national gas transmission

St Fergus Compressor Emissions Re-opener: Asset Health Distribution Boards

Engineering Justification Paper

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1 Project Summary Table

1.1.1 The summary table below sets out key information about the Distribution Boards (DBs) replacement project.

Table 1: Summary table for DBs

[1] For RIIO-T2 the direct costs aligned to CEPOt represent the allowances requested, as this project is subject to the Opex Escalator (Special Condition 3.18 of the Licence). For RIIO-GT3 and RIIO-GT4 our funding request under CEPOt includes direct and indirect cost.

2 Executive Summary

2.1.1 National Gas Transmission (NGT) is seeking [redacted] (2018/19 price base) funding under the RIIO-T2 Compressor Emissions Re-opener and Price Control Deliverable Uncertainty Mechanism for efficiently incurred costs associated with the replacement of eleven urgent priority DBs and one enabling workshop switchboard (SB/3) at the St Fergus Gas Terminal. The eleven reflects nine Priority 1 DBs identified in the [redacted] 2023 survey, plus two additional Priority 1 interventions confirmed by site verification where boards initially recorded as redundant were found to be in service with live-exposed parts.

2.1.2 This request is made in accordance with Licence Special Condition 3.11, Part D, as per Ofgem's Re-opener Guidance and Application Requirements Document. It supplements the previous submission for the replacement of DBs (NGT_AH2_10_St Fergus Distribution Boards EJP) at the St Fergus Gas Terminal included in the Asset Health Re-opener submitted in June 2023.

2.1.3 The St Fergus Gas Terminal is critical to UK energy security, handling between 25% and 50% of national gas supplies depending on demand and availability. As one of only two upper-tier Control of Major Accident Hazards (COMAH) sites on the network, it is subject to stringent Health, Safety and Environment (HSE) and Scottish Environment Protection Agency (SEPA) inspections. The terminal has operated continuously for over 45 years, and key electrical infrastructure is now beyond its original design life.

2.1.4 The Priority 1 DBs at St Fergus present significant operational and safety risks requiring urgent intervention. Asbestos is present within certain circuit breakers and insulation. This means that routine tasks including circuit isolation, fuse removal/ reinsertion and planned maintenance presents a risk of fibre release (see Figure 3 and Figure 4). When, for example, a fuse is removed for isolation of a circuit or maintenance on the board, the technician is at risk of Asbestos fibres being released. In addition, exposed live parts and reliability issues including defective fuse holders (e.g., legacy GEC Red-Spot sprung contact failures), increase the risk of overheating, arcing, electrical faults and fires. Site verification subsequently identified two boards in service with live-exposed parts that were initially recorded as redundant; these corrections are reflected in the eleven Priority 1 interventions now in scope.

2.1.5 Independent surveys conducted [redacted] in 2023 confirmed these asset health risks. Works are well underway and nearing completion to mitigate operational and safety risks, ensure compliance with standards, and maintain network resilience. An enabling replacement of the workshop switchboard (SB/3) was included to free space at DB locations and enable compliant cable routing/re-use of existing final-circuit wiring, allowing the DB interventions to be delivered efficiently.

2.1.6 In its December 2024 decision on the Asset Health Re-opener application, Ofgem agreed the need and option for this investment and further confirmed that NGT may submit an application for efficiently incurred costs via the Compressor Emissions Re-opener. This submission reflects that decision and aligns with the short-term strategy (Appendix D of the HV Transformers EJP) for St Fergus, which confirmed the requirement for investment in DBs associated with compressor units required until 2030 and was supported by the engineering justification in Appendix A of our previous submission. This submission reflects that decision and aligns with the short-term strategy (Appendix D of the HV Transformers EJP) for St Fergus, which confirmed the requirement for investment in DBs associated with compressor units required until 2030 and was supported by the engineering justification in Appendix A of our previous submission.

2.1.7 All DBs within this investment will be commissioned in January 2026 and project close-out aimed for January 2026.

2.1.8 All figures in this document are in 2018/19 prices except where otherwise stated.

3 Introduction and Request Summary

3.1.1 In developing our investment programmes at the St Fergus Gas Terminal since the RIIO-T2 Final Determinations, we have adopted a two-phase strategy to ensure clarity between short-term asset health and long-term site operating strategy.

3.1.2 Our St Fergus Short-Term Strategy provides certainty on terminal operation requirements, including minimum compression across Plant 1 and Plant 2, for operation out to 2030. The long-term strategy will deliver the enduring terminal solution, including compression capability required for operation beyond 2030.

3.1.3 Due to the critical nature of the electrical supplies, without a managed programme of investment the DBs could rapidly become a major risk to the continued safe and efficient operation of the St Fergus terminal.

