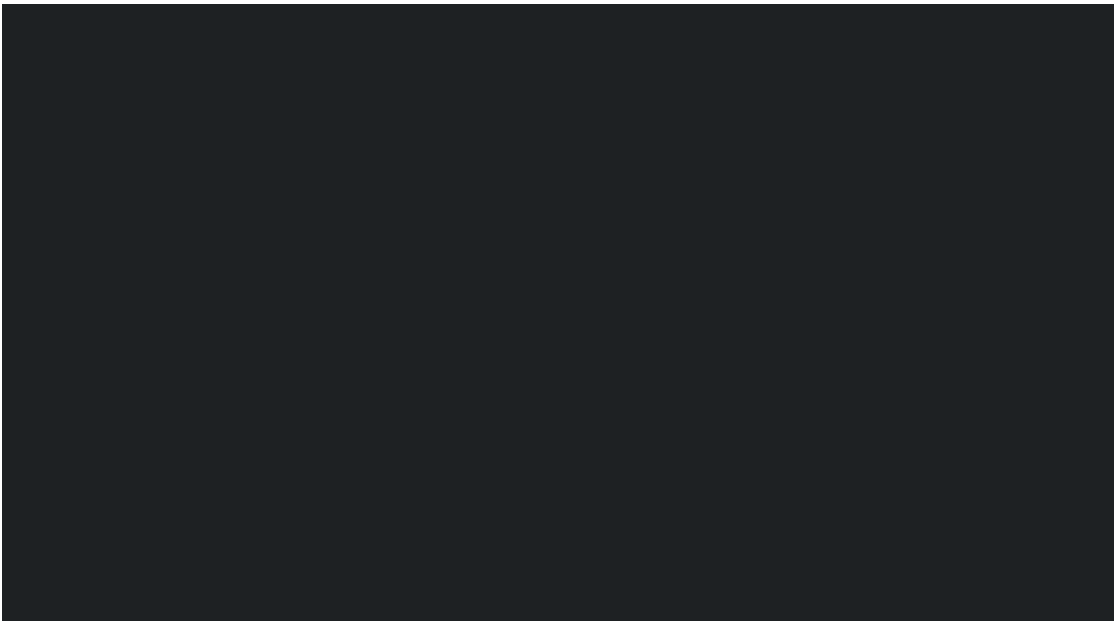


Figure 5.3.1 – The TNCC shown to give an indication of NGET Control Room facilities

#### 5.4 Need case for NGET Contingency Control Room (TNCC2)

1. SO TO Code Procedure (STCP) 06.4 – Contingency Arrangements requires all TOs to have a remote emergency control centre. As such not having one would be a breach of NGET's licence, Condition B12 System Operator – Transmission Owner Code.

STCP 06-4 Issue 005 Contingency Arrangements:

##### **2. Key Definitions**

*2.1.3 Emergency Control Centre means an additional Control Centre at a remote location from the Main Control Centre(s), which can be used to control and operate the System if the Main Control Centre(s) becomes unusable.*

##### **3. General Requirements**

*3.1.4 NGESO and each TO shall establish and maintain their own Emergency Control Centre facilities and arrangements.*

*3.1.5 Each Party shall have available as a minimum requirement the following systems at their Emergency Control Centre:*

- *a duplicated SCADA system for indications and alarms;*
- *a real time data transfer facility between the TO and NGESO;*
- *IS systems to support the control room which shall include external e-mail facilities;*
- *paper systems and documentation for the key processes;*
- *a telecommunication system with a minimum of one PSTN ex-directory line and one unique number on a private telephone network; and*
- *a fax machine capable of operating on both a PTN and the PSTN*

2. We are now approaching end of asset life for IEMS and replacing with separate systems. As such the divergence of roles and associated IT systems, the potential full separation of ESO, the output of the optioneering (see 1.6) drives the need for a new TNCC Contingency Control Room (TNCC2).
3. NGESO will not be able to provide [REDACTED] for NGET post SCADA replacement (or sooner if driven by full ESO Separation).



4. A second Control Room provides resilience options for unique catastrophic type scenarios (e.g. pandemic) as well as loss of premises.
5. Aligns NGET with other TOs and meets key stakeholder requirements and expectations, including BEIS (Downstream Gas & Electricity Resilience) and aligns with the requirements of the National Infrastructure Commission's publication *Anticipate, React, Recover Resilient infrastructure systems May 2020*.

#### Industry Comparators:

[REDACTED]

[REDACTED]

[REDACTED]

#### 5.5 Programme Drivers

When IEMS is decommissioned, NGET will not be able to use [REDACTED]

[REDACTED]

in the event of an evacuation of the TNCC.

Estimated time to build a new Control Room to required resilience, security and safety standards is 2-3 years. This will depend on location specific factors such as land and planning permission issues, OpTel connectivity, co-ordination across other investments at particular sites. Initial work has shortlisted 3 preferred [REDACTED] locations to progress costing and optioneering although an assumption has been made in the costing that 2 of these locations will be quickly eliminated due to lack of physical space (and limited potential to extend) to deliver to full resilience standards.

For optimal and efficient delivery of the SCADA replacement project, the new Control Room is on the critical path and integral to facilitate the SCADA entry into service strategy and will be available and used for the installation, testing and commissioning, training and parallel running of the new SCADA system.

The NGESO & NGET IEMS replacement programmes and resilience arrangements need to be co-ordinated and transitioned in parallel. With NGESO separately progressing their IEMS replacement and new contingency arrangements, a delay to ET programme risks [REDACTED]

## 6. OPTIONS ASSESSMENT

### 6.1 Options Selection

#### Optioneering step 1: Programme options

Under Phase 1 of the TNCC2 Project, high level option analysis was carried out utilising extensive both internal and external stakeholder engagement and reviewing other TO, OFTO and DNO contingency arrangements. At the highest level the options are summarised in table 6.1.1

The optioneering was conducted by internal stakeholder review workshops and scoping sessions with input from SMEs and the external stakeholder input as required and also from consultation with GNCC who went through a similar optioneering exercise to determine their requirement for a [REDACTED] contingency site.

Option	Reason for rejection (if rejected)	Further CBA reqd?
Do nothing	<b>NON-COMPLIANCE</b> <ol style="list-style-type: none"> <li>Does not align with endorsed NGET T2 strategy</li> <li>Would directly increase risk on NGET's Critical National Infrastructure</li> <li>Would lead to non-compliance with STC</li> <li>Does not meet black start requirements</li> <li>Would not meet key stakeholder requirements</li> <li>Unacceptable business, safety, system security and resilience risk</li> </ol>	No – noncompliant option
Continue with [REDACTED] arrangements	<b>NOT FEASIBLE, NOT IN LINE WITH STRATEGY</b> [REDACTED]	[REDACTED]

Outsource Contingency Arrangements	<b>SECURITY RISK, COST</b> <ol style="list-style-type: none"> <li>1. Lack of facilities suitable to meet CNI Security and Resilience standards with 24/7 availability and capacity for TNCC requirements.</li> <li>2. Cost and practicality of maintaining external staff competence and authorisations.</li> <li>3. Security risk of external access to CNI systems.</li> </ol>	No – primarily ruled out due to security risk and risk of outsourcing critical functions.
Utilise a non-secure location e.g. remote working or mobile control room	<b>NON-COMPLIANCE</b> <ol style="list-style-type: none"> <li>1. Extended use of such arrangements would not meet security standards for prolonged resilience</li> <li>2. Cyber security risk of remote access to SCADA and other CNI systems.</li> <li>3. Does not meet black start requirements</li> <li>4. Would require inefficient standby rota arrangements to cover any evacuation scenario</li> </ol>	No – noncompliant option
Delay	<b>COST</b> <ol style="list-style-type: none"> <li>1. Lead to inefficient delivery and delay to SCADA replacement project, increasing overall cost for consumer.</li> <li>2. Would lead to a subsequent enforced delay to NGESO Energy Management system replacement and subsequent consumer benefits.</li> <li>3. Would lead to additional IEMS Life Extension Costs for NGET and NGESO (ongoing opex and additional capex) and with increasing risk to performance and reliability.</li> </ol>	No – TNCC2 is on the critical path for efficient SCADA delivery. The SCADA project must have a secure control room location where it can install and operationally test. They would need to source an alternative temporary location at additional cost to the same security and connectivity standards or delay implementation.
New NGET Control Room	<b>N/A</b> <ol style="list-style-type: none"> <li>1. Aligns to NGET Strategy</li> <li>2. Delivers a STCP compliant solution</li> <li>3. Facilitates efficient delivery of the SCADA replacement</li> <li>4. Provides contingency options for pandemics</li> <li>5. Will meet black start requirements</li> <li>6. Will meet CNI Security requirements</li> </ol>	Preferred option taken through to step 2.

Table 6.1.1 Programme Options

### Optioneering step 1: Conclusion


This high level optioneering identified that in order to meet compliance, system security, stakeholder and resilience requirements there was **a need to deliver a new NGET contingency control room** that meets all required CNI standard and code compliance requirements and that could function as the main NGET control room for a prolonged period should there be a complete or prolonged loss

of the TNCC. This would be essential for delivering system security and public safety but also for long term planned work delivery to enable NGET to achieve its outcomes and deliver for consumers.

