Teviot 400kV & 132kV Substation

Site Strategy EJP
Version: 1.0
11/12/2024

SP Energy Networks
RIIO-T3 Business Plan

SP Energy Networks

Teviot 400kV Substation & 132kV "A" Board / 132kV "B" Board			
Name of Scheme	Teviot 400kV Substation & 132kV "A" Board / 132kV "B" Board		
Investment Driver	Local Enabling Wider Works		
BPDT / Scheme Reference Number	Part of wider works SPT200256 and SPT200917		
Outputs	Platform Creation 1 unit 400kV Circuit breaker 12 units 132kV circuit breaker 8 units 400kV disconnector 22 units 132kV disconnector 12 units Transformer 400kV <=500MVA 4 units		
Cost	£67.57m		
Delivery Year	2033		
Applicable Reporting Tables	BPDT (5.1 Project_Meta_Data, 6.1 Scheme_C&V_Calc_NonLoad_Actuals and 11.10 Contractor Indirects)		
Historic Funding Interactions	N/A		
Interactive Projects	CMN3 Corridor		
Spend Apportionment	**ET2**	**ET3**	**ET4**
	£0.11m	£25.94m	£41.54m

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1. Introduction

This engineering justification paper proposes to establish a new 400/132kV substation, Teviot, to uprate and reinforce transmission capabilities in line with the CMN3 scheme and enable a number of connections around the Scottish borders area.

This EJP is submitted for Ofgem's assessment of the need case for the project in order to provide sufficient funding for the pre-construction activities. A full optioneering cost submission will be made at the appropriate time, once the project is sufficiently developed to do so.

2. Background and Purpose

SP Transmission plc (SPT), as a transmission licence holder, has the responsibility "to develop and maintain an efficient, co-ordinated and economical system of electricity transmission" (Electricity Act 1989).

In the context of both UK and Scottish Government net zero targets, now supported fully by National Planning Framework for Scotland 4 (NPF4), development of transmission infrastructure is key to meeting these targets, with SPT required to deliver significant system reinforcement as well as facilitating the connection of increased renewable energy generation.

The purpose of this document is to set out the broader policy context and needs case for a new 400kV and 132kV substation at the proposed Teviot substation site.

2.1. Statutory Obligations

SPT is licenced under section 6(1)(b) of the Electricity Act 1989 ("the 1989 Act") to transmit electricity. The licence is granted subject to certain standard and special conditions. Under section 9(2) of the 1989 Act, SPT is required to fulfil the following duty:-

- *To develop and maintain an efficient, co-ordinated and economical system of electricity transmission; and*
- *To facilitate competition in the supply and generation of electricity.*

This statutory duty is reflected in SPT's transmission licence. In addition, SPT has the following obligations pursuant to its licence conditions (LCs):-

- To at all times have in force a System Operator-Transmission Owner Code (STC) which, amongst other things, provides for the co-ordination of the planning of the transmission system (LC B12);
- To at all times plan and develop its transmission system in accordance with the National Electricity Transmission System Security and Quality of Supply Standard (NETS SQSS) and in so doing take account of National Energy System Operator's (NESO's) obligations to co-ordinate and direct the flow of electricity on, to and over the GB transmission system (LC D3);
- To make available those parts of its transmission system which are intended for the purposes of conveying, or affecting the flow of, electricity so that such parts are capable of doing so and are fit for those purposes (LC D2); and
- To offer to enter into an agreement with the system operator on notification of receipt of an application for connection, or for modification to an existing connection (LC D4A).

Section 38 and Schedule 9 of the 1989 Act also impose duties on SPT when formulating any relevant proposals. In response to statutory and licence obligations upon it, SPT therefore requires to ensure that the transmission system is developed and maintained in an economic, co-ordinated and efficient manner, in the interests of existing and future electricity consumers, balancing technical, economic and environmental factors.

2.2. Broader Policy Context

Government Policy

In June 2019, the UK parliament passed legislation introducing a binding target to reach net zero greenhouse gas emissions by 2050. In Scotland, the Scottish Parliament has committed Scotland to becoming a net zero society by 2045. The timely connection of low carbon generation, such as onshore and offshore wind, will play a vital role in reaching these legislated net zero targets.

The UK Government announced in October 2020 its commitment to make the UK a world leader in green energy and boosted the UK Government's previous 30GW target for offshore wind to 40GW by 2030. The current Scottish Government ambition is 20GW of onshore wind and 11GW of offshore wind in Scotland by 2030. Further commitments, by the UK Government in October 2021, to decarbonise the power system by 2035, as well as British Energy Security Strategy[1] published April 2022 (which raises the UK Government ambition to 50GW of offshore wind by 2030), further support the requirement for investment in the existing electricity transmission system to enable the timely connection and integration of the required renewable generation sources.

In December 2022 the Scottish Government published its Onshore Wind Policy Statement[2], setting out its ambition deploy 20GW of onshore wind capacity by 2030. This is in addition to the Scottish Government's ambition of 11GW of offshore wind by 2030.