3.1.4 The St Fergus Short-Term Strategy supports the decision to rationalise the compression units across Plants 1 and 2 to four [redacted] (previously referred to as [redacted] units (1A, 1B, 1D and 2B) and maintain these in operation to at least 2030. The confirmed long-term plan to keep both Plants 1 and 2 makes it pertinent to invest in DBs for both the short-term and long-term operation of the terminal.

3.1.5 In 2023, we commissioned [redacted] plc to survey and assess DBs at St Fergus for condition and compliance with current electrical regulations and standards. [redacted] appointment reflected the scale and cross-discipline nature of the programme, over twenty Asset Health T2 scopes (DBs, HV transformers, valves, CM4) requiring electrical, mechanical, and civil/structural capabilities and the need for consistent, detailed scope definition and reports for each T2 package, guided by a comprehensive Electrical, Control & Instrumentation (E/I&C) survey scope.

3.1.6 The DBs Survey report (Appendix C) reviewed all DBs on site and identified that many of them have a range of asset health issues, including fuse boards containing asbestos creating a health and safety hazard. Furthermore, difficulties in maintenance and testing due to exposure of live parts within enclosures has been identified.

3.1.7 Following [redacted] 2023 survey across the St Fergus terminal (Appendix **C**), nine DBs were categorised as Priority 1 for urgent replacement due to unacceptable risk principally asbestos-containing fuse boards and exposed live parts. Subsequent site verification identified that DBs P6A and P6E, recorded as redundant in the survey, are in service with exposed live parts and therefore require Priority 1 intervention. Accordingly, this funding request covers eleven Priority 1 DB interventions, these were rationalised into 9 DB's as part of the design. A local workshop switchboard replacement (SB/3) was also required as enabling work to deliver the DB replacements compliantly. This switchboard replacement is included in scope but is not counted within the 11 Priority 1 DBs. (See Problem Statement).

3.1.8 The elevated risk of occupational health related incidents (asbestos fibre release) and electrical safety hazards (exposed live parts) necessitated intervention in RIIO–T2.

3.1.9 Before the replacement programme, emergent failures on DBs whether Asbestos-Containing Materials (ACM) or non-ACM could extend restoration durations and, in some cases, require a temporary Plant 1 or Plant 2 outage, reducing operational resilience (compression shortfall only if other units were already unavailable). Most targeted DBs have now been replaced, and this submission seeks recovery of efficiently incurred costs for those works (and necessary enabling activities).

3.1.10 For DBs with live-exposed parts, specifically P1 DB1, P2 DB3, P6A and P6E, safe maintenance requires isolating the affected circuits. This does not mean a whole-site shutdown; it may require a localised outage of Plant 1 or Plant 2. P6A feeds the mixer through which all site flow passes; isolating P6A can impact gas flow and require diversion via other terminal routes. Replacing these DBs enhances resilience and security of supply by reducing unplanned local outages and shortening restoration times.

3.1.11 As part of the programme, the workshop switchboard (SB/3) was replaced and reconfigured to free up space at the current Distribution Board locations and enable complaint cable routing and re-use of existing final-circuit wiring. The original switchboard was not defective, the change was enabling work to deliver the DB replacements efficiently, with shorter outages and a compliant layout. This approach also enables the reuse of existing wiring to the final circuits, optimising resources while improving layout efficiency and compliance. In addition, this investment mitigates the current spares' obsolescence risk and allows the site to benefit from the latest technologies developed for DBs.

3.1.12 Work to remediate the remaining DBs is planned for the RIIO-GT3 regulatory period, alongside the wider Asset Health investment for the other electrical assets at the St. Fergus Gas Terminal.

3.1.13 This submission follows Ofgem's December 2024 Final Determination, which confirmed that we may apply for efficiently incurred costs under Special Condition 3.11 – Compressor Emissions. Ensuring compliance with the Transmission Specification Electrical (T/SP/EL/50) remains a key priority throughout this programme, with all works executed in alignment with these requirements to guarantee operational integrity and safety.