## 6.2 Assessment of Control Room options

### Optioneering step 2: Control Room options

Also, under phase 1 of the project, further optioneering and high-level analysis of costs was then carried out to assess possible options for the new Control Room. This step 2 of optioneering considered existing NGET sites, non NGET sites or green field build:

Option	Reason for Rejection	High Level analysis of costs	Further CBA reqd?
1. Utilise an existing NGET site / building	<b>N/A</b> 1. Will have existing OpTel infrastructure in place 2. Will have existing external security in place reducing additional perimeter security costs 3. Provides long term assurance of the asset. Planning Application	No land purchase costs and delays Reduced security costs (enhance rather than start new) Limited OpTel fibre routing costs	Yes – see CBA in Annex 'NG_ET_IT-RO-07_TNCC_CBA'  Preferred option taken through to step 3
2. Acquire a new non – NGET site	<b>COST &amp; TIME DELAY</b> 1. Multiple OpTel connectivity is key requirement for Control room resilience and the costs and timescales of connecting to a non-NGET site would be prohibitive.		Yes – see CBA in Annex 'NG_ET_IT-RO-07_TNCC_CBA'
3. Acquire a new non-NGET building (and site)	<b>COST/RISK</b> 1. A non NGET existing building would require extensive security enhancements and would be unlikely to meet Control Room functional requirements	Security hardening, building/land purchase costs on top of OpTel connectivity costs would be significantly higher than a new modular CNI spec build on an existing NGET site with existing OpTel connectivity nearby.	No – Security hardening and building conversion costs would be on top of OpTel connectivity costs (above)
4. Lease a non-NGET building	<b>COST/RISK</b> 1. Leasing a 3 <sup>rd</sup> party facility - Investment of this scale on a 3 <sup>rd</sup> party owned site would not be appropriate or in the long-term best interests of consumers	The risk of sunk costs in investing >£10m in installing the necessary IT infrastructure and security in an asset that is a long-term investment on a 3 <sup>rd</sup> party owned property could not be properly mitigated.	No – not considered to be appropriate investment strategy

**Table 6.2.1 Control room options**

### Optioneering step 2: Conclusion

This optioneering, high-level cost analysis and CBA concluded that **an existing NGET site with good existing OpTel connectivity was the preferred option**. Any extensive Optel fibre routing would quickly fail Cost Benefit Analysis scrutiny

### Optioneering step 3: Control Room National Location

Step 2 narrowed the geographic location down to an NGET site and therefore in England and Wales. Factors now taken into consideration included:

Factor	Considerations/requirements
Evac Time	The time taken to reach the contingency control room in an evacuation, either by on shift TNCC staff, or by next shift from home. [REDACTED]
Geographical distancing	Sites should be separated by at least [REDACTED] miles to minimise risk of loss of both sites due to major incident, traffic gridlock, flood etc
Accessibility	Geographically should be accessible by a network of major routes
Staff mobility	Authorised control engineers are defined as a critical resource and are in short supply. They are bespoke trained and authorised by NGET and this can take 6-18 months to reach CP(O) authorisations. Relocation of a significant number of staff would result in a reduction in numbers below critical levels and require an extensive recruitment and training programme above current capacity. Maintaining a level of core staff at two locations is not as flexible as maintaining a core centrally and so is less efficient in overall headcount.
Long term occupancy	Control engineers working shift patterns would not be able to sustain lengthy commutes due to fatigue and safety risk and so would have to be accommodated in local hotels, if they agreed.
OpTel Connectivity	[REDACTED]

Table 6.2.2 Location criteria

The above factors were then used to assess a [REDACTED] location vs a [REDACTED] location.

Option	Reason for rejection	Further CBA reqd?
[REDACTED] location	<b>NON-COMPLIANCE</b> 1. [REDACTED] 2. [REDACTED] 3. [REDACTED]	No – noncompliant option
[REDACTED] location	<b>N/A</b> 1. [REDACTED] 2. [REDACTED] 3. [REDACTED] 5. [REDACTED]	Preferred option taken through to step 3

Table 6.2.3 [REDACTED] location

### Optioneering step 3: Conclusion

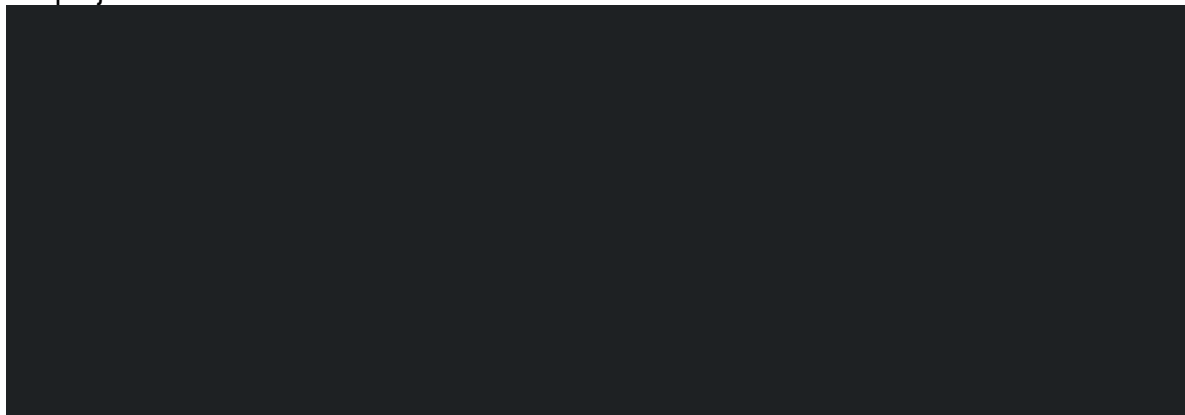
There is limited financial gain in locating the contingency control room in a more remote part of England and Wales due to lower land cost (will be using NGET land) or build costs and the negative impact of either a longer (and thus higher risk) evac route or having to relocate critical staff quickly lead to the conclusion that a [REDACTED] location is the preferred and most economic option to take forward.

#### Optioneering step 4: Control Room Sites

The next step of the optioneering and high-level cost analysis has been carried out to assess a number of potential NGET [REDACTED] locations for the TNCC2.

The site optioneering phase is summarised in figure 6.2.1 below but 15 criteria were used to score the 10 possible midlands-based locations.

These criteria, along with the estimated inherent costs associated with the RAG score for each site (e.g. a red on OpTel connectivity gives a high cost estimate to connect) provided the basis for shortlisting analysis as well as considering the viability and feasibility of each site given the scope of the project.



**Figure 6.2.1**



**Figure 6.2.2**

As well as evac time and accessibility of the new control room, a key factor in the cost benefit analysis and suitability of the final site will be consideration of the location in relation to authorised staff home locations. Primary considerations are:



- Minimising excessive commuting time for 24/7 shift workers for fatigue/safety reasons.
- An evac near the end of a shift is more efficiently covered by next shift diverting straight to contingency site from home.
- Minimising excess travel and/or relocation costs for some staff.
- Authorised staff being able to commute to site on a regular basis from home rather than have to use hotels or temporary accommodation.

#### Optioneering step 4 – Conclusion

This optioneering step 4 has reduced the sites down to **3 possible options where the fundamental requirements of the Control room can be met**. Red line requirements included physical space to house the Control Room and associated facilities, existing OpTel connectivity, reasonable travel distance for authorised staff without relocation, multiple access routes. Other factors considered the link to cost benefits of reduced scope and delivery costs.

These 3 sites are:

1.

2.

3.

## Optioneering next steps – Project Phase 2

At the end of phase 1 there are 3 sites shortlisted as warranting further study, however further desk top analysis and CBA will be done on the viability of each of these sites early in phase 2 before progressing with unnecessary on-site surveying, detailed design, planning applications etc at all 3 sites that will be required for detailed design and costing.

It is anticipated that the 3 options will be quickly reduced to one preferred location, as one of the sites [REDACTED]

[REDACTED] and likely rule out on space), one option [REDACTED]

[REDACTED] and

likely ruled out due to lack of space) leaving one site [REDACTED] Phase 2 effort and costs will then focus on that site subject to additional feasibility studies not ruling it out, to minimise wasted site survey, design etc costs. Note the costing for Phase 2 assumes surveying and design only undertaken at the 1 site.

## Optioneering Summary

In order to meet compliance, system security, stakeholder and resilience requirements there is a **need to deliver a new NGET contingency control room at [REDACTED] location** that meets all required CNI standard and code compliance requirements and that could function as the main NGET control room for a prolonged period should there be a complete or prolonged loss of the TNCC.

This would be essential for delivering system security and public safety but also for long term planned work delivery to enable NGET to achieve its outcomes and deliver for consumers.

NGET is confident that progressing this option is the **lowest cost credible option** and will provide long term consumer benefits in terms of the safe and reliable operation of the network.

Further, more detailed Cost Benefit Analysis will be utilised in Phase 2 to form part of the submission for Phase 3 funding in Jan 22.