ScotWind

The results of the ScotWind leasing process, a programme managed by Crown Estate Scotland to lease areas of the seabed around Scotland for offshore wind farm development, were announced throughout 2022 culminating in approximately 28GW of offshore wind being offered option agreements reserving the rights to specific areas of seabed.

The ScotWind results underline both the scale of development potential off the north and east coasts of Scotland and the commitment from industry to delivering the investments in energy infrastructure necessary to meet Net Zero targets. Off the north and east coasts of Scotland in particular, there is very high potential for offshore wind generation, in areas illustrated by the BEIS/ Ofgem Offshore Transmission Network Review[3] (OTNR) Generation Map[4].

ScotWind offshore developments are expected to make a significant contribution towards 2045 and 2050 Net Zero targets. It is vital that the onshore transmission system is developed in a timely manner to enable the benefits of ScotWind to be realised and contribute to the legislated Net Zero targets.

2.3. Future Energy Scenarios

Each year, NGESO produces a set of Future Energy Scenarios (FES) for use by the Transmission Owners (TOs) as network investment planning backgrounds. Through application of the criteria set out in the

[1] British energy security strategy - GOV.UK (www.gov.uk)
[2] Onshore wind: policy statement 2022 - gov.scot (www.gov.scot)
[3] Offshore Transmission Network Review
[4] OTNR - Generation Map

NETS SQSS, the FES provide an indication of the capacity requirements of the system based upon the potential future connection of generation and changing demand profiles.

The north to south power transfer requirements on all of the northern transmission system boundaries increase significantly over the coming years due to the connection of new renewable generation throughout Scotland as part of the energy transition to meet legislated Net Zero targets. This trend is clearly demonstrated by the transfer requirements on the boundary between the SPT and National Grid Electricity Transmission (NGET) areas (Boundary B6) (see Figure 1).

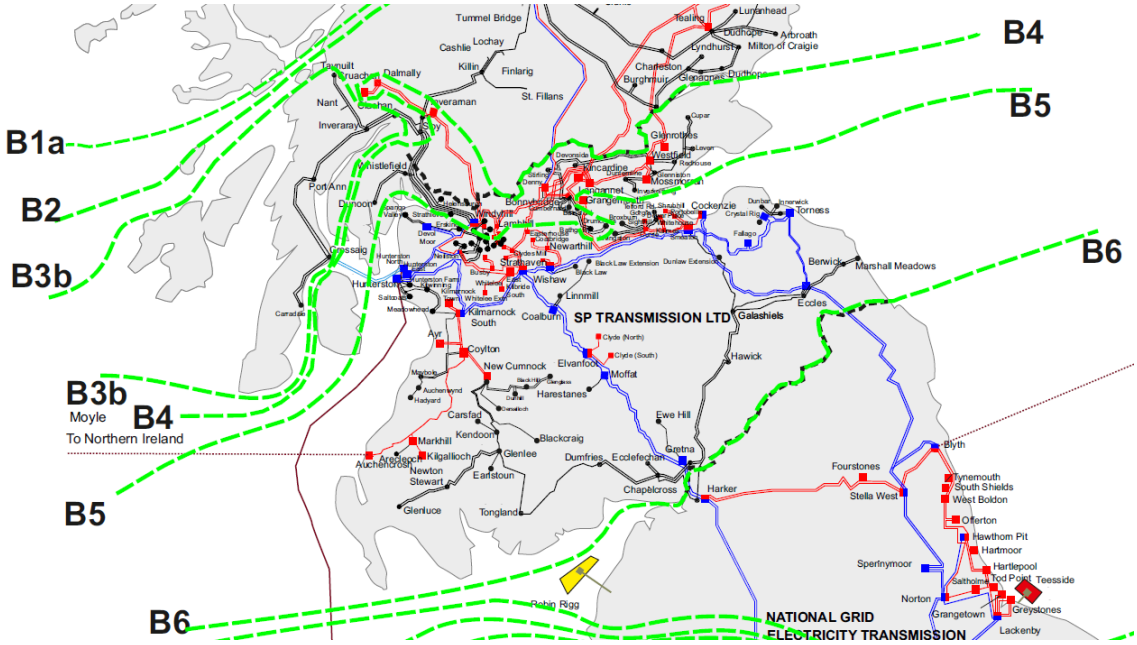

Figure 1: Network boundaries across SPT's network

The figure below indicates the 2023 FES and 2024 FES required transfer capability on the B6 boundary. The existing capability of B6 is already exceeded predominantly due to the connection of onshore and offshore wind across central and northern Scotland.

