national gas transmission

Peterborough Compressor Emissions Re-opener

June 2025

Contents

1 Summary Table

Name of Project	**Special Condition 3.11 Peterborough Compressor Emissions Re-opener and Price Control Deliverable**		
Scheme Reference/ Mechanism Category	[redacted] (Non Load Related Expenditure - Uncertainty Mechanism - Compressor Emissions - Peterborough UM) and [redacted] (Non Load Related Expenditure - Baseline - Compressor Emissions - Peterborough Feasibility) Special Condition 3.11: CEPt – Price Control Deliverable term CEPREt – Compressor Emissions Re-opener term		
Primary Investment Driver	Compliance with MCPD Legislation		
Project Initiation Year	2019		
Project Close Out Year	[redacted]		
Submission Estimate at Completion (EAC) £m, 2018/19)	[redacted]		
Funding Request (CEPOt) (Forecast expenditure from 1 April 2025 for direct costs incl. risk contingency, £m, in 2018/19 prices)	[redacted]		
Cost Estimate Accuracy (%)	[redacted]		
Project Spend to date as of 31 March 2025 (£m, in 2018/19 prices)	[redacted]		
Current Project Stage Gate	ND500 (4.4) Project Execution		
Reporting Table Ref	RRP Table 6.2 (Projects) and Table 6.1 (CAPEX Summary)		
Spend Apportionment for EAC (£m, in 2018/19 prices)	**RIIO-T2**	**RIIO-GT3**	**RIIO-GT4**
	[redacted]	[redacted]	[redacted]

Table 1 Summary Table

2 Executive Summary

2.1.1 National Gas (referred to in this regulatory submission as 'NGT, we, us and our') is submitting this funding request under the RIIO-T2 Compressor Emissions Re-opener and Price Control Deliverable Uncertainty Mechanism, in accordance with Licence Special Condition 3.11, Part D and E, as per the Re-opener Guidance and Application Requirements Document[1] ('the Guidance') and as per Price Control Deliverable Reporting Requirements and Methodology[2].

2.1.2 We are committed to reducing the impact of our activities on the environment. Critical to this is ensuring that our compressor fleet meets emissions limits as set out in the Medium Combustion Plant Directive[3] (MCPD), while meeting our 1-in-20 peak demand obligation and maintaining resilience to ensure Security of Supply.

2.1.3 Our Final Option Selection Report (FOSR), included as Appendix A, was submitted to Ofgem under Special Condition 3.11, Part C of the Licence in January 2023.

2.1.4 On 10 November 2023, Ofgem published its Final Determination[4] on our preferred option in which they approved "the installation of a new gas turbine driven compressor unit of approximately 15 MW output power[5] to be commissioned by 2030". Subsequently, the legacy SGT-A20 (Avon) Unit A compressor is to be decommissioned, subject to a reassessment following operational acceptance of the new unit.

2.1.5 Since submission of the FOSR, we proceeded with a pre-feasibility Study from May 2023 until February 2024 to enable development of early delivery plans and basis of design documents. This was an important step in ensuring readiness for the feasibility study from July 2024 onwards and was beneficial in identifying the asset health investment[6] applicable to Unit A. This is outlined in detail in section 6.3.

2.1.6 Following a full tender evaluation[7], [redacted] ("the Contractor") were awarded the Main Works Contract (MWC) under a 2-Stage New Engineering Contract – Version 4 (NEC4) Engineering and Construction Contract and Design and Build Contract on 5th July 2024. This contract type was selected, following market consultation with [redacted], to enable early collaboration and engagement with the Contractor, via the X22 Early Contractor Involvement (ECI) clause, to prioritise scope definition and cost estimate development ahead of the re-opener submission. The 2-Stage ECI contract model was split into Stage 1A (feasibility study to define the scope and to establish the cost estimate to deliver the project to +/-15% accuracy), Stage 1B (detailed engineering activities, procurement of long lead items and site setup while awaiting Ofgem's final determination on the re-opener submission) and Stage 2[8] (remainder of detailed engineering activities, construction and commissioning).

[1] Version 3, published in April 2023
[2] Version 4, published in August 2023
[3] MCPD requires that our existing compressor fleet, between 1 MW and 50 MW net thermal input, must not exceed a Nitrogen Oxide (NOx) emissions limit of 150 mg/m³ by 1 January 2030.
[4] Ofgem Peterborough and Huntingdon - Final Preferred Option
[5] Size was defined as approximately 15 MW output power as this was to be determined during the compressor procurement event
[6] Unit A asset health investment was descoped from the Peterborough MCPD project, but critical investment has been included in the RIIO-GT3 plan.
[7] Despite contracting directly with the MWC, NGT performed an evaluation which challenged the Contractor in their competency, proposed personnel and sub-contractors, cost methodology, commercial rates/fee and defined the Key Performance Indicators for use during ECI Stage 2.
[8] Pending issue of a Notice to Proceed following completion of Stage 1

2.1.7 [redacted] ("the OEM"), who installed two [redacted] as part of the original Emissions Reduction Phase 3 (ERP3) project, were contracted as Original Equipment Manufacturer (OEM) on 31st October 2024 for the delivery of a 15.3 MW [redacted] machinery train package. A five-month technical compliance exercise ensured the OEM technical scope met our specifications, standards and performance requirements. We drove value for consumers by challenging the OEM on their cost proposal, which resulted in a reduction of [redacted] in their Best and Final Offer (BAFO). In parallel, we benchmarked this price against normalised, outturn costs from Unit D and E to ensure that the proposed cost was efficient and competitive[9] while remaining mindful of macroeconomic impacts during the period: COVID-19, Brexit and the 2022 Ukraine invasion. In addition to the BAFO, we have also identified additional scope items which contribute to the "vendor package cost" total value of [redacted]. This is outlined in detail within section [redacted].

2.1.8 We have directly procured the compressor and auxiliary systems and will free issue these to the Contractor for installation. We adopted this approach, as opposed to Contractor procuring the equipment, to maintain the contractual relationship with the OEM over the 25-year design life of the unit. This strategy is intended to maximise cost efficiency and ensure the system meets NGT's stringent technical, environmental and operational requirements. Project scope and division of responsibilities across the three main parties were defined by adherence to existing planning permission conditions, division of responsibility workshops, compliance with standards and specifications and encapsulated lessons learnt from historic NGT projects. During the OEM tendering phase, both the OEM and the Contractor collaborated with us via dedicated workshops to produce a comprehensive reference document which covers 51 scope elements, including themes like site installation, testing and commissioning, main equipment supply and interfaces (all major systems and sub-systems), functional safety, noise, foundation design and transportation study. We provide a schematic which visually demonstrates this complex relationship in Appendix M.

2.1.9 In November 2024, we received a comprehensive cost build-up from the Contractor to support their ±15% estimate. To drive value for NGT and consumers, we undertook a robust review of all elements of the Contractor's cost estimate including resourcing, risk, design, supply chain, programme and materials. Over a three-month consultation period and following [redacted] their proposal, we worked collaboratively with the Contractor to refine their submission. This resulted in an [redacted] and [redacted]. The total value of the Contractor's scope inclusive of risk is identified as [redacted][10], which includes incurred spend. This is outlined in detail within section 6.4.

2.1.10 The market conditions we operate in are constrained, with a limited number of contractors possessing the necessary expertise to develop and deliver a project of this scope and scale. This scarcity exerts upward pressure on prices and significantly contributes to high contractor costs. Additionally, evolving geopolitical factors, such as the war in Ukraine, Brexit and the post-pandemic recovery, have led to substantial increases in material costs over the past five years. According to the Department for Business and Trade[11], the price of all types of building materials has risen by 37% since January 2020.

2.1.11 To assess the reasonableness of the Contractor's cost proposal, we engaged with [redacted][12] to update their FOSR estimate in line with changes in scope since 2022. This independent third-party assessment determined that the Contractor's +/- 15% cost proposal, following the [redacted], was within [redacted] of their less accurate +/- 30% cost estimate. More information on this assessment can be found within section 6.7.

[9] [redacted]

[10] [redacted]

[11] https://www.cladco.co.uk/blog/post/building-material-prices

[12] Consultant engaged in the Peterborough MCPD Final Option Selection Report study who prepared a +/-30% cost estimate to support comparison of the shortlisted options

2.1.12 We are responsible for overseeing project delivery and promoting efficient and effective interface between Contractor and OEM to ensure design, construction and commissioning activities are compliant with our full range of safety, quality and technical specifications and standards. To achieve this objective, we have identified a range of cost elements including internal staff and operations resources, independent third-party specialists to support us in delivering our commitments and our project risk contingency. Our Direct Company Cost (excluding risk) is identified as [redacted]. Section 6.6 includes detailed information on NGT costs[13].

2.1.13 We have identified a [redacted] project risk contingency, representing [redacted] of the EAC at a P50[14] confidence level, to mitigate against potential cost and schedule impacts. Given the complexity of modern compressor projects that span multiple years, involve extensive supply chains, and operate within a dynamic regulatory and economic environment, we consider this level of contingency appropriate. Past NGT delivery challenges[15] and experience do not support a uniform, percentage-based risk allocation approach. Instead, we advocate for a project-specific assessment of risk, reflecting the unique characteristics and challenges of each project. Additional supporting justification is provided in section 6.11.

2.1.14 An Estimating Uncertainty (EU) allowance has been included in this submission to reflect the potential variability in the EAC due to the current level of scope definition and design maturity. In line with the Infrastructure and Projects Authority (IPA) guidance, EU has been modelled separately from risk and was applied to the Estimated Cost to Complete (ECC) using a defined range of [redacted]. The uncertainty was quantified through a Monte Carlo simulation, with the P50 value established at [redacted]. This provides a robust view of cost confidence and ensures alignment with best practices in cost forecasting and regulatory reporting.

2.1.15 This re-opener submission details cost, technical, procurement, delivery strategy and risk management information meeting requirements of the Guidance. A robust and transparent Cost Book (Appendix C) has been developed, inclusive of Ofgem's guidance and historic feedback, to succinctly represent the requested funding allowances and necessary granular detail required to enable appropriate review and evaluation of the costs.

2.1.16 We request a re-opener direction from Ofgem to modify outputs, delivery dates and associated allowances (CEPOt) totalling [redacted]. Our delivery programme is contingent upon NGT entering financial supply chain commitments and contract award by December 2025 (ahead of the delivery of the OEM equipment to site). As our internal governance requires clarity of the regulatory position prior to such commitment, we request that Ofgem assess this application in line with its Standard Assessment Tier, with an estimated time from point of submission to decision of 3-6 months. Accordingly, we request Ofgem target Draft Determinations (DD) by 30th September 2025 and Final Determinations (FD) by 31 December 2025. This is aligned with Ofgem's re-opener guidance, para A11.21. As such, we are keen to support Ofgem in their review process to permit a timely decision. This will ultimately lead to operational acceptance of the new unit before 1 January 2030, the MCPD legislative deadline.

2.1.17 Due to Peterborough and Huntingdon compressors performing similar roles on the network, their interlinkage in terms of capability and performance as well as proximity of both sites, a joint FOSR proposal for Peterborough and Huntingdon was submitted to Ofgem for approval in January 2023.

2.1.18 Following Ofgem's approval of the preferred option in November 2023, we made the decision to separate the Huntington and Peterborough re-opener submissions into standalone submissions, reflecting the difference in technical scope and delivery strategy. This is detailed in the Peterborough and Huntingdon Compressor Emissions Re-opener Cover Note submitted alongside this document.

[13] NGT costs are labelled as 'Client Costs' in some reference of the Cost Book (Appendix C).

[14] A P50 confidence level means there's a 50% probability that a cost or project completion date will be within a certain range, as determined by Monte Carlo simulation. Essentially, with a P50 confidence level, we are 50% certain that the actual outcome will fall on or before the specified date or cost.

[15] [redacted]

2.1.19 All costs presented in this document are in a 2018/19 price base (or an explanation is provided if it is otherwise).

2.1.20 Throughout this document, the term 'Contractor' should be understood to refer to [redacted] unless otherwise specified. Similarly, the term ‘OEM’ should be understood to refer to [redacted].

3 Project Status and Request Overview

3.1 Introduction

3.1.1 At Peterborough the site historically consisted of three SGT-A20s (Avon's) Units A, B and C, of which Unit B and C are being replaced and decommissioned. Two [redacted] compressor machinery trains were supplied by [redacted] and installed in berths D and E as part of the ERP3 project, under Integrated Pollution Prevention and Control (IPPC) regulations to improve local air quality. The commissioning of the new Units D and E will allow Units B and C to be removed from service prior to decommissioning in 2025 and 2026. Unit A is not compliant with MCPD legislation and once Unit F has achieved operational acceptance will be decommissioned pending an assessment of its criticality to the network.

3.1.2 illustrates the locations of the units, highlighting the foundation where Unit F is proposed to be situated adjacent to the newly established Units D and E. Table 2 provides specifications and designations for these units.

Figure 1 Aerial view of Peterborough Compressor Station

Unit	Specification	Designation
A	Avon (SGT-A20)	Currently required to support Unit D and E. Decommissioning to be assessed once Unit F operational.
B	Avon (SGT-A20)	[redacted]
C	Avon (SGT-A20)	[redacted]
D	[redacted]	[redacted]
E	[redacted]	[redacted]
F	[redacted]	[redacted] (funding subject to this re-opener submission).

Table 2 Current and proposed units at Peterborough

3.1.3 As part of the option selection stage, supported by [redacted], we have considered a full suite of solutions to enable Peterborough to comply with MCPD. The options shortlist was derived where each of the main solutions, as seen in Table 3 were represented across five options.

Peterborough Costed Option Shortlist	Unit A[16]	Unit B	Unit C	Unit D	Unit E	Unit F
1 – Counterfactual	500Hr EUD	Removed	Removed	No Change	No Change	/
2 – 1 x CSRP	CSRP Retrofit	Removed	Removed	No Change	No Change	/
3 – 1 x 1533 DLE	1533 DLE Retrofit	Removed	Removed	No Change	No Change	/
4 – 1 x SCR	SCR Retrofit	Removed	Removed	No Change	No Change	/
5 – 1 x New Unit	Decom.	Removed	Removed	No Change	No Change	New Unit (Brownfield)

Table 3 Peterborough Option Shortlist Presented in FOSR

3.1.4 We assessed costed shortlisted options against key investment criteria, evaluation models such as Cost Benefit Analysis (CBA) and Best Available Technology (BAT), and have considered solution technical maturity and estimated total installed cost. This allowed for comparison between options and ensured that our final preferred option achieves our core investment requirements and network needs, as well as provides value for money for consumers and avoids over-investment leading to asset stranding.

3.1.5 A new unit at Peterborough scored highest in terms of network versatility, maintainability and emissions in the BAT assessments. It offers fuel efficient operation, long-term reliability, high availability, and low emission compression. Modern compressor units feature the most up-to-date technology and support packages, which provides a degree of future proofing against changes in energy legislation leading to 2050.

3.1.6 Project Status

3.1.7 Peterborough, central to National Transmission System (NTS) operations, is required to meet our 1-in-20 peak demand obligation and requires fully capable back-up as outlined within the Transmission Planning Code (TPC). Compressor failure is more likely to occur than a 1-in-20 demand day, therefore compressor standby is required to maintain transmission capability in the event of a credible loss of any single compressor unit.

3.1.8 Following the evaluation process, the FOSR recommended the installation of a new gas-driven compressor unit at Peterborough. Ofgem approved our preferred option and decommissioning of the remaining Peterborough SGT-A20 (Avon) Unit A is to be assessed after operational acceptance of the new unit. Funding to decommission the non-MCPD compliant unit has been excluded from this request, as decommissioning will only be considered after operational acceptance of the new unit.

