

NOA Constraint Management Pathfinder (CMP) B6 2023-24 – Extension of OTS

Medium Sized Investment Project (MSIP) Submission

January 2025



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Executive Summary

Project Name	NOA Constraint Management Pathfinder (CMP) B6 2023-24 – Extension of Operational Tripping Scheme (OTS)					
Project Reference	PT000968					
Investment Driver	ESO Constraint Management Pathfinder					
Start Year	2022					
End Year	2025					
Total Installed Cost Estimate (£m 18/19)	[REDACTED]					
Total Installed Cost Estimate (£m Nominal)	[REDACTED]					
Cost Estimate Accuracy (%)	The majority of the costs are actual spend, the remainder is a Class 3 estimate with an accuracy of –5/+10%					
Project Spend to date (£m 18/19)	[REDACTED]					
Current Stage Gate	Gate 3					
Spend Profile	21/22	22/23	23/24	24/25	25/26	T3
£m, 18/19 prices	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
£m, Nominal prices	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Funding Request (Total spend less allocation to NZUIOLI Pot)	21/22	22/23	23/24	24/25	25/26	T3
£m, 18/19 prices	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
£m, Nominal prices	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

Table 1: Project summary

All costs in this submission are in nominal price base, however we have converted the total cost estimate and the spend profile into 18/19 prices within the table above to ensure compliance with the Re-opener Guidance document.

The B6 Constraint Management Pathfinder (known as the “B6 CMP”) project connects Generators (which are already connected to, or contracted to connect to, the transmission network in Scotland) to the Anglo-Scottish Commercial Intertrip Scheme (known as the “B6 CIS”). This scheme seeks to disconnect those generators from the network within 150 milliseconds (ms) should a network fault occur. This enables the National Electricity System Operator (NESO) to operate the system at a higher capability, thus maximising the use of existing assets and reducing potential curtailment on renewable generation.

In accordance with Part F of Special Licence Condition 3.14 Medium Sized Investment Projects (MSIP) Re-opener, this application is to recuperate the expenditure incurred, and the forecasted spend up to completion, to build the additional intertrip links needed between the B6 OTS located at [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

There is no other appropriate funding route available for this investment which will bring material system benefits.

Our works required for this project have been completed with the exception of the establishment of diverse fibre communication routes for [REDACTED] which cannot be established and armed until ongoing works at the associated substation are complete. We have therefore provided a bottom-up ex-post cost summary using incurred staff hours and Original Equipment Manufacturer (OEM) invoices. The total project completion cost is forecasted to be [REDACTED]

The Net Zero and re-opener Development Fund guidance¹ allows us to use the NZ Use It or Lose It (NZ UIOLI) pot for early development work on projects we intend to bring forward under specific re-openers, including MSIP, up to the value of [REDACTED] per project. For this B6 pathfinder project we are allocating [REDACTED] (which equates to [REDACTED] in 18/19 prices) of early development engineering and design costs of the project to the NZ UIOLI pot.

The NESO anticipated savings from the B6 CMP over one year, October to September, to be in the region of £20m-£40m depending on the generation background driving the constraint and system conditions. The anticipated annual savings, baselined against 2024, are expected to increase in 2025 and 2026 as more generation continues to connect in Scotland ahead of significant network reinforcement across the B6 boundary.

While the total cost of the project does not exceed the minimum threshold for MSIPs, this submission is being presented alongside other applications which have a cumulative value above the materiality threshold.

We are seeking allowances of [REDACTED] (net of NZ UIOLI allocation) to support the delivery of the Connection of [REDACTED] sites to the B6 Operational Tripping Scheme by 31 March 2026.

We are requesting that the Opex Escalator (OE) is not applied to any of our MSIP or VISTA applications. We have previously provided Ofgem with evidence that the mechanism is no longer appropriate in this context.

2.2 ¹ [Net Zero Re-opener Development UIOLI Allowance Governance Document](#)

1 Introduction

Scope of submission

This MSIP application is to recuperate the expenditure to build the additional intertrip links needed to connect [REDACTED]