3.1.14 This EJP interacts with other documents to form the reopener submission pack as illustrated in Figure 1 below.

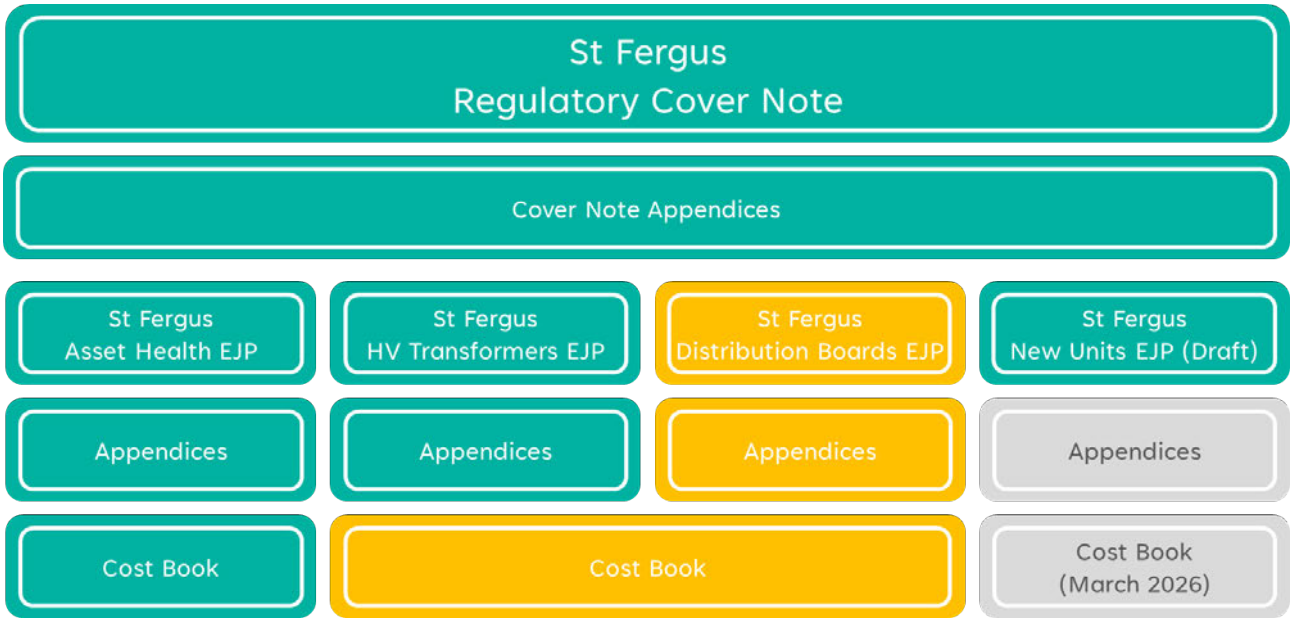

Figure : St Fergus MCPD Re-opener Submission Pack

3.2 Funding Request Summary

3.2.1 This submission has been prepared in accordance with the Gas Transporter Licence Special Condition 3.11 Part D and requests to modify the outputs, delivery dates and allowances in Appendix 2 of the Gas Transporter Licence (the Licence), which are detailed in Tables 2 and 3. Our total funding request (CEPOt) to deliver the required HV Transformer works at St Fergus is [redacted]. Ofgem are invited to assess and approve our cost proposal for the St Fergus Asset Health works in line with Special Condition 3.11, Part F.

3.2.2 Table 2 below sets out the total funding request to deliver the Asset Health scope at St Fergus. For RIIO-T2 the direct costs aligned to CEPOt represent the allowances requested, as this project is subject to the Opex Escalator (Special Condition 3.18 of the Licence).

Table 2: Current estimated RIIO-T2 spend profile and funding request (£m, 2018/19)

[redacted]

3.3 Price Control Deliverable

3.3.1 Table 3 summarises the proposed Price Control Deliverable (PCD) Output associated with the delivery of the re-opener scope for the DBs at St Fergus.

Table 3: Proposed PCD

[redacted]

3.3.2 This project is at Stage 4.4 in the ND500 process: Execute Project. Therefore, the cost accuracy is estimated at [redacted] in accordance with the Infrastructure and Projects Authority (IPA) cost estimating guidance.

4 Equipment Summary

4.1.1 DBs are an important part of an electricity supply system at St Fergus, enabling safe and reliable distribution of power to essential terminal equipment, including compressor units and analyser systems. They split the incoming electrical feed into multiple subsidiary circuits, each protected by fuses, breakers and other safety devices within a single enclosure.

4.1.2 A DB also provides additional safety features (typically fuses, breakers, Residual Current Devices (RCD) and Miniature Circuit Breakers (MCB)) that allow for safer use of mains power. As each branch circuit has an individual safety cut-off, the entire electrical system is better protected against overloads, short circuits and other hazards.

4.1.3 At St Fergus, these DBs support key operational assets required for compression and gas processing. For illustrative purposes, Figure 2 shows a typical line diagram of Analyser House 1 Raw Power DBs 2 at St Fergus. This demonstrates the configuration of outgoing circuits to heaters and sample cooling cabinets from a common bus bar rail.