### 6.3 Stakeholder Engagement

Internal stakeholder engagement has been extensive across NGET. Key internal stakeholders include:

- TNCC
- Corporate Security
- IT CNI Security
- IT Optel
- ET Cyber Project
- SCADA Replacement Project
- ET Lands & Consents
- ET Operations
- NG Workplace Experience
- Safety, Health & Environment
- ET Finance
- GNCC

External stakeholder engagement has included (with key input and feedback noted):

- BEIS (Downstream Gas & Electricity Resilience)
  - NGET to maintain resilience levels and not increase system security risk.
  - NGET to be able to meet black start requirements.
  - Full expectation that NGET must have a second contingency control room available at all times.
- CPNI
  - Will provide guidance and specifications on minimum security standards.
- HSE
  - Supporting a Quantified Risk Assessment to ensure the risk to public safety is appropriately mitigated by NGET through its contingency arrangements.
- NGESO
  - [REDACTED] NGET must to be able to meet black start requirements.
  - New contingency arrangements to be in place so as not to delay NGESO IEMS replacement
- Ofgem
  - Licence Compliance
  - Funding

## 7. PREFERRED OPTION / JUSTIFICATION

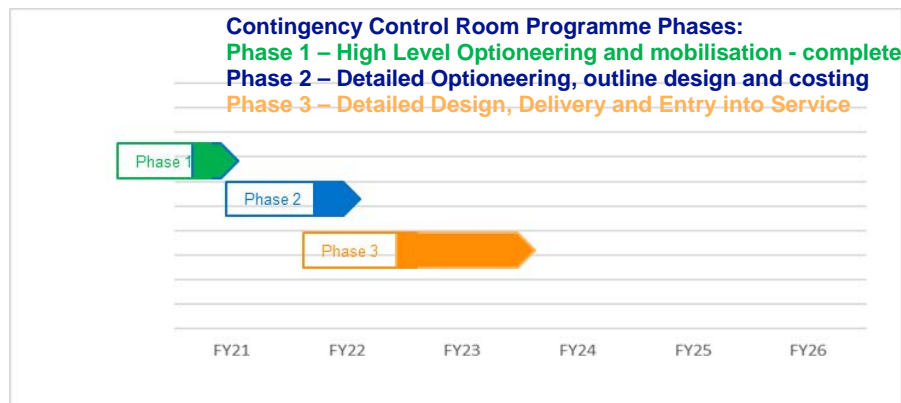
Delivering a second control room is a major project with Construction, HR, Planning, Security as well as IT infrastructure issues.

The project will be delivered in 3 phases:

Phase 1 – High Level Optioneering and mobilisation - complete

Phase 2 – Detailed Site Specific Optioneering, outline design and costing

Phase 3 – Detailed Design, Delivery and Entry into Service



### Contingency Control Room Programme Phases:

**Phase 1:** High level optioneering and mobilisation from October 2020 to March 2021. This is complete and has been funded from within T1 TNCC and IT opex.

**Phase 2:** Detailed Optioneering to confirm preferred site option and scope, outline design and costing from April 2021 to January 2022. Cost certainty is high [REDACTED] and is the subject of this re-opener (see Phase 2 Cost Breakdown).

**Phase 3:** Scope and cost certainty for Detailed Design, Delivery and Entry into Service is currently low and requires the completion of phase 2. It is proposed that a second re-opener for phase 3 will be triggered when the following criteria have been met:

### Phase 3 Re-opener pre-requisite requirements

#### Optioneering:

- Single preferred site identified, justified and confirmed viable.

#### Scope:

- Full scope defined – civils, IT, OpTel, Security.
- Lands issued identified and Planning Permission issues identified with plans in place to secure.
- Outline designs complete.
- Site surveys completed to identify delivery and cost risks.

#### Cost Certainty:

- Major suppliers – quotes received.
- Risks and contingencies articulated.
- Lands costs agreed (if applicable).
- T2 opex costs identified.

**Project Governance:**

- Detailed phase 3 project and resource plan.
- Internal sanction to proceed with stage 3.

It is believed that funding and delivering the project in this phased approach is the most efficient way of refining requirements, challenging costs and building high cost certainty for the majority phase 3 build costs as part of phase 2 before submitting a request for the funding of phase 3.

**Benefits:**

The second contingency control room will deliver:

**Compliance:** The proposed solution will deliver compliance with *STCP 06-4 – Contingency Arrangements* and meet BEIS requirements.

**Safe & Reliable Network:** Allows NGET to continue to deliver the safe, secure, reliable and efficient operation of the HV Transmission system for the benefit of consumers in the event of a short term or prolonged evacuation of the TNCC.

**Resilience:** As well as providing the for the loss of the TNCC, a second control room gives flexibility to manage segregation of shift teams as a primary control measure in the event of a pandemic.

**Customer Service:** Improve customer service by effectively managing the network risk. This will potentially reflect in Quality of Connection incentive scores.

The phased delivery approach will deliver:

**Cost Certainty:** The phased approach to funding and delivery ensures greater cost certainty for the consumer. A new CNI electricity control room is not a standard asset replacement or new build project that can easily be costed based on existing NGET data.

**Reduction in Total Cost:** Detailed optioneering and increased cost certainty allows reduction and risk and contingency in phase 3. The availability of the second control room in time for the installation, testing, training and entry into service also considerably reduces the risk, cost and programme of the SCADA replacement project and minimises disruption within the live existing control room environment.

**7.1 Breakdown of costs for preferred option****Phase 2 Cost Breakdown:**

Phase 2 costs have been developed from a bottom up build of project costs comprising:

**Core Project Resources:** costs based on a days per week estimate of core team based on grade specific fully capitalised rates based on 18/19 prices as directed by the re-opener guidance document. Costs cover the 12-month period from 01/04/2021. Full details of this bottom up resource build are detailed in Annex 'NG\_ET\_IT-RO-08\_TNCC\_Outline\_Costing'

**Wider Scheme Team costs:** as above

**Site Surveys & Planning application:** includes provision for the following activities based on estimates from previous projects and Planning Application Fee scales for England.

- buildings and lands/ecological surveys
- asbestos surveys
- Contaminated land surveys
- LA searches & Planning application
- Local power including USP/back-up generator spec & design
- Local telecoms surveys
- Earthing Survey

**External Design:** includes provision for the following activities based on estimates from previous projects.

- Vodafone OpTel preliminary works & design
- Physical security survey & design
- CCTV and Alarms survey & design
- Office & Buildings Design Contractor
- IT infrastructure Spec & Design
- AC Spec & Design
- Water & waste survey & design

Full details of this bottom up build are detailed in the spreadsheet “NG\_ET\_IT-RO-08\_TNCC\_Outline\_Costing’ Tab “Costs Phase 2 & Phase 3” inserted in the Annex.

The following cost breakdown summarised from the spreadsheet “NEW 2CR Outline Costing sheet V1.5” covers full year 21/22 through to April 2022. This makes allowance for efficient continuation of the project whilst Ofgem considers Phase 3 funding submission from Jan 22. As part of the Phase 3 submission there will be a true up against actual Phase 2 costs. So, if phase 2 is underspent against [REDACTED], the deficit will be removed from the phase 3 costs as part of the Jan 22 re-opener.

Phase 2 Summary Costs	/22	Cost Certainty
Core Project Resources*	£744,181	bottom up build of core project resources for 12-month period
Wider Scheme Team Costs*	£186,283	bottom up build of part time project resources for 12-month period
Site Surveys & Planning application**	[REDACTED]	Surveys based on cost estimates from previous schemes
External Design**	[REDACTED]	comprises estimates, building, civil, security etc design work
<b>Total</b>	[REDACTED]	
Risk contingency 10%	[REDACTED]	
<b>Grand Total</b>	[REDACTED]	High

**Table 7.1.1 Phase 2 cost breakdown (18/19 prices)**

\*Resource costs estimates based upon staff costs from the 18/19 Transmission Investment Handbook

\*\*Cost estimates based on previous preliminary works costs including NGET Innovation Centre, NGET refurb centre, [REDACTED]

### Phase 3 Cost Estimates:

Not forming part of this Phase 2 re-opener but a high-level initial estimate of Phase 3 and ongoing RTB Opex costs associated with the delivery and ongoing operation of TNCC2 in RIIO-2 are:

Phase 3 Estimated Costs	22/23	23/24	Cost Certainty
Core Project Resources			Pro rata estimate based on phase 2 costs plus additional build team
Wider Scheme Team Costs			Pro rata estimate based on phase 2 costs
			Estimate at this time
			Based on Vodafone ROM costs received subject to scope review and challenge
			Estimate to be updated in phase 2
Office & CR fit out			Estimate to be updated in phase 2
Power & Back Up Gen			Estimate based on GNCC
<b>Total</b>			
contingency 10%			
<b>Grand Total</b>			<b>Low</b>

Table 7.1.2 Phase 3 cost estimates (18/19 prices)

Phase 3 costs will be subject to a second Authority directed re-opener in Jan 22.