3.1.9 The new unit will be installed on the existing berth F and will operate in parallel[17] with one of the two [redacted] based compressor machinery trains on berths D and E. Unit D and E achieved Operational Acceptance in [redacted].

[16] Acronyms: Dry Low Emissions (DLE), Control System Restricted Performance (CSRP), Selective Catalyst Reduction (SCR), Emergency Use Derogation (EUD)

[17] Only two compressor units can provide compression at any one time. The third [redacted] compressor will serve as back-up in the event of lead unit downtime.

3.1.10 [redacted] were responsible for completing engineering (using [redacted] Engineering Design), construction and commissioning of Units D and E at Peterborough. The Contractor was present on site until operational acceptance and handover in [redacted] with a two-year defects period following project completion. Delivery options for Unit F included the potential to extend the contract with [redacted] which was pursued. As detailed in section 6, the decision was made to directly award the ECI 2-stage contract to the incumbent [redacted] serving as both the delivery partner and the contractor.

3.1.11 Network Development Process (NDP500) Stage 4.3 was sanctioned in June 2024 to fund a feasibility study in order to estimate the costs to deliver the project and establish the project programme of works. The project was sanctioned at ND500 Stage 4.4 in June 2025 to approve the cost proposal and the programme of delivery.

3.1.12 We have engaged with the local community via letter drop and attended the Glinton Parish Council to provide project updates in separate sessions in June and December 2024. External stakeholders wanting to find out come about the project can visit our website and/or contact our community relations team at contact@communityrelations.uk.com. We engage with Ofgem as part of the pre-application engagement on regular basis to ensure they are informed of project milestones and timescales.

3.2 Request summary

3.2.1 This submission has been prepared as part of the RIIO-T2 Compressor Emissions Re-opener and Price Control Deliverable (PCD) in accordance with Licence Special Condition 3.11, Part D and E, as per the Re-opener Guidance and Application Requirements Document and as per Price Control Deliverable Reporting Requirements and Methodology.

3.2.2 Special Condition 3.11 of the National Gas Licence relates to Compressor Emissions re-openers and enables National Gas to request adjustment to the value against the following licence terms:

- Price Control Deliverable term – CEPt
- Re-opener allowance – CEPOt

3.2.3 Our request for funding through this document is made against Special Condition 3.11 Compressor Emissions Re-opener and Price Control Deliverable and is outlined in Table 5.

FOSR Baseline Funding and PCD Assessment

3.2.4 In accordance with licence condition 3.11, Part E, our submission seeks to provide details of actuals and forecast (i.e. true up) of Baseline allowances (Appendix 1 of the Licence) received to allow Ofgem the assessment of the current PCD (Appendix 2 of the Licence).

3.2.5 We were awarded [redacted] (2018/19) Baseline funding for Peterborough and Huntingdon Compressor Stations. Section 3.3 details the current PCD.

3.2.6 It is our view that the current PCD is fully delivered given we have submitted the FOSR (in January 2023), procured long lead items (section 6 provides details on this) and submitted this re-opener aligned to Ofgem's approved final preferred option. As part of this submission, we have submitted a Cover Note which details our approach to splitting the Peterborough and Huntingdon PCD and Baseline allowances following Ofgem direction on the re-opener submissions for both sites.

3.2.7 As detailed in the Cover Note, the allocated Baseline allowance for Peterborough is [redacted]. The spend to date against Baseline allowances is [redacted] (as of 31 March 2025), which is [redacted] the allowances. Detail on spend to date is included in section 6 and has been quantified within the Peterborough Cost Book (Appendix C). The Baseline funding allowed was to cover development costs and deposits on long-lead items and were set as part of the Ofgem RIIO-T2 Final Determinations in 2020.

3.2.8 This submission follows Price Control Deliverable Reporting Requirements and Methodology, in which paragraph 7.4 details that where the delivery of a PCD output is a trigger for a re-opener submission or is the re-opener submission, the PCD assessment will be undertaken as a part of the re-opener assessment. In addition, Ofgem's RIIO-T2 Final Determination notes that Ofgem expects to true up baseline funding as part of the Compressor Emissions Re-opener events. As part of pre submission engagement, we have raised the issue of how and when Ofgem intends to approach the true up and PCD assessment. Ofgem and NGT leads continue to progress this matter as at the point of submission.

Site	Output	Delivery Date	Re-opener application window	Total allowance (all years) (£m, in 2018/19 prices)
Peterborough and Huntingdon	Final Option Selection Report[18]	01/2023	06/2025	[redacted]

Table 4 Special Condition 3.11, Appendix 2 – Compressor emissions Price Control Deliverable – Peterborough and Huntingdon only

3.2.9 Re-opener Allowances Request

3.2.10 Our total funding request (CEPOt) to deliver the new gas driven compressor unit at Peterborough is [redacted], which is funding for direct costs only to modify the outputs, delivery dates and allowances detailed in Appendix 2 of Special Condition 3.11. Funding to decommission the non-MCPD compliant unit has been excluded from this request, as decommissioning will only be considered after operational acceptance of the new unit.

3.2.11 This re-opener application is proposing revised outputs, delivery dates and allowances detailed in Appendix 2 of the Licence. We will continue reporting on PCD progress and spend as a part of the annual Regulatory Reporting Pack (RRP).

3.2.12 Table 5 below sets out the total funding request for National Gas to deliver the scope of Special Condition 3.11 at Peterborough. The direct costs aligned to CEPOt represent the allowances requested, as this licence condition is subject to the Opex Escalator (Special Condition 3.18 of the National Gas Licence).

£m 2018/19	RIIO-T2					RIIO-GT3				Total
	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	
Current Allowances										
Baseline (CEPAt) (Peterborough only)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Non-Baseline (CEPOt)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Actual/ Forecast/ Requested Allowances										
Actual Spend against Baseline PCD (direct + indirect costs)	[redacted]	[redacted]	[redacted]	[redacted]						[redacted]

[18] As per Ofgem's RIIO-T2 Final Determinations published in December 2020, this PCD is to ensure National Gas delivered a Final Options Selection Report, long lead items and the re-opener submission.

Non-Baseline Allowance Request (CEPOt)[19]					[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 5 Phased Peterborough MCPD Compressor Emissions Re-opener Funding Request

3.2.13 Ofgem are invited to assess and approve our cost proposal to deliver the final preferred option at Peterborough in line with Special Condition 3.11, Part E and F.

3.2.14 In accordance with section 2.2 of the Re-opener Guidance and Application Requirements Document this application is accompanied by an assurance statement (Appendix L) to comply with Ofgem's requirement for written confirmation from a suitable senior person within the company that the re-opener application has been appropriately assured. (Appendix K) presents a cross-reference to indicate where each of Ofgem's re-opener application requirements guidance is fulfilled within our submission.

3.2.15 Our designated point of contact for this re-opener application is [redacted].

3.2.16 In line with section 2.4 and 2.5 of the Re-opener Guidance and Application Requirements Document, this application documents and supporting business case documents will be published in their entirety within five days of submission, with only necessary redactions where appropriate. Publication will include an explanation for redactions.

3.3 Price Control Deliverables

3.3.1 As part of this submission, we are requesting to modify the outputs, delivery dates and allowances detailed in Appendix 2 of the National Gas Licence. Table 6 details the proposed adjustment with the revised outputs to deliver the final preferred option for Peterborough approved by Ofgem.

Site	Output Description	Delivery Date
Peterborough Compressor Station	Deliver one gas turbine driven compressor unit which has operational acceptance, as evidenced by the achievement of Operational Acceptance Certificate (OAC) by the Delivery Date to achieve MCPD compliance. OAC also confirms new compressor capacity and emissions compliance.	[redacted]
Peterborough Compressor Station	Implementation of noise mitigation measures for new compressor Unit F to address potential planning condition non-compliance. Extent of mitigation measures are to be evidenced by independent noise survey following completion of commissioning activities on Unit F project.	[redacted]

Table 6 Proposed update to Special Condition 3.11, Appendix 2 – Compressor Emissions Price Control Deliverable – Peterborough

3.3.2 We are seeking two standalone PCDs for Peterborough compressor station. The first output will deliver the new gas driven compressor unit as approved by Ofgem as the final preferred option following the FOSR submission. The second output has been agreed as part of the pre-application meetings with Ofgem to allow for potential investment in noise mitigation measures post new unit commissioning in [redacted], should the noise caused by the new unit exceed permitted noise levels.

[19] This excludes the funding request for the Noise PCD

3.3.3 Peterborough Noise PCD Allowances Request

3.3.4 As part of the delivery of the new unit, we are ensuring the design reduces requirements for any noise mitigation post commissioning. However, until a noise assessment is completed there is a high potential likelihood that additional noise mitigation could be required. The PCD is proposed to avoid including additional risk contingency into the core funding request to deliver the new unit in line with the MCPD compliance date.

3.3.5 Modern gas-turbine and compressor packages are very loud sources of industrial noise with levels exceeding [redacted] in discharge pipework ([redacted] data). However, the Compressor Acoustic Building (CAB) (including the exhaust stack and air intakes) is designed to attenuate this noise to circa [redacted] when recorded one metre from the unit.

3.3.6 Interconnecting pipework should be designed to achieve appropriate acoustic performance using acoustic enclosures or cladding. OEMs typically provide performance guarantees (including acoustic performance). However, this is difficult to verify until unit commissioning.

3.3.7 [redacted]

3.3.8 We have included costs for an appropriate level of acoustic mitigation within the funding request to deliver Unit F. We have also incorporated acoustic testing into the Factory Acceptance Test (FAT) at the OEM's manufacturing facility and separately at the Compressor Acoustic Building (CAB) supplier. This will give us an opportunity to validate near-field theoretical acoustic performance and address any concerns in advance of site installation and commissioning. Defined roles and responsibilities for entire project scope including acoustic performance and data sharing have been implemented resulting from lessons learnt from previous compressor projects. The Contractor's proposed design includes the burying of the suction and discharge pipework where possible as well as acoustic treatment for all exposed pipework. Section 6.4 includes further detail on this.

3.3.9 Despite the actions described above, there is no certainty that noise mitigations will be wholly successful in achieving acoustic performance given system complexity. Any further noise mitigation that might be required to meet planning conditions is not likely to be known until after [redacted] during unit commissioning when gas is introduced to the system. Only then it will become possible to fully assess the acoustic performance of the gas turbine and compressor package, compressor acoustic building, interconnected suction/discharge pipework and associated valves, filters and gauges, supporting steelwork, exhaust stack and air intake structures.

3.3.10 We propose the standalone PCD with funding to enable any actions required to bring the noise levels in line with planning conditions. We are continuing to progress an acoustic design study with a noise specialist to establish actions and costs to be taken for any additional required noise mitigation not included in the core scope of the new unit funding request. We have engaged with Ofgem on this topic ahead of the re-opener submission and an estimate will be provided to Ofgem for consideration within the re-opener consultation period for Peterborough[20].

3.3.11 As part of this we will update our funding request (CEPOt) to address potential noise mitigation following the commissioning of the new gas driven compressor unit (Unit F).

3.3.12 Ofgem will be able to review efficiency of the incurred spend and noise mitigation scope delivered as part of the PCD process that will be in place for RIIO-GT3. This will enable us to access funding without the need to include additional cost and risk contingency into the core funding request to deliver Unit F.

[20] A cost of [redacted] has been identified within the Cost Book (NGT subcontract – unlet) to support definition and costing of an acoustic enclosure to meet worst case noise performance on Unit F.

3.4 Incurred spend

3.4.1 Table 7 details the incurred spend to date (up to 31 March 2025) inclusive of feasibility studies, vendor package and project management costs aligned to our received Baseline allowances. Further details on spend to date are included in section 6.6

£m 2018/19	Incurred spend to date (£m)					Total (all years)
	2021/22	2022/23	2023/24	2024/25	2025/26	
Peterborough	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 7 Incurred Spend to Date

4 Problem/opportunity statement

4.1 Statement

4.1.1 We are legally obligated to have our compressor fleet compliant with MCPD legislation by 1 January 2030. The three SGT-A20 (Avon) compressors at Peterborough Compressor Station, Units A, B and C, fall within the MCPD category and can breach the NO_x limits imposed. Units B and C are being replaced with new units under IPPC, and Unit A will be reviewed for decommissioning once the new Unit F is operationally accepted.

4.1.2 Without a third fully operational unit at Peterborough, the NTS faces significant operational risk after the legislative deadline, particularly in the event of a 1-in-20 demand scenario (see section 5). The station's strategic location is critical for enabling zonal transfer and line-pack management. Without these capabilities, we cannot guarantee meeting our exit requirements in both the South-East and South-West regions of the network.

4.1.3 At the time of this submission, Units D and E [redacted] have been installed and are operationally accepted, replacing the capability previously provided by Units B and C. Once decommissioning of Units B and C is completed, there will be a total of three operational units at Peterborough, including Unit A.

4.1.4 Peterborough's two [redacted] will operate in parallel to meet high flow requirements. To maintain the required level of site resilience, an unrestricted unit with a high level of availability is required as a backup, to maintain parallel operation and uphold our 1-in-20 peak demand obligation.

4.1.5 The approved final preferred option supports the fleet's operational and availability requirements. Forecasts have shown that the third unit at Peterborough will be operated in excess of 500-hours a year to prevent network constraints. Parallel operation is required at both Peterborough and Huntingdon to enable our 1-in-20 peak demand obligations.

4.1.6 The final preferred option provides the right level of network capability and delivers a reduction in greenhouse gas emissions and fuel usage. This option has been selected from a range of potential options that have been evaluated against a range of potential future operating scenarios and represents the best solution to meet the future network requirements.

4.2 Related Projects

4.2.1 **Huntingdon MCPD:** The Huntingdon site is located to the south of Peterborough and alongside Peterborough is critical to the supply and demand of South-East and South-West. The preferred option approved by Ofgem will drive asset health investment on site to improve availability of Huntingdon Unit C which is to be retained under Emergency Use Derogation.

4.2.2 **King's Lynn MCPD:** King's Lynn is located to the east of Peterborough and will form a part of a compressor chain under certain scenarios when moving large volumes of gas towards or away from Bacton. King's Lynn MCPD's scope of works covers decommissioning of Unit A, asset health investment in Unit B and Re-wheel of compressor Units C and D.

4.2.3 **Other MCPD Projects:** The Delivery Programme in this submission are concurrent with compressor unit investment at other MCPD impacted sites: Wormington and St Fergus.

4.2.4 **ERP3 investment:** Commissioning of two [redacted] units at Peterborough to replace the two non-compliant SGT-A20 (Avon) units was completed with signoff of the Operational Acceptance Certificate in [redacted]. This project is now in the closure phase.

4.2.5 **RIIO-T2 Decommissioning:** Decommissioning of the two units has been funded and is scheduled to start in [redacted]. Lessons learned and detailed engineering from the ERP3 project and MCPD pre-feasibility study have been utilised to aid the development of this project.

4.2.6 **RIIO-T2 Funded Asset Health Scope:** For the purpose of this submission, we have assumed that any asset health scope at Peterborough that has already been funded in RIIO-T2 will be completed prior to the MCPD project site mobilisation. There is no known impact from works planned on the scope of this project.

4.2.7 **RIIO-GT3 Asset Health Scope:** The asset health works will take place on Units D and E in RIIO-GT3. There are site wide interventions related to [redacted], Gas Quality and Metering (Flow Control Valves), Gas Turbine (Burner Acoustic Monitor System v.2.0) and Compressor overhauls. These interventions will not have any known impact on the new Unit F works, since they are not major projects and will be delivered at various time within the RIIO-GT3 price control period.