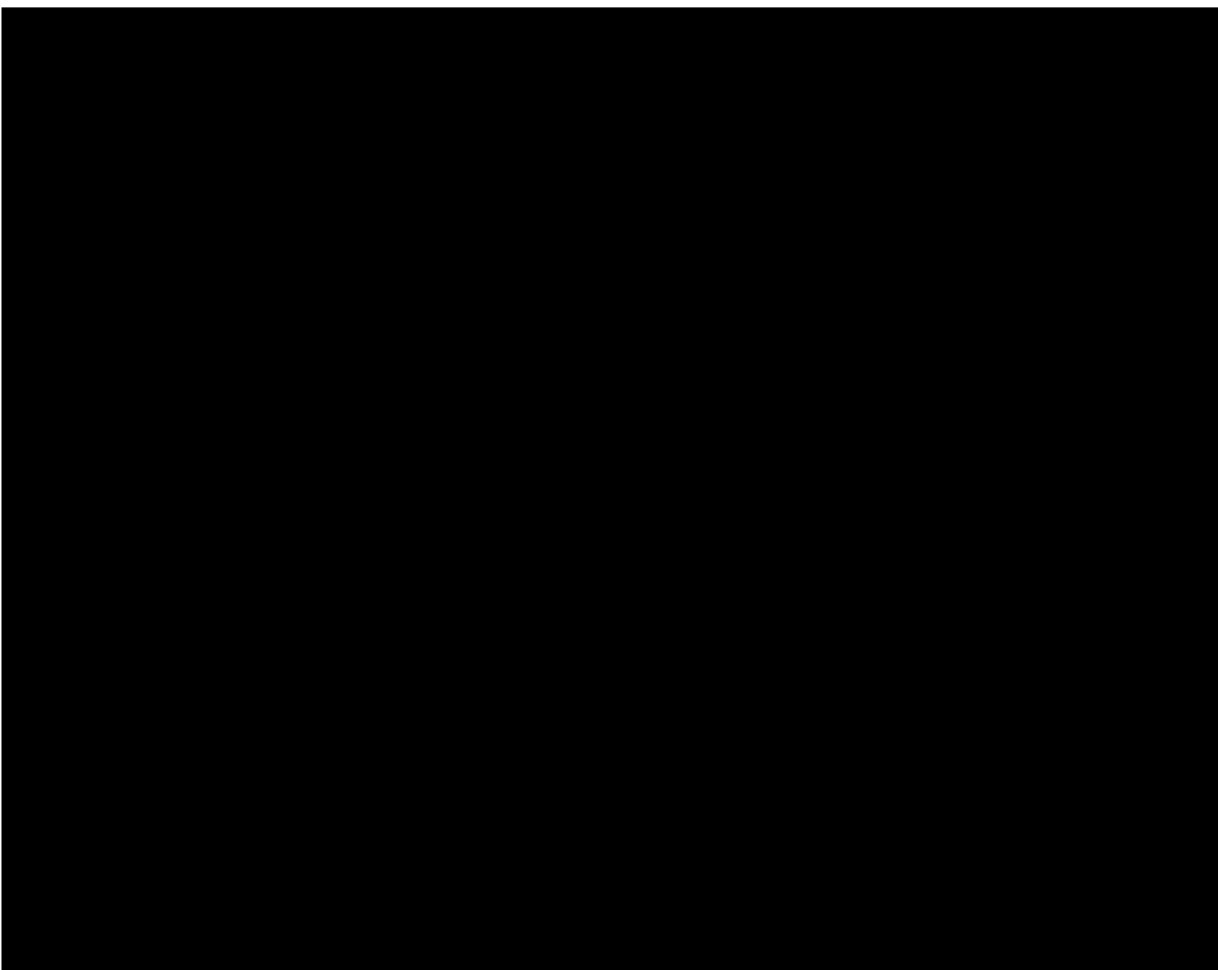


Figure 1: Map showing location of [REDACTED]

We are submitting this application under Special Condition 3.14: Medium Sized Investment Projects (MSIP) Re-opener. The project meets the criteria set out in paragraph 3.14.6 (f) “a system operability or constraint management project that has been requested by the System Operator”.

While the total cost of the project does not exceed the minimum threshold for MSIPs this submission is being presented alongside other applications which have a cumulative value above the materiality threshold. 0.5% of ex-ante average base revenue. We are requesting that the Opex Escalator (OE) is not applied to any of our MSIP or VISTA applications. We have previously provided Ofgem with evidence that the mechanism is no longer appropriate in this context.

The project is well progressed. [REDACTED]

Structure and content of MSIP Submission

The MSIP submission is structured as follows:

Section 2: Need: In this section we provide an explanation of the need for the project. It provides evidence of the drivers for undertaking the planned works and where appropriate it provides background information and/or process outputs that generate or support the “need”.

Section 3: Optioneering and preferred solution: We present all the options considered to address the “need” described in Section 2.