4.1.4 The distributed power from the DBs allows precise control and isolation of circuits without shutting down the entire incoming supply, which is essential for maintaining terminal resilience and operational continuity.

5 Problem Statement

5.1.1 The eleven St Fergus DBs within this scope had been in service for over 45 years, with most installed during the terminal's original construction. They were of varied designs from multiple manufacturers, resulting in inconsistent standards of design and construction.

5.1.2 Inspections and testing had identified an increasing number of defects on these DBs, including:

- Fuse boards containing asbestos, creating a major occupational health risk under the Control of Asbestos Regulations 2012.
- Component reliability issues, such as failure of fuse holders (e.g. GEC Red-Spot sprung contact failure), presenting a fire hazard.
- Lack of IP2X protection from live parts, posing a significant personnel safety concern.
- Non-availability of spares for obsolete boards and protective devices (e.g. Federal Electric and Crabtree Polestar, no longer manufactured for over 10 years).
- Non-compliance with current standards including BS7671 and NGT's Transmission Specification Electrical (T/SP/EL/50)

5.1.3 Priority 1 DBs: Intervention and Classification: [redacted] plc's 2023 survey (Appendix **C**) identified nine DBs as Priority 1 due to asbestos-containing fuse boards and exposed live parts during maintenance. Subsequent site verification confirmed that P6A and P6E, recorded as redundant in the survey, remained in service and presented live-exposed parts risk, they were therefore reclassified as Priority 1. In total, there are eleven Priority 1 DBs comprising of:

- Asbestos-affected (seven): DB E, DB F, DB G, DB H, DB L, DB LV, DB P.
- Live-exposed parts (four): P1 DB1, P2 DB3, P6A, P6E.

5.1.4 This corrects the initial nine replacements submitted in the previous submission (Appendix A). Following the site verification, the DBs were rationalised, closely related circuits were consolidated where appropriate, resulting in nine DBs (see Table 6).

5.1.5 Additionally, the workshop switchboard (SB/3) was replaced as enabling work to achieve a compliant installation within the physical constraints at the DB locations. The replacement consolidates protective devices for DB/E, DB/F, DB/G and DB/H at SB/3 while retaining local isolators for the HVAC DB, welder, shotblaster and overhead crane. This approach enables reuse of existing final-circuit wiring, avoids re-cabling and structural works, and reduces outage duration. SB/3 is enabling work (not defect remediation) and is documented on Drawing 6011/03/01/03.

5.1.6 Figure 3 and Figure 4 illustrate examples of boards and exposed fuse holder sections (red circles) that contained asbestos in fuse holders. Fuses were consumables that require periodic replacement, exposing maintenance personnel to asbestos fibres during routine work, an unacceptable risk under health and safety regulations as per the Control of Asbestos Regulation 2012. The exposed fuse holder sections (red circle) of the below DBs contained asbestos material which poses a major occupational health risk mainly to maintenance personnel.

5.1.7 Some boards also lacked Ingress Protection (IP2X), leaving live parts such as bus bars exposed, as shown in Figure 5. This creates a severe electrical safety hazard for personnel and equipment.

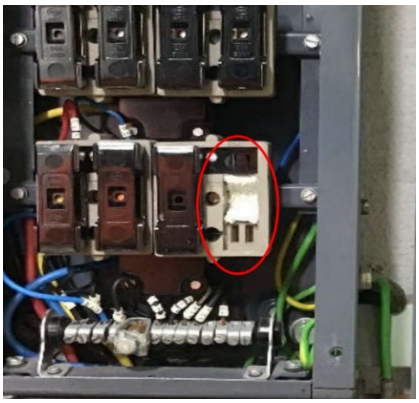

Figure 2: Asbestos presence on DBs BD(L)

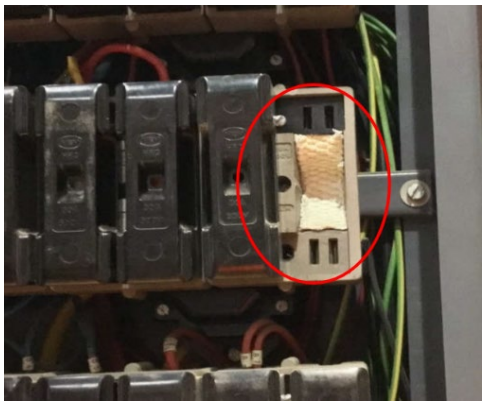

Figure 3: Asbestos presence on Fuse board 'G' SB/3-E415V 1

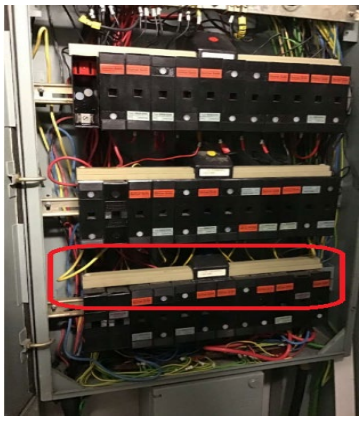

Figure **4**: Services DB1 exposed terminations

5.1.8 Failure of these assets could result in loss of electrical supply to critical equipment. In worst case scenarios, this would have prevented power from reaching all outgoing circuits, leading to:

- Compressor unit trips, disrupting gas flow though the terminal.
- The unavailability of safety, quality and metering systems essential for network integrity.