4.2.8 **CH4RGE Project**: The CH^4 Reduction from Gas Equipment (CH4RGE) innovation project is a compressor seal and venting gas recovery system. The objective of this project is to capture natural gas from the compressor, which would otherwise be released to atmosphere, recompress it and inject it back into the suction pipework for re-use. This project is part of a wider proof of concept trial across the NTS and is planned for implementation on Peterborough Unit D. Due to its close proximity to Unit F working area, there is an interface risk which is identified in our project risk register. This risk is actively being mitigated through close working relationship and regular interface meetings between both projects.

4.3 Project Boundaries

4.3.1 The scope of this project is delivery of emissions compliant compression which meets forecast network capability requirements. This re-opener summarises the costs associated with construction of a new compressor unit. Funding for other costs, such as ongoing asset health costs and operational running costs for the existing units and site, is not included in this re-opener submission.

4.3.2 Decommissioning costs for Peterborough Avon compressor Unit A were included within the FOSR. However, a request for decommissioning funding is not included within this cost re-opener as the decommissioning investment will be reassessed once the new unit has been operationally accepted. When required, funding will be requested as part of our future decommissioning business plan.

4.3.3 Peterborough Compressor Station site boundary remains consistent with the National Gas ownership boundary. Figure 2 identifies (in blue) the NGT site ownership boundary at Peterborough. No additional land take is planned to support the Unit F project. The temporary construction area identified (in pink) will be used for Unit F project construction activities whereupon it will be returned to agricultural use following project completion.

Figure 2 - Peterborough Site Boundary (Peterborough City Council Planning Application Ref: [redacted])

5 Project definition and business case outline

5.1 Network Operational Need

5.1.1 Peterborough Compressor Station continues to be one of the most important compressor stations on the NTS. It is located at a strategic multi-junction that conveys gas in multiple directions to meet geographical and national demand. The key network operational need for Peterborough compression can be summarised to:

5.1.2 **Meeting 1 in 20 demand requirements in the South-West:** Peterborough, along with other southern compression, plays a crucial role in meeting our Exit capability requirements in the south of the network. They are required to maintain our compliance with the 1-in-20 security standard in the South-West of the network.

5.1.3 **Zonal Transfer**: Peterborough compression is essential for the economic and efficient operation of the NTS. Its most important role is to provide the ability to transfer flows, depending on the prevailing supply/demand scenarios:

- North to South - especially when supply from Isle of Grain/Bacton and or imports over the interconnectors are zero or low
- East to West – while importing via the interconnectors
- South (low Milford Haven flows) and into the North West (for example when flows into North West are low including storage withdrawals).

5.1.4 **Line-pack management:** Peterborough compression, with two units operating in parallel, is key in maintaining sufficient line-pack stocks (volume of gas) in the south of the network. This ability to replenish line-pack stocks with the use of this compression is important due to limited line-pack capability and high demand levels/flexibility seen in these zones.

5.2 Continued Need for Third Unit at Peterborough

5.2.1 [redacted]

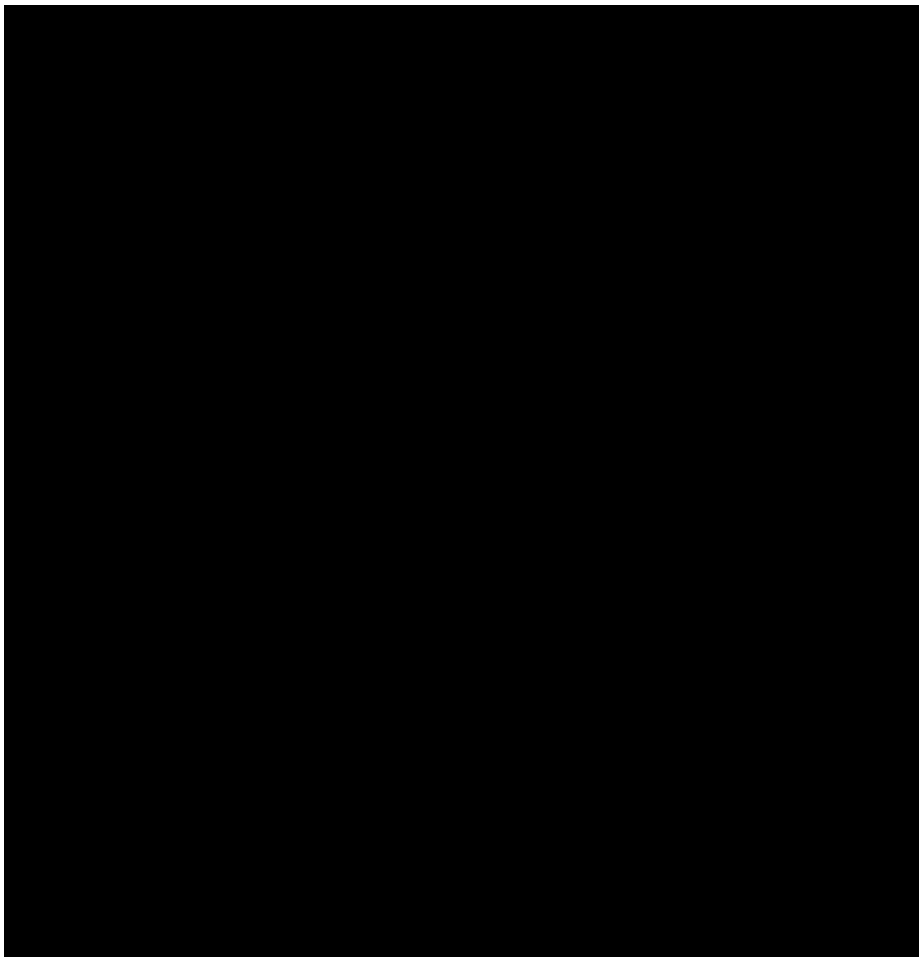

Figure 3 NTS schematic with Peterborough compressor flow directions

5.2.2 [redacted]

[21] This was submitted to Ofgem as part of our response to Ofgem's Peterborough and Huntingdon Compressor Emissions – Final Preferred Option consultation (published in May 2023), following which Ofgem approved the need case for one new gas turbine driven compressor unit in November 2023.

Figure 4 1-in-20 South West Demand Forecast – FES 2024

5.2.3 [redacted]

5.2.4 [redacted] Like our FOSR submission, the updated analysis continues to evidence for the need for reliable parallel operation and therefore the need for a third unrestricted unit at Peterborough, long into the future.

5.2.5 [redacted] The third unit, with unrestricted operating hours, is therefore key to maintain parallel operation at the compressor station and meet the required demand conditions.

5.2.6 [redacted] This supports the need for the third unit at Peterborough, as it is the only credible and cost-efficient way to assure the necessary availability of unrestricted parallel operation at the site and therefore protect our ability to meet 1-in-20 peak day demand in the South-West.

5.2.7 We have a licence obligation to design, build and maintain the NTS so that it is able to meet the forecast 1-in 20 peak day demand. The requirement to install an unrestricted third unit at the Peterborough compressor station is to ensure that parallel operation is maintained, which is essential for meeting this 1 in 20 demand level. The consequence of not being able to meet this demand level could lead to the disconnection/loss of supply to customers directly connected to the NTS or those within the Gas Distribution Network, including domestics consumers.

6 Engineering and Costs

6.1 Introduction

6.1.1 Chapter 6 explains the approach we have taken to arrive at the total cost to deliver the final preferred option with a cost confidence of ±15% and the approach to cost estimation taken by us and the Contractor to develop the costs. This includes how the contracting model was chosen, how the cost build-up was derived and how the Contractor's engineering and cost proposals demonstrate value for consumers.

6.1.2 The Contractor's scope of the project, spanning from July 2024 until [redacted], covers all aspects of engineering, procurement, construction and commissioning activities and is divided into:

- ECI Stage 1A where the Contractor conducted a five-month feasibility study to identify the costs to deliver the project and support the cost re-opener submission to Ofgem.
- ECI Stage 1B which represents the period from completion of Stage 1A until Ofgem Final Determination is received and includes engineering design and preparatory works, including site mobilisation, detailed site surveys, procurement tendering, ordering of long lead items and preparation for construction and outage critical works.
- ECI Stage 2 scope will include full-scale construction involving civil, mechanical, electrical, controls and instrumentation works and installation of the compressor machinery train and associated ancillary support equipment. It also includes coordination of station integration and commissioning activities to ensure our requisite delivery milestones (Maintenance Acceptance, Operational Acceptance and Asset Acceptance Certificates) are completed as per the delivery programme.

6.1.3 The OEM scope of the project is to design, manufacture, test and deliver to site a 15.3 MW gas-driven compressor machinery train package and ancillary support equipment such as Compressor Acoustic Building (CAB), fuel gas skid, seal gas skid and fire and gas suppression system by 31 March 2026.

6.1.4 We are responsible for overseeing the works and promoting efficient and effective interface between the Contractor and OEM to ensure design, construction and commissioning activities are compliant with our full range of safety, quality and technical specifications and standards. We will deliver this using a dedicated team of project managers, design coordinators, engineering subject matter experts, operations technicians and a comprehensive internal support network. We also use an experienced supply chain to provide expert guidance in the specialist areas of environmental coordination, acoustic testing and air quality modelling, welding inspection, coating inspection and ATEX[22] compliance as well as vibration and emissions monitoring.

6.1.5 Clear and unambiguous scope definition is critical to ensuring that all scope elements have an owner. This reduces the risk of scope creep that has the potential to increase costs and have negative impact on programme delivery. During Stage 1A, we led several Division of Responsibility (DoR) workshops between ourselves, Contractor and OEM to clearly define scope ownership. The output reference document forms a part of the Contractor and OEM contractual documentation and drives robust boundaries defining OEM's and Contractor's scopes of supply. This document continues to be developed and updated throughout the scope. A schematic which represents the delineation of scope ownership, and the complexity of this relationship, is provided in Appendix M.

6.1.6 The costs in this chapter are expressed in relation to the total Estimate Cost at Completion (EAC), unless otherwise stated, and they do not represent or reflect figures in relation to our direct cost funding request (CEPOt). These have been captured in section 3.2 - Request summary.

[22] ATEX stands for Atmospheres Explosives. It is a set of European Union regulations that are designed to ensure the safety of products being used in explosive environments.

6.2 Summary of the Estimated Cost at Completion

6.2.1 Figure 5 identifies the EAC at [redacted] and breaks down the main cost components i.e. Contractor, National Gas and the OEM.

Figure 5 Summary of Estimate at Completion (18/19)

6.2.2 The Contractor's scope was defined by a combination of factors including (but not limited to) existing planning permission, division of responsibilities, codes and standards and lessons learnt from previous projects. Section 6.4 provides more detailed commentary on this process.

6.2.3 Following a five-month feasibility study, the Contractor has provided a detailed cost build-up to support their ±15% estimate. The Contractor's cost estimate and programme were reviewed collaboratively over a period of three months. [redacted] Section 6.4 contains further detail on the cost estimate collaborative review.

6.2.4 The design, procurement, manufacture and delivery of new compressor equipment is provided by [redacted] and will be free issued to the Contractor for installation. These are detailed in section 6.5.

6.2.5 The OEM benchmarking exercise and numerous commercial discussions with OEM led to successful reduction in price, as detailed in section 6.5.11.

6.2.6 The final OEM scope of supply includes additional costs including commissioning service support beyond that initially offered, post project support services, commissioning spares, etc. and came to a cost of [redacted]. Further explanation on this can be found in section 6.5.17.

6.2.7 The OEM contract, signed on 31 October 2024 to the value of [redacted], includes supply of the main equipment items, but also shipment and import duty, preliminary commissioning support, training and standard warranty in addition.

6.2.8 To aid comparison of 2025 Contractor's costs against FOSR costs, we have updated the ±30% cost estimate by re-engaging with [redacted] who supported us in FOSR development. The outcome of the exercise gave us confidence that the MWC's proposal broadly aligns with the costing developed by [redacted] Section 6.7 provides further details on FOSR cost comparison and cost methodologies used.

6.2.9 Our costs, which include resourcing, third party sub-contracts and risk contingency were developed in line with the agreed Contractor's delivery programme.

6.2.10 Amendments to specifications, codes, standards and processes have led to an increased demand of resource across the organisation to deliver high quality projects. This has been a consideration in the build-up of our resourcing for the project where lessons learnt, and the experience of these amendments, resulted in a higher quality and in depth understanding of resource requirements.

6.2.11 Third party specialists are required to support us in delivering safety, quality and environmental obligations under the Licence conditions and, alongside our risk contingency, were informed by lessons learnt[23] from recent compressor delivery projects.

6.2.12 Our risks stand at [redacted] and supplement the Contractor's risks. We have undertaken a Quantitative Cost Risk Analysis (QCRA) to determine an appropriate risk contingency for the effective management of our risks. Further details on our risk methodology can be found in the NGT Cost and Risk Report (Appendix D) while analysis of our top project risks is provided within section 6.11.

6.3 Progress Since the Final Option Selection Report

6.3.1 We received the FOSR Final Determination in November 2023 following our submission in January 2023. Since then, the project has progressed significantly; the following stages have been completed: pre-feasibility and feasibility studies, contracting model selection, contract award to OEM and MWC and environmental assessments. Figure 6[24] shows a timeline of these activities.

[redacted]

Figure 6 - Timeline of activities from [redacted]

6.3.2 Pre-Feasibility Study

6.3.3 The project has progressed the development of the final preferred option by contracting [redacted] to complete a pre-feasibility study between May 2023 and February 2024.

6.3.4 The objective of this study was twofold:

- To further refine the preferred options across all MCPD sites in terms of engineering detail (new compressor locations, pipework routes and tie-ins, high-level electrical controls and instrumentation requirements, etc.), programme development, risk development and to produce a technical scope of work for the feasibility study phase once Final Determination was received from Ofgem.

[23] Examples include ATEX compliance and welding/coating inspection services which have caused cost and programme delays historically.
[24] Invitation to Tender (ITT)

- Conduct a Remnant Life Study (RLS) on the Siemens/Rolls-Royce SGT-A20 (Avon) 1533 units to be retained at these sites. This identified a list of potential asset health investments for consideration within the RIIO-GT3 plan, but no critical asset health investment was deemed necessary as part of the Peterborough MCPD project, given the future plan to replace Unit A with Unit F. The wider RLS was however successful in identifying asset health requirements at Wormington, Fergus, Kings Lynn and Huntingdon sites.

6.3.5 The pre-feasibility study enabled the following deliverables for Peterborough MCPD:

- New compressor plot plan was developed, which identified mechanical, electrical, controls and instrumentation routing together with an assessment on hazardous zones and the impact on any adjacent structures.
- Identification of the decommissioning scope for Units B and C, including plant and equipment within the original station control building that helped aid the decommissioning project scope. This considered the level of decommissioning that is possible whilst keeping Unit A operational, this scope is being developed as a separate RIIO-T2 decommissioning project.
- Development of Basis of Design documents, which defined design requirements to industry and National Gas standards and existing service capacity limits (assuming a repeat of Units D and E design).
- Investment in Unit A in RIIO-GT3 will be minimised due to its planned decommissioning following the completion of Unit F, however, it does need to remain operational until that point so some investment may still be required. Given the Ofgem decision to support the investment of one new gas-driven compressor, further asset health investment on Unit A was not deemed critical and was descoped in March 2024.
- Development of Level 2 delivery programme which supported definition of Contractor/Supplier early engagement timeline and roadmap to completion in advance of 2030 MCPD legislation deadline.
- Early definition of project site specific risks.

6.3.6 2-Stage ECI Contracting Model

6.3.7 In 2023 we examined options for delivering our planned programme of compressor investment projects faster and more efficiently. A study was performed against the backdrop of recent major compressor investment projects (including Peterborough, Huntingdon and Hatton) which had experienced delivery completion challenges. We utilised lessons learnt from these projects and their contracting models to ensure that the most practical option was selected.