Section 4: Stakeholder engagement: In this section we identify relevant stakeholders and outline how engagement with these stakeholders has supported development of the project.

Section 5: Whole system We discuss our whole system approach.

Section 6: Cost information: We provide evidence of expenditure justification, cost drivers, forecasting and mitigation whilst identifying the costing approach and rationale.

Section 7: Conclusion: We highlight the pertinent points from the preceding chapters, as well as providing indication of timeline and next steps.

Requirement Mapping

Table 1 details where the submission meets the minimum requirements set out in Special Condition 3.14 and associated Reopener Guidance.

Licence and Guidance Requirement	Submission Section
Statement setting out what MSIP the application relates to	Section 1
Amendments requested to outputs, delivery dates or allowances	Section 7
Clear statement on needs case	Section 2
Justification of technical need and, where relevant, the consumer benefit that the MSIP is expected to deliver	Section 2
Explanation of options assessment	Section 3
Clear description of preferred option	Section 3
Explanation of how expenditure which could be avoided as a result of the change has been accounted for	Section 3
Clear description of stakeholder engagement and whole system opportunities	Section 4 & 5
Statement that costs (incurred or expected) exceed the Materiality Threshold, but are less than £100m	Executive Summary
Statement that costs are confined to those incurred or expected on or after 1st April 2021	Section 6
Explanation of the basis of the calculation any amendments requested to allowances	Section 6

Table 2: Requirement mapping

2 Need

Background

Through the NOA Constraint Management Pathfinder (CMP) for 2023-24, the NESO looked to contract [REDACTED] that can be tripped, during the period October 2023 – September 2024, at the time of a critical fault on the Anglo-Scottish boundary (B6) circuits. The exact volume and sources of generation to be procured for B6 CMP were to be decided by the NESO through a commercial tender process. The CMP for 2023-24 is based on the NESO's commercial solution assessed in the NOA – CS05 NESO-led commercial solution for Scotland and the north of England (Stage 1) – which was given a Proceed signal in NOA 2020/21 (NOA6) and NOA 2021/22 (NOA7).

The NOA CMP aims to help resolve GB system wide constraints by introducing a post-fault generation turn down service which can resolve network congestion on the transmission network at the time of a network fault. This is to help provide GB consumer value by allowing more power flow on the circuits pre-fault which would otherwise be turned down by the Electricity National Control Centre (ENCC). There are high constraint costs currently seen and forecasted for the B6 boundary between Scotland and England, and CMP 2023-24 is helping to resolve these constraints ahead of network reinforcement.

The NESO commissioned a Feasibility Study from each affected Electricity Transmission Owner (ETO) on the work necessary to support the CMP activity up to the commercial tender stage. Any subsequent changes to the OTS are expected to be funded through the Medium Sized Investment Project (MSIP) regulatory mechanism.

For CMP 2023-24, the NESO launched the Expressions of Interest (EOI) in March 2021 with a window of 6 weeks for parties to register their interest. SSEN Transmission and SPT then undertook a feasibility study from June - July 2021 to confirm capability and costs associated with connecting the interested parties to the B6 OTS. The NESO then evaluated the EOI and ETO feasibility assessment before issuing an invitation to tender for the successful parties in August 2021. The NESO then carried out a commercial assessment on the submitted tenders, signed contracts with the successful parties and published tender results in March 2022. The tender results state that the NESO anticipates savings from the B6 CMP during the service term (from October 2023 to September 2024) to be in the region of [REDACTED] depending on the generation background driving the constraint and system conditions.

In November 2021 the NESO issued a System Operator Transmission Owner Procedure on Investment Planning (STCP 16-1 Planning) Request to [REDACTED]

The circuit breakers associated with the above parties were required to be connected to the B6 OTS established by SPT for operation by October 2023 such that when the party was armed, for the faults being monitored by the intertrip scheme, the circuit breakers would operate and disconnect the party from the transmission system.

The SSEN Transmission works required for this project have mostly been completed except the establishment of diverse fibre communication routes for [REDACTED].

[REDACTED]

The NESO anticipated savings during the service term (from October 2023 to September 2024) to be in the region of £[REDACTED] depending on the generation background driving the constraint and system conditions. It's important to note that although there is a delay to the SSEN Transmission works for one of the scheme's, the savings anticipated will continue beyond 2024 and will likely increase in 2025 and 2026 as more generation continues to connect in Scotland ahead of significant network reinforcement across the B6 boundary.

