Scottish & Southern Electricity Networks

TRANSMISSION

Skye 132kV Reinforcement Final Needs Case Submission

21 July 2022

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Executive Summary

In July 2021, we[1] set out an evidence-based and economically justified case for replacement of the existing overhead line (OHL) between Fort Augustus and Ardmore on the Isle of Skye. Over the last year, the case for reinforcement of the Skye network and the need for our recommended reinforcement solution have continued to strengthen. This Final Needs Case (FNC) updates the key project components, reflecting progress over the last 12 months and continues to show that the required investment to reinforce the full 160km length of the Skye 132kV single circuit is certain. The new line will consist of:

- 110km of new build 132kV double circuit OHL between Fort Augustus and Edinbane substations
- 24km of new build 132kV double circuit underground cables between Fort Augustus and Edinbane substations, and associated sealing end compounds at the cable remote ends
- 24km of new build 132kV single circuit OHL between Edinbane and Ardmore substations
- Establishing a new 132kV Gas Insulated Switchgear (GIS) switching station at the existing Broadford substation to connect to the current and planned additional 132kV Grid Supply Points (GSPs) and required reactive equipment as part of underground cable works.
- A 132kV GIS switching station at the existing Edinbane substation to connect to the current and planned additional 132kV infrastructure and required reactive compensation equipment.

The total investment cost is currently estimated to be around £488m. Subject to necessary regulatory and planning approvals, we expect construction to be underway in March 2024, with the scheme fully energised in October 2026. We have undertaken further analysis to evidence the significant wider benefits created from our recommended Skye reinforcement.

- Our socioeconomic analysis has **outlined the investment will create over £300m and £1.2bn to the local and UK economies** inclusively over the lifetime of the asset
- Our **whole life carbon profile has outlined that £160m of net benefit to society** will be created.

This additional analysis further strengthens the case that our investment proposal for the Skye region is economic, efficient and carries with it significant socioeconomic and environmental benefits.

Proceeding with the alternative option being considered by Ofgem (reinforcement of the line at a lower capacity, Option 1b) at this stage would lead to significant delays given the need to undertake redesign activities, including carrying out extensive stakeholder engagement and submitting a new Section 37 (S37) application.

- Any delay to investment will impact our ability to deliver the non-load works on time and ultimately **put security of supply on Skye and the Western Isles at risk.**
- Furthermore, we would **not be able to satisfy current contracts to connect low carbon renewables** to the system, with more that 50% of generators denied a connection.

[1] SSEN Transmission, the owner and operator of the transmission system in the north of Scotland

Over the last year the requirement for secure GB low carbon generation has strengthened, renewable targets have increased and the need for additional capacity in reliable networks has never been greater. The British Energy Security Strategy, ushered in by the ongoing global energy crisis, supports the overarching approach we have taken with the Skye project from the beginning; to support the GB energy system, achieve low carbon energy targets and build the best solution for the long term.

This is the right approach to meet our net zero targets, whilst minimising the need for disruptive repeated works in an environmentally sensitive area, and therefore our economic and efficient solution provides the right outcome for consumers. The strengthened national context, alongside the ever-increasing need for the required investment, means that now is the time for Ofgem to expedite approval and accelerate GB's domestic supply of clean and affordable electricity.

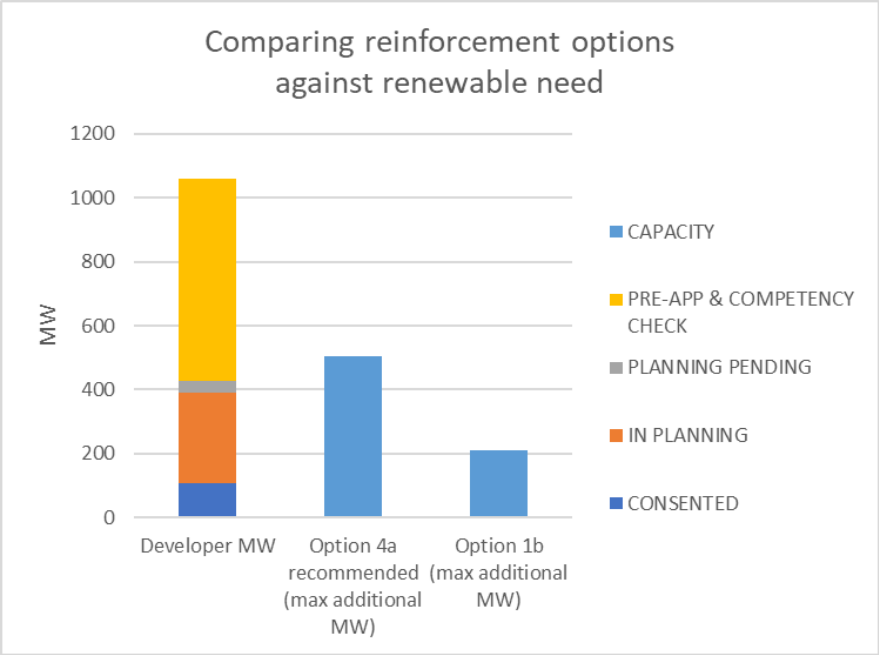
The need for growth is certain

The existing Fort Augustus to Skye overhead line is at the end of its operational life, with sections of the line urgently requiring intervention by 2026. The generation pipeline shows over 1GW of consented, contracted, and potential new low carbon renewables requiring network capacity in the next 5 years.

Our response has been to develop a long-term economic solution which meets two key system needs; the current end of life asset condition requirements and the provision of capacity for identified growth in renewable generation. Both outcomes can be achieved through a sustainable solution while meeting the minimum requirements of our local and national stakeholders to develop a long term, enduring solution.

The continued and strengthening commitment from our contracted developers alongside the high pre-application activity clearly demonstrates that our recommended solution, Option 4a, remains the best option to deliver the growth in renewable generation on Skye. In its INC review, Ofgem highlighted some concerns over the need for increased capacity for new renewables. The volume and commitment of the generation pipeline removes all cause for concern over the need for network reinforcement.

- Our recommended investment, addressing both condition and capacity, will enable capacity to connect over **500MW of additional low carbon renewable generation**.
- In comparison, the alternative option being considered by Ofgem (Option 1b) would not even be able to accommodate half of the contracted generation.



Comparing investment outcomes to system requirements confirms why the need for the recommended option is certain and is the only viable route:

- New contracted generation is 424MW
  - ✓ Only the recommended option can meet this need
- 107 MW has already achieved planning consent
  - ✓ **Developers are committed** to pursuing their network connection
- A further 285MW is progressing through the consenting process
  - ✓ The MW volume of developer **commitment continues to increase**
- A further 600MW+ of individual identifiable projects are at the pre-application stage
  - ✓ Developer interest demonstrates **further future growth**

Proceeding with reinforcement of the line at a lower capacity (Option 1b) would be to build a network which was under capacity and remained significantly oversubscribed from the day it was energised. Situated in an area of outstanding natural beauty, the clear position of our stakeholders is that we should develop an enduring solution to meet the system need and not pursue incremental network growth.

We expect any attempt to return to reinforce the circuit (within a generation) would result in a backlash from the local community and statutory consultees. This would effectively block future renewable generation development, as well as 250MW of already contracted generation, in the Skye and surrounding area back to Fort Augustus and lead to a similar backlash from developers.

Our recommended option delivers significant benefits for GB consumers

At the time of our INC submission, we understood that sections of underground cables could potentially be required to mitigate landscape and visual impacts to aid with consenting of the line. A +20% sensitivity was included within our CBA to account for any changes in cost once the extent of undergrounding was better understood. Further consultation with stakeholders has confirmed that

24km of underground cables will be required. We commissioned detailed technical cable system design studies to ensure that any potential impact from undergrounding cables could be mitigated and that all the requirements to keep the network safe and operable were met. The result of this study has shown that reactive compensation will be required in the form of shunt reactors at Broadford and Edinbane, as well as synchronous condensers at Edinbane, with an associated increase to capital costs.

The cabling requirements informed by stakeholder feedback apply to all options considered in the INC. The technical requirements for shunt reactors necessitate the need for synchronous condensers due to the long radial nature of the line. The extent of electrical compensation, and the costs thereof, are proportionate to the ratings of the options.

With this information we have revised the necessary CAPEX spend profiles to account for both the cost of cabling and compensation, leading to an increase of 22% from the CAPEX profiles submitted in the INC. We have applied a uniform assumption that the CAPEX increases will be proportionate across all options in order to allow us to undertake an impact assessment to the INC CBA outcome.

The +20% CAPEX sensitivity included in our INC CBA aligns closely with our updated expenditure profile allowing us to sense check the impact of the updated design requirements across options.

- **This continues to show that our recommended option, 4a, provides the highest consumer value**

Having checked the continued validity of the INC analysis we have concluded that a full rerun of the CBA is not warranted. This is supported by the ESO who independently reviewed the impact of the CAPEX increase and is satisfied that the result of the CBA remains unchanged and that we have used an appropriate and proportionate approach to treating the additional CAPEX outside of the original sensitivity.

Now is the time to give the green light

In the period since the INC was submitted, the need for reinforcement of the Skye network has increased and is increasing still, while the need to address network condition drivers remains robust. **The case for timely investment through the recommended option is very strong.** Securing regulatory certainty is now important to enable the next stage of development and delivery of the new network in time for customers.