6.3.8 Across three study phases, [redacted] and National Gas investigated:

- Phase A - Potential delivery models for compressor projects: In this phase several core design principles were identified that ultimately became fundamental pillars for our project delivery (use of an integrated delivery model, early supply-chain engagement, encourage collaboration and transparency, standardise oversight and control and to standardise and simplify where possible).
- Phase B - Assessing the shortlisted delivery model options: While an Enterprise Partnership was rated highly as a delivery model in the long term, a 2-Stage ECI Design and Build delivery model was selected as the optimum model for short to medium term needs.
- Phase C - This phase assessed how best to integrate large compressor delivery projects at sites which also feature other major delivery projects (i.e. [redacted], asset health, etc.) and are critical to the operation of the NTS.

6.3.9 The central output of the delivery strategy study was an agreement that the 2-Stage ECI design and build delivery model for the Contractor was the preferred contracting option. Early engagement supports better planning and provides visibility to allow the Contractor to manage skills and capacity. It eliminates the risk of a Contractor having to implement another party's design and the associated issues that we have previously experienced from using this model. Additionally, in the event of poor performance, it provides the Client the ability to change Contractor following the completion of the first Stage.

6.3.10 Direct Contract Award Approach

6.3.11 Through the application of a 2-Stage ECI contract model, we identified an opportunity to enter a contract with the incumbent Contractor at Peterborough on the ERP3 project. This opportunity provided several key benefits, such as delivery programme acceleration, utilisation of extensive lessons learnt, consistency of design allowing use of existing planning permission and key site experience to de-risk and enhance the potential for successful project delivery. A similar approach was taken for the OEM scope as [redacted] had supplied two [redacted] compressor packages at both sites under the ERP3 project. Both ECI and OEM contracts were called off from existing frameworks which has the benefit of utilising pre-agreed rates and conditions. All direct award of contracts were in line with the Utilities Procurement Act, which aims to address many of the issues with competition in the sector. Our direct award approach has been shared with Ofgem and is detailed in Appendix E.

6.3.12 Using the existing Asset Health Framework and following internal approval, National Gas and [redacted] entered into a closed tender process in April 2024. [redacted] were required to submit a full commercial offer for Stage 1A in addition to technical documentation to support their tender bid.

6.3.13 The Contractor tender was submitted on 13 May 2024 and was reviewed by National Gas. The rates were validated within the parameters of our existing Asset Health Framework and the Contractor's responses to the technical competency questions were assessed by competent subject-matter experts. Several rounds of clarification meetings between National Gas and the Contractor took place during both tender and post-tender where the following items were discussed, challenged and negotiated:

- Technical experience and competency including proposed personnel, proposed use and management of subcontractors and transparency of cost against programme.
- Commercial rates and Contractor's fee was determined to be in line with the Asset Health Framework cap.
- Optimising cost transparency and forecast quality within Stage 1A and beyond.
- The inclusion of additional Contract clauses to be added to Contractor supply chain to optimum cost transparency within the ± 15% Stage 1B/2 cost proposal.
- Review of contract clauses and inclusion of additional "X clauses" when applicable.

6.3.14 Following internal approval via a multi-step procurement governance process, the Contractor was awarded the Main Works Contract for Stages 1A, 1B and 2 under an NEC4 Engineering and Construction Contract with X22 (ECI) Design and Build Contract terms on 5 July 2024. This Contract was split into Stage 1A, Stage 1B and Stage 2 (pending issue of a Notice to Proceed following completion of Stage 1) as described in section 6.1. The two main outputs of Stage 1A are the Summary Report and the Cost Estimate Report (Appendix F and G), which serve as the Contractor's cost basis for this re-opener submission.

6.3.15 Following a similar multi-phase procurement governance process and approval by National Gas' Chief Operating Officer, [redacted] were ordered a supply contract with fixed price contract terms on 31 October 2024. The scope for both contracts can be found within section 6.4 (MWC) and section 6.5 (OEM).

6.3.16 Environmental Assessments

6.3.17 Throughout Option Selection (ND500 Stage 4.2) and Conceptual Engineering (ND500 Stage 4.3), we have utilised the services of [redacted] to act as the environmental coordinator for the project. This appointment is in line with [redacted][25] which defines the need for an environmental coordinator to support with delivery and compliance to [redacted][26] that includes supporting the scoping of environmental assessments, permitting and consents, facilitating the transfer of environmental project information with the Contractor and OEM and supporting Formal Process Safety Assessments (FPSAs) as defined within [redacted][27] amongst other activities.

6.3.18 As part of this contract, we commissioned [redacted] to conduct a Best Available Technology (BAT) review (provided within Appendix J). The objective was to review and reaffirm that the previously determined compressor machinery train solution, identified as representing BAT during the third phase of ERP3, remained an appropriate BAT solution for the MCPD upgrade. The review is also needed to meet the requirements of the Environment Agency (EA) in respect of the site's Environmental Permit and Ofgem, in respect of our licence obligations.

6.3.19 The report authors analysed each element in turn, undertaking multiple analytical and review steps to determine the outcome. The BAT narrative confirmed that a new build compressor package employing DLE emission control technology remains the appropriate BAT technology for Peterborough, and that the [redacted] compressor set is a current competitive market offering.

6.3.20 We applied the Formal Environmental Assessment (FEA) process to the project, as mandated by internal policy, in line with the requirements of [redacted]. The FEA Planning Proforma (which formally records required FEA and consenting activities and associated internal governance) was reviewed and updated. The objective was to identify environmental requirements (and related project risks) associated with the works. Where appropriate, FEA activities undertaken during ERP3 were reviewed and carried forward to the MCPD programme. There are several planned environmental and sustainability activities, including preparation and submission of an Environmental Permit variation application to the Environment Agency, supported by required assessments including noise, air quality and site condition. This submission will be made in [redacted].

6.3.21 A project Environmental and Sustainability Coordinator was appointed to the project, the same resource also being used on ERP3, to ensure knowledge transfer and leverage lessons learnt. Additionally, further ongoing engagement with the Local Planning Authority (LPA), Peterborough City Council, Glinton Parish Council and the local community will continue in respect of the works planned.

6.3.22 A contract was let with [redacted] under the Environmental Services Framework to review landscape and ecological studies carried out under ERP3 and make recommendations as to what updates were required. [redacted] undertook an updated Ecological Impact Assessment[28] at the site to assess risk of ecological impact from the Unit F project. The study determined that there was a low risk of ecological impact. Further works are being undertaken by the Contractor to review noise mitigation options for Unit F, including increasing the extent of buried pipework.

6.3.23 Planning Permission

6.3.24 Planning permission was granted in April 2016 by Peterborough City Council for the installation of Units D, E and F and associated support infrastructure. While Unit F was not installed at the time, planning permission remains valid so long as the design of Unit F remains consistent with the original design intent.

[25] Project Team Roles and Responsibilities
[26] The Application of Formal Environmental Assessments (FEAs) during Engineering Design and Project Delivery Phases
[27] The Application of Formal Process Safety Assessments during Engineering design and Project Delivery Phases
[28] [redacted] (2024), Ecological Impact Assessment, Peterborough Compressor Station, Project No. [redacted]

6.3.25 [redacted]

6.4 Contractor's Costs

6.4.1 Scope

6.4.2 The Peterborough MCPD project involves the design, supply, installation and commissioning of one [redacted] (Gas Turbine) and all associated foundations, general civils activities, associated pipework, valves and fittings, electrical and instrumentation equipment and compressor system integration. The Contractor's scope deliverables are well defined within the Stage 1A Summary Report contained in Appendix F.

6.4.3 Key elements of the scope were defined by the existing planning permission, division of responsibility workshops, compliance with standards and specifications and encapsulating lessons learnt from historic projects. As we are utilising the existing planning permission, its validity is dependent on the design of Unit F remaining consistent with the original design intent. Section 6.5.7 provides information on division of responsibilities between the OEM and the Contractor.

6.4.4 Contractor Cost Summary

6.4.5 A detailed Cost Estimate Methodology was produced by the Contractor (Appendix G), identified as [redacted], and includes key aspects explaining how the Contractor has approached the cost estimation of the project. This includes cost accuracy, cost development and assurance, risk management and handover (including open book pricing documents and supply chain tender pricing).

6.4.6 The estimated total Contractor cost for Stage 1B and 2 (the design, construction and commissioning of Unit F) is [redacted]. [redacted]

6.4.7 Cost Proposal Transparency

6.4.8 The [redacted] Contractor's cost proposal for Stage 1B and 2 were received on the 15 November 2024, [redacted], and included a significant volume of detailed cost supporting documentation including Cost Estimate Report, supply chain quotations, staff forecast and histogram, assessment of the cost comparison with 2022 ±30% cost estimate, Contractor's rates and working hours, risk register and mapping to the our Cost Book.

6.4.9 For us to efficiently review and assess this wealth of information, the Contractor was requested to support a three-day cost proposal workshop in November 2024. The workshop provided us with an opportunity to discuss their engineering design and process, cost basis, assumptions, risks and opportunities. This engagement was extremely valuable in accelerating our review process and enabled a refinement of the Contractor's costs in [redacted].

6.4.10 Cost Appraisal Approach

6.4.11 When reviewing the [redacted] Contractor's cost proposal, we took a systematic approach in identifying the highest value cost items identified by the Contractor.

6.4.12 Primary focus was placed on evaluation of the Contractor's Design and Build delivery programme which constitutes the single largest influence on Contractor and EAC as it determines the sequence and duration of programme activities, given the direct relationship between the programme, resourcing and time related risk. The durations of each project phase – detailed engineering, construction, commissioning and handover have a direct bearing on the staffing levels required by the Contractor (and us) to support the works. Subsequently, Contractor's staffing is one of the highest project costs as identified within Table 8.

6.4.13 Similarly, there is a direct connection between project resourcing and time-related risk. For example, as per the initial cost proposal, an average combined direct and indirect burn rate[29] is applied on any programme delay risks. Therefore, a reduction in the programme and staffing levels proposed by the Contractor would have a beneficial knock-on impact to the Contractor's risk contingency (and NGT's by association).

Table 8 Contractor's Cost Breakdown by Cost Category [redacted] (18/19)

6.4.14 Secondary focus was placed on all other aspects of the Contractor's cost proposal such as supply-chain scope, staffing rates, material quotations and associated risks in addition to the cross-checking of labour and plant rates against the agreed rates within the Asset Health Framework. Furthermore, we have also looked at design verification, labour build-up for each activity and site welfare facilities, plant and equipment rates. Specific narrative on the main areas of refinement is provided below.

6.4.15 Collaborative Review – Contractor's Programme

6.4.16 Collaborative planning reviews held with the Contractor to identify efficiencies and improvements focused on several aspects of the programme. One of the main NGT objectives was to achieve commissioning acceptance within [redacted]. The [redacted] winter running period provides an opportunity to operate Unit F, either in isolation or while load-sharing with Unit D, Unit E or Unit A through the full range of operation expected from the network in this period of peak gas flow demand. The initial Contractor's programme did not schedule performance testing until [redacted] which would leave only [redacted] for intensive unit testing ahead of the MCPD legislation deadline of 1 January 2030. Other areas of focus included:

- Formal Process Safety Assessment (FPSA) – we reviewed the FPSA's within the Contractor's programme as this was identified as a lesson learnt in previous projects. We evaluated the sequence and duration during the Stage 1B detailed engineering period and found that Contractor's FPSA activities were well developed and sequenced within the programme.
- Concrete foundation pours – these were planned during [redacted]. The civil works starting in [redacted] were driven by Stage 1B detailed engineering critical path activities. [redacted]

[29] Staff cost per week

[redacted]

- Connecting Unit F pipework to station pipework - this critical activity enables the introduction of gas to the new compressor unit and requires a dedicated station outage as the station pipework first needs to be purged prior to pipework 'golden weld' connection.
- [redacted]

6.4.17 There were several constructability concerns which, once rectified, had a positive impact on the Contractor's final delivery programme version. At our request, the Contractor prepared a detailed step-by-step overview of how the construction build would be performed as aligned to the delivery programme. In the construction industry this analysis is typically performed using a 4D model, which links the 3D model environment and the delivery programme side-by-side to enable comparison of working areas and build sequence logic. Due to the unavailability of sufficiently mature design information, a 4D model was not developed to support this cost submission, however, the provision of a 4D model by the Contractor is planned to support cost refinement in advance of Stage 2. The cost for this workstream is included within the re-opener and will be provided by the in-house design team at [redacted]

6.4.18 [redacted]

6.4.19 Our collaborative approach helped to improve the overall quality of the Contractor's delivery and [redacted]

Figure 7 – Contractor's [redacted] Delivery Programme

6.4.20 Collaborative Review - Staffing Costs

6.4.21 As identified in Table 8, the Contractor's staffing represents the highest cost category at [redacted] This includes time-related preliminaries and is sensitive to any reduction in programme duration. [redacted] and evaluation of Contractor's roles and their utilisation during key programme phases helped reduce the Contractor's staff costs in the [redacted].

6.4.22 We also performed an assessment of Contractor's rates against the Asset Health Framework which defines pre-approved rates for several roles. Contractor's rates were compliant to the rates agreed in the framework, however there were several roles that were not represented. Following collaboration with us, the Contractor accepted a reduction in the proposed rates which resulted in an overall deduction. The methodology of the challenge on these rates is outlined below:

- Checks within framework - checking the framework conditions to ensure compliance and no duplication of costs where appropriate.
- Benchmarking of rates - using the Contractor's historic and proposed future projects to benchmark the rates provided.
- Cost audit - during stage 1A we carried out a cost audit to ensure that the correct resources were booking to roles that they have been assigned to within the Contractor's organisation.
- Further information requested – the Contractor was asked to provide further information such as a breakdown of the rates, i.e. build up to the charge out rate and Contractor's internal salary bandings.

6.4.23 In total, across Contractor's staffing rates, roles, utilisation and via programme acceleration, we were successful in achieving a staff cost [redacted]

6.4.24 Collaborative Review - Risk

6.4.25 Contractor's risk contingency represented the second highest cost category in the [redacted] Contractor's proposal at [redacted]. We reviewed the risks and identified several overlapping or duplicated risks, as well as an overlap with our internally identified risks and risks which we considered could be retired following the completion of Stage 1A.

6.4.26 Overall, through working collaboratively with the Contractor on their risk identification, mitigation, controls and probabilities of occurrence, a total [redacted] was realised.

6.4.27 Collaborative Review - Supply-Chain

6.4.28 At [redacted], the Contractor's subcontractor or supply-chain represented the third largest cost category in their proposal. The Contractor has provided a comprehensive analysis of all supply-chain quotations received for services and materials covering Stage 1B and Stage 2 scopes.

6.4.29 Early engagement of the supply chain, well in advance of the actual works, posed a limitation on the Contractor's procurement strategy. This has resulted in the receipt of budgetary prices from multiple sources across most scope elements while any firm prices received have an expiration date within 1-3 months of the quotation issued. Additionally, design immaturity has driven the Contractor to engage with the supply chain using preliminary design information.

6.4.30 [redacted]

6.4.31 Similarly to the direct award strategy, the Contractor has identified benefits in contracting directly with several major sub-suppliers who delivered the same scope on the Peterborough and Huntingdon ERP3 projects. These suppliers include [redacted].

6.4.32 We have reviewed the value of these quotations and sought cost transparency documentation from each vendor to ensure value for consumers in the absence of direct competition. This identified that the vendor rates were in line with those applied in the historic ERP3 projects.