Alignment with SSEN Transmission RIIO-T2 Business Strategy

The extension of the B6 OTS to include [REDACTED] as per the outcome of the CMP 2023-24 tender delivers the following outputs and benefits consistent with our RIIO-T2 business strategy:

- Increases the transfer of renewable electricity able to be securely accommodated across the Anglo-Scottish B6 boundary, through the contracting of post-fault tripping services with generators in Scotland, in line with our RIIO-T2 goal to transport the renewable electricity that, in total, powers 10 million homes;
- Enables renewable generation to continue to operate in pre-fault conditions and trip if critical faults manifest, in line with our aim for 100% transmission network reliability for homes and businesses.

3 Optioneering & Preferred Option

The nature of this type of network intervention means that some of the elements of optioneering normally carried out by the ETO are instead carried out by the NESO. As a result, there is range of options considered in our analysis builds on the work undertaken by the NESO².

All Options Considered

For CMP 2023-24, the NESO launched the EOI in March 2021 with a window of 6 weeks for parties to register their interest. SSEN Transmission and SPT then undertook a feasibility study from June - July 2021 to confirm capability and costs associated with connecting the interested parties to the B6 OTS.

For the SSEN Transmission licensee area, seven participants were identified from the EOI. Their eligibility was then evaluated in the feasibility study against the following technical requirements³:

- **Operational Intertipping Time**: The generator should ideally be disconnected or have its active power injection to the network at zero MW within 150 milliseconds (ms) from fault

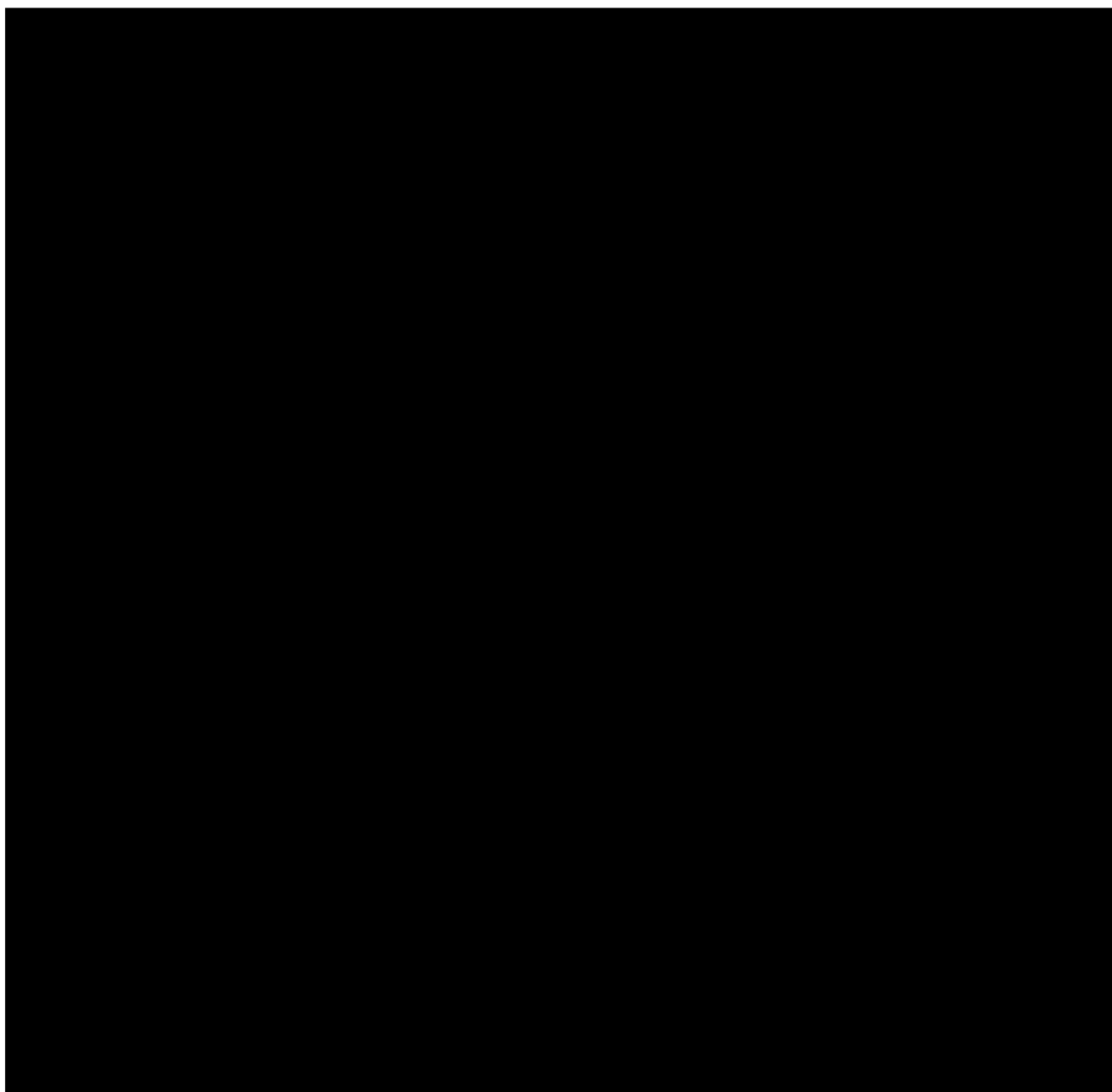
² This means some of the elements of optioneering set out in 3.13 of the reopener guidance are not included as allowed for under paragraph 3.3..