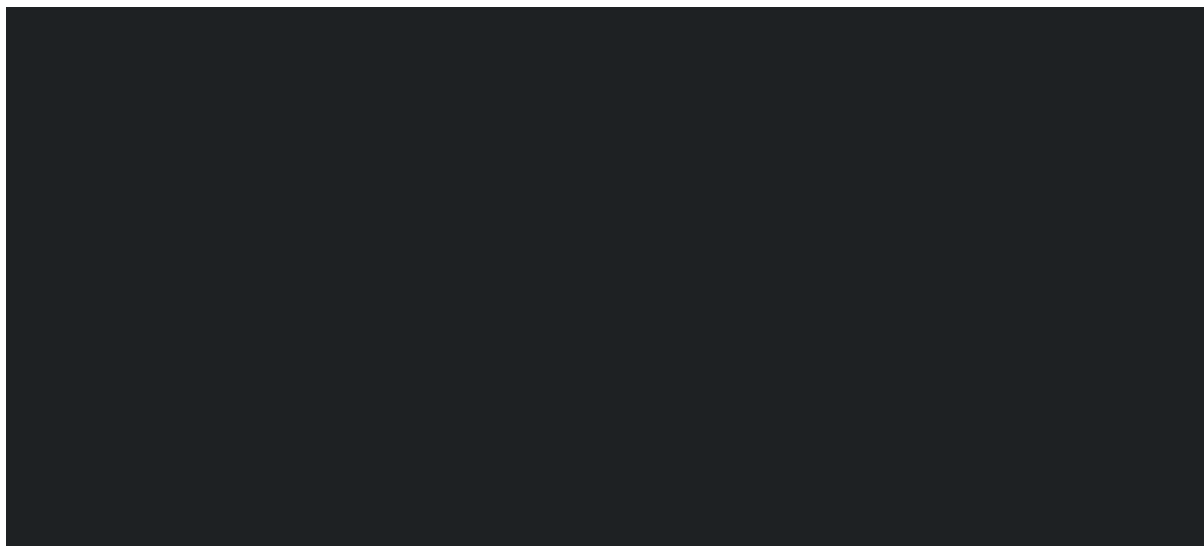


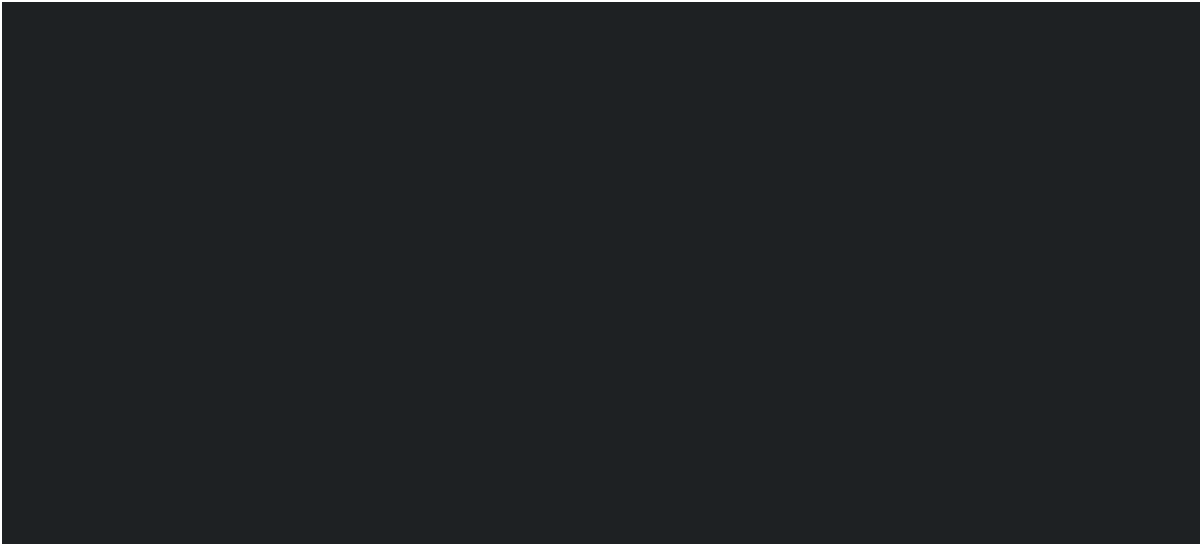
Figure 7.1.1 Contingency control room capex estimates

Purely indicative estimates of ongoing RTB costs for the contingency control room at this stage – to be defined in stage 2:

ESTIMATES (£m)	22/23	23/24	24/25	25/26	T2 Total
RTB Estimated Opex Costs					

Table 7.1.3 RTB Estimated costs (18/19 prices)





***Figure 7.1.2 Contingency control room RTB estimates***

## 8. DELIVERABILITY AND MONITORING

### 8.1 Project Delivery and Monitoring

The project will be delivered within the NGET portfolio and follow the TP500 Network Development Process as the primary framework for project controls and governance. Due to the scale, complexity and cross functional nature of the project, it will have its own Project Management Board (PMB) that will include representation from outside NGET, namely IT and Workplace Experience. The PMB will align with SCADA replacement PMB due to the interdependencies between the two projects and because of the overlap of key PMB stakeholders.

The TNCC2 Programme Manager will be accountable to the PMB who have the delegated authority of the NGET Exec to oversee the project.

TNCC Resilience PMB Terms of Reference		
<b>Scope:</b> Ratify decisions and recommendations from delivery board. Accountable for overall Programme progress		<b>Objectives:</b> <ul style="list-style-type: none"> <li>Review delivery progress against plan</li> <li>Escalation route for delivery risks, issues or dependencies</li> <li>Review benefits realisation against plan</li> <li>Review delivery team performance</li> <li>Agree Performance status reporting headlines, escalations, RAG</li> </ul>
<b>Chair:</b> <ul style="list-style-type: none"> <li>Programme Sponsor: [REDACTED]</li> </ul> <b>Standing Members:</b> <ul style="list-style-type: none"> <li>[REDACTED]</li> </ul>		<ul style="list-style-type: none"> <li>Agenda</li> <li>Key Messages</li> <li>Delivery Progress Review (Progress, escalated RAID)</li> <li>Benefits Tracking &amp; Realisation Update (If Applicable)</li> <li>Delivery Team Resource Check-In</li> <li>Agree monthly headlines</li> <li>Any Other Business (AOB)</li> </ul>
<b>Invited Members:</b> <ul style="list-style-type: none"> <li>as required</li> </ul>		<b>Decisions Expected:</b> <ul style="list-style-type: none"> <li>Mitigation of any Risks incl. Ofgem submission challenge, ET/ESO delivery issues, Covid-19 issues</li> </ul>
<b>Quorum:</b> <ul style="list-style-type: none"> <li>At least 2x exec members, Business &amp; Programme Leads, TNCC &amp; Ops representatives</li> </ul>		<b>Inputs:</b> <ul style="list-style-type: none"> <li>Delivery Status Report (Progress, RAID, Key Messages)</li> <li>Updated Plan on a Page</li> <li>Benefits Tracker</li> <li>Proposed discussion points / decisions &amp; supporting</li> </ul>
<b>Frequency:</b> <ul style="list-style-type: none"> <li>Bi-Monthly (Warwick Face to Face/Teams Invite)</li> </ul>		<b>Outputs:</b> <ul style="list-style-type: none"> <li>Validated Performance monthly Status Report</li> <li>Agreed actions and escalations</li> </ul>

National Grid

1

Figure 8.1.1 TNCC2 PMB Terms of Reference

### 8.2 Dependencies

The below depicts the dependencies between the planned programme and other activities, projects and programmes. Full Project RAID log is attached in the Annex 'NG\_ET\_IT-RO-09\_TNCC\_RAID\_Log'.

Dependency	Description	Mitigation
1. <b>Business Resource</b>	The programme will be dependent on availability of relevant business resources to support definition of requirements and work in partnership with the project team	Use of established processes for engaging and requesting business resources for programmes. Departments are already engaged with a significant base of business users and this engagement and focus will continue.
2. <b>SCADA Replacement</b>	IT Requirements and project timelines driven by the SCADA replacement project will be needed to determine requirements and programme for TNCC2. TNCC2 will not become fully operational until NGET migrates to the new SCADA system as IEMS will not be installed in TNCC2.	Close working relationship across project teams with sharing of key resources. PMB governance aligned and all dependencies recorded and reviewed on RAID logs for each project

<b>3. HS2 co-ordination of works</b>	HS2 associated construction and connection activity may hinder progress or access to selected sites and delay programme	Engagement with HS2 project through NGET Consents Officer covering HS2 works impacting NGET sites and also the TNCC2 project

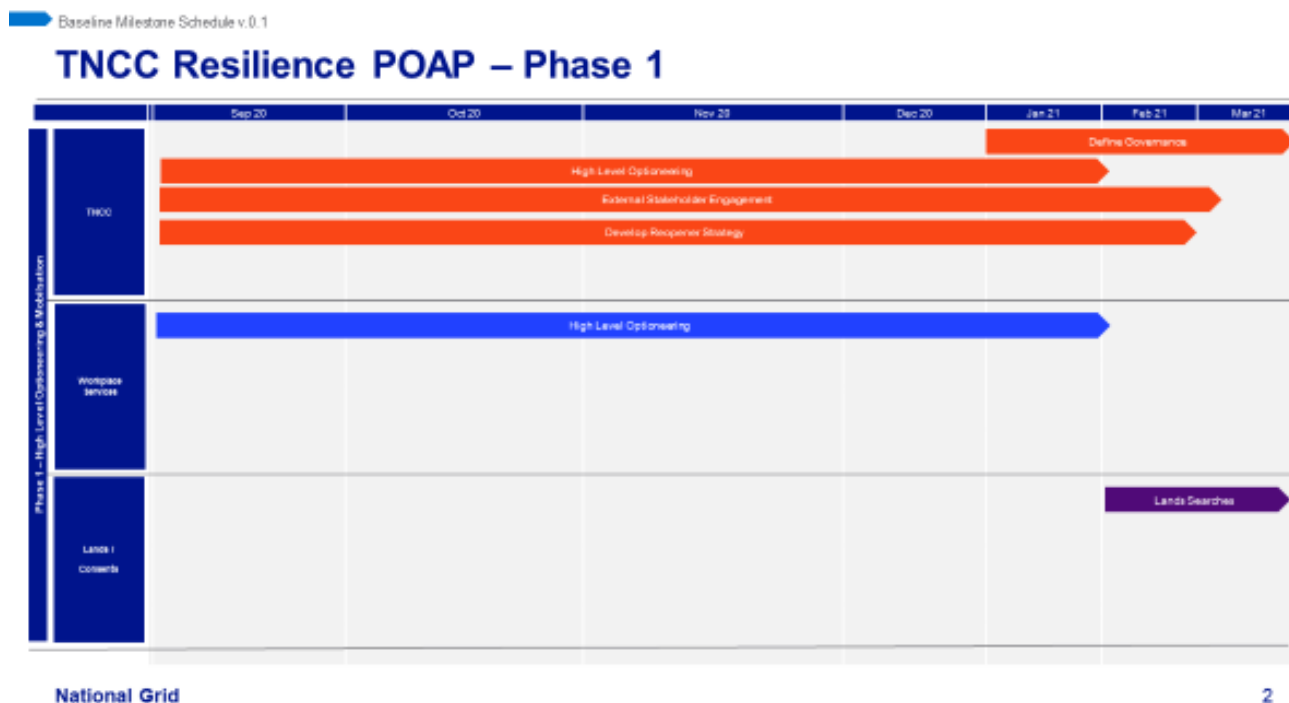
**Table 8.2.1 Dependencies**

Note that there are no dependencies with OT Cyber investments and no 'double-dip' between TNCC2/SCADA/IEMS and OpTel and OT Cyber investments.