1. Introduction

1.1. Overview

This Needs Case is presented under Special Licence Condition 3.13 for Large Onshore Transmission Investment (LOTI) Reopener in RIIO-T2 which allows for large transmission developments that benefit consumers to be brought forward during the price control period on a case-by-case basis. This is an uncertainty mechanism that helps ensure investments are made at the right time when both need and cost is more certain, protecting both consumers and companies from over and under investment.

Following the submission of our INC in July 2021, this submission is our FNC for the Skye OHL Reinforcement project and meets the requirements as set out in Special Licence Condition 3.13 and the Large Onshore Transmission LOTI Re-opener Guidance and Submissions Requirements Document. This FNC submission supports the case for the replacement and reinforcement of the Skye OHL circuit from the Fort Augustus 400kV substation on the mainland to Ardmore on the Isle of Skye to address both the asset condition of the existing OHL and to enable renewable generation seeking to connect in the Skye area.

The need for the Skye Reinforcement Project can be summarised as follows:

- The existing OHL is reaching the end of its operational life and requires replacement in order to maintain security of supply for homes and businesses on Skye, and on the Western Isles that are currently supplied via a subsea cable from the north of Skye;
- Existing generation exceeds planning standards and is allowed under derogation. There is now a requirement to connect new renewable electricity generators on Skye which results in a requirement for an increase in capacity of the existing OHL; and
- Following commitment from both the UK and Scottish Governments to achieve net zero emissions by 2050 and 2045 respectively, we have set out an economically justified pathway for reinforcement that will meet net zero targets at the lowest risk to GB consumers.

We are therefore asking Ofgem to approve the need for SSEN Transmission to undertake the reinforcement of the Skye OHL circuit which will cover the full 160km length of the Skye 132kV single circuit OHL from Fort Augustus substation to Ardmore on the Isle of Skye.

1.2. Structure and content of Final Needs Case Submission

We recognise that Ofgem's FNC assessment will focus on those developments which have taken place after the INC. This submission focuses on the key developments to the project as it has progressed over the last 12 months and does not look to recapitulate information set out within the INC that remains unchanged.

Alongside the detailed information set out in the INC, this FNC conclusively demonstrates both the need for the reinforcement and the clear justification for our proposed solution. This includes an updated view of the generation background, including progress of contracted developers, and our continued stakeholder engagement activities to co-create our final solution. We have provided

details of further development work to conclude the selection of our recommended solution, including detailed work undertaken on underground cable design and an update to the INC CBA to account for subsequent increases in CAPEX. The submission includes new carbon profile and socioeconomic analysis that demonstrate the significant economic and environmental benefits of the project. It also provides details of the final configuration and design of our proposed solution, alongside updates to our delivery strategy that will ensure the timely delivery of the Skye project.

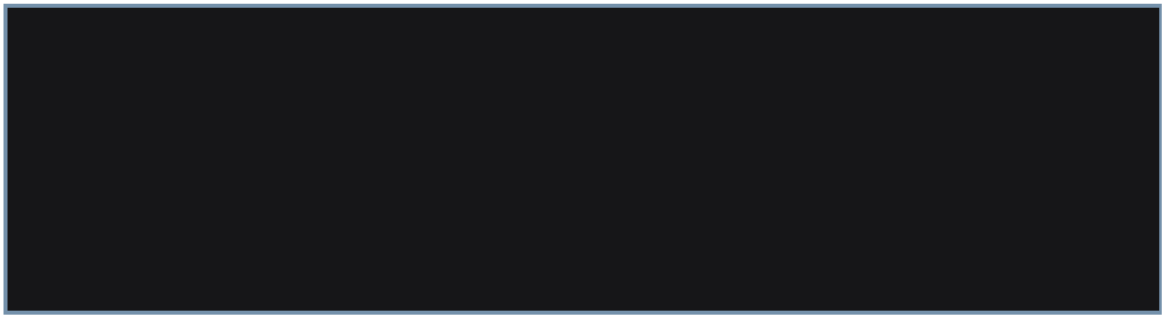
1.3. Timing of submission

We have welcomed Ofgem's pragmatic and flexible approach to the assessment of the Skye project so far, and particularly welcome Ofgem's recognition within its INC decision to allow flexibility in the LOTI process to ensure that required delivery dates can be met. The need for timely delivery is particularly pertinent for Skye given the non-load element which requires urgent intervention by 2026.

Final planning consents are not expected to be in place until November 2023 and therefore following open dialogue with Ofgem, this FNC submission is being submitted prior to planning consent being granted. To protect project delivery timescales (illustrated in figure 1), we would ask that Ofgem consult and provide a decision to its FNC assessment prior to receipt of a decision on planning consents. A timely FNC decision will allow us to submit the Project Assessment (PA) as planned in Summer 2023. If Ofgem is only willing to provide a FNC decision conditional on the approval of planning consents, we ask that it commits to reviewing the PA submission ahead of this conditionality being met in November 2023. This will be key to ensuring that the project programme can be met. We also request a PA determination before February 2024, when the project is planned to go through Gate 3 approval.

It is important to note that the current challenging market conditions mean that the price hold period is likely to very short. Our current expectation is that prices will only be held for 2 months after best and final offers. It is therefore likely that an alternative means of Ofgem giving funding certainty prior to contract award may be necessary. We will continue to engage with Ofgem following FNC submission to find a constructive way forward ahead of the PA stage.

Figure 1.1: Timeline of key dates



2. Continued Stakeholder Engagement

Key Points

- Through continued engagement with stakeholders, support for the Skye reinforcement remains, with recognition of both the generation and demand requirements for facilitating renewable generation and its criticality for the security of supply to the local area and GB as a whole.
- Stakeholders continue to urge us to develop an economic, co-ordinated solution that satisfies current and future consumers' needs. This further supports our 'do it once and do it right' approach that seeks to optimise the opportunities while avoiding the need to return for future construction works in later years.

Since our INC submission in July 2021, we have continued to conduct targeted engagement activities to refine the development of the alignment for the Skye 132kV OHL and co-create the final solution.

This engagement has primarily been:

- **Public and Statutory Consultation during Q3 2021 to Q1 2022**
- **Generation Developer Engagement in Q2 2022**

2.1. Key Stakeholder Engagement, Feedback & Actions Taken

Public and Statutory Consultation – Q3 2021 to Q1 2022

A series of proactive and targeted public events took place in Q3 of 2021, both virtually and in-person. We will continue to seek to understand stakeholders' positions and as far as reasonably practical, ensure their views are represented to achieve consensual decision making throughout the project development. We also continue to review and reassess our approach based on stakeholder feedback.

Dunvegan Hall	28 September	15:00 – 19:00
Broadford Hal	29 September	15:00 – 19:00
Glenelg Hall	30 September	15:00 – 19:00
Kyleakin Hall	4 October	15:00 – 19:00
Glengarry Hall	5 October	15:00 – 19:00
Fort Augustus Hall	6 October	15:00 – 19:00
Virtual Consultation	13 October	13:00 – 15:00 17:00 – 19:00

Our engagement activities are detailed below:

- 9,194 project update postcards sent to local homes and businesses
- 106 attendees at our in-person events
- 67 attendees at our virtual event
- 120 views of project webpage

- Councillors and Community Councillors sent posters encouraging them to advertise the local consultation events

In September 2021, we began further detailing our plans for the project by seeking views on our Consultation Document: Alignment Selection which presented the preferred route corridor proposed for the replacement line. This provided an opportunity for local communities and wider stakeholders to put questions directly to the development team and share feedback on proposals. Extensive supporting information was published to the project webpage and subsequent further engagements and meetings were undertaken to discuss stakeholder responses to proposals.

Feedback from these sessions is consistent with that heard from stakeholders previously and can be summarised as:

- **any disruption in the area must be minimised, urging us to develop an economic, co-ordinated solution that satisfies current and future consumers' needs and so avoiding the damaging cost of multiple incremental interventions**

This approach is also **consistent with the recommendation from the Committee on Climate Change on the approach to building infrastructure to support net zero**[2]

For this reason, we propose a **'do it once and do it right'** approach that seeks to optimise the opportunities while avoiding the need to return for future construction works in later years.

Generation Developer Engagement – Q2 2022 - Understanding Skye's Future Energy Ambitions

To supplement our assessment of the generation potential on Skye and to provide further supporting evidence to the Cost Benefit Analysis (CBA), we again invited all developers with plans to connect to the electricity network in this area, to confirm their connection interests via targeted engagement.

This engagement provided a better understanding of the developer perspective, who are supportive of our Project development in Skye.

Generation Developer feedback:

Responses were received from [redacted] generation developers, which very much welcome Ofgem's conclusions on the INC and agree that there is sufficient evidence of a clear Needs Case for the Skye Project. All parties are in support of an upgraded and extended Transmission network in the Skye area and are assured that the CBA supports the need for the Project.

2.2. Stakeholder Engagement Conclusion

Our comprehensive engagement with key stakeholders and approach to triangulation of feedback has enabled the identification of requirements and requests at an early stage in the development process which allows adequate time for these to be adapted into project refinement where

[2] The May 2019 Committee on Climate Change report, Net Zero – The UK's contribution to stopping global warming, is available online at https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/

necessary. This also allows space to discuss any required stakeholder trade-offs in working to determine the final project alignment.