³ There is an option for the ETO to discuss the relaxation of requirements due to practical or economic limits.

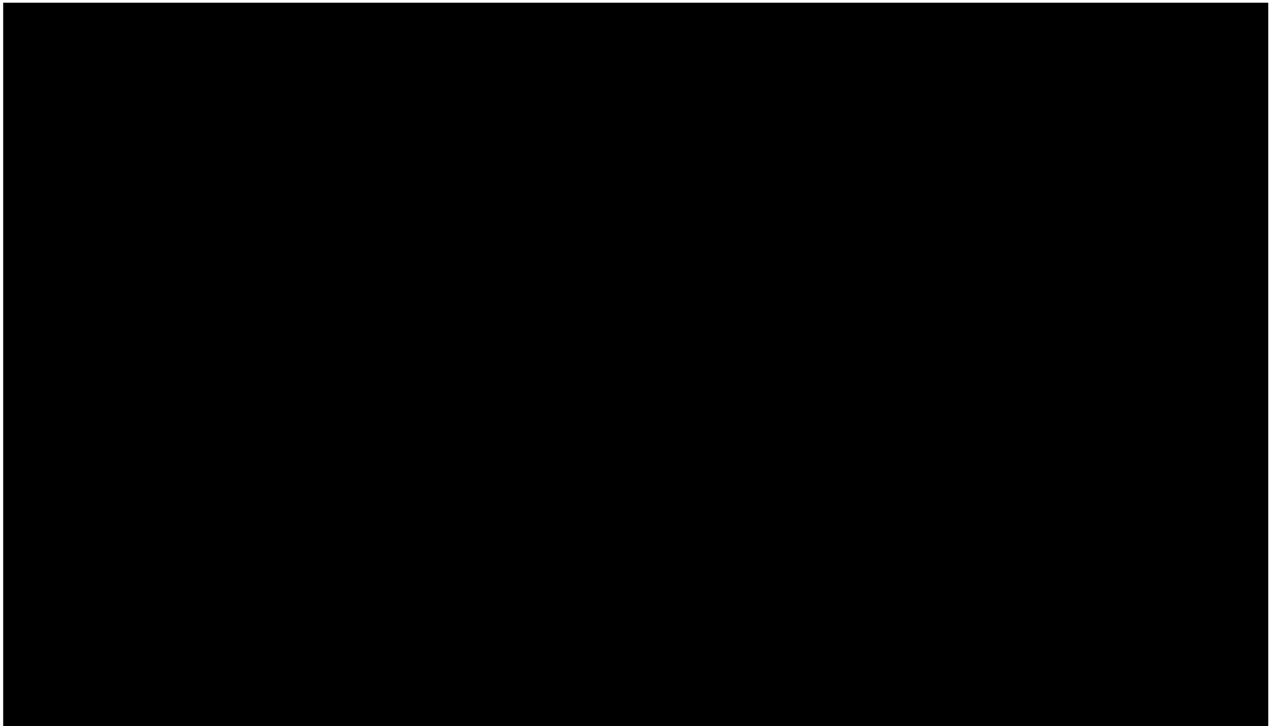
inception to circuit breaker open. The generator must remain disconnected until the ETO is notified by the ENCC that they can be re-connected safely.



Table 3 provides a summary of the outcome of the feasibility study we carried out for the [redacted] participants from the EOI. Full details can be found in the feasibility report⁴ which we have included as a supplementary document to this submission.