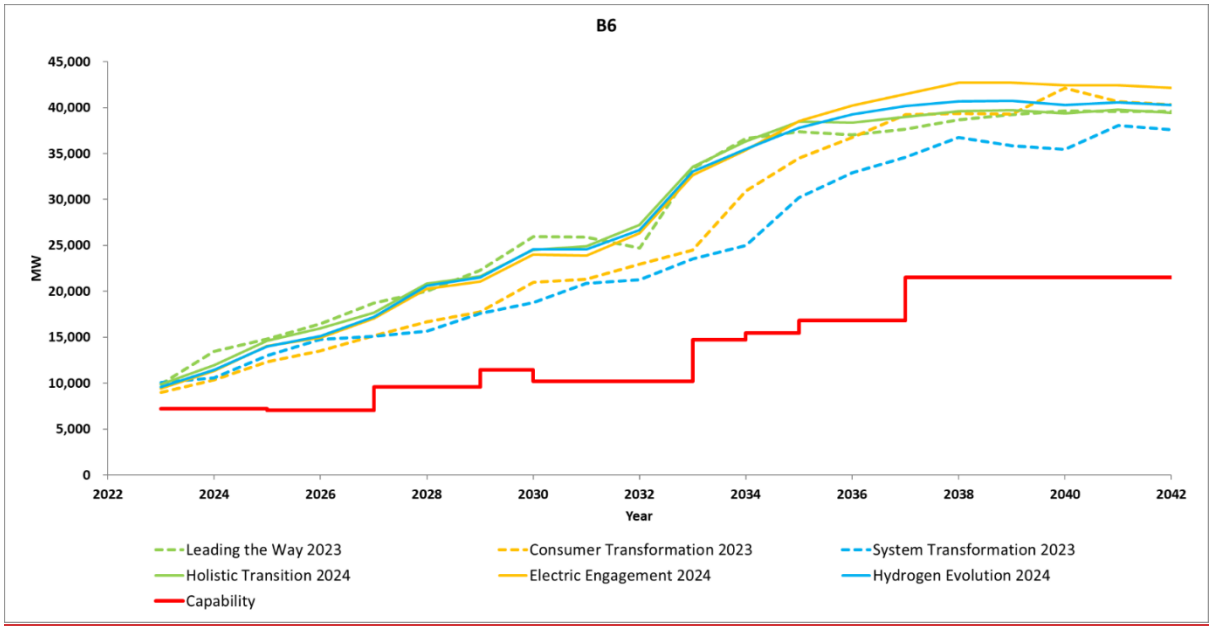

Figure 2: Required transfers and base capability for B6 boundary

The current capability of transmission network boundary B6 is approximately 6,700MW, dependent upon the geographic disposition of renewable generation output and based on a thermal limitation on the cross border ZV route, south of Elvanfoot. Figure 2 shows a required transfer of up to 24.9GW by 2030 and up to approximately 38.5GW by 2035. In order to maintain an efficient and economic transmission system whilst economically integrating additional renewable generation, significant system reinforcement is required in an unprecedented timeframe.

2.4. Beyond 2030 Publication

Building upon NGESO's Network Options Assessment (NOA) 2021/22 Refresh report[5] the recent publication of NGESO's "Beyond 2030" report[6] outlines a requirement for further significant network reinforcements to the value of approximately £58 billion across Britain.

The report's recommendations will facilitate the connection of an additional 21 gigawatts of low carbon generation to the UK transmission system as a direct result of the ScotWind leasing round and will help the UK meet its decarbonisation ambitions.

The beyond 2030 report sets out the output of a holistic network design exercise undertaken by NGESO and TOs which assessed various permutations of onshore and offshore network reinforcement against an agreed set of design criteria[7]. One of the key areas identified for onshore reinforcement within the report is central and southern Scotland where a coordinated suite of onshore reinforcement has been identified to complement the proposed offshore network and provide a significant increase to the transfer capability of key system boundaries including B6.

2.5. The CMN3 Project

As part of the annual Network Options Assessment (NOA) a new 400kV double circuit OHL was identified as a means of creating a third onshore 400kV double circuit over the B6 boundary. This was originally identified within NOA7 as "CMNC – South East Scotland to North West England" and was given a proceed recommendation. The need for the reinforcement project has recently been reaffirmed through the Transitional Centralised Strategic Network Plan 2 (tCSNP2) exercise under the reference "CMN3". Generation connection applications have also been received along this corridor which have then required a reinforcement instruction to establish the Teviot substation.

CMN3 provides an increase to the B6 transfer capability by establishing a new 400kV double circuit OHL from the new Gala North 400/132kV substation to the Carlisle area within NGET's licensed area via new 400kV substations at Ettrickbridge and Teviot.

The majority of the CMN3 scheme when it is considered as its constituent parts is required to enable new onshore connections with ~1.6GW of contracted offers in the Scottish Borders via the proposed new Teviot 400/132 kV and Ettrickbridge 400/132kV substations.