A summary of the key mitigations agreed following the engagement activities are as follows:

- Design and build an enduring solution that recognises both local and developer needs
- Environmental and wildlife sensitivities will continue to be assessed through the EIA process, and the implementation of appropriate mitigation measures
- All preferred alignment routes will be sought to minimise impacts on ancient woodland wherever possible, with appropriate measures put in place to mitigate where possible or compensate for any woodland loss
- Continue to engage with stakeholders to support understanding of the challenges associated with alignment options with respect to areas of harsh terrain
- Alternative technologies in locally and environmentally sensitive areas must be, and subsequently are being considered

Our engagement thus far in developing the FNC has confirmed the need for the project. Support is widely recognised by stakeholders both in terms of generation and demand requirements for facilitating renewable generation. This is crucial for the maintenance of security of supply to the local area and GB as a whole.

3. Need

Key Points

- Since INC, the certainty of generation growth has continued to grow. We have seen continued commitment from our contracted developers, with an additional 240MW having submitted a scoping application for consents and a further 45MW expected to follow suit shortly.
- Pre-application activity has increased since the publication of Ofgem's INC decision. There is currently over 600MW in pre-application activity, 281MW of which has already made a formal connection application through the ESO.
- Our recommended solution, Option 4a, continues to be the only viable option to accommodate the growth in renewables in the Skye area. Proceeding with Option 1b will result in a significantly oversubscribed asset based on the current generation background.

3.1. Current Generation Background

Throughout our discussions with Ofgem at INC, Ofgem agreed that additional capacity would be needed to allow new generation to connect to the Skye network, however remained concerned over the perceived uncertainty over the level of generation that will ultimately end up connecting to the transmission network. While we acknowledge that there will inevitably be some short-term uncertainty over the exact levels of generation to connect at this stage, our approach with the Skye reinforcement project has been to reach a long-term economic solution; short-term thinking will not be sufficient to achieve our strategic legally binding net zero targets.

Since our INC submission we have continued to monitor the generation background. We continue to see positive signals that reflect both developer interest in the Isle of Skye and progress of current contracted generation. The significant and growing level of generation in the consenting process provides certainty that renewable generation will build out their developments and the capacity of our recommended reinforcement will be utilised.

Current and future generation requirements have been considered in this FNC and a summary of the existing, contracted, and proposed generation at each substation is detailed in Table 3.1. Since INC, there has been a 5.7MW increase in contracted capacity and further applications have been submitted for [redacted]. Further, there has been more than 600MW of interest from developers looking for connection opportunity in the area. The contracted demand at Broadford GSP has not changed between the INC and FNC, it remains at 10MW.

Table 3.1: Background generation comparison between the INC and FNC

Developer	Generation Project	Contracted Capacity (MW)		▪Applied Capacity (MW)	Comments
		INC	FNC		
[redacted]	[redacted]	[redacted]	[redacted]		
[redacted]	[redacted]	[redacted]	[redacted]		
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]		[redacted]
[redacted]	[redacted]	[redacted]			
[redacted]	[redacted]	[redacted]	[redacted]		
[redacted]	[redacted]	[redacted]	[redacted]		
[redacted]	[redacted]	[redacted]	[redacted]		
[redacted]	[redacted]	[redacted]	[redacted]		
[redacted]	[redacted]			[redacted]	[redacted]
Total Capacity		**418**	**423.7**	[redacted]	

* Formerly [redacted]

▪ Generation capacity applied for connection between INC and FNC

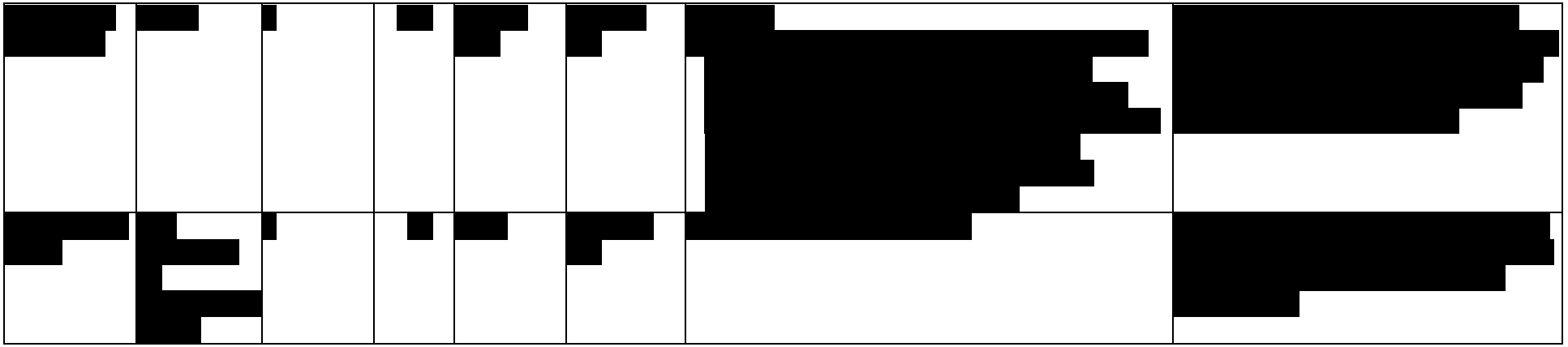
We have seen significant interest by developers on Skye, especially around Edinbane where connection applications have been interactive. There is only non-firm capacity available under our recommended reinforcement which means that future connection applications will be interactive.

There has been recently interactivity between [redacted]

At the point of submitting the INC, four out of the seven contracted schemes had already obtained planning consent. The progress of the projects consent and planning status and connection date offered between the INC and FNC is detailed in Table 3.2.

Table 3.1: Planning and consent progress of contracted generation schemes

Project name	Developer	T or D connection	Capacity (MW)	Type	Connection Site	Consent and Planning Status	Connection date update
[redacted]							



Of the remaining three unconsented schemes, [redacted] has now submitted a scoping application. This is the first step for developers planning to submit a consents application. The purpose of the scoping application is to obtain an opinion on the proposed development from either the relevant local authority or Ministers before submitting a formal application. At the stage of submitting a scoping application, developers have already invested significant time and money into their projects. [redacted]

In developing a long-term solution for Skye, we must look beyond currently connected and contracted generation and consider scoping generation. Pre-application activity has significantly increased following the publication of the INC decision by Ofgem. The following schemes have been in pre-application discussion or have requested a formal competency check through National Grid ESO.

Table 3.2: Applications in pre-application and competency check stages

Project Name	Developer	Status*	Technology	Capacity (MW)
[redacted]				
Total				**592 – 632**

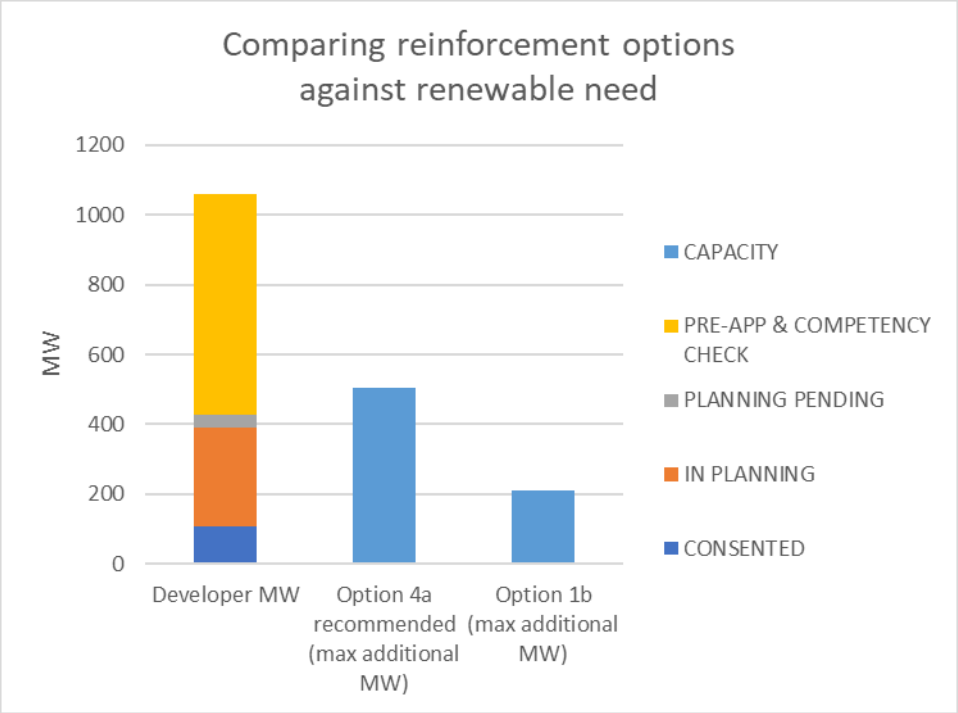
* **Pre-App**: A pre-application meeting has been organised through NGESO with the Developer and SSEN-T, where the possible connection options are discussed, and any early questions are answered before the formal connection application

Competency: A formal connection application has been made through NGESO who pass on the application form onto SSEN-T to perform a competency review. Once the application has been confirmed as competent, the application is 'clock started'

This updated view of the generation background in Skye demonstrates the certainty of generation that will connect to the transmission network. Contracted generation remains on track to obtain planning consents and there is clear interest from developers in the Skye area shown by the high levels of pre-application activity. Based on this information, if Option 1b was pursued it would result in a significantly oversubscribed asset, only able to accommodate an additional capacity of less than

50MW and further non-firm capacity up 160MW. This is significantly less than the contracted capacity of 428MW as shown in Figure 3.1. On the other hand, our proposed solution accommodates an additional 183MW and a further 320MW non-firm capacity. Our view remains that our recommended solution, Option 4a, is the only viable option to accommodate current and future generation.