⁴ SSEN Transmission CMP Feasibility Assessment Report_V2_2021-07-30



Preferred Option

The three sites within the SSEN Transmission licensee area that were successful in the NESO's tender for CMP 2023-24 for connection to the B6 OTS were [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] this would mean exposing the connecting OHL circuits and any future connections to the B6 OTS tripping signal. This would lead to amendments to the B6 OTS should any new generator connections apply in this area for access to the OHL circuit between [REDACTED] which would not be efficient. For all three sites, the work being undertaken represents the most efficient way to meet the minimum requirements to connect the three contracted sites to the existing B6 OTS as part of the NESO Pathfinder exercise and realise the associated benefits for consumers.

4 Stakeholder Engagement

Our Commitment to Stakeholder Engagement

SSEN Transmission understand it is essential that key stakeholders, local communities, and their representatives understand the need for and benefits of any proposed works to the Transmission Infrastructure.

SHE Transmission conduct regular external assurance audits on our Stakeholder Engagement Strategy and delivery plans. We recently undertook the AA1000 Stakeholder Engagement Standard Health Check, in association with the international consulting and standards firm, Accountability and are pleased to report a total score of 88% for the 2023/24 assessment. Our score means we continue to sit within the 'Advanced' stage of the Accountability Stakeholder Engagement Maturity Ladder and are operating at the highest level of stakeholder engagement.

We work hard to ensure stakeholders' views are considered throughout the development of our projects. In this chapter, we will describe our approach to engagement for and outline our ongoing commitment to engaging with interested or impacted stakeholders in an effective and timely way.



Figure 2: Stakeholder groups

Our Stakeholder Engagement

Following engagement with the National Electricity System Operator (NESO) a STCP 16-1 Planning Request was issued to request that SSEN Transmission design and build additional intertrip links between the existing B6 Operational Intertrip Scheme (OTS). With this monitoring installed, the NESO can intertrip Scottish generation and only trigger disconnection of plant once the fault has materialised. This means more renewable energy can remain connected on the system and not constrained pre-fault. It is hoped that this will lead to better commercial offers that will help to alleviate the high constraint costs currently seen and forecasted for the B6 boundary between Scotland and England and other boundaries in the north of England.

The GB energy market often faces public criticism due to the amount of electricity generation, which is constrained off, as a result of grid constraints during periods of high winds, with these additional charges ultimately paid by GB energy consumers. During engagement, Citizens Advice have confirmed that they are concerned by the current size of constraint payments added to consumer bills. These costs appear to reflect system inefficiency and reducing them is clearly in the interest of the consumer. Citizens Advice have said they believe it is important that timely investment is made to ensure that

networks can facilitate efficient constraint costs. With this extension, the NESO can allow for less generation to be bid off the system pre-emptively in anticipation of a possible network fault, thus saving network congestion costs. Following internal engagement, a Feasibility Study identified that the [REDACTED] were the most viable options for this technology and provide the best value to consumers.

SSEN Transmission are committed to ensuring we develop an efficient and coordinated network which delivers economic benefits for the local communities which host our infrastructure. Following extensive engagement with the supply chain, we procured local supply partners [REDACTED], to assemble the panels ensuring economic benefits are retained within local community. Ongoing engagement continues with the supply chain for enabling works and we are particularly keen to ensure we secure further contracts with the local supply chain where possible.

As the intertrip panels sit within the existing [REDACTED], we expect this will cause minimum, if any, disruption to local communities during the installation and maintenance. Our dedicated Community Liaison Managers will be on hand to answer any queries and ensure communities are kept informed as the works progress and the resultant wider benefits to consumers are explained.

Energy partners and stakeholders, including the NESO, other Transmission Operators (TOs), generators and politicians, generally agree that the evolution of a smarter, more flexible electricity grid will be required to meet the changing needs of GB as it adapts to deliver Net Zero. We already have a design for the OIT and our engineers have engaged with colleagues to take learnings from the [REDACTED] installation, which will be applied to these sites. We will continue to collaborate with other TO's to share learning where similar projects are being developed to help meet Scottish and UK carbon emissions targets.

Stakeholder Engagement Next Steps

Next steps regarding stakeholder engagement on the B6 Pathfinder Constraint Management Pathfinder Extension project are primarily around:

- Maintaining ongoing communication with NGEESO regarding the completion of the project and to ensure efficient grid management
- Sharing learning with other TO's and the NESO for consideration when developing similar projects
- Manage the interfaces with the ongoing developments in the Transmission network and coordinate the communication with the parties involved.