6.4.33 Bids for the supply of valves were reviewed in depth. [redacted]

6.4.34 For majority of sub-contract scopes at least three quotes were received, with some lower value elements receiving only two quotes due to supply chain constraint.

6.4.35 Throughout the review we identified gaps and limitations in the Contractor's supply chain scope in areas such as [redacted] Stage 1B cost, price increase in the supply of the [redacted], vibration analysis scope and cable duct lid removal / replacement during [redacted]'s cable pulling activities. This led to an overall improvement to scope and more accurate cost identification.

6.4.36 [redacted]

6.4.37 Challenge - Inflation

6.4.38 [redacted]

6.4.39 [redacted]

6.4.40 Collaborative Review - Design

6.4.41 Our design review focused on the below ground pipework configuration as a mitigation to noise and vibration [redacted]. We worked with the Contractor to refine and improve the pipework configuration utilising lessons learned such as:

- Switching the temporary suction strainer from a Tee piece to a straight pipe spool to improve gas flow and avoid flow induced vibration
- Reducing the 'dead leg' on the unit recycle header by relocating the isolation valve, [redacted], closer to the tee on the Discharge header
- Switching heavy branched valves to lightweight [redacted] valves, allowing for the removal of the Small-Bore Connectors (SBC)
- During a pipework configuration workshop held in October 2024, we identified limitations with the Contractor's consideration for cathodic protection and pipework coating. The preliminary design introduced underground pits, however, it did not fully consider the management of corrosion through pit-wall transitions. In addition, we highlighted concerns over potentially detrimental interaction between cathodic protection and earthing of structures. The Contractor recognised this limitation and advised that the below ground pipework configuration remains a detailed engineering scope within Stage 1B and will be refined further.

6.4.42 Summary of Realised Efficiencies

6.4.43 We extensively reviewed the Contractor's estimate over a period of three months. This evaluation period led to [redacted].

6.4.44 The breakdown based on the [redacted] Contractor's proposal is provided within Table 9.

[redacted]

Table 9 Contractor's Cost Breakdown by Cost Category

6.4.45 As mentioned earlier, the Direct Award approach offered several benefits to the project. In addition to leveraging a unique set of capabilities and maintaining consistency and continuity in the scope of delivery, we have quantified several key advantages that the project will benefit from:

- Programme acceleration: reduction in the overall Stage 1 duration due to the presence of red-line mark-ups and as-built drawings from ERP3 project, as well as a comprehensive collection of site photographs and records. [redacted]
- Shortening of overall timeframes/outputs given Contractor's familiarity with the site: Represented within the Contractors [redacted].
- Lessons learnt implemented during the design phase reducing the amount of rework required by the engineering teams - represented within the Contractors reduced Stage 1 duration described above.
- Reduction in the project risk profile due to better understanding of the site conditions and NGT processes – risk register demonstrates better understanding of NGT established processes and site knowledge. [redacted]

[30] In the MWC [redacted] resource types were grouped together, whereas in the Contractors Costs tab (Appendix C), they are correctly itemized.

[31] [redacted]

[redacted]

- Higher degree of cost accuracy due to familiarisation with the site – demonstrated by the Contractors ability to produce a +/-15% cost estimate four months into Stage 1A, [redacted].
- As described later within section 6.5.14, the OEM's experience in delivering the [redacted] compressor packages for Unit D and E at Peterborough directly resulted in a commercial reduction of [redacted]. This was mainly achieved through a reduction of engineering hours and the avoidance of repeating some aspects of the design work.
- Additionally, OEM was able to inform the project's preservation guidance regarding how equipment should be handled and processed once delivered, drawing on their experience from the ERP3 project. This information had been lost to NGT and included inspection reports and photographic evidence of the storage conditions of the equipment in question, which had subsequently degraded during storage and needed to be replaced, as it was also no longer covered under warranty.

6.5 OEM Costs

6.5.1 Scope

6.5.2 The design, procurement, manufacture and delivery of new compressor equipment is provided by [redacted] and will be free issued by National Gas to the Main Works Contractor for installation.

6.5.3 The compressor machinery package contains the following systems and sub-systems:

- Fully integrated [redacted] gas turbine compressor set with [redacted] compressor including:
  - Gas turbine
  - Start system
  - Fuel system
  - Lubricating oil system
  - [redacted]
  - On-skid electric wiring
  - Skid with drip pans
  - Piping and manifolds
- Compressor Acoustic Building / Enclosure (Sub-contracted to [redacted])
  - Air ventilation system
  - Fire and gas detection
  - Fire suppression system
  - Combustible gas detection
  - Air intake
  - Exhaust stack
- Balance of Plant
  - Fuel gas skid (Sub-contracted to [redacted])
  - Seal gas skid (Sub-contracted to [redacted])
  - Fire and Gas suppression (water mist) system (Sub-contracted to [redacted])

6.5.4 The OEM scope also includes Delivery Duty Paid (DDP) shipment including import duty, preliminary cover for commissioning support[32], site operations training and standard warranty terms.

6.5.5 The [redacted] compressor machinery train was selected as BAT for Units D and E. This continues to be the case for Unit F. Supporting narrative from our environmental consultant [redacted] is contained within Appendix J.

6.5.6 [redacted]

6.5.7 Division of Responsibility

6.5.8 Division of Responsibility Workshops between us, the Contractor and OEM led to a development of a comprehensive reference document covering 51 scope elements, including themes like site installation, testing and commissioning, main equipment supply and interfaces (all major systems and sub-systems), functional safety, noise, foundation design and transportation study. This document was key in driving correct and robust scope definition for inclusion in both OEM and Contractor's scope of supply.

[32] [redacted]

6.5.9 Technical and Commercial

6.5.10 To ensure compliance with project specifications and standards, our engineering Subject Matter Experts (SME's) conducted a five-month technical exercise with the OEM. This in-depth process confirmed the OEM's technical ability to meet our safety, cyber, operational, environmental and quality requirements and, in combination with the Division of Responsibility (DoR) workshops, determined the overall solution package to be costed.

6.5.11 We have demonstrated our intention to deliver both value for money and cost efficiency by benchmarking the received costs against historic projects of similar OEM scope; namely the ERP3. Both projects involved supply and installation of [redacted] 15.3 MW compressor packages with similar ancillary equipment, which are broadly consistent with that to be delivered for Unit F.

6.5.12 However, Unit F contains several new scope elements that are not present on Units D and E. [redacted] package design has evolved since 2014 and, coupled with new or updated NGT specifications, has made a robust like-for-like scope and cost comparison difficult. [redacted] [33]. [redacted]

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

6.5.13 Aside from the new scope elements, the cost benchmarking study was also limited by the following aspects:

- [redacted]
- [redacted]
- [redacted]
- [redacted]

[33] [redacted]
[34] [redacted]
[35] [redacted]

6.5.14 We held numerous commercial meetings with OEM to better understand changes in the market conditions since 2014 (for example, labour and material price increases driven by Brexit and Ukraine invasion of 2022). These commercial engagements were successful in achieving a reduction in the final price largely realised by agreeing a reduction in engineering labour hours given their past experience in delivering a similar scope at Peterborough.

6.5.15 The OEM contract was signed on 31 October 2024 to the value of [redacted]. The OEM benchmarking exercise found that the costs are approximately [redacted] than the 2014 ERP3 baseline. This range accounted for the aforementioned gaps in cost data and the presence of new features unique to Unit F. [redacted]

6.5.16 ## Post OEM Contract - Additional Scope

6.5.17 The total OEM supply includes several cost elements that were not originally in the [redacted] contract. This was due to several factors, including:

- The Contractor's delivery programme had not been fully developed at the time of OEM contract award. Therefore, the duration of commissioning activities could not be determined in time to fully define the OEM's commissioning support duration – thus, a preliminary budget was included.
- Additionally, a standard OEM warranty period was included as the overall duration of the delivery programme was not known. It was expected that a long duration delivery programme would necessitate the requirement for extended warranty to cover equipment warranty until OEM commissioning and operational acceptance.
- Our internal position on the requirement for post-project support period to cover the three-year period between project delivery and site operational ramp up had not been finalised at the time of OEM contract award.
- Commissioning spares for [redacted] were included in the OEM contract, however, spares requirements from the other sub-suppliers were not ready and therefore not considered in time.

6.5.18 All additional post-contract OEM costs are defined in the Cost Book, see "OEM Costs" tab. The high-level additional OEM costs covering post project support, commissioning spares, commissioning service support and extended warranty totals [redacted]. Additional context on these services is provided below.

6.5.19 ## Post project support services

6.5.20 Post project support services costs comprise of:

- Equipment Health Management System (remote performance monitoring): The provision of an equipment health management system (Insight) for a period of 36 months is required to provide detailed performance monitoring of Unit F when system errors and trips can impact unit availability to the network. The system will be proposed within the RIIO-T4 business plan which begins in 2031. It will help to bridge the gap between Operational Acceptance in [redacted] and the introduction of site wide Insight support from 2031.
- Insurance Parts and Tools: This cost element includes critical and non-critical parts, operational consumables, repair kits, maintenance and special tools for [redacted] and initial two years spares for [redacted]. We compared and refined the initial OEM spare parts list based on existing spares stock levels and compatibility of Unit F against Unit D and E leading to a cost reduction. Further opportunities to reduce the requirement for insurance parts exist, however this is dependent on OEM design maturity which will define final compatibility between the Peterborough units. This is expected to be realised by [redacted].
- [redacted] were not able to provide a cost for post project support spares ahead of their design freeze. As such, no cost has been requested, but contingency for cost increase is included in our Risk Register under T-82869: OEM insufficient spare equipment/post project support scope.
- Unscheduled Maintenance Support: We have received OEM quotation for the supply of ad-hoc field service support to cover issues occurring during the three-year post project support period. This cost covers an assumption of two unscheduled site visits per year (one [redacted] field service employee labour, travel and subsistence for three days for each visit relating to such support). This

support service is not related to planned maintenance support which is covered under the Peterborough Operations team funding budget.

6.5.21 Commissioning Spares

6.5.22 The OEM contract contains commissioning spares for [redacted]. However, it was identified that [redacted] spares were not included in the final price. For this reason, we have included for [redacted] commissioning spares.

6.5.23 Commissioning Service Support

6.5.24 As part of the OEM tender, [redacted] provided a preliminary breakdown of typical commissioning and performance testing activities and their durations. This breakdown identified a requirement for [redacted] individual Field Service Representative (FSR) support days. We have reviewed this breakdown and determined that a total of [redacted] FSR support dates are warranted following further engagement and refinement of the programme with the OEM. This was further verified through engagement with electrical and rotating machinery subject matter experts within NGT who have direct experience of commissioning Unit D and E on the ERP3 project. The additional [redacted] FSR support days are included within the Cost Book inclusive of FSR day rate, mobilisation, travel time and daily subsistence rate. All rates are based off the OEM's agreed standard rates.

6.5.25 Extended Warranty

6.5.26 During the ERP3 project and the elongated delivery programme, several OEM supplied equipment exceeded their warranty by the time of unit commissioning. This, coupled with on-site preservation issues, meant that the out-of-warranty equipment had to be replaced.

6.5.27 The OEM standard warranty period is [redacted] after the unit commences operation at the project site, or [redacted] after readiness of the units for shipment (whichever occurs first), provided the equipment is installed and operated in accordance with [redacted] guidelines.

6.5.28 As identified within Table 10, based on the project delivery programme detailed in section 6.10, the OEM's standard warranty terms do not cover the period up to and including Operational Acceptance. As a result, we have received a quotation from the OEM to provide for [redacted] warranty terms for the OEM and its suppliers.

[redacted]

Table 10 - OEM Warranty Comparison

6.5.29 [redacted] were not able to provide a cost for extended warranty ahead of their design freeze. We have factored their cost using the [redacted] extended warranty cost as a proportion of total scope value, circa [redacted]. There is a risk for the actual cost to be higher than this therefore it is included in the NGT Risk Register contained within the Cost Book.

6.6 National Gas Costs

6.6.1 We are responsible for overseeing project delivery and promoting efficient and effective interface between the Contractor and OEM to ensure design, construction and commissioning activities are compliant with our full range of safety, quality and technical specifications and standards.

6.6.2 We achieve this using a dedicated project team of project managers, design coordinators, engineering experts, operations technicians and a comprehensive internal support network. We also use a small, but experienced supply chain to provide expert guidance in the specialist areas of environmental coordination, acoustic testing and air quality modelling, welding and coating inspection, ATEX compliance as well as vibration and emissions monitoring.

6.6.3 We are exposed to a broad range of project risks which are separate from those under the remit of the Contractor. These are captured in the NGT Risk Register (see Cost Book QRA and Risk Register tabs in Appendix C).

6.6.4 In this section we provide a supporting narrative for each of the cost elements including forecast internal staff and operations resourcing, external sub-contracts to support us in delivering our commitments, risk contingency and project spend to date.

6.6.5 Resource Build-Up Approach

6.6.6 Our staff and operations resources required to support successful project delivery has been built-up using the Contractor's refined delivery programme. This programme defines when the key project delivery milestones will take place and as such, we can determine our resourcing required to support each stage. We have identified resourcing through several key sources:

- Assessment of governing specifications and standards (e.g. BP/133G) defines core project delivery roles and responsibilities, NEC4 Engineering and Construction Contract scope document determines the Contractor's scope and elements which are the responsibility of NGT.
- Cross comparison against the resources currently involved in delivering existing major compressor delivery projects (i.e. Hatton LCPD).
- Lessons learnt from historic delivery projects (i.e. ERP3 projects at Peterborough and Huntingdon, Bacton and St Fergus terminal asset health projects).
- Engagement with various disciplines across our core departments (Asset, System Operator, Construction and Operations).

6.6.7 Staff utilisation throughout key project phases (detailed engineering, construction, commissioning, documentation handover/closure) was determined by the interrogation of:

- The Contractor's Master Document Register (MDR) to ascertain the volume and complexity of documents to be received per week over the course of the project.
- The Contractor's schedule for Formal Process Safety Assessment (FPSA) workshops such as HAZIDs (Hazard Identification), HAZOPs (Hazard and Operability Study), CHAZOPs (Control Hazard and Operability Study), LOPA (Layer of Protection Analysis), etc. which are resource intensive particularly for engineering subject matter experts.
- The Contractor's construction programme outlines work areas to be supervised, crew numbers, site working durations [redacted].
- The commissioning programme from both the Contractor and OEM to help determine the extent of our engineering support required during the commissioning phase.

6.6.8 The output of this workstream is a comprehensive build-up of resources to not only manage and oversee the Contractor and OEM, but also to ensure interface alignment between both parties and any critical external party who needs to ensure compliance to specifications and standards such as the Environment Agency, [redacted] and the Health and Safety Executive (HSE).