Figure 3.1: Additional capacity provided by Option 1b and 4a vs contracted generation



3.2. Interaction with Offshore Wind Developments and Holistic Network Design (HND)

Near the Western Isles, there is forecasted to be a total of 2,835MW of ScotWind generation (a mixture of fixed and floating offshore wind capacity) developed, where 2,740MW is already contracted. The large size of these offshore schemes necessitates new and additional infrastructure to be built to connect these schemes to the GB mainland network. Due to the distance and size requirement for connection to the GB mainland from the Western Isles (and surrounding coast), HVDC technology is the most economic solution compared to utilising multiple AC cables. We are therefore exploring HVDC solutions to connect the forecasted ScotWind generation to the GB mainland and we have provided these solutions for assessment in the upcoming HND. Some of the HVDC solutions proposed provide an opportunity to benefit from our planned 600MW HVDC link from Arnish (on the Western Isles) to Beauly for the connection of significant contracted onshore wind located on the Western Isles, and it is here where we have been exploring potential coordination opportunities. The Skye reinforcement creates a more resilient transmission network in the North-West of Scotland and allows for the future possibility of connecting the AC and HVDC

systems together on the Western Isles to provide alternative paths for power to flow to and from the GB mainland (improving generation access).

4. Reinforcement Options

Key Points

- Further development work since INC has concluded with the selection of Option 4a over Option 4a01.
- Stakeholder input has been key in shaping the updated scope of the preferred solution, now including underground cable sections and associated reactive compensation plant.
- The updated scope, which affects all options, has resulted in a 22% CAPEX increase for the preferred solution – Option 4a.

At the time of INC submission, further development work and stakeholder engagement was ongoing on the Skye project, with the decision on options 4a vs 4a0/1 and the need for undergrounding certain sections of the Skye OHL to be concluded. We have now concluded on the options 4a vs 4a0/1 selection and the sections of the line which would require undergrounding.

4.1. Option 4a vs. Option 4a01

In the INC, Option 4a rebuilds the Fort Augustus to Edinbane section with 132kV double circuit steel tower line and the remainder of the line to Ardmore with 132kV wood pole line, while Option 4a01 considered a phased approach which saw the Skye line turned into the new 400kV substation that was proposed at Invergarry when complete in 2027, with the section of the 132kV line back to Fort Augustus dismantled following the Invergarry turn in.

Following further development work, the originally proposed location of the 400kV substation near Invergarry to accommodate Coire Glas pumped storage scheme is now proposed at a new location near Loch Lundie, approximately 2km away. The overall approach to substation siting and decisions on the overhead lines was influenced by stakeholder feedback which required us to focus on developing a long-term solution to the multiple overhead line routings into Fort Augustus, and demonstrating a joined up approach between Skye and the 400kV infrastructure projects relating to Coire Glas.

The Fort Augustus to Fort William 132kV OHL follows the same route as the proposed new 400kV line to connect Coire Glas. It is proposed to mitigate the visual impact of the infrastructure along this corridor by constructing the 400kV infrastructure and turning in the Fort William line into the new 400kV substation near Loch Lundie and dismantling the section of the 132kV line back to Fort Augustus. With the capacity of the Coire Glas scheme contracted at 1,296MW, this planned turn in of the Fort Augustus – Fort William circuits into the new 400kV substation would not leave enough capacity on the 400kV overhead line to also turn in the Skye circuit into the new 400kV busbar. This would breach the loss of infeed limit criteria by connecting the Skye circuits into the new 400kV site and would result in a non-compliant design in respect of the loss of infeed criteria specified in Section 2.6 of the National Electricity Transmission System (NETS) Security and Quality of Supply Standard (SQSS). The total amount of generation that would be disconnected for the unplanned outage of the 400kV double circuit would exceed the infrequent loss of infeed risk of 1,800MW.

Considering these points, the option to turn in the Skye line into the new Loch Lundie 400kV substation was dropped, hence only Option 4a was taken forward.

4.2. The need for cable sections

Stakeholder feedback relating to consenting of the line has shaped the design of the line to now include a 9km cable section coming out of Fort Augustus and a 15 km section on Skye to aid with visual mitigation of the line, thereby significantly mitigating consenting challenges. We therefore commissioned a specialist consultancy, WSP, to undertake a cable design study. This has identified the need for reactive compensation to ensure the line can be operated safely, within operational voltage limits and circuit breaker capabilities. A separate detailed technical study report titled "70089995_Skye_System_Studies_Steady_State_Analysis_Final" is included with supporting documents listed in Appendix 1. This report identifies the need for static reactive compensation in the form of shunt reactors at Broadford and Edinbane, as well as the need for dynamic reactive compensation at Edinbane. A further report titled "70089995 - SSE SKYE ZMP studies Final", also listed in Appendix 1, further explores the options for meeting the dynamic reactive compensation and fault current requirements for safe operation of the network. This identifies the need for synchronous condensers to meet this requirement. The key considerations and outcomes of the study are briefly discussed below.

4.3. Cable design

Due to the electrical properties of the cables which result in high charging currents and elevated voltages, reactive compensation equipment is required to control the charging current on the overall line comprising overhead line and underground cable sections.

The technical requirements these cable sections introduce have been assessed and studies have been carried out to optimise what reactive compensation is required. Based on the key study outcomes, we propose:

- Two 60MVAr line end connected shunt reactors on the new Fort Augustus – Broadford double circuit line (one on each circuit) at the Broadford substation to provide reactive compensation for the 9km 132kV cable section out of Fort Augustus.
- Two 60MVAr line end connected shunt reactors on the new Broadford – Edinbane double circuit line (one on each circuit) at the new Edinbane collector substation to provide reactive compensation for the 15km 132kV cable section between Edinbane and Broadford.

  These four reactors are critical for keeping the line charging current within the rating of line circuit breaker rating at the Fort Augustus end, and for maintaining an acceptable operational voltage profile.
- Two -50/+125MVAr busbar connected synchronous condensers at Edinbane collector substation serving two purposes:
    - (i) Dynamic voltage support at Edinbane for different line loading as the wind output varies between no wind to full wind output; and

- (ii) Correction of a (direct current) DC offset issue known as the 'Zero Missing Phenomenon[3]' caused by the line end shunt reactors, under fault conditions.

4.4. Updated options

The cable system design (combined cable, overhead line, and associated compensation) was concluded following detailed engineering design studies over a period of five months. Considering the resource implications of undertaking detailed engineering design studies for all options, we considered it appropriate to focus on the preferred solution. However, given cable mitigation is required for all options, the requirement for reactive compensation would therefore exist for all the options with the need for compensation proportionate to the number and capacity of the circuits given that the linear nature of the cables and overhead line. On this basis, we assumed a proportionate increase in costs for all the other options using the detailed design costs for the preferred solution as the reference point. This allowed us to undertake an impact assessment on the outcome of the INC CBA which is detailed in Section 5. Table 4.1 provides a summary of the options with the updated scopes and costs, while Figure 4.1 shows the location of the cables and associated compensation equipment for each option.

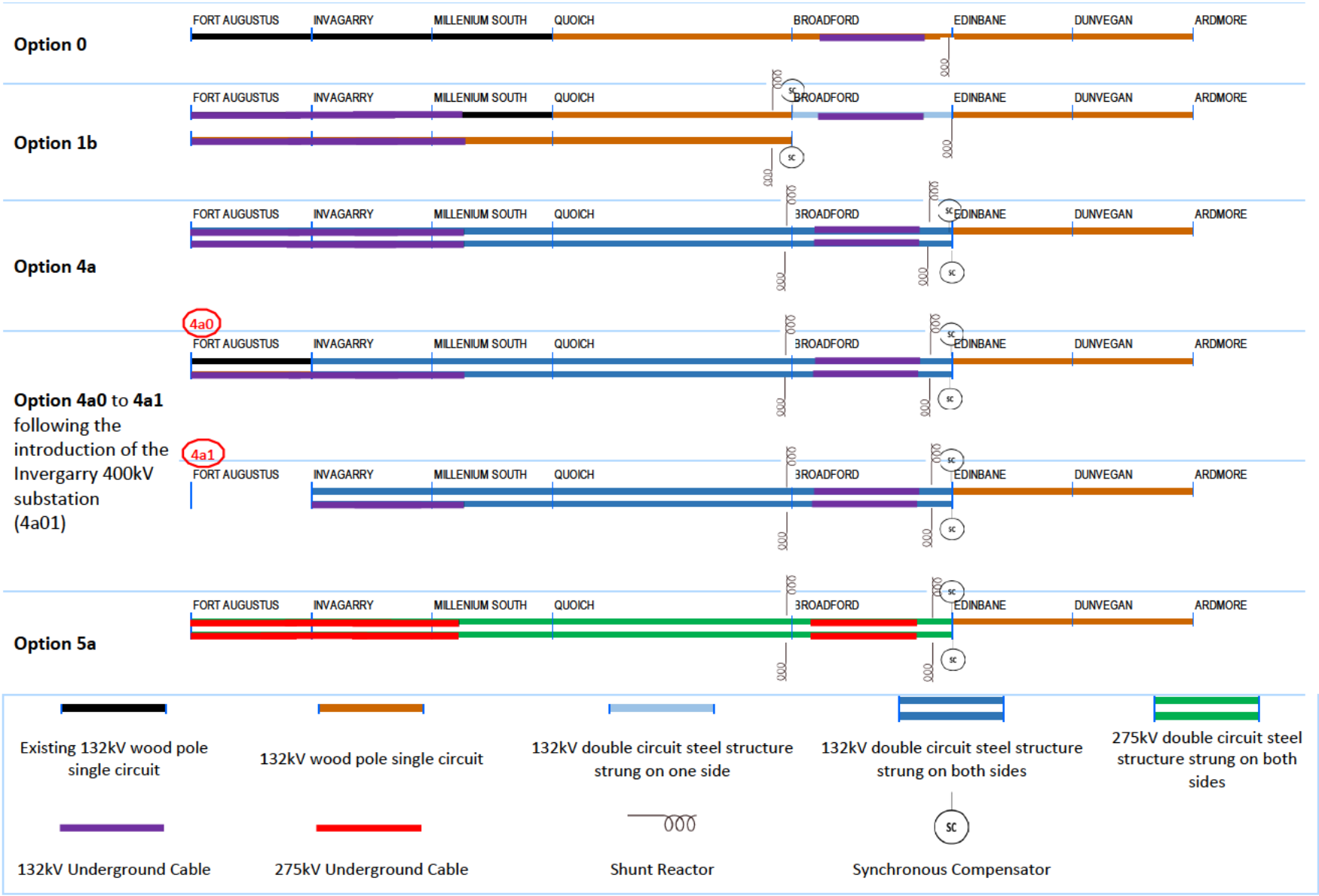
Table 4.1: Updated option scopes and cost movements between INC and FNC submissions (costs on 2019/20 price base)