Note that in the RAID log there is an assumption that the new proposed [REDACTED] will not be part of the TNCC2 plans but will be based at [REDACTED]. In light of the announcement of the sell off of Gas Transmission, the strategy for [REDACTED] and other shared functions is under wider review, but this does not affect the need case or the requirement for funding Phase 2 of the TNCC2 project. Any change in scope would be assessed in Phase 2 and confirmed in Jan 22 submission.

## 8.3 Project Plans

### Phase 1 Plan on a Page - Complete



### Phase 2 Plan on a Page

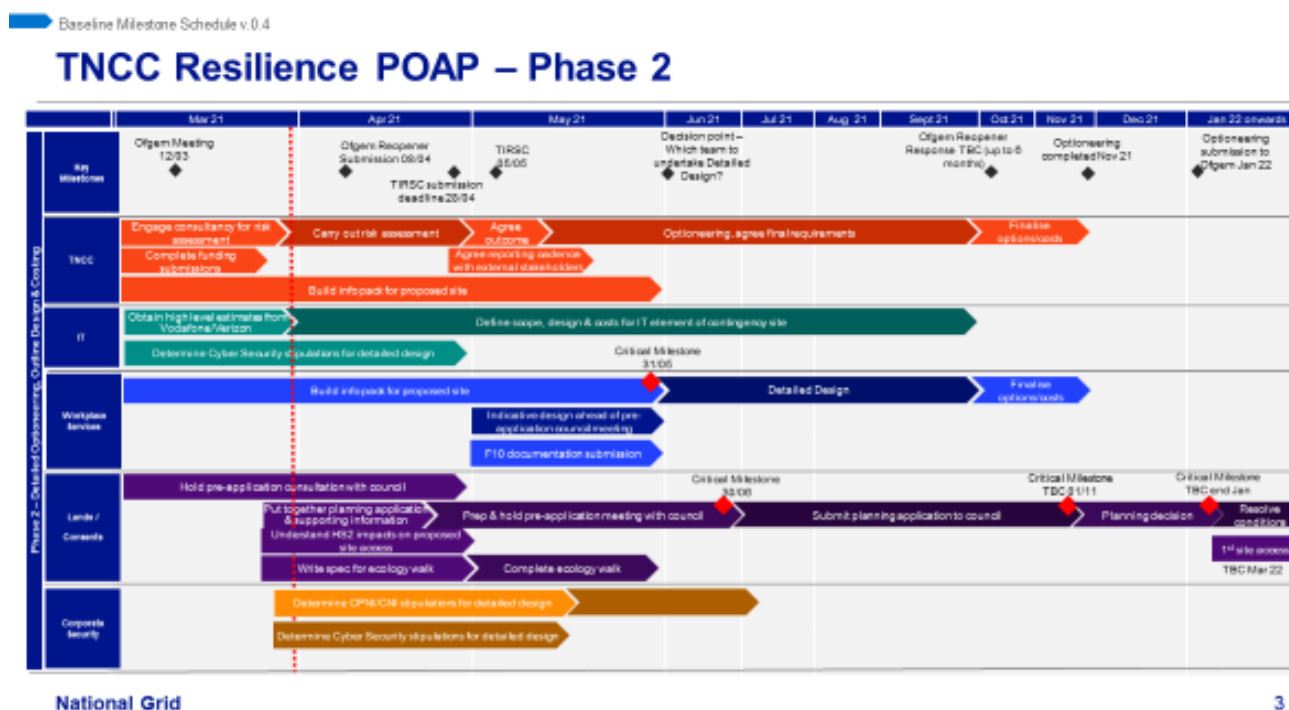
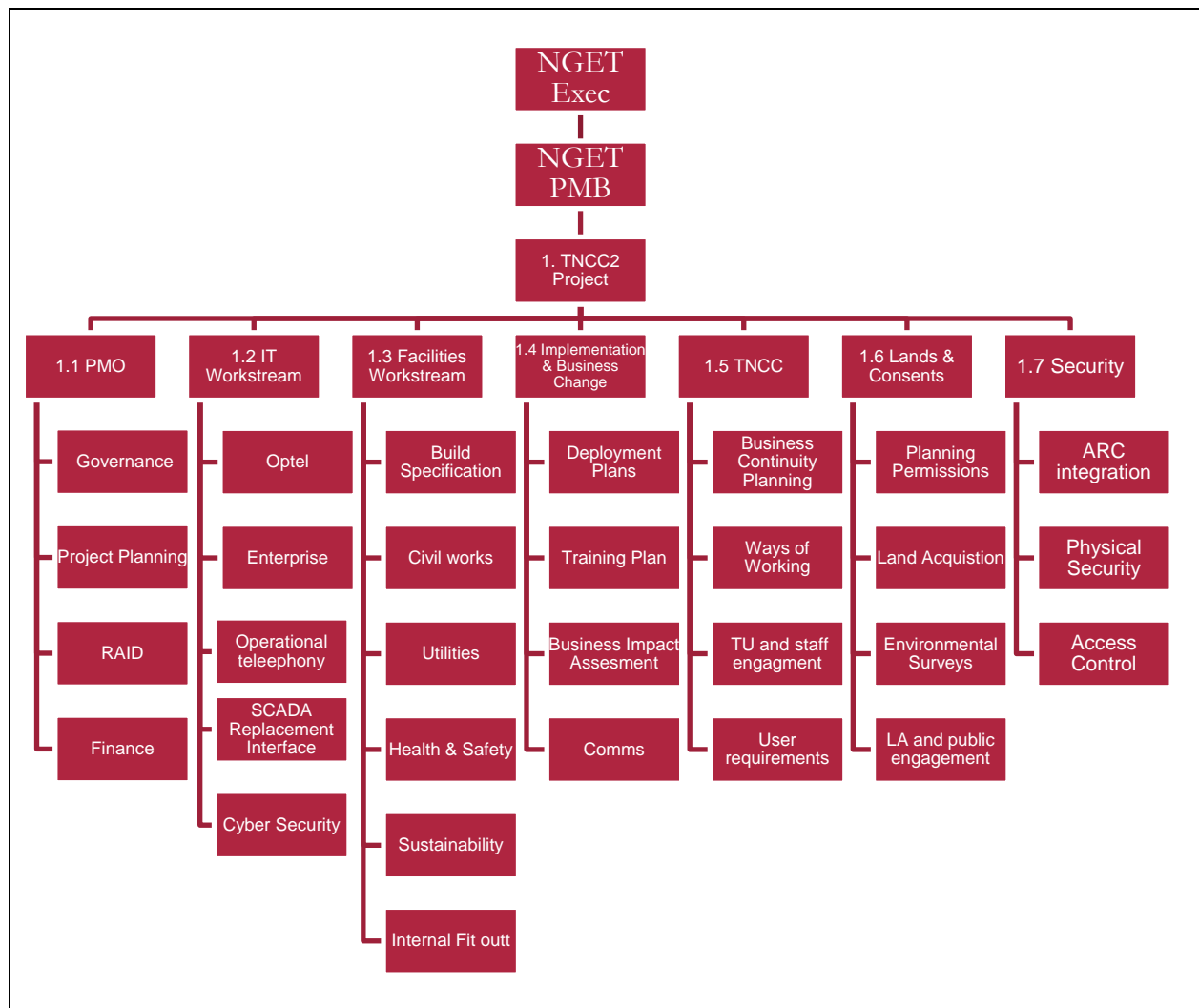


Figure 8.3.1 Phase 2 Plan on a Page

Full Phase 3 plan to be developed during Phase 2 but expected to run from Feb 22 to Jun 23.

## 8.4 Project Breakdown Structure

The below defines the key activities and deliverables for this programme that is governed by our Change Delivery Framework (CDF). The chart shows the core project team structure which will be supported from business units from across NGET and NG Support functions.



**Figure 8.4.1 Project structure**

## 9. DEFINITION OF REQUIRED RESOURCES

### 9.1 Resourcing requirement and availability by type Phase 2 – T2 Year 1

The table below summarises the estimated resource requirements and an assessment of resource availability to support delivery of the committed outcomes. Resource requirements taken from the spreadsheet 'NG\_ET\_IT-RO-08\_TNCC\_Outline\_Costing' Tab "Phase 2 Resource Utilisation" inserted in the Annex.

	Sourcing Strategy	Estimated FTE Requirement - Phase 2	Resource Availability	
	Internal	0.80		
	External	0.65		
	Internal	0.94		
	Internal	0.80		
	Internal	0.17		
	Internal	0.10		
	Internal	0.24		
	Internal	0.40		
	Internal	0.28		
	Internal	1.00		
	Internal	0.10		
	Internal	0.00		
	Internal	0.50		
	Internal	0.01		
	Internal	0.20		
	Internal	0.02		
	Internal	0.10		
	Internal	0.05		
	Internal	0.00		
	Internal	0.40		
	Internal	0.04		
	TBC	0.02		

**Figure 9.1.1 Resourcing requirement and availability by type**

The detailed resource requirements for phase 3 will be identified as part of the scope of phase 2.