[5] Subject reinforcement recommended to Proceed within NOA 2021/22 Refresh see option ref CMNC within download (nationalgrideso.com)
[6] nationalgrideso.com/document/304756/download
[7] Further detailed provided within NGESO's Beyond 2030 Technical Report Final Strategic Options Appraisal (nationalgrideso.com)

Figure 3: Planned CMN3 Scheme, indicative route shown in Pink (subject to further routing activities)

2.6. Existing System

The existing electrical infrastructure in the borders region of Scotland around where the Teviot 400kV substation is due to be connected is shown in Figure 4 (geographic) and Figure 5 (Network Diagram). As can be seen, the borders region consists of an existing 132 kV double circuit connecting Gretna to Hawick, a 132 kV single circuit (predominantly on double circuit towers) connecting Hawick to Galashiels, and a 132 kV double circuit connecting to Eccles from Galashiels.

As shown in Figure 4 (geographic) and Figure 5 (Network Diagram) there currently is no 400kV or 275 kV infrastructure in the surrounding region. The addition of the 400kV substation with four 400/132kV SGTs will provide capacity for contracted and future connections.

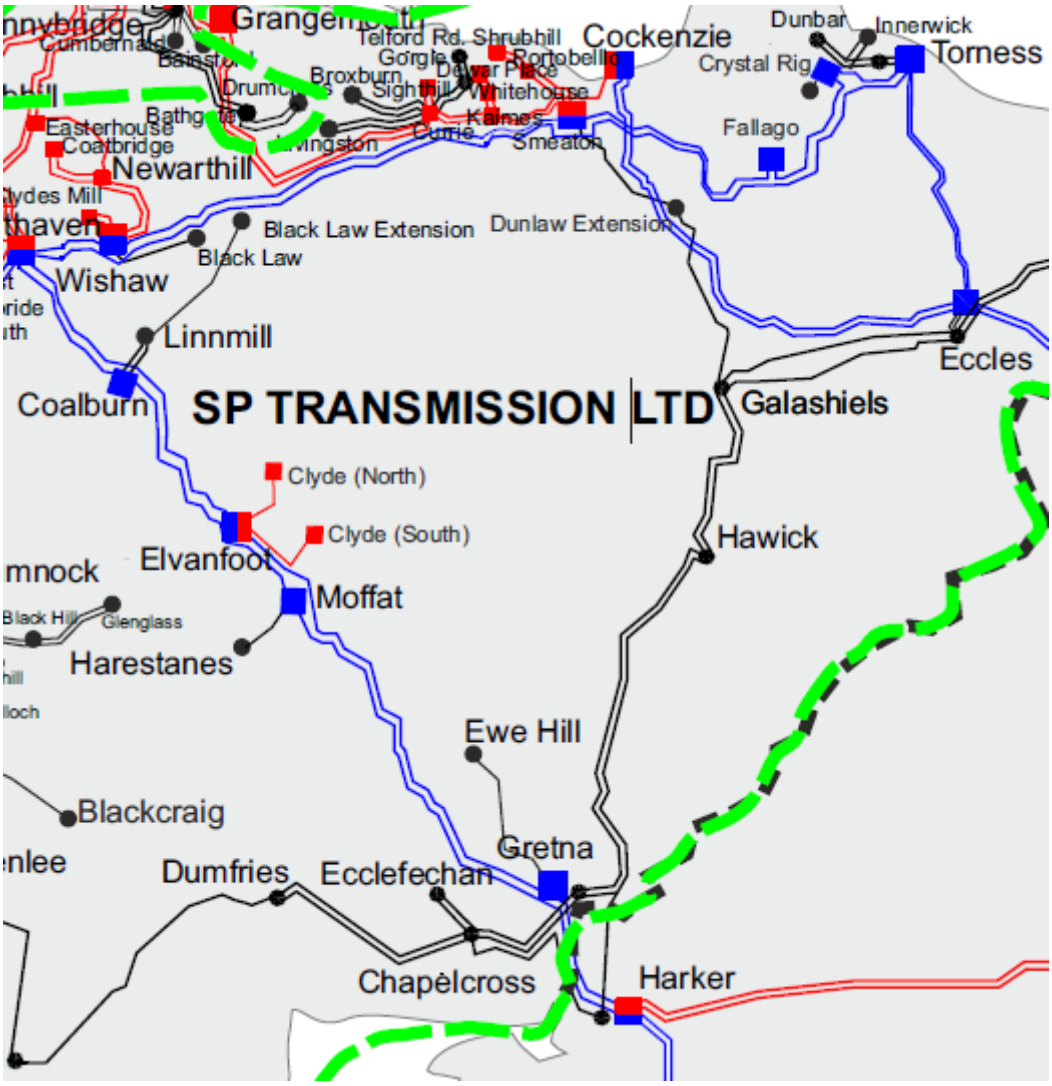

Figure 4: Existing Geographical Transmission Network in Area - Extracted from ETYS Appendix A)