Option	Description	CAPEX INC (£m)	CAPEX FNC* (£m)
0	Baseline (Minimum option) – Single Circuit Trident 132kV wood pole from Fort Augustus to Ardmore. **FNC scope update**: 15km section of 132kV single circuit cable in the Cuillins NSA on Skye and associated line end reactor at Edinbane (dynamic reactive compensation potentially required but would require detailed design to ascertain).	[redacted]	[redacted]
1b	Two 132kV wood pole single circuits from Fort Augustus to Broadford, 132kV double circuit steel structure strung on one side from Broadford to Edinbane and a 132kV wood pole single circuit from Edinbane to Ardmore. **FNC scope update**: 9km section of 132kV single circuit cable out of Fort Augustus and 15km section of 132kV double circuit cable in the Cuillins NSA on Skye and associated line end reactors at Broadford and Edinbane, and two synchronous condensers at Broadford.	[redacted]	[redacted]
4a	132kV steel tower double circuit from Fort Augustus to Edinbane and a 132kV wood pole single circuit from Edinbane to Ardmore **FNC scope update**: 9km section of 132kV double circuit cable out of Fort Augustus and 15km section of 132kV double circuit cable in the Cuillins NSA on Skye and associated line end reactors at Broadford and Edinbane, and two synchronous condensers at Edinbane.	[redacted]	[redacted]

[3] The ZMP issue was investigated in detail by SSEN Transmission in 2018. Details of the investigation, undertaken as an NIA (Network Innovation Fund) project, are available on the ENA portal: https://smarter.energynetworks.org/projects/nia_shet_0025/

4a0 to 4a1 (4a01)	Two 132 kV wood pole single circuits from Fort Augustus to Invergarry, 132 kV double circuit steel tower strung both sides from Invergarry to Edinbane then single circuit wood pole to Ardmore. If the Invergarry 400 kV substation progresses, the Fort Augustus to Invergarry section will be dismantled and the line turned into the new substation. **FNC scope update**: 9km section of 132kV double circuit cable out of Fort Augustus and 15km section of 132kV double circuit cable in the Cuillins NSA on Skye and associated line end reactors at Broadford and Edinbane, and two synchronous condensers at Edinbane.	[redacted]	[redacted]
5a	Double Circuit 275 kV from Fort Augustus to Edinbane with single trident 132kV to Ardmore. **FNC scope update**: 9km section of 275kV double circuit cable out of Fort Augustus and 15km section of 275kV double circuit cable in the Cuillins NSA on Skye and associated line end reactors at Broadford and Edinbane, and two synchronous condensers at Edinbane.	[redacted]	[redacted]

Figure 4.1: Updated scope for options showing the location of the cables and associated compensation equipment for each option



5. Cost Benefit Analysis

Key Points

- The case for Option 4a creating highest net benefit remains unchanged.
- Wider benefits to society and the environment are ready to be realised and add weight to the proposed reinforcement.

In the INC, the main CBA concluded that the preferred option (Option 4a) was the option of least worst regret and highest net benefit to the consumer under the high generation capacity scenario. We also undertook sensitivity analysis on the generation background, CAPEX and constraint costs. In all sensitivities, Option 4a remained the top performing option, demonstrating the robustness of the CBA outcome.

5.1. Review of generation background changes

As described in Section 3, we have seen an increase in renewable generation exploring opportunities to connect in the Skye area (632MW in pre-application and competency checks). There has been material progress in planning and consenting applications for the contracted generation (285MW out of 424MW) above existing levels (107MW). There has also been a slight increase in the level of contracted generation. The updated generation background sits within the envelope of the generation scenarios we developed at the INC, therefore at this point there is no need to review the CBA on account of the generation background. The changes in consenting do increase the certainty of developer investment and affirm the need for significant increased capacity.

5.2. Review of CAPEX changes

Details of the scope modifications due to the introduction of cable mitigations are provided in Section 4. The introduction of cable sections and associated reactive compensation resulted in cost increases for all the options as summarised in Table 4.1. We engaged the ESO to undertake an impact assessment of the cost increase on the INC CBA outcome.

The original CAPEX sensitivities considered a ±20% range, acknowledging the potential for possible cable mitigations to take the costs to around the upper CAPEX sensitivity of +20%. The CBA result remained robust at the +20% CAPEX point. The impact of the cable and associated reactive compensation scope change has resulted in a 22% cost increase. Unsurprisingly, given the marginal movement of the CAPEX from the +20% sensitivity, the ESO's review of the CBA has shown that the preferred option remains the option of least worst regret and with the highest net benefit to the consumer in high generation capacity scenario. Details of the ESO's analysis are provided in the report titled "Isle of Skye LOTI, Cost Benefit Analysis Updates for FNC" in Appendix 1.

5.3. Review of constraint costs

In their CBA report, the ESO advised that with the ongoing Russian-Ukraine war, the average day-ahead power price during Q1 2022 was £200.80/MWh, over triple the average prices for the same auctions in Q1 2021; and within day price averages also tripled from £59.62/MWh in Q1 2021 to £194.30/MWh. At this point, the ESO has not updated its constraint assumptions but has noted that if this event had an impact on GB power market in the long run, the transmission constraint saving derived from the boundary uplift of each option and forecasted electricity wholesale price would be higher, making Option 4a even stronger compared to other options.

5.4. CBA Update

This ESO performed a CBA to understand how the revised CAPEX due to the updated scope affects the INC CBA outcomes. The results are summarised in their report, "Isle of Skye LOTI, Cost Benefit Analysis Updates for FNC". This report builds on the CBA which was performed for the INC, which also considered CAPEX sensitivities as described above.

The analysis takes the updated costs as presented above in Section 4 and performs the standard present value (NPV) discounting of the CAPEX in order to assess against benefits (total constraint cost relief) to present NPVs and least worst regrets (LWR). The results are summarised in table 4 of the ESO's report, a copy of which is provided in Table 5.1.

Table 5.1: NPV and Regret Analysis with Underground Cable and Reactive Compensation Equipment

[redacted]

In the high generation capacity background consistent with net zero, Option 4a provides a net benefit of £350m to the GB consumer. Across the four scenarios considered, the recommended solution has the least 'worst regret', £179m, in stark contrast to a worst regret of £537m for the 'minimum' option which only addresses the asset condition requirements.

For clarity, to understand how these results compare to the analysis which was conducted in the INC, we have prepared Table 5.2 below. Regret values provided for Option 4a represent the options of least worst regret.

Table 5.2: Comparison of NPVs and LWRs for Option 1b and Option 4a across base, +20% and updated CBAs.

To stress test this finding, the ESO considered an alternative approach to the estimation of reactive compensation costs for the options other than the preferred option, resulting in an alternative reallocation of these costs across the options. The ESO assumed the reallocation of costs based on reactive asset count, which is simplistic and does not consider that the asset ratings may need to be different, as well as the specifics of the cable system designs for the different options, such as number of jointing bays, footprint and location of assets. It is however a reasonable approach for purposes of stress testing the sensitivity of the cost variability between the options. The ESO's CAPEX estimates (Table 5 in their report) and the resulting NPVs and LWRs (Table 6 in their report) show that the optimum solution remains unchanged, highlighting the robustness of the proposed solution.

5.5. Wider Benefits

From a system benefit perspective, the synchronous condensers which are part of the proposed cable compensation will contribute to grid stability due to their inherent electromechanical characteristics. They will therefore complement the ESO's Stability Pathfinder solutions in Scotland. While the ESO has not quantified this benefit, it has acknowledged in its report the important contribution that the synchronous condensers will make to wider system stability.