5.1.9 In some cases, the failure may be localised to a single outgoing circuit, with severity determined by the criticality of the affected equipment.

5.1.10 Such failures could have compromised our ability to meet our obligation to deliver gas where required, resulting in contractual breaches and significant financial penalties. Furthermore, if a compressor unit trips, there is a risk that it could impact our compressor operational strategy necessitating more expensive operational solutions.

5.1.11 For instance, if any such failure affects a compressor unit which was ordinarily envisaged to be available at the time of failure, then it impacts the terminal operational strategy.

5.1.12 Environmental risks arising from Distribution Board failure and related maintenance activities: Failure of DBs can trigger protective shutdowns and process trips, requiring controlled depressurisation of plant systems to return equipment to a safe state. Depressurisation is achieved through venting or flaring, both of which release gas into the atmosphere. Flaring produces greenhouse-gas emissions, primarily as CO_2 from combustion, while venting without compression releases methane. Repeated events can lead to cumulative environmental impacts.

5.1.13 The continued use of DBs without investment and remediation of the above key issues will result in continued deterioration and an increasing number of defects. Depending upon the severity of the defects, the affected assets may require immediate isolation rather than planned repair which further increases the operational impact.

5.1.14 This investment is beneficial as it resolves the elevated safety, environmental and occupational risk highlighted above. The investment will also reduce maintenance activities and defects thereby reducing operating expenditure and in turn increase the reliability of the terminal compression activity, ensuring the continued safe and efficient operation of the terminal.

5.1.15 A summary of the DBs within the scope of this project is included in Table 3 below, along with their observed condition.

Table 4: Summary of DBs within scope

Subsite	Asset	Condition
MTB	Distribution Board (LV)	Asbestos Present
	Distribution Board (L)	Asbestos Present
	Distribution Board (P)	Asbestos Present
	Fuseboard (H)	Asbestos Present
	Fuseboard (E)	Asbestos Present
	Fuseboard (F)	Asbestos Present
	Fuseboard (G)	Asbestos Present
Plant 1	Distribution Board (1)	No IP2X protection
Plant 2	Distribution Board (3)	No IP2X protection
Plant 6	Distribution Board (P6A)	No IP2X protection
	Fuseboard (P6E)	No IP2X protection

5.1.16 Due to limited space in the DB locations within the workshop, and to enable re-use of wiring to existing final circuits, Switchboard 3 was replaced with a new switchboard. The new switchboard incorporates protective devices for the replacement DBs (E, F, G and H) as well as existing isolators for equipment such as HVAC DB, welder, shotblaster and overhead crane. This requirement was only identified during the design phase.

6 Optioneering

6.1.1 Three options were assessed to address the condition, obsolescence, and compliance risks associated with the Distribution Boards (DBs). In line with asset health, safety, and regulatory requirements, only full replacement delivers the required service life and compliance.

6.2 Options discounted

6.2.1 Option 1: Do nothing.
Not viable. Does not mitigate safety risks or progressive deterioration, fails to meet COMAH/HSE expectations and electrical compliance requirements (e.g., BS 7671, T/SP/EL/50), and cannot support the terminal's expected life to ≥2050.

6.2.2 Option 2: Major refurbishment
Not viable. Component-level upgrades do not address whole-board ageing and introduce compatibility/standards gaps (e.g., BS EN/IEC 61439 for switchgear assemblies). Obsolescence of OEM parts persists, increasing downtime and OPEX. Would require replacement before 2050, offering poor value for money.

6.3 Progressed option

6.3.1 Option 3: Replacement (selected)
Complete replacement of DBs with compliant, OEM-supported equipment. Works executed under planned outages with temporary boards/emergency power maintaining critical supplies.

- **Advantages**: reduces personnel safety risks (e.g., arc-flash exposure), restores reliability, lowers OPEX, secures spares and supportability, and ensures compliance with modern standards.
- **Disadvantages**: highest upfront capital cost.
- **Status:** delivery is nearing completion, with practical completion targeted for January 2026.