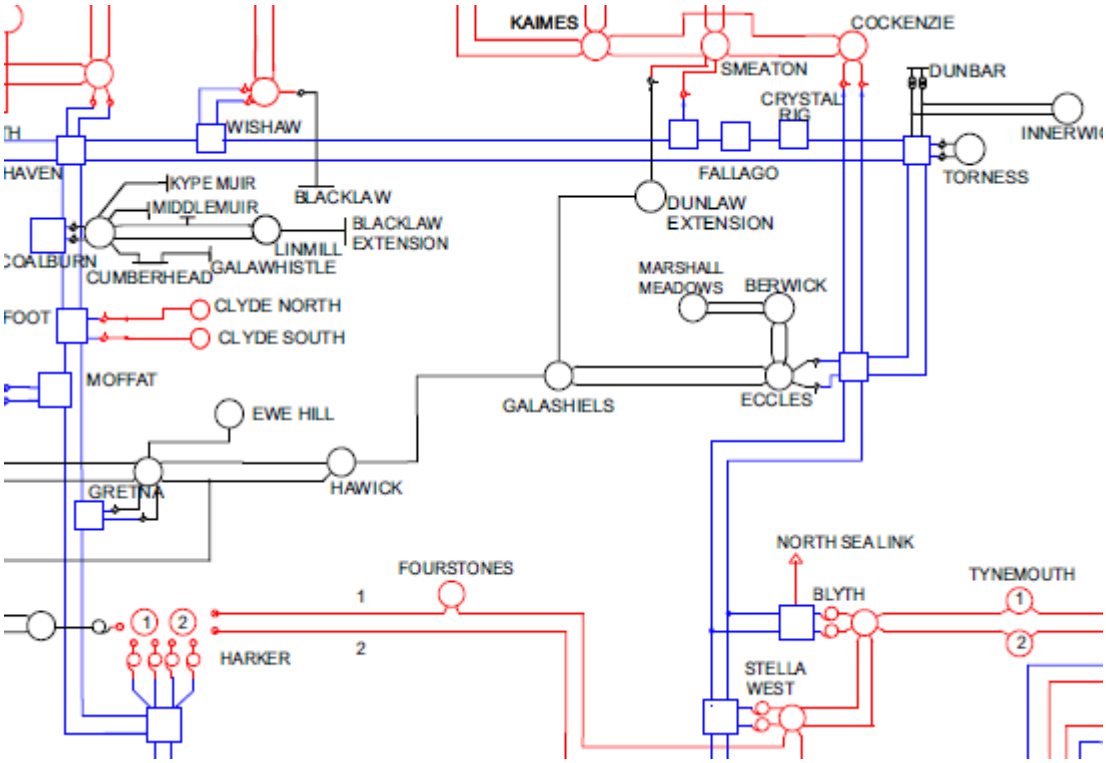

Figure 5: Existing SLD Transmission Network in Area - Extracted from ETYS Networks Diagram Geographical Layout shown in Appendix A (Figure A-1)

2.7. Wider System Upgrades

In order to facilitate new connections and uprate the transmission network's 400kV capacity within the Borders region, several transmission works have been proposed of which SPT-RI-2378 and SPT-RI-2418 are part. These works are listed below and are shown graphically in Figure 6 below:

- **SPT-RI-2079 –** Gala North 400kV Substation
- **SPT-RI-2417 –** Gala North to Teviot 400kV OHL
- **SPT-RI-3829 –** Ettrickbridge 400/132kV Substation
- **SPT-RI-2378 –** Teviot 400kV Substation & 132kV "A" Board
- **SPT-RI-2418 –** Teviot 132kV "B" Board
- **SPT-RI-1738 –** Teviot to NGET

The Teviot works are an integral element of the proposed reinforcement of the B6 boundary, providing a route for the 400kV transmission network while providing connections to contracted developments in an area without transmission infrastructure. The construction of the Teviot 400 kV substation in the Borders region is part of a co-ordinated package of works (SPT-RI-2079, 2417, 3829, 1738) with the substation construction primarily being completed through SPT-RI-2378 and SPT-RI-2418.