## 10. RISKS AND OPPORTUNITIES






Extract from risk register is shown below. Full Project RAID log is attached the Annex under 'NG\_ET\_IT-RO-09\_TNCC\_RAID\_Log'.

No	Date raised	Raised By	Risk Area	Risk statement	Likelihood		
					Impact	Probability	RAG
R1	04-Mar-21		TNCC Resilience	there is a risk that key stakeholders do not support the decision to co-locate all ET contingency, ie 3 site strategy	3	1	1
R2	04-Mar-21		Funding	There is a risk that Ofgem will not support the TNCC Resilience flexible reopener	3	2	6
R3	02-Mar-21		Funding	There is a longer term risk that the project has been initiated without confirmed Ofgem funding past Phase 2	4	2	8
R4	15-Mar-21		Project Scope	There is a risk of potential scope creep depending on NIMC requirements as an agenda item in TNCC/SCADA PMB.	2	2	4










**Table 10.1.1 Risks and opportunities**

## 11. WHAT DOES SUCCESS LOOK LIKE?

Key Success criteria for TNCC2 project phase 2 will be:

• NGET will be in a position to submit for an Authority directed re-opener in Jan 22 to complete phase 3 of the project.	
• Cost certainty for phase 3 will be HIGH.	
• NGET will have defined IT requirements and costs with a detailed implementation plan.	
• NGET will have a building design and layout with all core elements costed and a detailed implementation plan.	
• NGET will have submitted a Planning application for the contingency control room and have HIGH confidence in achieving consent.	

Key Success criteria for the overall TNCC2 project will be:

• NGET will have a remote contingency control room that is compliant with the requirements of STCP 06-4.	
• The Contingency Control Room building, IT infrastructure, facilities will be complete in time for the SCADA replacement project to install, test, commission, train, parallel run the new SCADA system as part of the entry into service strategy by late 2023.	
• The Contingency Control Room will be delivered at or below budget (to be defined in phase 2).	
• The contingency control room requirement will meet all CPNI Physical Security Standards.	
• The contingency control room requirement will meet all NIS and other relevant Cyber Security requirements.	
• The contingency control room requirement will meet all CNI resilience requirements related to power, water, accessibility, reliability and communications.	
• The contingency control room requirement will meet all H&S legislation and best practice guidance regarding control rooms and supporting office space / facilities.	
• The contingency control room will not only meet all Environmental legislative requirements but will be held as a model of sustainability for control room design and construction with environmentally efficiency and low carbon footprint a core design criterion.	
• Control Room employee feedback will be positive regarding the new control room being an appropriate workspace and a fit for purpose environment for a control room function that allows them to efficiently, effectively and safely execute the primary function of monitoring, controlling and safety management of the system on an enduring basis.	



Note that prior to the Authority directed re-opener in Jan 22 we would welcome discussions on the structure of the next re-opener and whether these success criteria could be developed into a PCD or another RIIO-2 construct.

## SCADA

### EXECUTIVE SUMMARY

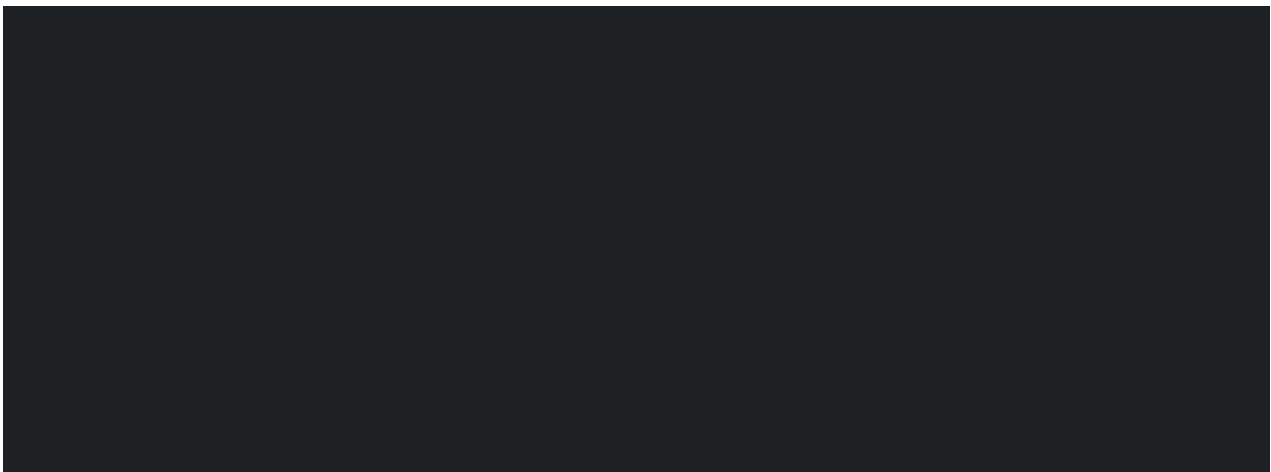
**The detail provided on the SCADA programme within this document is for information only and we are not asking for any allowances in April 2021 reopener.**

The IEMS (Integrated Energy Management System) is a Critical National Infrastructure (CNI) operational tool used extensively by both National Grid Electricity Transmission (NGET) and National Grid Electricity System Operator (NGESO) to facilitate the management and control of the GB Transmission Grid System and enable the provision of safe access to the system for construction and maintenance for the England and Wales transmission system.

In March 2020, after consultation with NGESO and other stakeholders, NGET mobilised and sanctioned the first phase of a programme to deliver an independent SCADA solution within the RIIO-2 period. This will run from March 2020 to Oct - Dec 2021 and will include:

- Development of functional and non-functional requirements to support the next stage
- Product recommendation and vendor contract award
- Sourcing strategy and delivery contract award
- Ongoing alignment of NGET/NGESO programme milestones and risks
- Development of a business case to support the next stage of this programme
- Mitigation plan for current IEMS asset health issues

Given the materiality of the uncertainty of the cost, scope and timeline of the following phase we are proposing to utilise the Authority directed re-opener for the large proportion of the SCADA programme. This will cover all activities outside of the initial allowances for the core SCADA team and activities in 2021-22 which were awarded in Dec 2020.



*SCADA Baseline vs UM cost split*

## 12. NEED CASE / PROBLEM STATEMENT

### 12.1 A need to replace iEMS

Support for the existing IEMS will expire in 2022-2023 and the existing system is presenting availability, supportability and reliability issues, which will increase unless there is significant mitigation. Even a temporary or partial IEMS outage would result in interruption to the operation of the network for customers and stakeholders and ultimately have a significant impact on connected customers and end consumers, both in terms of cost and energy supply. Loss of IEMS would also present a serious safety risk to NGET staff, supply chain and the public.

## 12.2 ESO legal separation

Following customer and stakeholder feedback and a formal consultation process, Ofgem published its decision for the legal separation of the ESO within the National Grid Group in July 2017. Subsequent organisational changes and 'soft separation' of systems and data enabled NGET and NGESO to operate as separate businesses from 1 April 2019. Legal separation has highlighted a clear functional divergence in the future business requirements between NGET and NGESO with NGET utilising SCADA (supervisory control and data acquisition) to focus on remote control of assets and data acquisition to support efficient asset management whilst NGESO focuses on enhanced situational awareness capability, real time network analysis, monitoring and simulation. Following analysis carried out in 2019-20, both NGET and NGESO mobilised programmes to deliver separate capabilities within RIIO-2.

Whilst upgrading and continuing to use a shared system is a lower cost IT option, this prevents NGESO from achieving Ofgem's target of IT separation and creates an ongoing infrastructure and operational interdependency between NGET and NGESO. In addition to preventing the completion of legal and organisational separation, a continued shared system will limit wider benefits and efficiencies in both NGET and NGESO. This sub-optimal arrangement would continue through until the next cycle of asset replacement, toward the end of RIIO-3.

## 12.3 SCADA progress against T2 baseline allowances

By June 2021 NGET, as part of its phase 1 SCADA programme, will have delivered a completed set of requirements, market engagement and formal tender process to enable a contract to be awarded for the purchase of software and implementation of the solution. This timeline is driven by the need to meet the overall programme requirements.

Any delay to the programme increases the risk of failure of the current IEMS system and restricts the options for life extension and ultimate replacement. NGET's commercial strategy provides an opportunity to open up competition to a wide range of vendors to maximise value both in delivery and ongoing support costs. Delay could restrict the opportunities for competition and increase costs by limiting the time for development and implementation.

The request granted for £3.55m of baseline funding in 21/22 is supporting the programme team to progress through the procurement process and provide a fully underpinned submission for the remainder of programme funding through the Authority directed re-opener.



# 13. PREFERRED OPTION / JUSTIFICATION

## 13.1 Preferred option (outline and costs)

- Continue to use baseline funds to finish the vendor RFP.
- Submit UM request in Jan 2022 once RFP complete.

## Success criteria

NGET will be able to submit for an Authority directed re-opener in Jan 22 to complete phase 2 of the project when:

<ul style="list-style-type: none"><li>• Cost certainty for the following phase will be high and both the vendor RFP and SI RFP will be complete.</li></ul>	
<ul style="list-style-type: none"><li>• NGET will have defined high level IT requirements and costs with a detailed implementation plan.</li></ul>	

### 13.2 Justification for preferred option

The programme will have insufficient cost certainty and project maturity until the RFP is complete.