5 Whole System Considerations

This project is by nature a “Whole System” solution which requires coordination between the NESO, the TOs, and network users. Modifications at the sites of the three aforementioned onshore wind farm schemes within the SSEN Transmission licensee area are needed for connection to the B6 OTS located at [REDACTED] area, for operational tripping to facilitate power flow across the B6 boundary into NGET's area. This solution is a NESO proposed commercial solution which is being led by the NESO following a recommendation to Proceed in both NOA 2020/21 (NOA6) and NOA 2021/22 (NOA7). The intertrip schemes require communication channel and end-end operational testing between SSEN Transmission and SPT.

6 Costs

The total requested allowance for this project is [REDACTED] inclusive of pre-construction costs. The costs set out within this submission only include costs incurred after 1 April 2021 and, when combined with the other projects being submitted, meet the materiality threshold set out within the Licence.

Our works required for this project have been completed with the exception of the establishment of diverse fibre communication routes for [REDACTED] which cannot be established and armed until ongoing works at the associated substation are complete. Table 4 shows the split between actual and forecast spend for the project.

PT000968 – NESO Constraint Management Pathfinder B6 Boundary	Requested allowances estimate (18/19 Price Base)	Requested allowances estimate (Nominal)	SSEN Transmission Project Cost Class	SSEN Transmission Indicative Estimate Tolerance	Supporting Documentation
Actual Spend (Up to 31 Dec 2024)	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	Gate 3 Estimate Document
Forecast Spend	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	PT000968_HUB_RPT_Nov2024

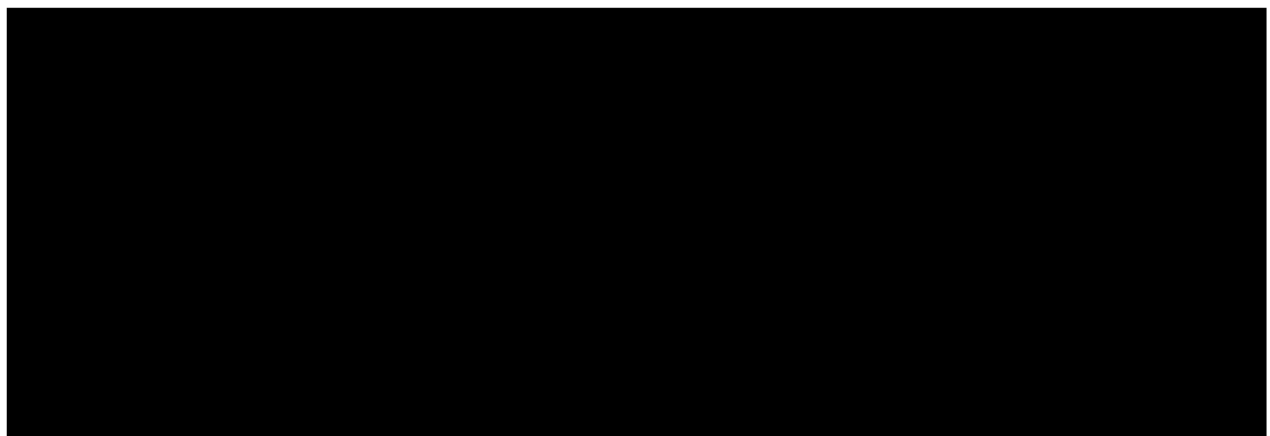
Table 4 - Cost Summary

The estimate for the remaining forecast spend:

- has a Class 3 accuracy range from -5% / +10% based on the project status and scope maturity.
- has been produced in line with our Cost Estimating Procedure.

Cost Estimation, Regional Variations and Site-Specific Factors Driving Costs

Design, SSEN staff costs and commissioning costs are based on the number of staff hours and the standard RIIO-T2 day rates for each role converted to hourly figures. Materials costs are based on actual manufacturer costs paid/quotes for control panels and multiplexor IEDs. All other costs are actual costs incurred through the delivery of this project.



Project Benchmarking & Metrics

Labour costs for this project have been based on the benchmarked costs agreed with Ofgem through the RIIO-T2 settlement process. The allocation to activities is comparable with producing deliverables and the resource burden required to adequately deliver the project.

Procurement Strategy

For technical reasons the Original Equipment Manufacturer (OEM) is the only provider that can provide the required IEDs. Therefore, we have used a direct allocation approach to procurement and purchased equipment directly from OEM. This was the most economic and efficient approach to take for this project as the IEDs to be installed at these sites will match those in use at existing sites and are unique to the OEM we have procured them from. Tendering these works would introduce tendering costs and it was determined that overall project costs would be higher as bidders would have to sub-contract works to this same OEM, introducing additional fees.