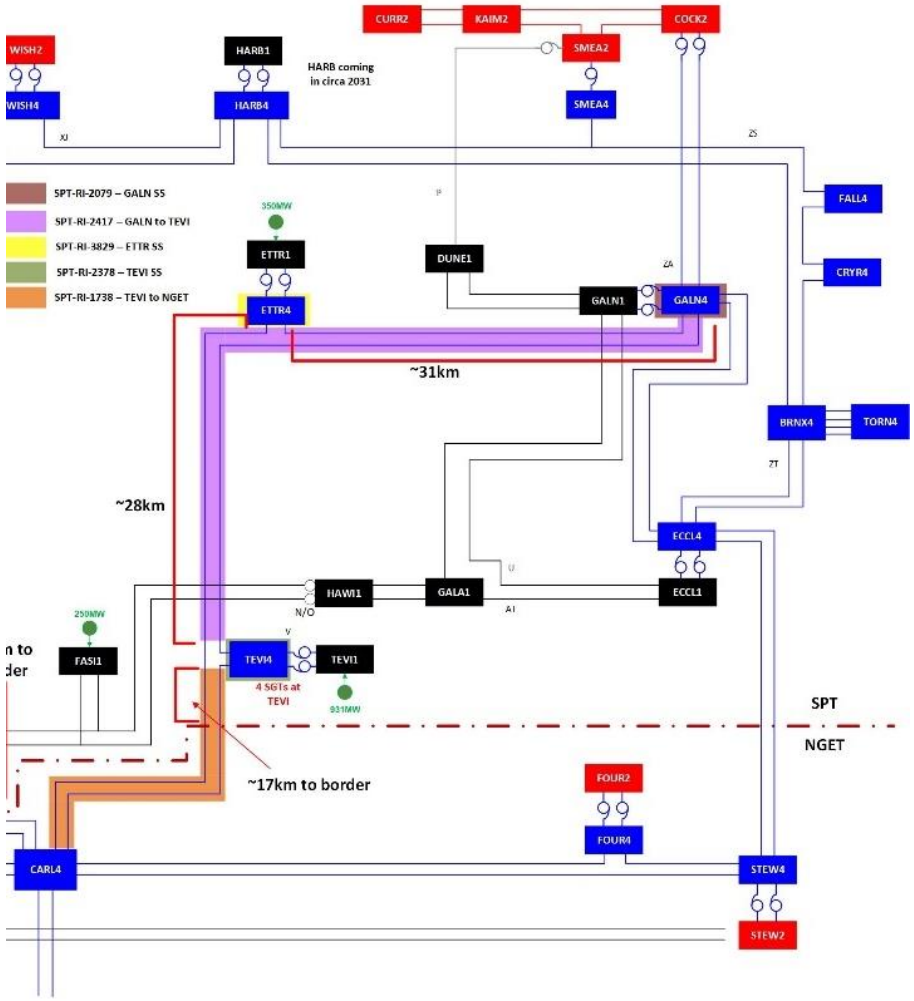

Figure 6: Proposed CMN3 Upgrades in Borders Scotland Area - Extracted from CMN3 SLD

2.8. New Connections

There is currently 931 MW of contracted generation to be added to the network in this region which will not be possible without a package of network upgrades which includes the development of a new 400kV substation in the Teviot area. The details of the contracted generation projects currently determined to be dependent on the aforementioned works are listed in Table 1.

Table 1: Contracted Generation Dependent Upon SPT-RI-2378 and 2418 (Development of Teviot 400/132kV Substation)

Connecting Substation	Contracted Development	Contracted Status	Consent Status	TECA Score[8]	Contracted Energisation Date	SPT-RI-2378/2418	Associated Enabling Works
[redacted]							
Total Capacity (MW)	-		-	-	**931 MW**	-	

During the process of identifying and evaluating options for each connection offer, due regard was given to the development of an efficient, coordinated and economical system of electricity transmission. As well as determining the most appropriate connection location and connection method (e.g. overhead line, underground cable, wood pole vs steel tower, connection voltage etc).

As a part of the RIIO-T3 load planning strategy, SPT has developed a probability scoring system, in order to score directly connected transmission projects based on parameters that will indicate their likelihood to connect to the network by their intended connection date, to inform requirements of network reinforcements. By utilising this tool, a portfolio of generation connections that have a high probability of connecting to the network in the near future can be built, enabling SPT to take a proactive approach when considering future reinforcement works on the network. Areas that have a significant number of generation connections scheduled to connect to the network, with a corresponding high probability score, has helped to shape the SPT RIIO-T3 plan.

The methodology of the scoring system splits the overall score into 4 separate categories, each of which carry a different weight regarding the final score and which take into account aspects that are specific to individual projects and the technology as a whole. The four categories are as follows:

[8] *Transmission Economic Connections Assessment (TECA) – This assessment represents SPT's best view of the contracted generation background to 2036 and to evaluate timely delivery of reinforcement works. This regular assessment activity provides updated projections of renewable development in Scotland, and feeds into SPT's plans, ensuring the investment best meets the needs of users and customers.*

- Technology
- Technology Maturity
- Developer Track Record
- Planning Status

The data presented indicates that there is sufficient confidence that all of the projects directly affected by the works of SPT-RI-2378 and SPT-RI-2418 will connect to the network, based on those categorised as high and medium probability to progress these works. This would indicate an increase of 931 MW being added to the network that are affected by the enabling works of SPT-RI-2378 and SPT-RI-2418.

Given the targets set by the Scottish government to reach Net Zero by 2045, it is vital that the necessary electrical infrastructure to support the connection of new renewable generation is completed within the upcoming RIIO-T3 period and beyond. The completion of infrastructure projects, such as the proposal outlined in this document, will provide the necessary increase in capacity required to support these projects and will ensure continuity of connectivity through providing robust and stable infrastructure.

3. Optioneering

This section provides a description of the options that were considered to accommodate connection of renewable generation developments in the Scottish Borders area as well as reinforce the B6 connection boundary for future transmission requirements. A summary of each option is described in Table 4. Also, the system requirements and design parameters for the considered options are summarised in Table 5.