## 14. COSTS ASSUMPTIONS (CURRENT PHASE)

Area	Cost FY22 (£m)
IT, Cyber, CNI	
Business Resource	
Procurement & Legal	
UK Change	
External	
Business SME inputs	
Total	

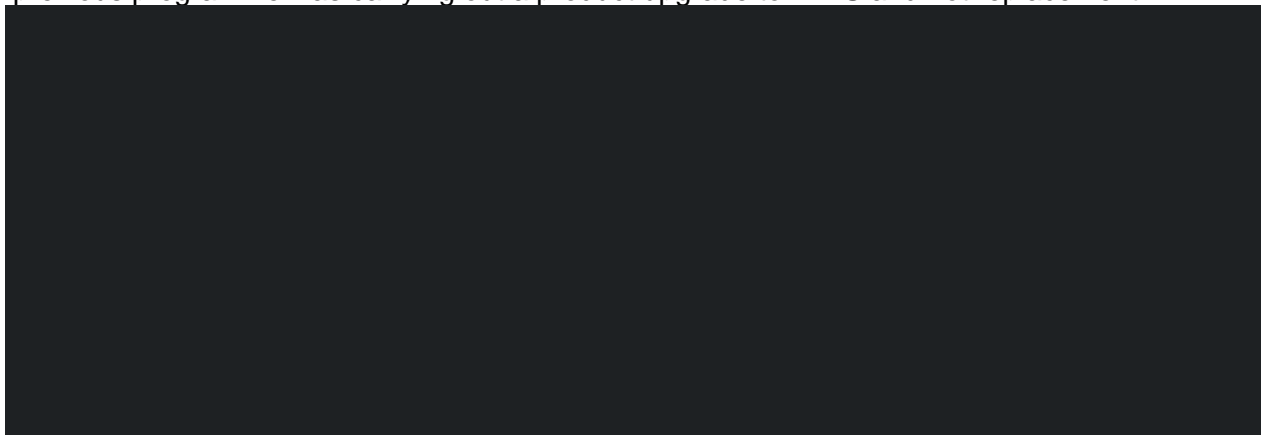
**Table 14.1 SCADA cost assumptions**

The spend outlined above is 100% allocated to the SCADA programme to complete the current stage activities. This was awarded as baseline in the Dec 2020 final determination. There is no change to this.

## 15. DELIVERABILITY AND MONITORING

### 15.1 Project plan

The programme plan shown reflects the strategy to minimise customisation and use out of the box functionality wherever possible. In comparison to the existing IEMS, the plan shows reduced timescales for development but extended implementation time, required to make the changes to business processes aligning to standard functionality, the development of NGET capability to support the new system and reflecting that the previous programme was carrying out a product upgrade to IEMS and not replacement.



*Figure 15.1.1 SCADA programme timeline*

**Current Stage Plan**

*Figure 15.1.2 SCADA current stage plan*



## 15.2 Risks

[illegible]

**Table 15.2.1 SCADA risks**

### 15.3 Governance

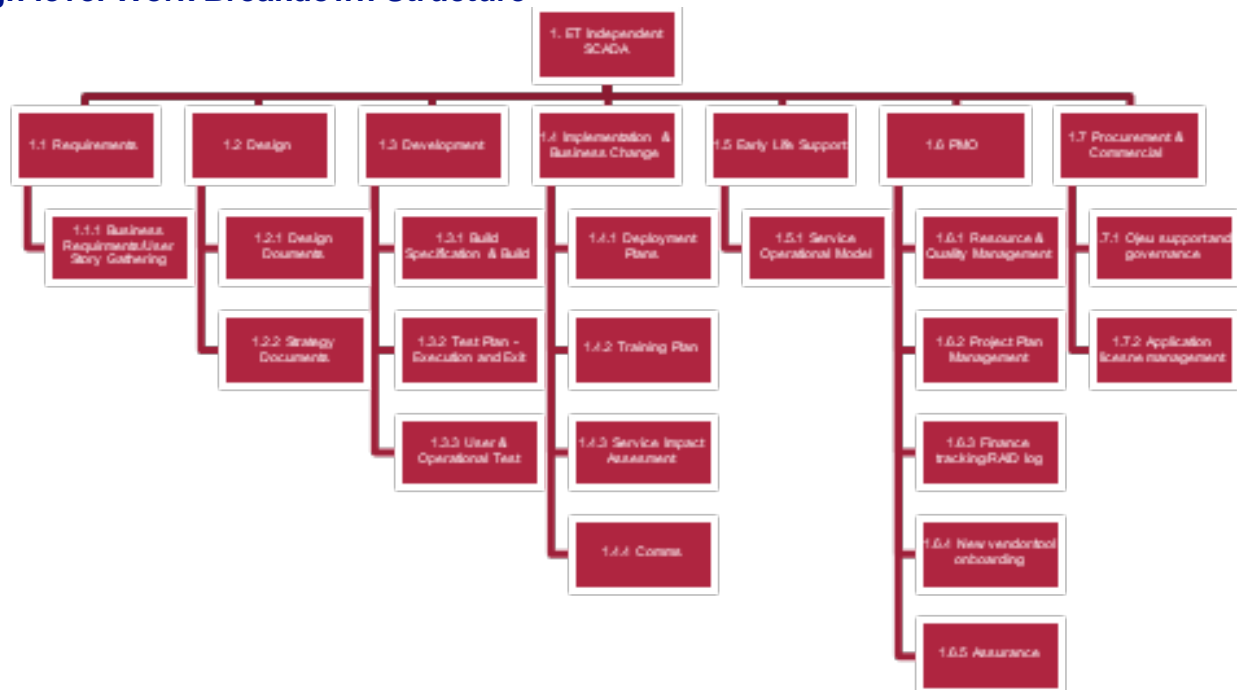
Given the scale and complexity of the programme a dedicated Programme Board has been established with delegated authority from ET Exec. The governance structure is outlined below:

**Figure 15.3.1 Governance Structure**





## High level Work Breakdown Structure



**Figure 15.3.2 High level work breakdown structure**

**Resource Requirements by Task**

ACTIVITY REFERENCE	TASK	RESOURCE TYPE	ESTIMATED SCALE (DAYS)
1.1	REQUIREMENTS	INTERNAL AND PARTNER	1000
1.2	DESIGN	INTERNAL AND PARTNER	2500
1.3	DEVELOPMENT AND BUSINESS CHANGE	INTERNAL AND PARTNER	5000
1.4	IMPLEMENTATION	INTERNAL AND PARTNER	2500
1.5	EARLY LIFE SUPPORT	INTERNAL AND PARTNER	500
1.6	PMO	INTERNAL	
1.7	PROCUREMENT & COMMERCIAL	INTERNAL	

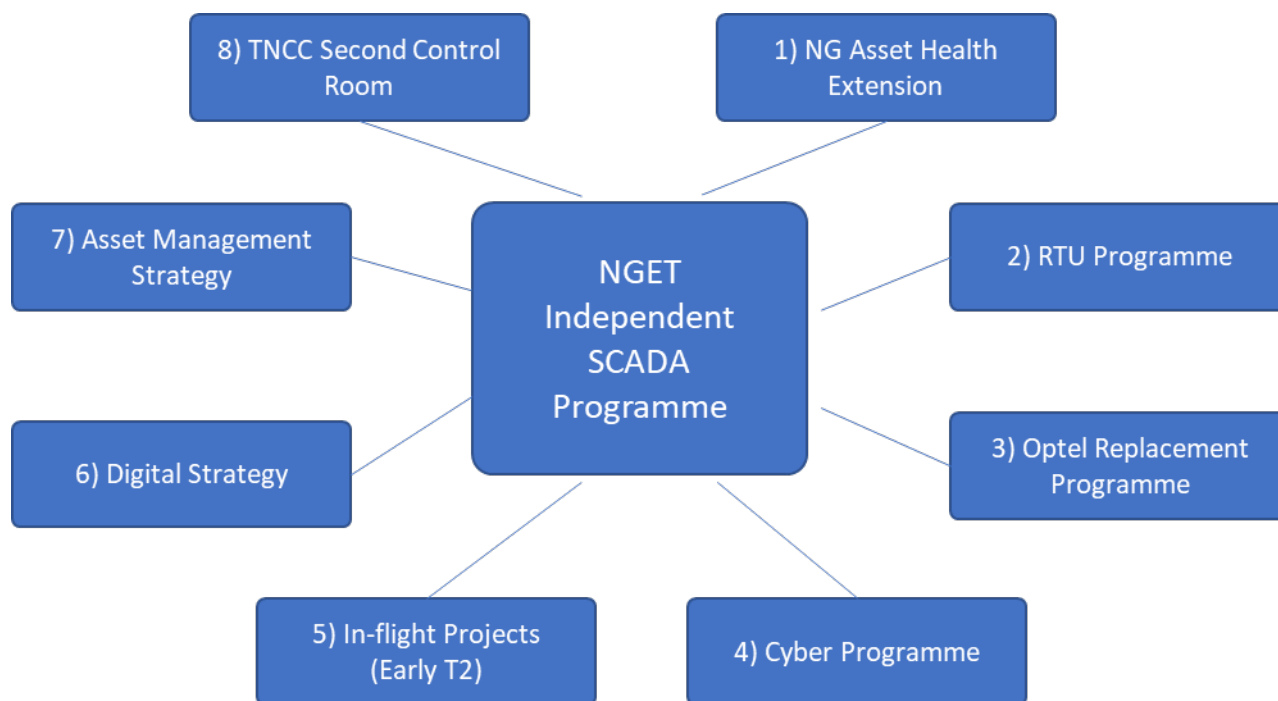
**Table 15.3.1 Resource requirements by task****Resourcing Requirement by Type – T2 Year 1**