The evidence presented in the INC demonstrated our strategy for an economic, efficient and coordinated solution in the Skye region. We have proposed a solution which meets all drivers for investment and in doing so assist in the transition towards low-carbon energy sources for the UK supporting Net Zero.

The primary consideration for economic value creation in the INC was built on the dimension of network capacity increase and the long-term security of supply for the region. These are core benefits created as the result of our investment project, but value creation does not end here however.

We have therefore investigated two further areas of economic analysis as part of this submission to provide additional intelligence for Ofgem as to the benefits of the proposed reinforcement. The

[4] As noted in the INC, pg69; "Positive NPVs represent net cost while negative NPVs represent net benefits"

analysis considers: i) the socio-economic benefits of the investment project and ii) the whole life carbon profile associated with the project.

These assessments were carried out from January 2022 to May 2022 and were completed based the project information used in the INC. Data relating to the updated project scope and costs were not available and therefore the data used for the INC was utilised. The conclusions that follow remain reliable for value creation as the updated scope of the project does not materially affect the findings of the studies.

5.6. Socio-economic benefits

We are proposing a significant investment in the Skye region, supporting a major future industry in Scotland as well as facilitating wider supply of energy to the homes and business in Skye and the surrounding regions. Our investment of over £480m will unlock a range of economic benefits which will be experienced both locally and across the UK in the form of Gross Value Add (GVA).

We therefore commissioned a report with consultants GHD, to quantify the wider socio-economic benefits from the investment; "GHD Socio-Economic Analysis Report", listed in Appendix 1. For the purposes of this study, GVA encapsulates both economic activities taken directly by SSEN Transmission, as well as those of the developers who will connect to the network. A full summary of the details of this study, including methodology and assumptions, can be found in the accompanying report "Skye 132kv Reinforcement – Socio-Economic Impact Assessment" listed in Appendix 1.

The analysis was conducted on Option 1b and Option 4a, with both options delivering socio-economic benefit. The evidence presented in the report shows Option 4a is the best performing option with GVA of over £300m to the local economy and over £1.2bn to the UK (inclusive) across the lifetime of the asset in the high generation scenario. For comparison, Option 1b is worth over £220m and £800m to the local and UK economies (inclusive).

5.7. Carbon economy

The UK energy supply landscape is undergoing a transition towards low-carbon energy in the pursuit of the UK's Net Zero ambitions. We have pledged our support towards this ambition, as outlined in our RIIO-T2 Business Plan – A Network for Net Zero, which details our role in facilitating the connection of renewable generation in the North of Scotland and its transportation to demand centres further south.

Everything that we do as a Transmission Owner (TO) contains a carbon footprint, one of several important indicators as to our impact on the environment and climate. We are committed to lowering that footprint, as demonstrated by our Science Based Target accreditation, to reduce our absolute greenhouse gas emissions by 46% by 2030. Our interaction with the carbon economy also goes beyond this, as our infrastructure is a key enabler of renewable low-carbon generation which will displace conventional energy sources over time. We therefore prepared the report "Skye 132kv

Reinforcement – Whole Life Carbon Profile" (listed in Appendix 1) which provides full details of how we quantified the carbon impact to society from this investment.

The analysis takes into consideration the embodied carbon and displaced carbon as a result of the investment, looking at carbon impacts from the construction, operation and eventual decommissioning perspective compared to the contribution to national decarbonisation by facilitating the connection of new renewable generation. The study was conducted for Option 1b and Option 4a, with both options delivering a net benefit to society.

Our investigation of whole life carbon found Option 4a as the highest performing option, with over £160m net benefit created in the high generation scenario. For comparison, Option 1b creates £120m of net benefit.

5.8. Summary

Investments in the transmission network are judged on the basis of value creation; we seek to maximise value and unlock benefits as readily as possible. Looking to the wider context for decision making in the energy sector at present, the need to arrive at decisions in a timely manner is sobering. The UK Government has stated in its Energy Security Strategy the need to transition away from foreign gas sources towards domestically produced energy from renewables, and in doing so address security of supply issues. There is a growing consensus among climate scientists that the next decade presents possibly the 'last chance' to avoid the catastrophic effects of climate change, heightening the need to move to sustainable energy sources now. And the UK is facing one of the most challenging energy bill spikes in recent times, putting the issue of affordability at the top of the public's priority list. In short, this is a time in the energy sector where timely holistic decisions really matter.

Throughout our ongoing dialogue with Ofgem we have sought to evidence the clear need for investment in the Skye region and the case for value creation as a result. As we have discussed in this chapter, further clarity on the scope of works and project costs are now available. These do not change the outcome of the CBA in the INC and continue to provide a strong net benefit of up to £350m over the lifetime of the project.

Since the submission of the INC and the subsequent discussions across the SQ process, we have undertaken further analysis to evidence the benefits which will be created from the Skye reinforcement. Our Socio-economic analysis report has outlined the investment will create over £300m and £1.2bn to the local and UK economies respectively. Our whole life carbon profile has outlined that £160m of net benefit to society will be created from the investment, further explaining the role we play in supporting net zero in the UK.

Option 4a consistently provides the highest benefit creation in each of the assessed areas; economic, societal, and environmental. From every perspective, Option 4a outperforms the other options assessed as part of the analysis and represents a clear preferred solution.

The investment proposal for the Skye region is the most economic, efficient and sustainable, and it strengthens the security of supply, improves grid stability as well as carrying with it significant socio-economic and environmental benefits. These benefits are readily available to be realised and should be pursued without delay, particularly given the role of the energy sector as the backbone of the transition to net zero. We have used three analysis methods to demonstrate the value creation associated with the Skye reinforcement, opening further opportunities for industry leadership and wider decarbonization activities.

6. Proposed Reinforcement Option

Key Points

- The recommended solution will consist of:
  - New Build 132kV Double Circuit OHL between Fort Augustus and Edinbane substations
  - Two sections of new build 132kV Double Circuit underground cables between Fort Augustus and Edinbane Substations, and associated Sealing End Compounds at the cable remote ends
  - New build 132kV Single Circuit OHL between Edinbane and Ardmore substations
  - 132kV GIS switching stations at the existing Broadford and Edinbane substations
  - Reactive compensation equipment as part of underground cable works (2 x 60MVAr line end reactors at Broadford, 2 x 60MVAr line end reactors at Edinbane and 2 x -50/+125MVAr synchronous condensers at Edinbane)
- The updated cost estimate has been derived from historical project costs and informed with the most recent tender information relevant to the project where available. The increase in cost between INC and FNC is primarily driven by the introduction of underground cables and associated reactive compensation equipment.

6.1. Overview of proposed option

A high-level breakdown of cost for the Skye 132kV Reinforcement project is provided in Table 6.1. These are Class 2 cost estimates which provide an update to the cost estimate provided in the INC submission. The increase in costs between INC and FNC is primarily driven by the addition of two sections of Underground Cable (UGC) with a total length of 24km and associated reactive compensation equipment to the project scope, in order to overcome significant consenting challenges. The costs have been derived from historical project costs and have been informed and updated with the most recent tender information relevant to the project where available.

Table 6.1: High level cost breakdown

[redacted]

6.2. Final Configuration and Design of the Proposed Option

The system will consist of:

a) 110km of new build 132kV Double Circuit OHL between Fort Augustus and Edinbane substations
b) Two sections of 24km of new build 132kV Double Circuit underground cables between Fort Augustus and Edinbane Substations, and associated sealing end compounds at the cable remote ends
c) 24km of new build 132kV Single Circuit OHL between Edinbane and Ardmore substations
d) A 132kV GIS switching station at the existing Broadford substation to connect to the current and planned additional 132kV GSPs and required reactive equipment (2 x 60MVAr line end shunt reactors) as part of underground cable works
e) A 132kV GIS switching station at the existing Edinbane substation to connect to the current and planned additional 132kV infrastructure and required reactive compensation equipment (2 x 60MVAr line end shunt reactors and 2 x -50/+125MVAr synchronous condensers)

6.3. Fort Augustus to Quoich

The Fort Augustus to Quoich section is 28km long and will consist of a double circuit 132kV underground cable for the first 9km out of Fort Augustus substation, with the remaining 19km made up of 132kV double circuit OHL. At the Quoich end the OHL will turn into the new Quoich Tee substation, which was approved by Ofgem in the RIIO-T2 Final Determinations. Consultation on the primary project design option of an OHL only solution with key statutory consultees and Landowners indicated strongly that visual impact mitigation would be required due to the cumulative visual impact of proposed and existing transmission infrastructure in and around the Fort Augustus substation area. This feedback was provided in the form of written representations that confirmed at that stage or indicated an objection would be forthcoming at the consent application stage.

6.4. Quoich to Broadford

Between Quoich and Broadford substations a double circuit 132kV OHL will run for 64km across some of Scotland's most remote and challenging landscapes. This will pass through the Knoydart National Scenic Area, Kinloch and Kyleakin Hills Special Area of Conservation (SAC), as well as areas of Wild Land. It will then connect to a new 132kV Switching Station that is proposed at the existing Broadford substation site. Due to significant routing limitations, this section will also retain and reuse the existing crossing towers as the point of connection between the mainland and the Isle of Skye.