Table 5: Optioneering Summary

Solution considerations		Option 1 Do Nothing	Option 2 Major Refurbishment	Option 3 Replacement (Selected)
Cost		Lowest	Medium	High in short term, but low from the whole-life cost perspective and addresses all cost drivers
Compliance	COMAH	Non-compliant because of the risk associated with aged assets	Non-compliant because of the risk associated with aged assets	Compliant
	BS7671	Non-compliant	Non-compliant	Compliant
	T/SP/EL/50	Non-compliant	Non-compliant	Compliant
Environmental Impact		Medium due to failures resulting in gas venting	Medium due to failures resulting in gas venting	Low
Maintenance	Ongoing OPEX	High due to continued deterioration and defects requiring OPEX interventions	High since refurbishment will address known defects, but new ones will materialise since parts will fundamentally still be deteriorated.	Low
	Risk	High - unsafe for personnel to work in the vicinity of highly unpredictable failures.	High – due to recurring defects.	Low – Recurring defects are resolved through this intervention
Operational Resilience	Single Point of Failure	High since the probability of failure is high and these assets have no direct redundancy	Medium since the probability of failure lower that Option 1	Compliant DBs have very low probability of failure
	Security of Supply	Recurring maintenance activities would require continuous plant outages	Recurring maintenance activities would require continuous plant outages	Low - addresses all age-related defects and provides maximum availability
Overall viability		Not viable	Not Viable	Viable

7 Project Scope, Plan and Costs

7.1.1 Replacement of the DBs categorised as urgent priority was chosen as the most viable, cost effective and logical option to take forward.

7.1.2 Following engagement with Ofgem after the original needs case submission in June 2023, our focus has been on ensuring that this investment is delivered at the most efficient overall cost. Appendix B confirms the delivery programme of works with project completion of the Distributions Boards installation expected for January 2026.

7.2 Contracting Strategy

7.2.1 In line with the delivery works for the DBs, we utilised its Electrical Control and Instrumentation (EC&I) Framework for the St Fergus Asset Health DBs Design and Build procurement activity. Specifically, Lot 2 – Telemetry and Electrical (T&E) and Lot 4 – Electrical were applied. Lot 1 – Control Systems Replacement Projects and Lot 3 – Gas Quality and Metering (GQM) were not utilised as they did not align with the scope or contractual requirements.

7.2.2 A mini competition was conducted under the EC&I Framework for both requirements. However, only [redacted] submitted a response. The remaining suppliers declined to participate, citing insufficient capacity and capability to deliver works at the St Fergus location. Consequently, [redacted] was the sole bidder and was awarded the contract.

7.2.3 Although the award was made directly to [redacted], we undertook negotiations on commercial terms, scope and contractual conditions to ensure alignment on deliverables. This process safeguarded value for money and confirmed that all works would be delivered on time and in accordance with the programme. NEC Option A was utilised for the direct call-off from the EC&I framework.

Table 6: Contracting Strategy

Framework	Summary
Conceptual and Detailed Design and Build	Both stages are covered under an NEC Option A contract with [redacted]

7.3 Cost assurance

7.3.1 Baseline funding for the St Fergus DBs has not been allocated. A total [redacted] (2018/19) has been spent to date (June 2025) in procuring and installing DBs. Further details of the spend-to-date have been quantified within the DBs Cost Book (Appendix C of HV Transformers EJP).

7.3.2 To ensure robustness of costs, we employed the use of Designers / Main Works Contractors (MWCs) to validate scope, understand engineering challenges and build an externally priced estimate reflecting current market costs.

7.3.3 The cost estimates are considered tendered prices i.e. they are based on a bottom-up approach provided by an experienced MWC, using tendered pricing from designers, equipment and material suppliers and internal estimates for people, plant and machinery.

7.4 Estimating Uncertainty (EU)

7.4.1 In line with the infrastructure and Projects Authority (IPA) cost estimating framework, the cost estimate has been structured around the fundamental equation: Base Estimate + Estimating Uncertainty + Risk = Anticipated Final Cost. The EU range selected was based on a Class estimate maturity, with a range of +11%/- 8% applied. Our Cost and Risk Report (Appendix J of HV Transformers EJP) further detail the methodology for calculating the EU on this project.

7.4.2 The Cost and Risk Report (Appendix J of HV Transformers EJP) outline the cost and risk methodology used to establish a comprehensive and transparent framework for the project's financial planning and risk management. It delineates the systematic approach used to develop our cost estimates for this project.

7.5 Efficient Cost

7.5.1 Cost estimate and delivery programme, design report all formed part of the deliverables produced by the MWC during the conceptual FEED studies.