Our optioneering approach has identified Whole System interactions with other electricity network / system operators in the development of our proposed solution and has considered the appropriate Whole System outcome. The scope of the options appraisal is limited to the substation only and has been based on the current proposed voltage levels in the CMN3 scheme consisting of a 400kV connection between the Carlisle area and the proposed Gala North 400kV substation, as set out in tCSNP2 as “CMN3 – South East Scotland to North West England”.

This stage of the optioneering process high-level analysis has been conducted. Further work to develop the stated options will take place to progress the project maturity of the project. As such, the development of this paper is not based upon a particular switchgear technology as the precise location of the Teviot 400/132 kV substation is being developed in conjunction with the studies to determine the routing of the new 400kV overhead lines. Similarly, groundwork investigations and pricing for civil details have been based on a reasonable desktop scenario but are not site-specific. The number of bays has been assigned based upon the current requirement at the Teviot 400/132 kV substation, and its integration with the CMN3 scheme.

3.1. Baseline: Do Nothing / Deferral

As such, a ‘Do Nothing’ or ‘Delay’ option is not credible in relation to this project and would be inconsistent with SPT’s statutory duties and licence obligations, including Licence Conditions D3 and D4A, which require SPT to comply with the NETS SQSS and to offer to enter into an agreement with the system operator upon receipt of an application for connection, such offers being in accordance with the System Operator Transmission Owner Code (STC) and associated Construction Planning Assumptions provided by NGESO. The proposed works are identified as Enabling Works in the connection agreements relating to the projects in Table 1.

3.1. Option 1 – Teviot 400/132kV Submission

This option is to establish a new double busbar (DBB) Teviot 400/132 kV substation in the vicinity of the proposed [redacted] windfarms. Figure 7 contains the single line diagram for the proposed Teviot substation.

The existing electrical network in the Borders region of Scotland currently consists of 132kV infrastructure which does not have the required capacity to host the contracted connections queue (circa. 1.6 GW). Thermal reinforcement at 132 kV only is not sufficient due to this very high volume of contracted generation. Thus, an additional link to the 400 kV system is required.

As such, Option 1 proposes to connect the [redacted] Windfarms to the proposed CMN3 route via a new 400 / 132kV substation. This will also increase power transfer across the B6 boundary as proposed as part of NOA7. In addition, by providing an interface with the wider CMN3 upgrade, this option provides project delivery efficiencies when viewed as a part of the wider borders network reinforcements.