6.5. Broadford to Edinbane

From Broadford the double circuit 132kV OHL skirts the north eastern coast of the Isle of Skye, crossing through the Cuillin Hills National Scenic Area before heading northwest towards an existing

generator substation site at Edinbane. Within the Cuillin Hills National Scenic area a 15km section of underground cable is proposed to mitigate significant landscape and visual impacts identified through the environmental assessment of an OHL option and following feedback from consultation with Key Statutory Consultees and Landowners. The 15km underground cable section reduces the visual impact of steel transmission towers within the National Scenic Area for approximately two thirds of its length. The primary concern for stakeholders in this section was to protect the highly valued landscapes presented by the Cuillin Hills, one of Scotland's most visited tourist destinations. The remaining portion of this section is proposed as OHL. At Edinbane the double circuit 132kV OHL connects to a new 132kV switching station that is required to connect reactive equipment required as part of the network solution and to facilitate various generators seeking to connect in the Edinbane area. At the time of INC submission the new 132kV switching station was to be funded under the Medium Sized Investment Projects (MSIP) reopener, however, has now been incorporated into the final scope for the Skye 132kV Reinforcement LOTI.

6.6. Edinbane to Ardmore

After Edinbane, it is proposed that the OHL changes from a double to single circuit, following a similar route to the existing 132kV circuit for 9.5km up to Dunvegan substation. Here the line is connected into the local distribution network at Dunvegan GSP. The OHL then mostly follows the route of the existing circuit for another 14km north to Ardmore substation where the 132kV network terminates and two 33kV subsea cables connect to Western Isles, the islands of South Uist and Harris.

7. Project Timeline and Delivery Strategy

Key Points

- Project programme is on track to deliver energisation of the Skye 132kV Reinforcement by October 2026.
- The procurement strategy presented in our INC remains unchanged. The ITT will be launched in June 2022 and run until December 2022. The preferred bidder will then be appointed in May 2023.

7.1. Overview of project delivery strategy and monitoring

In compliance with the SSE Group's project governance framework, the Skye 132kV Reinforcement project is classed as a Large Capital Project (LCP) and is subject to full LCP governance. The project will progress through 5 phases to project completion; 3 development stages and 2 construction stages as demonstrated in Figure 7.1 below. The project is currently in Development and will move into the Refinement phase in the summer of 2022. Following this phase, and upon securing the necessary consents and funding, the project will move to the construction phases (Execution and Operate & Evaluate) in March 2024.

Figure 7.1: SSE LCP Project Phases

7.2. Programme of key activities

The Skye 132kV Reinforcement project summary programme, provided in the list of supporting documents in Appendix 1 presents the key project activities with anticipated start, finish and duration. The project duration shown is from 2021 to 2027 and covers the outstanding project development, consenting, and approvals activities in addition to the full construction programme.

A description of the key activities under each project phase as noted is provided below.

7.3. Opportunity Phase

The project successfully completed the opportunity phase in December 2020. During the opportunity phase the project team undertook the selection process described in section 5 of the INC resulting in the preferred Skye 132kV Reinforcement option. To support the selection of this preferred option, the project team held several public and statutory authority consultation events to gain feedback on their key considerations about the design solution and routing. The project team

consulted with local mainland and communities on Skye, the Highland Council (HC), Nature Scot (NS), Scottish Environment Protection Agency (SEPA) and Historic Environment Scotland (HES).

7.4. Development Phase

During the Development phase the Skye Reinforcement project has focused on concluding an alignment for the 132kV OHL and underground cable works, as well as identifying relevant substation scope for the reinforcement. The alignment is based on the engineering contractor design, results of the environmental assessment and multiple engagements with stakeholders. The LCP project documentation has been referred to and updated throughout this phase of the project. The key milestones for this phase of the Skye 132kV OHL reinforcement have been:

- Review LCP project documentation to confirm scope, update the documentation at the end of this phase in preparation for the next phase, including programme, risk and finance project information for the project.
- Confirm the technologies for the 132kV OHL
- Undertake an OHL and underground cable routing study to confirm the routes
- Write and tender the contractor design scope; award scope of work to undertake ground investigation of the OHL and underground cable routes and OHL alignment and cable design during this phase
- Undertake environmental surveys that include visual and landscape, noise and habitat along the OHL route and substation tie-ins
- Engage with all relevant landowners along the route
- Undertake stakeholder engagement throughout this phase with landowners, statutory stakeholders, local government, community and other interested stakeholders
- Regulatory submission of the INC

Following on from the conclusion the works described above, development focused on detailed engineering designs and confirmation of each tower position and substation layouts. This work also included for site investigation works, covering bore holes and trial pits that will inform foundation, access and accommodation design.

Further engagement was sought with landowners to agree progression of design to a suitable stage that allows for negotiation of wayleaves, for which the supporting information from the OHL design will be used to aid these discussions. The deliverables from the technical design, outcome of the environmental studies and further engagement with stakeholders during this phase will support completion of the Environmental Impact Assessment which will then be submitted as a S37 application to the Energy Consents Unit (ECU) for review and determination. During this phase the

FNC will be submitted to Ofgem. The key milestones for the second Development phase of works for the Skye 132kV OHL reinforcement are:

- Review LCP project documentation to confirm work undertaken within the previous phase, update the documentation at the end of this phase in preparation for the next phase, including programme, risk and finance project information for the project.
- Undertake the final pre-construction alignment study to confirm all tower positions
- Undertake bore holes and trial pits at each OHL tower location
- Write and tender the contractor construction scope for construction.
- Start negotiations with landowners to agree wayleaves and Heads of Terms based on the outcome of the alignment study and substation site confirmation, and identify any Necessary Wayleave applications required
- Undertake stakeholder engagement throughout this phase with landowners, statutory stakeholders, local government, community and other interested stakeholders
- Finalise the environmental surveys and complete the Environmental Impact Assessment, when finalised, submit the S37 planning application to the ECU.
- Regulatory submission of the FNC referring to the refined design work within this

7.5. Current Position

The Skye project is currently within this second phase of design. Due to the length and risk of objection for the new OHL S37 planning application, an approach of early detailed design has been taken to facilitate detailed discussions with stakeholders earlier in the planning process and aid and support minimising risk of time delay and objection to the planning application.

In order to facilitate this approach, during Q1 and Q2 of 2020, we prepared Works Information and undertook a tender process to key suppliers on its high value OHL framework to obtain competitive market pricing for the design phase of the Skye 132kV Reinforcement Project. The contractor works are split into two phases, alignment design (first development phase) and detailed design (second development phase).

The Skye 132kV Reinforcement Project design work will conclude the second phase of development in time for submission of a S37 consents application in July 2022.

7.6. Refinement Phase

The Refinement phase is the last of the 3 pre-construction phases that the project will complete. This project will have undertaken most of the detailed design within the previous phase, the main deliverables will be any changes to the detailed design arising from stakeholder discussions after the

previous phase and confirmation of expected construction costs, confirmation of planning approval and signed Heads of Terms agreements with landowners. The construction design will be tendered during this phase to support efficient progression to construction phase. When all pre-construction deliverables are confirmed, reviewed, and agreed the project will be ready to start construction. The key milestones for the last phase of pre-construction activity are:

- Review LCP project documentation to confirm work undertaken within the previous phase, update the documentation at the end of this phase in preparation for the construction phase, including construction programme, risk and a Class 3 estimate to confirm required finance for the project
- Undertake any additional engineering studies required before Gate 3. This would include changes to engineering design for landowners, and any engineering requirements required to discharge planning conditions
- Confirmation of expected detailed construction costs for the project post Gate 3
- Further ground investigation may be required if the detailed design is amended
- Place orders on any long lead items of equipment
- Write and tender the contractor construction scope for construction
- Finalise all negotiations with landowners and have all Heads of Term signed
- Continue with stakeholder engagement throughout this phase with landowners, statutory stakeholders, local government, community and other interested stakeholders
- Receive feedback from the planning authority on the status of the planning applications; and if successful, prepare to discharge conditions.

7.7. Project Assessment

The Project Assessment will be submitted to Ofgem following confirmation of the CAPEX and OPEX costs. As shown in the project programme, we will undertake a competitive tender exercise for the execution phase of the project during Q3 and Q4 of 2022, using the final design output of the works outlined above as the basis of this. The tender exercise will allow refinement of the construction programme and costs and allow us to finalise other project costs, such as risk and project management values. Securing a Project Assessment determination prior to Gate 3 will be crucial to ensuring the programme remains on track. We will continue to engage with Ofgem ahead of the Project Assessment submission and anticipate that a programme of meetings will be arranged with Ofgem throughout the Project Assessment stage to assist and expediate the review process.

Outstanding Planning and Consents

SSEN Transmission will complete core elements of the Skye 132kV Reinforcement planning and consents requirements with the submission of the S37 application to the Scottish Government ECU in July 2022. Following periods of consultation and review, granting of this consent is expected to be in place for November 2023. Additional planning and consents required for the project substation works via Town and Country Planning Applications, are programmed to be submitted and consented in the same timeframes at the S37 application.

Further individual permissions such as Controlled Activity Regulations licences to cross watercourses will be sought by SSEN Transmission or our appointed contractors during the Execution Phase once detailed design is completed.

7.8. Execution

The Execution stage includes the manufacture and installation of equipment, as well as commissioning and energisation. We will review and reconfirm project delivery programme and cost for detailed design, construction and installation inclusive of consent conditions before awarding the project contracts for pre-construction design refinement in mid-2023, and full construction contract options in March 2024. The contractors will mobilise project teams and set up site offices on the mainland and Skye with SSEN Transmission taking a major interface management role. The construction period allows for confirmation of the design detail, manufacture and installation of equipment. Commissioning is due to take place from Q2/3 2026 and the planned energisation of the Skye 132kV Reinforcement is October 2026.