Area	Roles	Total resource days	Resource Availability
IT	IT Programme Manager, IT Project Manager, IT Business Consultant, Solution Architect, Business Analyst Lead, Business Analyst Support	1086	Named Resources identified and secured
Cyber	Cyber Security Lead, Cyber Security Specialist	240	Named Resources identified and secured
CNI	CNI Lead, CNI Specialist	260	Named Resources identified and secured
Business Resource	Business Architect/Lead, TNCC Lead, TNCC Operations Control Engineer, TNCC Safety Control Engineer, TNCC Support Functions SME, Ops Lead, Ops Field SAP SME, Ops Lead ACE, EAM Asset Health Specialist, C&I Engineer	2002	Named Resources identified and secured
Procurement & legal	Procurement Manager, Procurement Specialist, Legal	324	Named Resources identified and secured
UK Change	Business Change Manager, Business Project Manager, Assurance, PMO	988	Named Resources identified and planned
External	Technical Architect, SCADA Specialist, Solution Architect, HMI Specialist, Sourcing SME, Business Requirements Specialist	660	supply chain engaged and resource availability confirmed
Business SME inputs optioneering and design workshops	Input from asset, operations, process, safety, engineering, planning, control and support to support optioneering, requirements and design activities	340	Business SME input identified and confirmed available

**Table 15.3.2 Resource requirements by type year 1****15.4 Dependencies**

The figure below depicts the dependencies between the NGET's SCADA programme and other activities, projects and programmes. The fundamental dependency is between NGET and NGESO, both via the IEMS life extension work currently being undertaken by ESO which will provide time for both NGET and NGESO to deliver a new SCADA and replacement EMS solutions, and the NGESO

IEMS replacement programme, which will enable NGESO to achieve Ofgem's target of full IT separation and provide them with an up to date and effective EMS solution.



To manage the life extension interdependency, NGET and NGESO will maintain close links at key stage gates, with aligned but separate governance models, and a joint design authority process for decisions affecting both parties.

The NGET SCADA programme has several interdependencies with other work being undertaken in NG during T2, including:

1. RTU upgrade programme – updating legacy RTUs from the GI74 communications protocol to modern IEC standards
2. OpTel upgrade programme – improving the communications infrastructure to provide bandwidth, speed and resilience for protection and control. Optel enhancements also provide a wider range of options for backup control facilities.
3. Other related digitisation and IT programmes outlined in the table below

Dependency	Description	Mitigation
1. <b>NG Asset health extension</b>	Analysis of current asset health life will impact the scope, timeline and business case for this programme. NG are developing options	<ul style="list-style-type: none"> <li>• NGET to be fully engaged in the process to ensure that the recommend the option most consistent with NGET's ambition.</li> </ul>
2. <b>RTU Programme</b>	The RTU upgrade programme is in flight and will continue through T2. The programme will update the RTU estate to remove the legacy, proprietary GI74 communications protocol and move to current IEC standards. This work will not be completed before the ET SCADA system is implemented.	<ul style="list-style-type: none"> <li>• Ensure that the chosen SCADA product has a proven solution to communication via GI74</li> <li>• Maintain close links with the RTU programme to coordinate RTU updates with SCADA installation and commissioning to</li> </ul>

		<p>avoid any scheduling or technical conflicts</p> <ul style="list-style-type: none"> <li>• Ensure that RTU requirements are used in selection and optioneering decision making processes</li> </ul>
<b>3. OPTEL Replacement Programme</b>	<p>Optel upgrade project will commence in T2 and will run alongside the NGET SCADA project. The intention will be to upgrade and enhance the existing infrastructure and resilience across our network. The improvements will not be defined during the NGET SCADA procurement stage.</p>	<ul style="list-style-type: none"> <li>• Select our vendor based on the existing physical OpTel infrastructure and software capabilities.</li> <li>• Our strategic and backup options will be constrained by the existing infrastructure.</li> <li>• Maintain close contact with the OpTel upgrade project team to ensure that changes do not have a detrimental impact on the SCADA project.</li> </ul>
<b>4. Cyber programme</b>	<p>The cyber security programme is implementing a range of security solutions, from physical site security, digital and behavioural changes. Security for a CNI solution such as SCADA is a primary requirement and the programmes must work closely to ensure that NG's security objectives are delivered</p>	<ul style="list-style-type: none"> <li>• Cyber specialists included within the SCADA team to identify and define requirements and evaluate products and solutions</li> <li>• Cyber standards and requirements used as a key criteria in selection and optioneering decision making processes</li> </ul>
<b>5. In-flight Projects (Early T2)</b>	<p>Major Business Applications: CNI Data Centre Programme</p> <ul style="list-style-type: none"> <li>• SCADA is dependent on the strategy that is adopted in terms of which data centre a new SCADA system would be hosted</li> </ul>	<ul style="list-style-type: none"> <li>• Close watch on in flight projects, create a common steering committee where the projects and dependencies can be tracked</li> <li>• Resource demand and correct projection to resourcing team if required form SCADA team</li> <li>• Flexible ADAM partner model allowing appropriate scaling up and down</li> </ul>
<b>6. Organisation/Digital strategy</b>	<ul style="list-style-type: none"> <li>• Digitalisation Strategy – potential to share asset data across the energy sector will determine sequence of projects</li> <li>• Energy Data Taskforce (EDTF) recommendations on digital mapping resulting in system enablement to publish pipeline data</li> </ul>	<ul style="list-style-type: none"> <li>• Continuous impact assessment of Industry trend and regulatory changes</li> <li>• Continuous revisions to Digital Strategy</li> <li>• Ongoing engagement with Ofgem and Catapult regarding EDTF requirements</li> <li>• Suitable funding, as outlined in submission, to enable required changes</li> </ul>
<b>7. Asset Management Strategy</b>	<ul style="list-style-type: none"> <li>• Asset Health and Management Strategy, policy and asset specifications will be in development throughout T2. Any changes could</li> </ul>	<ul style="list-style-type: none"> <li>• Asset Management specialists are embedded into the SCADA programme team to ensure that requirements are reflected in selection and</li> </ul>

	<p>impact SCADA in a number of ways, for example:</p> <ul style="list-style-type: none"> <li>• If a change resulted in work types moving from large scale capital projects to volumes of single asset type replacements, the SCADA system would need to efficiently accommodate a higher number of smaller scale switching operations and isolations.</li> <li>• Changes in technology or asset specifications could place additional requirements on the SCADA system to handle new types of alarms, asset types, configurations, etc</li> </ul>	<p>optioneering decision making processes</p>
<b>8. TNCC Second Control Room</b>	<ul style="list-style-type: none"> <li>• The move to independent SCADA and EMS systems prevents the ongoing sharing of control rooms for emergency switching and resilience. To meet code requirements NGET must create a second control room</li> </ul>	<ul style="list-style-type: none"> <li>• The TNCC second control room project is aligned with SCADA through shared governance to ensure that objectives, plans and outcomes are aligned and optimise the use of resources</li> </ul>

**Table 15.4.1 SCADA Dependencies**

## 16. CONCLUSION

IEMS is critical to the safe, secure and reliable operation of the electricity transmission system and investment is now required to maintain the integrity and resilience of this CNI system until it is replaced in 2026.

This IT Re-opener submission is requesting funding of [REDACTED] for the NGET contribution to the shared NGET/NGESO cost for the first year of the work required to extend the asset life of IEMS to 2026.

Further funding to complete the work will be requested once scope and costs are more certain. [REDACTED]  
[REDACTED] The additional funding will be requested via a subsequent re-opener around January 2022 and will deliver the essential upgrades required to maintain IEMS within vendor support at the most efficient cost for consumers.

This paper seeks [REDACTED] of allowances for Phase 2 of the TNCC2 programme, where scope and cost certainty is high and resource is mobilised. This is specifically to fund Phase 2 of the programme which covers detailed site specific optioneering, outline of the design and costing. This programme is mainly driven by the STC requirement to have a contingency control room for our operations, which with legal separation of ESO will be lost from our existing capabilities. As such, it was agreed at Legal Separation that the current contingency arrangements of shared IEMS, infrastructure and resilience plans built around shared facilities for both short and long-term disaster recovery in the event of loss of an NGET or NGESO Control Room, could only continue as an interim solution. Driven by STC compliance, and also IEMS replacement, we now need to deliver alternative contingency arrangements in the form of a new remote emergency control centre (TNCC2). This second control room aligns NGET with other TOs and meets stakeholder requirements and expectations including BEIS and aligns with the requirements of the National Infrastructure Commission's publication '*Anticipate, React, Recover Resilient infrastructure systems*' May 2020.

Optioneering and a CBA has been undertaken to consider different options for providing contingency arrangements, different control room options, and a suitable location for a Control Room. This has narrowed down options to three potential sites for a new Control Room which will be further assessed to determine the viability of each of these sites within the next phase of the programme.

The phased approach to our delivery and allowance request provides greater cost certainty for the consumer, with the allowances requested based on cost estimates of previous schemes. At this time, our Phase 3 cost estimates are of a lower cost certainty and therefore will be requested once we have a higher cost certainty through an authority directed re-opener (expected early 2022). At this point in time, we are not requesting any allowances for the SCADA programme, however are open to providing greater transparency for our stakeholders on our future projects and allowance requests.

A summary of the allowance request that we are making through this re-opener is detailed within the table below;

(£m)	2021/22	2022/23	2023/24	2024/25	2025/26
IEMS					
TNCC2					
SCADA					
Total					

## **APPENDIX**

### **Appendix 1 – Heatmaps for IEMS**

Software heat map for IEMS



Hardware heat map for IEMS