6.6.9 The staffing roles for the project have been determined after a thorough analysis of the work required across the project lifecycle. More supporting narrative on key direct staffing roles is contained within the NGT Cost and Risk Report. Each identified role is crucial to the project's success. We have performed several checks and refinement actions to provide a fair assessment of our resourcing requirements without overestimating the budget required to deliver our responsibilities as project owner:

- Each role, its allocation to the main project phases and their average utilisation throughout the period has been reviewed in isolation and in comparison, with any corresponding matched role within the Contractors or OEM's organisation.
- A minimum level of management presence has been included, [redacted], to allow for oversight of the workstream quality being delivered by their discipline leads and to help incorporate lessons learned from related projects.
- NGT staffing presence on site beyond core working hours (i.e., [redacted]) has been restricted to priority personnel, such as Site Controller and Site Supervisor. [redacted]
- The roles have been meticulously reviewed by disciple teams [redacted]
- Disciplines involved in the preparation of the funding submission to Ofgem have been time bound in line with the expected consultation period which decreases following this submission in June 2025.
- Project Owner Representative (POR): Feasibility back from the site operations team indicates that the POR role is effectively covered under the existing operational

6.6.10 Throughout the refinement actions above, we have identified several roles which we consider to non-essential and subsequently removed from the funding request. These are detailed below:

- Project Owner Representative (POR): Feedback from the site operations team indicates that the POR role is effectively covered under the existing operational roles already included in the project team structure. Typically, a full time POR is assigned to act as a single point of contact between Site Operations and the active delivery projects at the site. However, given the experience of the site operations team in supporting historic major compressor delivery projects and the MCPD project will rely heavily on the existing authorising engineer to perform elements of this role in addition to their other site commitments. While this role will also be tasked with supporting the other site works at Peterborough [redacted] it is still expected that sufficient capacity remains within the site operations team to adequately support the needs of the MCPD team. There is an associated risk contained within the project risk register that in the event of any site operations resource attrition during the project delivery, an option remains to hire a dedicated POR to support the project.
- Secondary Project Supervisor (outside of core construction activities): We originally had an allowance for a second site supervisor during the entire construction phase due to the high volume of works being performed in multiple areas. However, we have refined this role to be required only for peak construction activities, i.e. 25% of construction phase, and the role will not be required [redacted].

6.6.11 Figure 8 illustrates the distribution of resources allocated across different project phasis. There is a significant reduction in the projects workforce once the construction phase is over and the project moves into the commissioning period. This refinement by NGT ensures that only the necessary staff participate in commissioning and their respective time allocation have been accurately estimated. Figure 8 identifies project full-time equivalents[36] and full-time actual resources.

6.6.12 The detailed engineering phase primarily involves the core project team and design team efforts to firm up the design scope, ensuring elements are finalized before moving into Stage 2. Only essential engineering design functions are allocated to the project during this period (to minimise costs) before a general ramp up in resourcing required to support construction activities. Optimized scheduling and continuous monitoring help maintain project efficiency and achieve successful project completion.

6.6.13 [redacted]

Figure 8 - NGT Staff Histogram (Incl. in-directs)

6.6.14 Resource Cost Summary

6.6.15 The resource build-up identifies a direct staffing cost of [redacted], as defined within the Cost Book, which provides a breakdown of all delivery unit and site operations staffing to support project delivery until [redacted].

6.6.16 National Gas Sub-Contracts

6.6.17 Third-party specialists from the supply chain are required to support us in delivering our safety, quality and environmental obligations under licence conditions and include the following scope elements:

- 100% Welding, Coating and NDT Inspection (as per Site inspection requirements [redacted])
- 100% ATEX Inspection (as per ATEX / DSEAR standards - [redacted])
    - Post Compressor Installation

[36] Full-time equivalent (FTE) is a metric that measures the total working hours of employees, including full-time and part-time staff, as if they were all working full-time. It allows NGT to standardize workforce capacity, regardless of individual working hours. It converts part-time work into a full-time equivalent, providing a clearer picture of the NGT's labour capacity. This metric, in addition to the corresponding value for the Contractor, has been useful in identifying the required capacity of the construction compound car park which needs to cater for peak construction and staffing requirements.

    - Above Ground Installation (AGI)
    - During OEM and Fuel/Seal Gas Skid Factory Acceptance Tests (FAT)
- Functional Safety Assessment 3 (FSA-3) Independent Adjudicator
- Earthing System Pre/Post Survey (as per [redacted] Inspection requirements)
- Pressure System Safety Regulation (PSSR) Inspection (as per [redacted] Inspection requirements)
- Vibration Monitoring (as per [redacted])
- Noise Monitoring (as per [redacted])
- Emissions Monitoring (as per [redacted])

6.6.18 There are several additional third-party costs that do not fall under our specifications but are either a legal requirement or support best practice. These include business rates applied to the on-site construction welfare facility and the supply of a tool storage pod adjacent to Unit F to house essential maintenance equipment which is consistent with the approach taken on Unit D and E.

6.6.19 As part of the project's procurement process, a competitive tendering approach was undertaken for any scope where value exceeds [redacted] to drive commercial tension and cost efficiency. Although we requested three quotations in accordance with standard procurement process, we did not receive responses from all suppliers by the submission deadline; this is likely due to the large duration between inquiry and expected contract date. In the absence of a full set of comparative quotes, the most cost-competitive and comprehensive in scope of the received quotations were selected as the basis for budgeting. This approach was deemed appropriate given the quality and completeness of the proposal, and it ensured that the project could proceed within a realistic and market-aligned budget. We have determined that the costs are broadly in line with those received for the Hatton LCPD project. While there is potential for outperformance due to greater design maturity achieved during the detailed design phase, there is an equal risk that these prices may increase by the time we engage the market. This risk is reflected in our risk register (T-82868).

6.6.20 The following inspections are considered under the Contractor's scope and have not been costed by us:

- Corrosion Protection System Testing (CIPS)
- Construction Design Management (CDM) Inspection ([redacted])
- Pre-Construction Surveys ([redacted])
- Sensible Monitoring ([redacted])
- Civil Inspection ([redacted])
- Supplier assurance for Contractor's supply chain ([redacted])
- Compressor performance test (by OEM)
- Pre-Construction Vibration study (desktop study to be performed by Contractor)
- FSA-1 and FSA-2 (Functional Safety Assessments)

6.6.21 Furthermore, there is additional scope which currently does not form a part of our existing MWC contract. A budget estimate was requested to cover the unlet scope including a 4D model[37], an acoustic enclosure design study[38] and the supply of a biometric turnstile access facility[39] to aid tracking of site personnel for both commercial and safety performance purposes. The estimate has been added to our subcontractor costs contained within the Cost Book.

6.6.22 The total cost for all unlet subcontract costs is located within the Cost Book. This supporting tab identifies the scope, price basis, work breakdown structure identifier, granular and high-level cost split and total spend profile.

[37] See justification within paragraph 6.4.17
[38] See justification within paragraph 3.3.10
[39] See paragraph 6.4.16 for additional supporting narrative

6.6.23 Estimating Uncertainty (EU)

6.6.24 In line with the Infrastructure and Projects Authority (IPA) cost estimating framework[40], the cost estimate has been structured around the fundamental equation as shown in Figure 9.

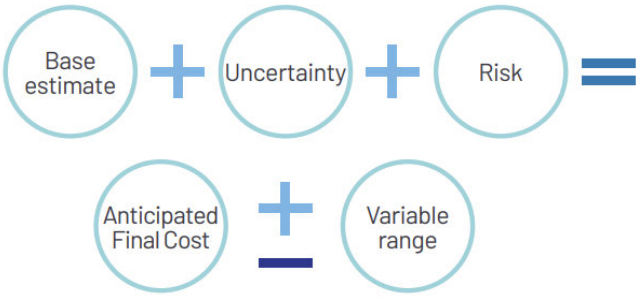

Figure 9 Cost Estimating Process - Infrastructure and Projects Authority (IPA) Cost Estimating Guidance 2021

6.6.25 Estimating uncertainty accounts for potential variation in the base forecast due to the natural limitations of available information, scope clarity, and design maturity at the current stage. It is fundamentally different from cost contingency, which is reserved for known events or conditions with associated probabilities.

6.6.26 For this estimate, EU was applied to the Estimated Cost to Complete (ECC), recognising that the ECC reflects remaining expenditure. The adopted EU range was determined using a structured estimating maturity assessment aligned with Association for the Advancement of Cost Engineering (AACE) International Recommended Practice. The assessment was conducted at Level 4 of the Work Breakdown Structure (WBS), evaluating the estimate maturity through a structured evaluation of project scope definition, cost and quantity estimate methodologies, and the integrity and reliability of data sources and benchmarking references. Furthermore, project complexity was assessed by considering factors such as uniqueness, familiarity with the technology, and the delivery environment. The structured assessment ensured the range was not arbitrary, but driven by a transparent, evidence-based process that reflects the inherent uncertainty at this stage of project development.

6.6.27 The EU range selected was based on a Class estimate maturity, with a range of [redacted] applied. This range is consistent with industry guidance and internal cost assurance governance, acknowledging the scope maturity and market variables.

6.6.28 To quantify the impact of EU and establish a credible confidence level for reporting, we conducted a Monte Carlo Simulation (MCS). The ECC input, adjusted for the defined uncertainty range, was simulated over 10,000 iterations to produce a probabilistic distribution of the final cost outcome. This approach is in accordance with good practice as recognised by the IPA.

6.6.29 P50 value of the simulation was determined to be [redacted], which represents the expected value of estimating uncertainty based on the applied range and ECC value. The simulation output provides a statistical basis for confidence-level reporting and supports transparent decision-making regarding investment approval thresholds (e.g. P50 for baseline reporting or P80 for budget setting).

6.6.30 The use of Monte Carlo simulation to model EU allows for a more robust and transparent assessment of the cost estimate reliability. By separating estimating uncertainty from risk, we align with IPA's expectation that project estimates should not rely solely on arbitrary uplifts, but should be driven by structured, evidence-based modelling approach.

[40] IPA_Cost_Estimating_Guidance.pdf

6.6.31 National Gas Spend to Date

6.6.32 An overview of actual project cost or spend to date is contained within the Cost Book under "Actual Costs". More information on actual and forecast costs, containing a breakdown per Work Breakdown Structure (WBS) can be found in the NGT Cost and Risk Report.

6.6.33 Project spend to date, considered to be spend prior to 31 March 2025, has consisted of activities associated with supporting Pre-Feasibility (ND500 Stage 4.1), Option Selection (ND500 Stage 4.2) and Conceptual Feasibility (ND500 Stage 4.3) project development phases.

6.6.34 The Pre-Feasibility phase (Stage 4.1) involved a high-level combined sanction across all the critical MCPD sites to establish the scope and options to inform the 2019 RIIO-T2 business plan submission. Ultimately this workstream helped to identify target solutions for achieving emissions compliance[41] and enabled setting up of individual MCPD projects into Peterborough and Huntingdon, King's Lynn, St. Fergus Terminal and Wormington and supported progression to Stage 4.2.

6.6.35 The Option Selection phase (Stage 4.2) included activities which supported submission of the FOSR to Ofgem in January 2023. We contracted with Consultant [redacted] to support identification and evaluation of investment solutions which enabled compliance with the MCPD while [redacted] were contracted to support with environmental coordination and to perform a Formal Environmental Assessment (FEA) on the shortlisted options. Similarly, feasibility assessments were performed by [redacted] on potential CSRP and DLE technology proving studies. This phase also involved contracting with Worley to perform a pre-feasibility study to help progress the scope and programme for the final preferred option.

6.6.36 Conceptual Feasibility (Stage 4.3) included contracting with [redacted] for the supply of OEM equipment and services, and [redacted] to develop a +/- 15% cost estimate and feasibility study to support detailed engineering, construction and commissioning activities. See section 6.3 for more supporting narrative.

6.6.37 In advance of this re-opener submission to Ofgem, the Peterborough MCPD project received approval from our Gas Transmission Investment Committee (GTIC) to progress into the Project Execution (NDP Stage 4.4), with funding released to support project activities until Q1 2026. This timeline allows us to receive Ofgem's Final Determination by December 2025 and re-sanction at F4 stage to reduce any commercial spend at risk position.

6.6.38 To avoid duplication, please see section 3.4 Table 7 for the incurred cost spend profile. These costs exclude Huntingdon MCPD actual costs as explained in the Regulatory Cover Note. This cost separation assessment identified staffing and sub-contracts which were dedicated to Huntingdon and in all other remaining cost elements project judgement was used to determine the appropriate split of costs shared across the two projects.

[41] Included indicative Best Available Techniques (BAT) screening, Control System Restricted Performance (CSRP), Dry Low Emissions (DLE), Selected Catalytic Reduction (SCR) technologies.

6.7 FOSR Cost Estimate Comparison

6.7.1 The Peterborough and Huntingdon 2023 FOSR identified the final preferred option investment to be [redacted][42] (±30% cost confidence) across both sites. The five shortlisted investment options were costed to ±30% accuracy to support option evaluation and comparison via a stepwise Cost Benefit Analysis (CBA) process. However, the ultimate investment driver for the final preferred option was to achieve 1-in-20 compliance rather than the best overall option determined by CBA (see section 5 for more detail).

6.7.2 The ± 30% cost estimate was never intended to be directly compared against ± 15% cost in this submission. The main purpose of the estimate was to support the commercial evaluation and comparison of the shortlisted options and did not include for future years inflation. While effective in supporting cost comparison across the shortlisted options, the estimating approach contains inherent limitations when compared to the ± 15% cost estimate produced by the Contractor. These include:

- [redacted] used immature Material Take Offs (MTOs) from the ERP3 project. The [redacted] estimate methodology was a top-down stochastic approach developed using their proprietary cost estimating software tool called [redacted]. The software utilised high-level MTOs as the starting basis for the Capex build-up. This is an Excel-based tool that specifically identified items of equipment and bulks to calculate procurement, fabrication, installation and engineering costs using a series of norms, factors and algorithms. Major equipment and long-lead items were costed using budget quotations and the estimate was prepared in accordance with the AACEI[43] requirements.
- The [redacted] estimate used a pre-determined algorithm to forecast procurement, fabrication, installation and engineering costs while the Contractor's estimate used a defined scope based on Unit D and E design, direct quotations from the supply chain, staff resourcing based on a bottom up cost build-up aligned to an established delivery programme and risk contingency informed from historic delivery of the ERP3 project at a site familiar to the Contractor.
- Since the FOSR estimate was developed in May 2022, the project scope, design and our technical specifications have evolved, and many new scope elements have been identified which were not originally captured in the FOSR estimate.
- The FOSR cost did not include several cost aspects, such as spend to date at the time or our risk contingency.

6.7.3 To update the 2022 estimate against market conditions and 2025 project scope, we contracted again with [redacted] to perform a cost verification assessment to revalidate their estimate using the latest Contractor's MTO data and market price information. Use of the latest MTO data ensured that any new scope elements were included in the revised estimate. The revalidation of the Contractor's cost elements is represented in section 6.4. This exercise has identified a significant increase in direct costs (civil, electrical and instrumentation design[44]) in the order of [redacted], as well as the inclusion of industry inflation factors to bring the estimate up to the beginning of construction (November 2025 in line with the Contractor's cost proposal). This increase in direct costs also had a proportional impact on in-direct costs due to the way in which [redacted] factor their estimate.

6.7.4 Table 11 identifies that, when the [redacted] cost proposal from the Contractor is evaluated against the [redacted] revalidation assessment, the cost delta stands at [redacted] difference between the two estimates.

6.7.5 The top range of both estimates identifies a delta of [redacted] which can be viewed positively as the quantification of the benefit associated with direct awarding the MWC contract to [redacted]

[42] [redacted]

[43] Refers to the cost estimation practices and standards developed and promoted by AACE International; a professional organization focused on total cost management

[44] New Unit F scope elements include the burying of suction and discharge pipework as an effective mitigation to reduce pipework noise (this scope includes significantly more excavated material and temporary works costs), relocation of electrical and telemetry kiosks on the Peterborough AGI to facilitate construction in the works area, [redacted], updated designs and locations for the fuel/seal gas skids and fire suppression kiosk, etc.