7.9. Procurement Strategy

A variety of factors will influence the strategy of a major SSEN Transmission project including programme, project and interface management, technical capabilities, system integration, supply chain availability and risk allocation. Value for money and quality of product are consistent considerations.

7.9.1. Supply Chain Contracts

The New Engineering Contract 3 (NEC3) suite of contracts will typically be used for all key contracts on the Skye 132kV Reinforcement. This suite of contracts has been used successfully on other large projects delivered by SSEN Transmission. The planned key contract and procurement awards are shown in Table 7.1.

Table 7.1: Skye 132kV Reinforcement Project Procurement Summary

No.	Works	Contract Conditions	Special Conditions
1	OHL works – wood pole	NEC3 ECC, Option A Lump Sum (via SSE Wood pole Call Off Framework)	Various 'Z' Clauses
2	OHL Works – steel towers	NEC3 ECC, Option A Lump Sum. Either to be awarded under the new T2 Frameworks or a standalone regulated tender	Various 'Z' Clauses
3	UGC Works – to mitigate landscape and visual impact in designated landscapes and for substation "Tie In's"	NEC3 ECC, Option A Lump Sum. Mini Competition via new framework (potential to include above)	Various 'Z' Clauses
4	Substation works – switching station and reactive technology including civils	NEC3 ECC, Option A Lump Sum. Mini Competition via new framework (potential to include above)	Various 'Z' Clauses

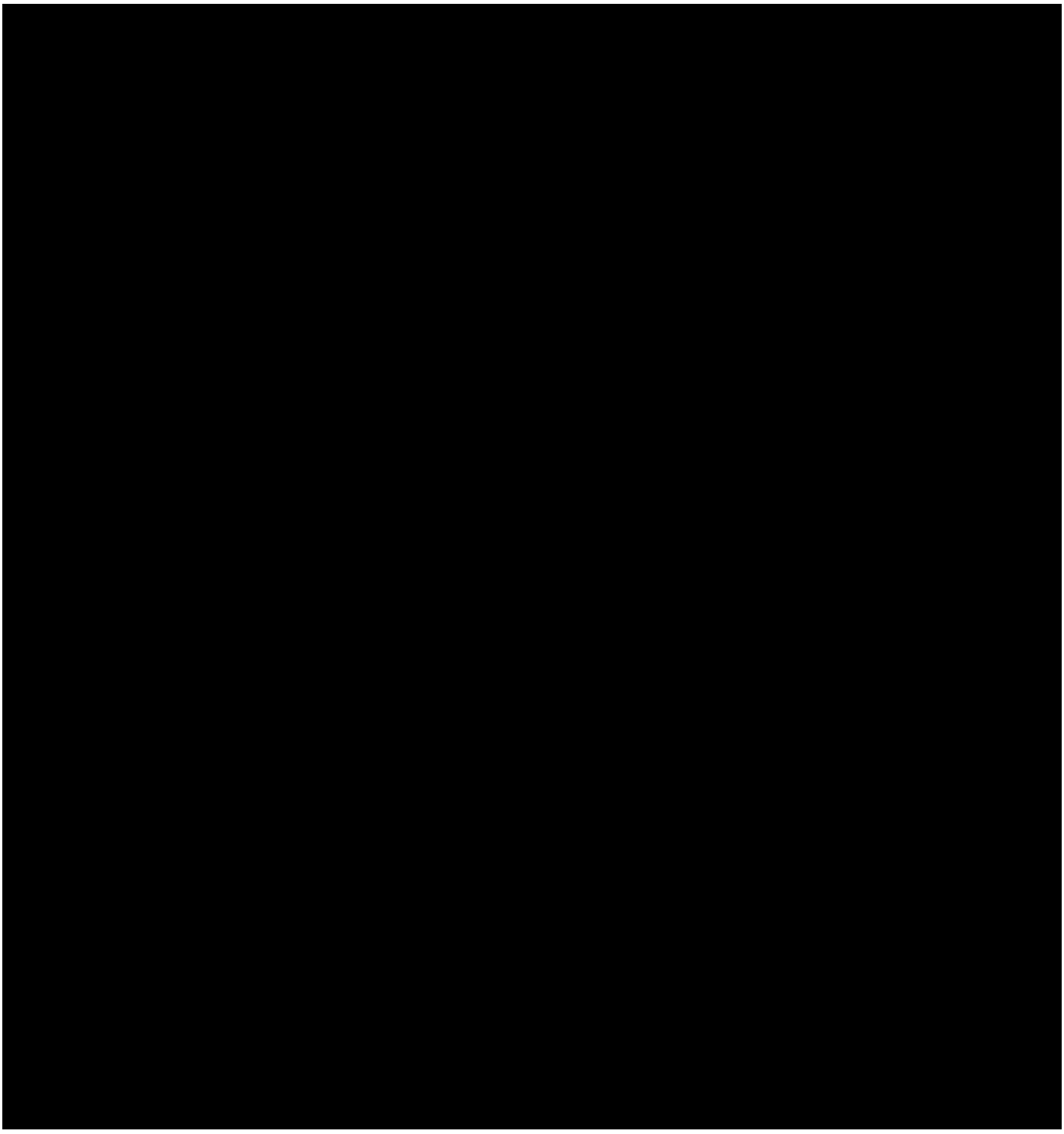
The summary of the main contracts and associated tendering strategy presented within section 8 of our INC submission remains the same. It is envisaged that value will be maximised using competitive tenders for all key procurement awards via framework and one-off contracts. The ITT will run for 7 months between June 2022 and December 2022. Best and Final Offer (BAFO) responses will then be negotiated with the preferred tenderer to be appointed in May 2023.

7.10. Risk

The Skye 132kV Reinforcement project is managing risk in accordance with the LCP Governance Manual and requirements. Our risk management strategy remains the same as within section 8.4.8 in our INC submission. An updated view on the top five pre-construction risks for the project are set out in Table 7.2.

Table 7.2: Top 5 risks

[redacted]



8. Conclusion

Alongside the evidence set out within our INC, this FNC conclusively demonstrates that our recommended reinforcement solution continues to provide the most economic and efficient long-term solution to address both the non-load and load drivers. Our approach to the Skye project from the beginning has been to develop an enduring solution which addresses which not only addresses the current asset condition issues, but also accounts for future growth in renewable generation whilst respecting the strong ask from our stakeholders to ensure disruption and lasting visual impact is minimised in one of Scotland's most valued wild landscapes.

Since our INC submission in July 2021, our contracted developers have continued to show ongoing commitment to their projects and developer interest in the Skye area has continued to grow. With 107MW of contracted generation already consented and a further 285MW showing clear progress since INC towards reaching a planning determination, the need for growth in the network is certain. Since the INC was submitted pre-application activity has increased to over 600MW, further highlighting that as reinforcements are progressed it will act as a positive signal for new generation to come forward. These factors clearly demonstrate that our recommended option, Option 4a, is the only viable solution to deliver the growth in renewable generation on Skye.

The further clarity on the scope of works and project costs has not changed the outcome of the CBA carried out in the INC. Our investigation into the impact of increased CAPEX profiles for all options demonstrates that Option 4a continues to provide a strong net benefit of £350m over the lifetime of the project. In addition to the economic analysis, we have undertaken further analysis to evidence the important wider benefits which will be created from the Skye reinforcement. Our socioeconomic analysis shows that our investment will create over £300m and £1.2bn to the local and UK economies inclusively, while our whole life carbon profile has outlined that £160m of net benefit to society will be created. Option 4a consistently provides the highest benefit creation in each of the assessed areas; economic, societal, and environmental. From every perspective, Option 4a outperforms the other options assessed as part of the analysis and represents a clear preferred solution.

Alongside the updates provided within this submission, it is also important to reflect on the wider policy changes that have occurred since the submission of our INC last year. The British Energy Security Strategy published in April this year has set a clear direction to accelerate our transition towards domestically produced energy from renewables. Our recommended solution meets the ambition of the government's strategy to support the GB energy system, achieve low carbon energy targets and build the best solution for the long term. Our investment proposal for the Skye region is economic, efficient and carries with it significant socioeconomic and environmental benefits. A timely decision from Ofgem to approve our recommended Skye 132kV reinforcement will be key to accelerating GB's domestic supply of clean and affordable electricity.

We are therefore asking that Ofgem approve the Final Needs Case and the recommended solution which will consist of:

- **110km of new build 132kV Double Circuit OHL between Fort Augustus and Edinbane substations**
- **Two sections of 24km of new build 132kV Double Circuit underground cables between Fort Augustus and Edinbane Substations, and associated sealing end compounds at the cable remote ends**
- **24km of new build 132kV Single Circuit OHL between Edinbane and Ardmore substations**
- **A 132kV GIS switching station at the existing Broadford substation to connect to the current and planned additional 132kV GSPs and required reactive equipment (2 x 60MVAr line end shunt reactors) as part of underground cable works**
- **A 132kV GIS switching station at the existing Edinbane substation to connect to the current and planned additional 132kV infrastructure and required reactive compensation equipment (2 x 60MVAr line end shunt reactors and 2 x -50/+125MVAr synchronous condensers)**

Appendices

Appendix 1: List of supporting documents

Document name	Description
[redacted]	[redacted]
[redacted]	
[redacted]	
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