7.5.2 To assure the [redacted] estimates, the activity pricing schedule they provided has undergone a cost assurance exercise. Key activities included cross checking Material Take-off (MTO) quantities and rates for materials, reviewing durations and resources for both construction activities and design phases to ensure alignment with both the programme of works and project requirements.

7.5.3 To ensure that all costs have been allowed for by the MWC, a Document Review Sheet (DRS) was produced by us and issued to the MWC highlighting areas of concern or where clarification was required. This has resulted in a revised activity pricing schedule incorporating the comments and queries raised to clarify points such as granularity of costs, scope limits and resource allocations.

7.5.4 Through this additional information, durations of activities and detail of allowances were able to be checked against scope activities. The resource forecast provided by the MWC provides additional cost assurance that sufficient project management allowances have been made. Where quantity errors have been found, these have been adjusted/reduced in alignment with resource durations. Rates have also been used from the EC&I framework, an existing set of contractor rates.

7.5.5 Our costs (our staff and operations resourcing) required to support successful project delivery has been built-up using the Contractor's delivery programme. This programme defines when the key project delivery milestones will take place and as such, we can determine our optimum / efficient resources required to support each stage. Resourcing has been identified through several key sources listed below:

- Assessment of governing specifications and standards (e.g. BP/133G) defines core project delivery roles and responsibilities,
- Cross comparison against the resources utilised on similar asset health projects (i.e. Bacton asset health projects).
- Lessons learnt from historic delivery projects.
- Engagement with various disciplines across our core departments.
- Staff utilisation throughout key project phases (detailed engineering, construction, commissioning, documentation handover/closure) was determined by the interrogation of:

7.5.6 The Contractor's programme for Formal Process Safety Assessment (FPSA) workshops such as HAZOPs (Hazard and Operability Study), HAZCON (Hazard in Construction) etc. which are resource intensive particularly for engineering subject matter experts. Additionally, The Contractor's construction programme which identifies the number of work areas to be supervised, the number of work crews proposed by the Contractor, the presence of any weekend working (the Contractor will work a 10-day rotation). This helped us determine the requirement for more than one project supervisor or safety advisor.

7.5.7 Supporting narrative on our direct roles and their project responsibilities are contained within (Appendix C of HV Transformers EJP). Please refer to our Cost tab of the St Fergus Distribution Board cost book for more granular cost detail.

7.6 Project Scope

7.6.1 The scope for this investment, which is the basis of the cost estimate, is shown below:

- Disconnection, removal and disposal of eleven DBs and one associated switchboard.
- installation of nine replacement DBs and one switchboard as per specification (T/SP/EL/50 and BS7671) and the approved design outcome (Table 6) resulting in a net reduction of two DBs

7.6.2 Installation and connection of earthing wires to ensure compliance with current electrical safety standards.

- Mobilisation of asbestos specialists to undertake a demolition asbestos survey following identification of asbestos during works in the BGC (British Gas Corporation) substation, including remediation of identified areas of concern.
- Programming and Coordination of works with ongoing terminal activities.
- Site Acceptance.
- Update of Operational Drawings and asset registers to reflect changes.

7.6.3 A Table 7 summarises legacy DBs and their new configurations, with descriptions and justification for each change.

Table 7: DBs Changes Summary

Subsite	Old Asset	New Asset	Description	Justification
MTB	Distribution Board (LV)	DB LV	BG Sub 110v Sockets	Asbestos Present
	Distribution Board (L)	DB PL – Design rationalised to merge DB L&P into a single unit called DB PL	BG Sub Lighting	Asbestos Present
	Distribution Board (P)		BG Sub Power	Asbestos Present
	Fuseboard (H)	DB H	Main Workshop 110v Sockets	Asbestos Present
	Fuseboard (E)	DB E	Main Workshop Lighting	Asbestos Present
	Fuseboard (F)	Design rationalised to merge circuit (2off) from DB F to DB G	Heating & Control	Asbestos Present
	Fuseboard (G)		Building Power	Asbestos Present
Plant 1	Distribution Board (1)	DB 1	Building Services Board	No IP2X protection
Plant 2	Distribution Board (3)	DB 3	Control Building Services 110v Sockets	No IP2X protection
Plant 6	Distribution Board (P6A)	DB P6A	Control Building Power, Heating & Lighting	No IP2X protection
	Fuseboard (P6E)	DB P6E	Analyser House Small Power & Lighting	No IP2X protection

7.6.4 Below are comparative photographs depicting the pre-replacement and post-replacement states of the DBs. This shows the progress made to date in replacing asbestos containing DBs However, work is still in progress on the remaining scope of works covered in this funding request.