Delivery

The project is managed in line with the principles set out in our Large Capital Project governance framework, ensuring it is governed, developed, approved and executed safely.

Two of the three intertrip schemes are currently completed:

- [REDACTED] works have been fully commissioned; and
- [REDACTED] works have been fully commissioned.

[REDACTED]

These projects are being carried out in accordance with our Large Capital Project governance framework, ensuring the works are governed, developed, approved and executed safely. As part of this governance, a project programme and Project Development Plan are in place to ensure adequate resourcing, clear reporting mechanisms, and adherence to a structured schedule.

Risk

The B6 OTS project manages risk in accordance with the International Standard on Risk Management (ISO31000), and the agreed SSEN Large Capital Projects (LCP) Governance Manual and requirements therein. The Project has used a Risk Management Plan to set out the approach and process the Project followed to manage risk (threats and opportunities) over the lifetime of the Project.

The Risk Management Plan considered the key risks (threats and opportunities) the project faces, the risk process that the project will follow to manage risk, project teams roles and responsibilities in respect of managing risk, and that the Project is using KERIS, the SSEN LCP Risk Management Information System (RMIS) for managing risk on the project.

KERIS is the repository for all project risks (threats and opportunities) as it allows the users to create and assess all risks, impact assess these risks and track mitigating risk actions through to successful closure. All risks and actions are assigned owners who are then accountable for updating the KERIS system. Risk owners can simultaneously access the RMIS, that is an ongoing project activity to ensure that risk data is captured, up to date and can be used to support project decision making. To supplement the ongoing updates to the RMIS, the B6 NESO project team holds strategically timed risk workshops to collectively review and challenge the Project Risk Register ahead of each key gate stage.

The development of the project risk register follows the LCP Governance Gated Process in the Manual, and the risk register is a live document that evolves through continuous updates and contributions from the project team over the life of the project and is contained within KERIS.

Risks are regularly reviewed by the Project Manager with:

- Updated reports detailing the status of Risks and Actions to highlight risks/ actions requiring attention; and
- Monthly report, showing risk progress (new risks, opportunities, new actions, and closed items); risk gaps, usage, quality of the information being recorded and where the risk focus needs to be going forward for the Project.

Our works required for this project have been completed with the exception of the establishment of diverse fibre communication routes for [REDACTED] which cannot be established and armed until ongoing works at the associated substation are completed. [REDACTED]

7 Conclusion

This project has a clear needs case driven by the STCP-16 request we received from the NESO and will deliver a reduction in constraint costs which are ultimately borne by GB consumers. The work being undertaken represents the most efficient way to meet the minimum requirements to connect the three contracted sites to the existing B6 OTS as part of the NESO Pathfinder exercise and realise the associated benefits for consumers.

Our works required for this project have mostly been completed except the establishment of diverse fibre communication routes for [REDACTED]. The cost incurred for the project up to and including December 2024 is [REDACTED] and a remaining forecasted spend of [REDACTED], providing an estimate at completion of [REDACTED] which has been calculated on a bottom-up basis using staff-hours and OEM quotes. This submission justifies the most efficient tripping solution which will meet the requirements of the NESO.

The NESO anticipates savings during the service term (from October 2023 to September 2024) to be in the region of [REDACTED] depending on the generation background driving the constraint and system conditions. It's important to note that although there is a delay to the SSEN Transmission works for one of the schemes, the savings anticipated will continue beyond 2024 and will likely increase in 2025 and 2026 as more generation continues to connect in Scotland ahead of significant network reinforcement across the B6 boundary.

We propose the below PCD output for this project:

Scheme Name	Output	Delivery Date	Allowance (£m)
PT000968 – NESO Constraint Management Pathfinder B6 Boundary	Connection of [REDACTED] sites to the B6 Operational Tripping Scheme.	[REDACTED]	[REDACTED]

Table 6 - Proposed PCD Output

Glossary of terms

Acronym	Definition
CMP	Constraint Management Pathfinder
IED	Intelligent Electronic Device (for substation automation)
EOI	Expression of Interest
ETO	Electricity Transmission Owner
RTU	Remote Terminal Unit (for data acquisition at the substation)
NOA	Network Options Assessment
OTS	Operational Tripping Scheme
TO	Transmission Owner
NESO	National Electricity System Operator
ENCC	Electricity National Control Centre
STCP	System Operator Transmission Owner Code Procedure
MSIP	Medium Sized Investment Project
RMIS	Risk Management Information System
LCP	Large Capital Projects