[redacted]

Table 11 - [redacted] Estimate Revalidation [redacted]

6.8 Efficient Cost

6.8.1 There are several examples of efficiencies we have driven to deliver for the customers and consumers:

- The direct procurement approach adopted when contracting with the incumbent Contractor and OEM Supplier at Peterborough is articulated within section 6.3.10, where we describe how we've maximised the benefit.
- A cost reduction of [redacted] in a three-month Contractor's proposal evaluation period. The detailed example of cost efficiency is represented in section 6.4.
- Improved scope definition and cost efficiency defined over a period of five months during the OEM procurement process. The technical scope was aligned with our specifications and standards, and a cost benchmarking exercise was performed against historic compressor delivery projects at Peterborough and Huntingdon. This example of cost efficiency is articulated within section 6.4.
- Development of a comprehensive build-up for the internal costs to support a successful project delivery. Internal resourcing has been informed from historic compressor delivery projects. However, the build-up has been refined to ensure support roles effectively ramp up for core construction and commissioning stages and similarly do not book to the project during closure/handover. Supporting narrative is contained within section 6.6.5.
- Inclusion of budgetary pricing from our supply chain and any scopes exceeding [redacted] in value have been competitively bid to drive competitive tension and optimum price for consumers. This is articulated within section 6.6.16

6.9 Cost Build Up

6.9.1 Table 12 provides a breakdown of the final EAC costs for the project split by several categories.

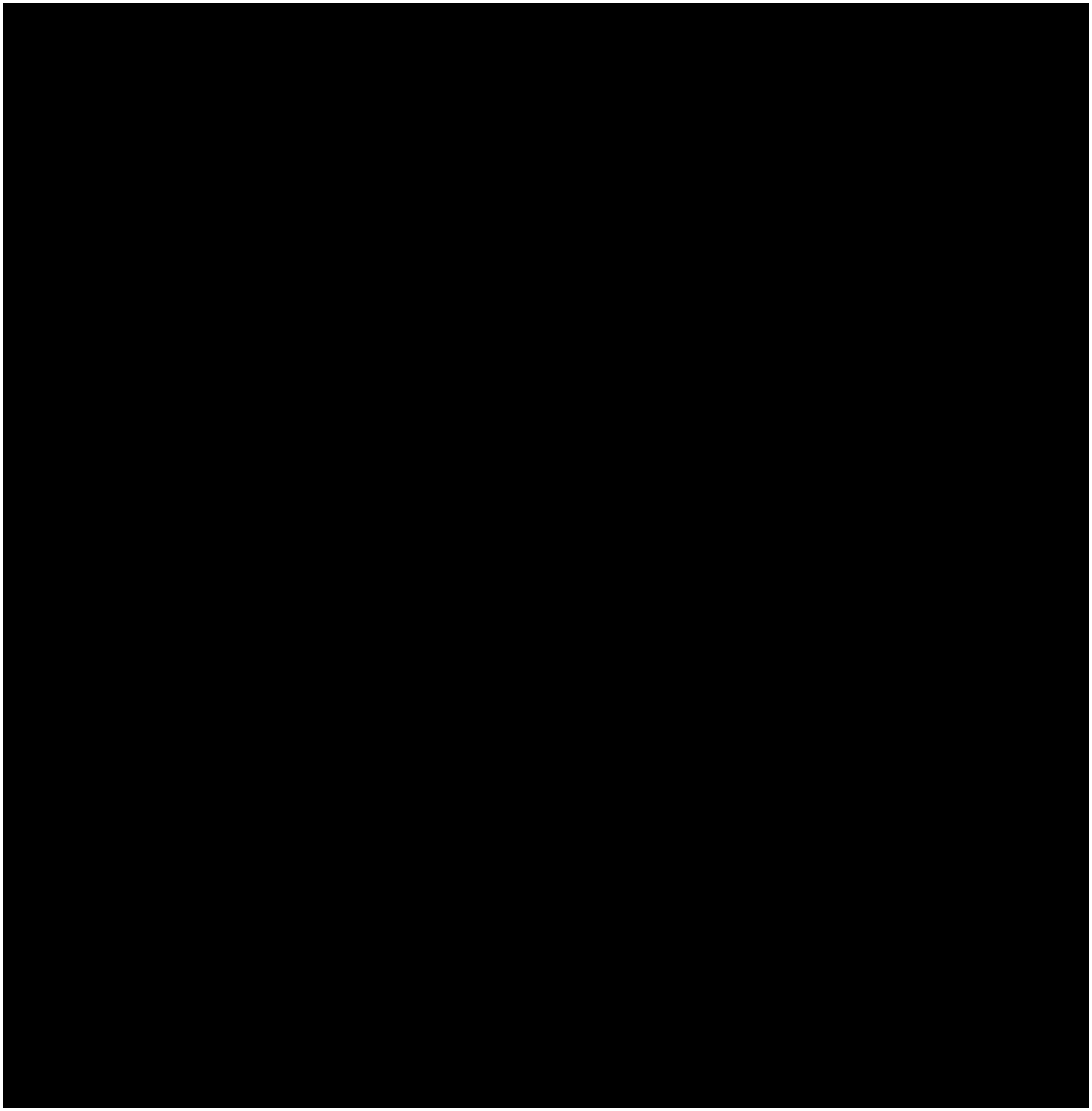

Table 12 Final Cost EAC Breakdown

6.10 Project Delivery Programme and Key Dates

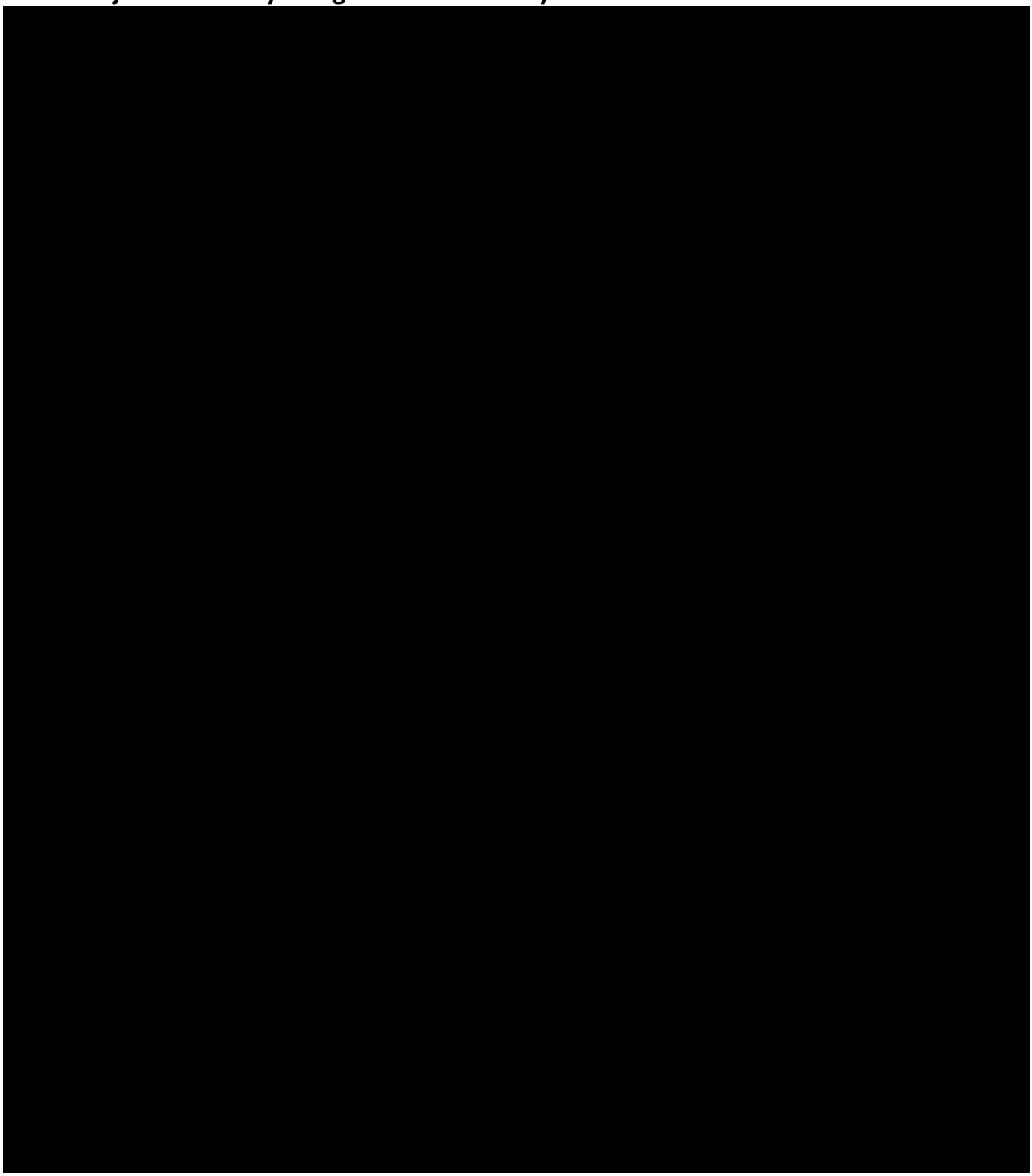

Table 13 - Project Delivery Programme - Key Dates

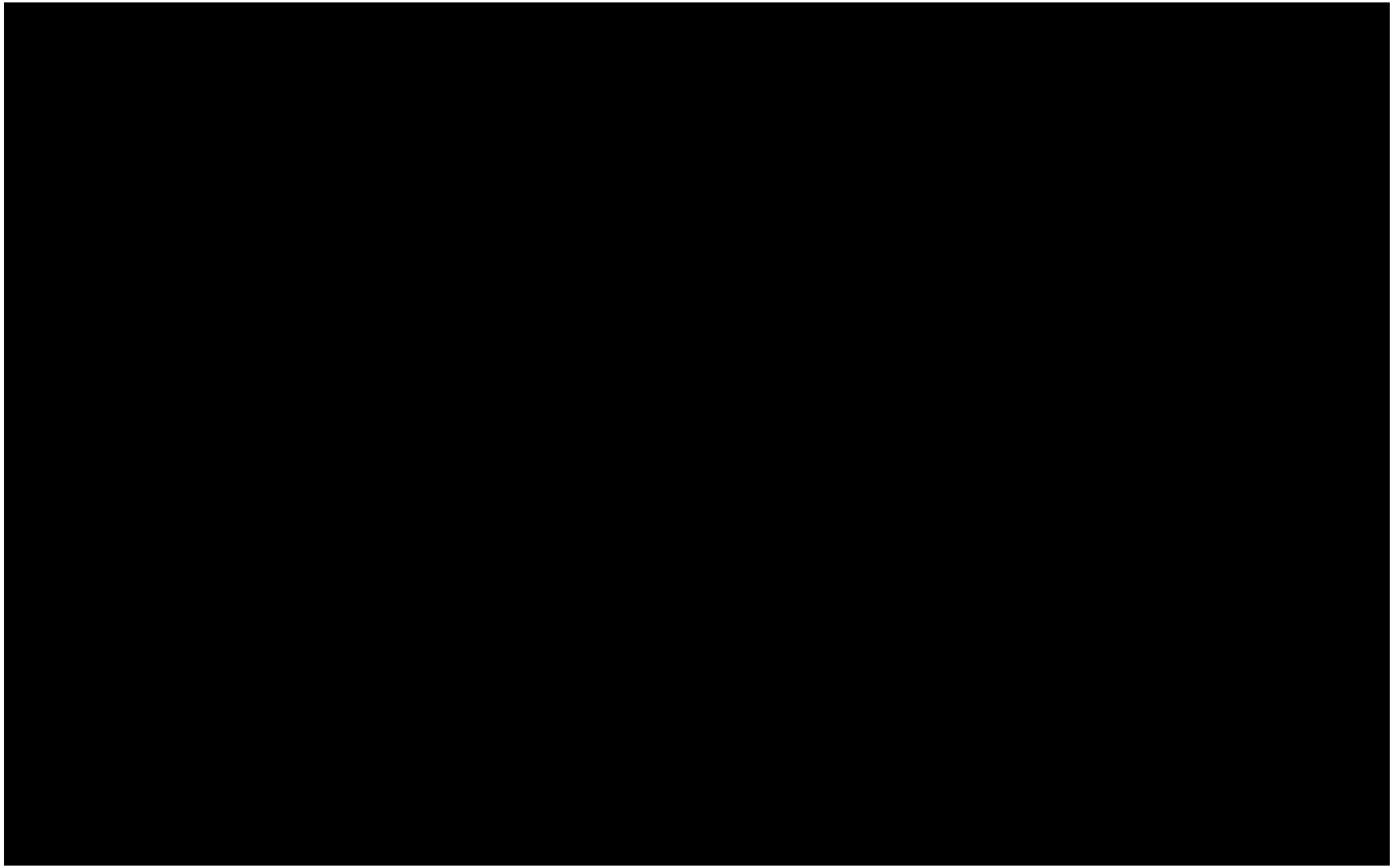

Figure 10 - Project Delivery Programme (Level 2)

6.11 Key Risks and Opportunities

6.11.1 This section presents a high-level overview of our total risk approach for the Peterborough MCPD project and identifies our key project risks determined through a rigorous risk assessment process involving multiple iterations and broad stakeholder engagement. The risk methodology used to identify, prioritise and quantify these risks is documented in the NGT Cost and Risk Report to avoid the need for excessive content within the main body of this report. Summary risk values and associated spend profile are provided within the "QRA" tab in the Cost Book while the full risk register including descriptions, min/most-likely/max costs, quantification narrative and proposed mitigations are provided within the "risk register" tab in the cost book.

6.11.2 Our risks have been developed through comprehensive risk identification and assessment processes, leveraging structured brainstorming sessions, expert interviews and scenario analysis to ensure a thorough identification of potential risks to the project. This process enabled the capture of lessons and experience from our recent compressor delivery projects at Peterborough, Huntingdon and Hatton.

6.11.3 Contractor's risks have been established using a similar approach to ours and are described within their Cost Methodology document (Appendix H). As part of our evaluation and collaboration with the Contractor, we have reviewed their risks and removed duplications where appropriate to ensure delineation across both registers. Section 6.4.24 includes supporting narrative on this.

6.11.4 In line with the IPA guidance[45], we have quantified risk value at the median or P50 equivalent of risk. This means that there is a 50% chance of spending above or below the allowance during project delivery. Based on our experience of coordinating complex multi-year compressor delivery projects, evidence shows that a P50 confidence level is inadequate for the nature of complex project delivery. [redacted] We have decided to progress with a P50 approach for Peterborough MCPD project given Ofgem see this as a recognised and appropriate methodology for calculating risk allowances. However, in the narration below we indicate the additional actions taken to ensure adequate allowance to protect us against time and cost impacts throughout the duration of the project.

6.11.5 Project risk contingency does not incorporate the direct effects of mitigation measures in the cost estimation at this preliminary stage, in line with our historic funding submissions. This decision is driven by the inherent uncertainty surrounding the effectiveness of potential mitigation strategies in reducing risk severity, particularly given historical project overspends and inadequate cost contingency provision. We have taken a conservative risk position that fully accounts for the potential impacts of the identified risks, without presuming the success or effectiveness of unproven mitigations. This approach is justified until the completion of the detailed engineering phase, at which point a more refined assessment of specific mitigation measures and their associated cost benefits can be undertaken.

6.11.6 [redacted]

[45] IPA Cost Estimating Guidance Document (dated 17 March 2021)
[46] See Table 9

6.11.7 We have identified a total of [redacted] project cost contingency, representing [redacted] of the EAC. Given the complexity of the modern compressor projects that span multiple years, involve extensive supply chains, and operate within a dynamic economic environment, we consider this level of contingency appropriate. Our past delivery challenges and experience do not support a uniform, percentage-based risk allocation approach. Instead, we advocate for a project-specific assessment of risk, reflecting the unique characteristics and challenges of each project.

6.11.8 [redacted]

6.11.9 [redacted][50]. This position is further justified across a wide range of industry papers and supporting documents. A review by the Oil and Gas Authority[51] of 58 major projects (2011-2016), found that fewer than 25% were delivered on time, with an average delay of 10 months and a cost overruns of approximately 35% [redacted]. Similar trends are highlighted in "Mapping Delay Risks of EPC[52] Projects[53]" while a Columbia University study[54] identifies why infrastructure investment projects are systematically over-optimistic in the planning phase.