Figure 5: Pre-replacement: DB H, DB E, DB F, DB G and Switchboard 3

Figure 6: Post-replacement: DB H, DB E, DB G and Switchboard 3

Figure 7:Pre-replacement: DB LV, DB L, DB P

Figure 8: Post-replacement: DB LV and DB PL

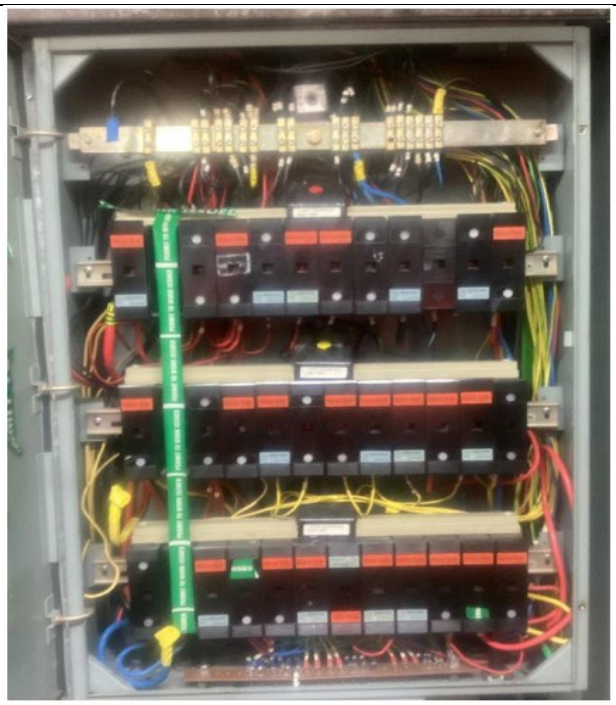

Figure 9:Pre-replacement: DB 1

Figure 10:Post-replacement: DB 1

Figure 11:Pre-replacement: DB 3

Figure 12:Post-replacement: DB 3

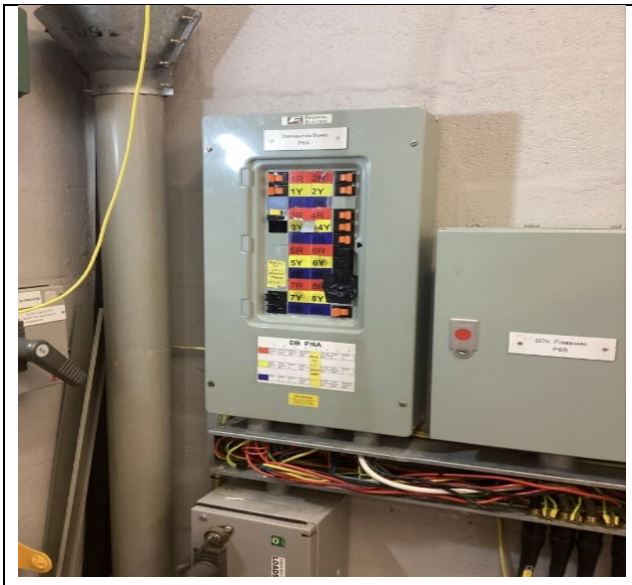

Figure 13:Pre-replacement: DB P6A

Figure 14:Post-replacement: DB P6A-

Pre-replacement: DB P6E

Post-replacement: DB P6E- Installation ongoing

7.7 Project Timeline

7.7.1 Table 8 provides a breakdown of achieved and future delivery project milestones within RIIO-T2. A detailed delivery programme is included Appendix B.

[redacted]

7.8 Project Costs

7.8.1 A breakdown of the costs for the delivery of this replacement project is included below in Table 9

Table 9: Project Cost Breakdown (£m, 2018/19)

[redacted]

7.9 Volume InvIDs (Investment Identification)

7.9.1 Table 10 below provides a summary of the UIDs and associated funding for the scope of works proposed in this paper.

Table 10: InvID Details (£m, 2018/19)

[redacted]

7.9.2 The cost accuracy at this stage of the project is estimated at [redacted] in accordance with the Infrastructure and Projects Authority (IPA) cost estimating guidance.

8 Conclusion

8.1.1 This report has explained the asset health and compliance shortcomings of the DBs at St Fergus and their implications to the safe and reliable operation of the terminal. As detailed in this justification paper, this replacement is of paramount importance and significant work has been undertaken to ensure the most efficient spend to address the highlighted investment drivers.

8.1.2 An estimated amount of [redacted] (2018/19 Prices) is therefore being requested for the ongoing replacement project of nine DBs and one Switchboard.

9 Appendices

Appendix A:NGT_AH2_10_Distribution Boards EJP

Appendix B: Programme of Works

[redacted]