6.11.10 Our project risk is valued at [redacted] of the total project cost contingency value, representing [redacted] of the EAC. Figure 11 shows the total NGT risk value distribution and determination of the P50 value following 10,000 iterations. We are exposed to a broad range of project risks which are separate from those under the remit of the Contractor. These risks include any cost or time impacts involving:

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

[47] RIIO-T2 Final Determinations – NGGT Annex (Revised) – 03 February 2021 (Sect. 3.52)
[48] National Grid letter "RE: Ofgem's initial view on RIIO-T2 funding and outputs for NGGT's investment in compressor emissions compliance at Hatton" dated 5 October 2020
[49] As per RRP
[50] [redacted]
[51] Lessons Learned from UKCS Oil and Gas Projects 2011-2016, dated 3 March 2017
[52] EPC refers to Engineering, Procurement and Construction
[53] Mapping Delay Risks of EPC Projects: A Case Study of A Platform and Subsea Pipeline of An Oil and Gas Project (2019)
[54] Cost Overruns and Schedule Delays of Major Projects: Why We Need Reference Class Forecasting – J.E.Park (2021)
[55] Foreign Exchange abbreviation

Figure 11 - Output from Monte Carlo Simulation indicating NGT risk contingency value (2025/26)

6.11.11 Throughout the efficient and iterative development of our risk register we have identified several risks which we have not included within the register as we do not feel they can be accurately quantified. These are either addressed via the separate PCD for noise (section 3.3) or are not appropriate to be applied. These include:

- [redacted]

6.11.12 Top Five NGT Risks

6.11.13 To provide a clear understanding of the relative significance of risks identified, a Monte Carlo simulation has been employed using [redacted], a proprietary Electronic Risk Management (ERM) system provided by [redacted]. This probabilistic approach generates a range of potential cost outcomes considering the uncertainties associated with each risk factor. The P50 risk values, representing the 50th percentile of the simulation cost distribution, are presented for each of the top 5 risks.

6.11.14 Figure 12 identifies the top 5 risk events based on severity, which collectively account for [redacted] of the cost contingency applied for within this submission. This highlights their critical importance to the project's financial stability.

Figure 12 - Monte Carlo Simulation indicating the top NGT risks by severity

6.11.15 Table 14 provides a supporting narrative justifying the inclusion of the risk within the project funding request and outlines the probability and estimated value of each top risk.

Risk ID	Title	Description	Probability Value (%)	P50 Value FY19	Mitigation Measure Proposed
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 14 Top 5 Key Project Opportunities

6.11.16 [redacted]

6.11.17 [redacted]

6.11.18 [redacted]

6.11.19 [redacted]

6.11.20 [redacted]

6.11.21 To help understand the sensitivity of our programme risks to our delivery programme, we have conducted an informal Quantified Schedule Risk Assessment (QSRA) using the top 5 NGT and Contractor risks. This assessment is typically performed in the industry using specialist modelling software[56], however, at the time of writing, this was not available to us. Instead, we calculated QSRA using the planning software [redacted]) and the latest baseline delivery programme from the Contractor, with activities relating to the top programme risks overlaid and then modelled via Monte Carlo Simulation which ran 10,000 iterations. The assessment indicated that should the min/most-likely/maximum programme impact for each top risk materialise to a P50 confidence, then this would have a detrimental impact on the programme. The critical path would be gradually pushed to the point where activities would miss the end of the main outage windows and be deferred to the next outage period. This resulted in the project delivery completing in [redacted]. This is identified in an extract of the analysis represented in Figure 13.

[redacted]

Figure 13 - Extract from the [redacted] QSRA Analysis

6.11.22 In addition to identifying and implementing effective risk mitigation strategies, we recognise the importance of proactively identifying and capitalising on opportunities to enhance project value and achieve a successful project outcome. This approach is designed to ensure that the project not only meets its core objectives but also maximises its potential to deliver long-term benefits for our customers and stakeholders.

6.11.23 We have identified opportunities through ongoing collaboration with the Contractor and OEM, primarily driven by the potential for design refinement during detailed engineering. While current design maturity limits precise quantification, each opportunity has been assessed for its likely impact on project cost, programme or both.

6.11.24 [redacted]

6.11.25 We have collaborated closely with our Contractor to review the project programme and ensure optimal efficiency. Initially, the site establishment, including the installation of site cabins, was scheduled to commence at the [redacted]. [redacted] The associated costs are currently under review and negotiation with the Contractor and their sub-supplier. We anticipate that this adjustment will result in a reduction in the overall site establishment costs.

[56] For example, [redacted] Risk Analysis

6.11.26 [redacted]

7 Conclusion

7.1.1 This re-opener submission outlines the justification, detailed project scope, delivery plan, cost efficiency measures, and the regulatory allowances requested for the installation of a new gas turbine at the Peterborough compressor station.

7.1.2 The objective is to define a scope and timeline that are both fit for purpose and cost-effective, ensuring compliance with the Medium Combustion Plant Directive (MCPD). This project also supports our ongoing commitment to minimizing the environmental impact of our operations.

7.1.3 This document confirms the needs case for a new [redacted] gas turbine compressor, based on the 2024 FES scenario, to meet 1-in-20 peak demand, ensure Security of Supply, support customer requirements, and reduce likelihood of network constraints. The investment remains essential for MCPD compliance and to provide reliable, emissions-compliant compression across varying flow forecasts.

7.1.4 We have progressed the project with a combination of a 2-Stage ECI design and build delivery model for the Contractor which was deemed best fit for purpose based on lessons learnt. We direct-awarded the contract to [redacted] having concluded that their experience in delivery ERP3 is invaluable and will deliver substantial cost benefits.

7.1.5 We have worked with [redacted] to evaluate the cost and concluded that the MWC's costs are efficient and reflective of the current market conditions.

7.1.6 The OEM award to [redacted] followed a rigorous process ensuring that the technical design of the new unit meets our safety and environmental requirements as well as compliance with project specifications and standards.

7.1.7 To ensure value for money, we benchmarked OEM costs against previous projects of similar scope, adjusting for market conditions. We have concluded that the final contract reflects competitive pricing, and any additional scope was transparently documented to align with project requirements.

7.1.8 Using Monte Carlo simulation, we have developed a robust QRA that represents [redacted] of the EAC, ensuring that risk exposure is realistically and comprehensively modelled. This level of contingency is appropriate given the project's complexity and scale, and it reflects lessons learned from the ERP3 project. We are committed to proactive risk management and strategic opportunity realisation to ensure optimal outcomes for this project.

7.1.9 Due to the critical nature of our assets and associated operations we are faced with numerous safety, environmental, operational and financial risks should the project described in this document not be delivered and should we not be able to meet our 1in20 obligations. Delivery of this project by 2030 will ensure that our customers continue receiving gas at volumes and pressures required and are not exposed to constraint costs because of reduced network capability.

7.1.10 We are requesting a re-opener direction from Ofgem to modify outputs, delivery dates and associated allowances (CEPOt) totalling [redacted].

7.1.11 Having utilised baseline allowances, we will continue to progress with the delivery programme through spending at risk ahead of Ofgem's funding direction for works on the critical path, detailed engineering design and procurement. Following Ofgem's final determination anticipated in December 2025, we will be able to fulfil contractual delivery and construction award in line with the programme delivery path.

8 Appendices

8.1 Appendix A – FOSR

8.2 Appendix B – Needs Case Evidence

8.3 Appendix C – Cost Book

8.4 Appendix D – NGT Cost and Risk Report

8.5 Appendix E – NGT Direct Award Paper

8.6 Appendix F – [redacted] Stage 1A Summary Report

8.7 Appendix G – [redacted] Stage 1A Cost Estimate Report

8.8 Appendix H – [redacted] Cost Methodology

8.9 Appendix I – Project Programme

8.10 Appendix J – [redacted] BAT Summary Report

8.11 Appendix K – Mapping of Ofgem Requirements

8.12 Appendix L – Assurance Letter

8.13 Appendix M - Division of Responsibilities Schematic

Glossary	
1-in-20	The 1-in-20 peak day demand is the level of demand that, in a long series of winters, with connected load held at the levels appropriate to the winter in question, would be exceeded in one out of 20 winters, with each winter counted only once.
AGI	**Above Ground Installation:** Above ground gas assets (including, but not limited to; pipework, valves, pig traps, meters and regulators) located within a fence line for the safe operation and maintenance of the National Transmission System.
Avon	Rolls Royce (Siemens) gas turbine engine which forms part of the compressor machinery train and is subject to MCPD.
Barg	Bar gauge is the pressure gauge reading.
BAT	**Best Available Technique:** The most effective and advanced stage in the development of activities and their methods of operation which indicates the practical suitability of particular techniques for providing the basis for emission limit values and other permit conditions designed to prevent (and where that is not practicable), to reduce emissions and the impact on the environment as a whole.
Brownfield	Construction within the existing site perimeter fence.
Capability	The physical limit of the NTS to flow a volume of gas under a given set of conditions; this may be higher or lower than the capacity rights at a given exit or entry point.
Carbon Dioxide (CO_2)	A naturally occurring chemical compound composed of two oxygen atoms and a single carbon atom. If there is not enough oxygen to produce CO_2 during combustion, (CO) is formed.
Carbon Monoxide (CO)	A colourless, odourless and tasteless gas produced from the partial oxidation of carbon-containing compounds. It forms when there is not enough oxygen to produce carbon dioxide (CO_2), such as when operating an internal combustion engine in an enclosed space.
CEPRAt	**Compressor Emissions Baseline Allowances Term.**
CEPROt	**Compressor Emissions Re-opener Allowances Term.**
Compressor Station	Equipment used to compress gas to high pressure for transport through the NTS. Each compressor station consists of one or more compressor units as well supporting equipment such as meters, filters, valves and pipework. Compressor units can be driven by gas turbines or electric drives.
CSRP	**Control System Restricted Performance:** Technology that restricts the performance of a gas-driven compressor to limit NO_x emissions.
CBA	**Cost Benefit Analysis:** A mathematical decision support tool to quantify the relative benefits of each site option.
Counterfactual	The counterfactual option represents current network with minimum interventions to comply with emissions legislation.

DD	**Draft Determination.**
DLE	**Dry Low Emissions:** An Avon DLE retrofit modifies the combustion system within the Avon engine so that air and fuel are premixed before combustion. This reduces the peak combustion temperature, which in turn reduces the amount of NO_x produced.
EAC	**Estimate Cost at Completion** The total cost of the project at completion.
ECC	**Estimate to Complete Cost** The remaining cost to complete the project.
ECI	**Early Contractor Involvement.**
EUD	**Emergency Use Derogation:** Compressor unit derogated under the MCPD limited to run 500-hours per year on a rolling 5-year average, with a maximum limit of 750-hours in any one year. This removes the use of the compressor from standard operation, where they can only be run to prevent commercial constraints (Essential Use) or exit constraints (Emergency Use) on the network.
Emission Limit Values (ELV)	Limits set for industrial installations by the LCP directive and IPPC under the umbrella of the IED and MCPD.
Emission Abatement	Includes technology that reduces the emissions from a gas-driven compressor.
Entry Capacity	Holdings give NTS users the right to bring gas onto the NTS on any day of the gas year. Capacity rights can be procured in the long term or through shorter term processes, up to the gas day itself. Each NTS Entry point has an allocated Baseline which represents a level of Capacity that National Grid is obligated to make available for delivery against on every day of the year.
EA	**Environment Agency:** A non-departmental public body, sponsored by DEFRA, with responsibilities relating to the protection and enhancement of the environment in England.
ERP3	**Emissions Reduction Phase 3** – Project to install two new [redacted] driven compressor trains at Peterborough and Huntingdon as part to replace the capability of two of the three Avon's at each site under and IPPC emissions driver.
Exit Capacity	Holdings give NTS users the right to take gas off the NTS on any day of the gas year. Capacity rights can be procured in the long term or through shorter term processes, up to the gas day itself. Each NTS Exit point has an allocated Baseline which represents a level of Capacity that National Grid is obligated to make available for offtake on every day of the year.
FOSR	**Final Option Selection Report.**
FES	**Future Energy Scenarios:** An annual industry-wide consultation process encompassing questionnaires, workshops, meetings and seminars to seek feasibility back on latest scenarios and shape future scenario work. The Future Energy Scenarios document is produced annually by National Grid ESO and contains their latest scenarios.

Greenfield	Construction on land that is outside of the existing perimeter site boundary, where there is no need to demolish or rebuild any existing structures.
IPPC	**Integrated Pollution Prevention and Control:** A regulatory system that employs an integrated approach to control the environmental impacts of certain industrial activities.
Intrusive Outage	Significant outage works impacting the whole station and where the station cannot be returned to service until the scheduled works are completed.
LCPD	**Large Combustion Plant Directive:** An EU directive to reduce emissions from combustion plants with a thermal output of 50 MW or more. Combustion plant must meet the emission limit values (ELVs) given in the LCP directive for NO_x, CO, SO_2, and particles.
MCPD	**Medium Combustion Plant Directive:** A directive to reduce emissions from combustion plants with a net thermal input between 1-50 MW.
MTO	Material Take Offs.
Contractor	Main Works Contractor.
NTS	**National Transmission System:** The high-pressure system consisting of terminals, compressor stations, pipeline systems and offtakes. Designed to operate at pressures up to 85 barg. NTS pipelines transport gas from terminals to NTS offtakes.
NDP	**Network Development Process:** The process by which National Grid identifies and implements physical investment on the NTS.
NGT	National Gas Transmission.
Nitrogen Oxide (NO_x)	Oxides of nitrogen which are a by-product of combustion of substances in the air, such as gas turbine compressors.
OEM	**Original Equipment Manufacturer:** The company that originally produced the equipment eg. [redacted] which produces the [redacted] turbine.
Ofgem	**Office of Gas and Electricity Markets:** The regulatory agency responsible for regulating Great Britain's gas and electricity markets.
Re-opener	Re-openers are a type of RIIO uncertainty mechanism. Depending on their design, they allow Ofgem to adjust a licensee's allowances (in some cases up and in some cases down), outputs and delivery dates in response to changing circumstances during the price control period.
RIIO	**Revenue = Incentives + Innovation + Outputs:** RIIO-T2 is the second transmission price control review to reflect the framework; it sets out what the transmission network companies are expected to deliver and details of the regulatory framework that supports both effective and efficient delivery for energy consumers.
RRP	**Regulatory Reporting Pack:** Annual submission to Ofgem on 31 July as per RIIO-T2 reporting requirements Standard Special Condition A40: Regulatory Instructions and Guidance.

SEPA	**Scottish Environment Protection Agency:** Scotland's environment regulator and flood warning authority.
Selective Catalytic Reduction (SCR)	A means of converting nitrogen oxides (NO_x) with the aid of a catalyst into diatomic nitrogen, N_2, and water, H_2O. A gaseous reductant, typically anhydrous ammonia, aqueous ammonia or urea, is added to a stream of flue or exhaust gas and is adsorbed onto a catalyst. Carbon dioxide (CO_2) is a reaction product when urea is used as the reductant.
UAP	Unallocated Provision.
Uncertainty Mechanism	Uncertainty mechanisms exist to allow price control arrangements to respond to change. They protect both end consumers and licensees from unforecastable risk or changes in circumstances.
Unit Outage	Significant outage works impacting one or more compressor units on a compressor station, the unit cannot be returned to service until the scheduled unit works are completed, however, the station can still operate with other available units.
United Kingdom Continental Shelf (UKCS)	The region of waters surrounding the United Kingdom, in which the country claims mineral rights.