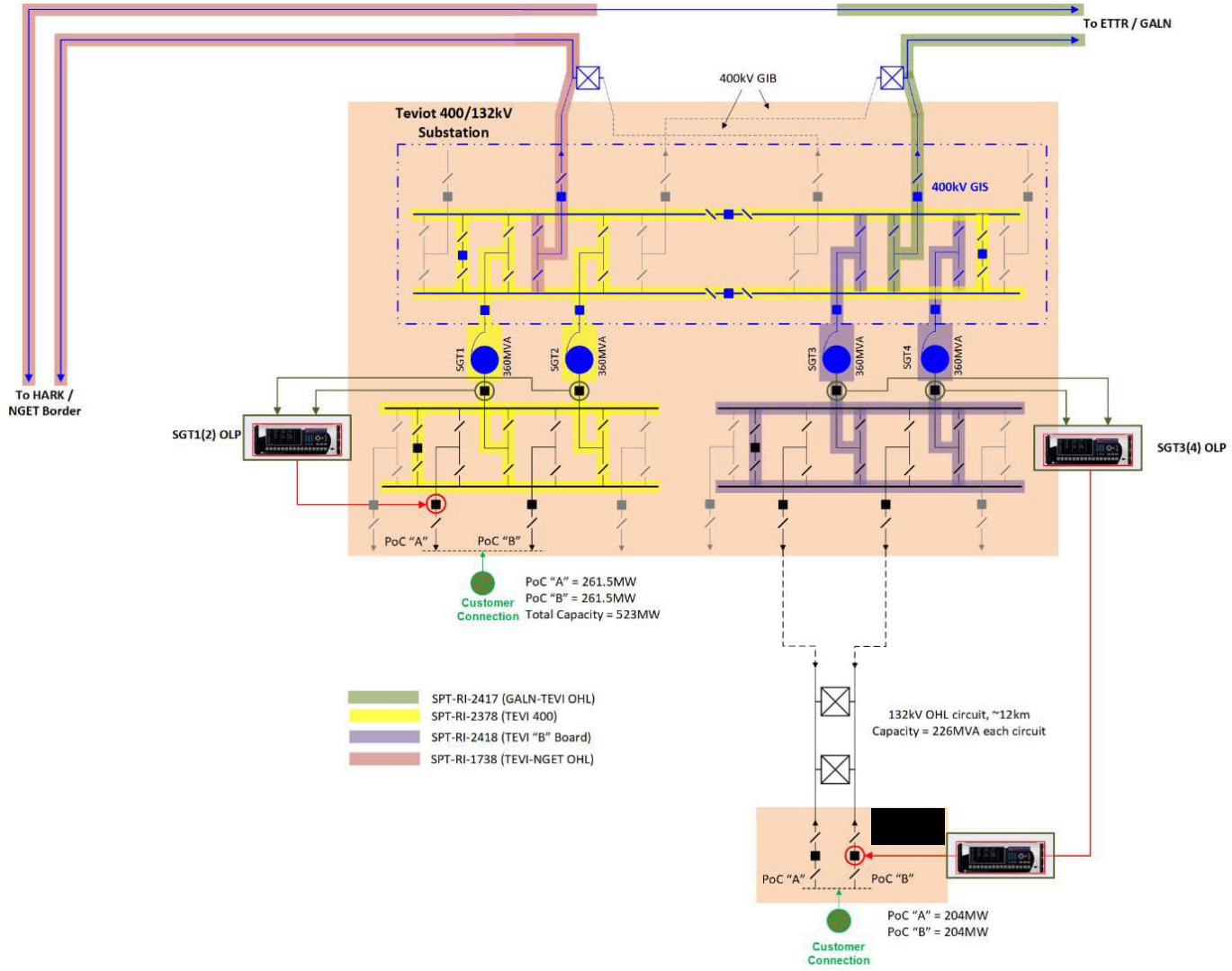

Figure 7: Single Line Diagram for the Teviot 400/132kV Substation - TORI-2378 and TORI-2418.

The scope of SPT-RI-2378 is noted below:

- 1 x 400kV feeder bay for Gala North/Ettrickbridge
- 1 x 400kV future feeder bay for Gala North/Ettrickbridge
- 1 x 400kV feeder bay provisionally for interconnection with the Carlisle Area
- 1 x 400kV future feeder bay for future turn in of circuit to Carlisle Area
- 4 x spare 400kV feeder bays (1 x each end of the substation in addition to 2 x shown in diagram)
- 2 x 400kV bus section circuit breakers
- 2 x 400kV bus couplers
- 2 x 400kV transformer bays for 400/132kV SGTs
- 2 x 400/132kV 360MVA SGTs
- 2 x 132kV transformer feeder bays
- 1 x 132kV bus coupler
- Space for 2 x 132kV feeder bays for connections into the “A” board ([redacted]WF)
- Space for 2 x 132kV feeder bays for future connections.

The scope of SPT-RI-2418 is noted below:

- 2 x 400kV transformer bays for 400/132kV SGTs
- 2 x 400/132kV 360MVA[9] SGTs
- 2 x 132kV transformer feeder bays
- 1 x 132kV bus coupler
- Space for 2 x 132kV feeder bays for connections into the “B” board ([redacted]WF)
- Space for 2 x 132kV feeder bays for future connections.

Common works for both reinforcement instructions are:

- All associated protection and control works.
- All associated environmental and civil works.
- Miscellaneous works.

It is noted that in order to support economic, efficient and coordinated development of the future network, the design and decision-making process that will determine the most appropriate switchgear technology, i.e. GIS or AIS, will be clearly set out in the future application under the relevant uncertainty mechanism at the appropriate time following the conclusion of the integrated substation siting and overhead line routing study. Without prejudice to the ongoing project

[9] Contractually to fulfil the [redacted]WF connection thermally only 2 x 240MVA 400/132kV transformers are required however a strategic decision has been made to specify 2 x 360MVA transformers given the need across the system for more capacity. In addition, procurement of six 400/132kV 360MVA transformers is required to be procured across the CMN3 corridor alone and it may be more economic to procure 8 x 360MVA units compared with 6 x 360MVA and 2 x 240MVA units. This will be confirmed and scope updated once the project is further developed.

development, the current cost estimate for the development of Teviot 400/132 kV substation has been based upon 400kV infrastructure utilising SF_6-free Gas Insulated Switchgear (GIS) equipment rated at 5000A and the 132kV equipment is based on Air Insulated Switchgear (AIS).

In order to support economic, efficient and coordinated development of the future network recently identified through the tCSNP2, space allowance will be made for compensation equipment at Teviot. The specific size and type of the compensation will be determined through ongoing analysis. For sizing purposes allowance has been made based on the existing series compensation platforms at Eccles. It is noted that the technology selected to provide the required compensation equipment whilst not having a significant effect on the overall footprint of the site, but it will have a significant effect on the layout of the substation.

The current estimated total cost for this option is £67.57m. It would allow for the connection of the contracted developments detailed in Table 1 and provide reinforcement and additional capacity in the Borders region and B6 boundary.

3.2. Selected Option – Teviot 400/132kV Substation

As discussed above, the most appropriate option to enable the economic, efficient, and co-ordinated connection of the proposed renewable generation developments in the area for the Scottish Borders area is to develop a 400 kV substation to facilitate connection to the wider network as part of CMN3 alongside 132 kV infrastructure to connect the contracted generation of the [redacted] Windfarm and [redacted] Windfarm.

Teviot 400kV substation will be established at a location, to be determined as the project develops in maturity, but currently proposed to be within the vicinity of the proposed [redacted] Windfarm. The Teviot 132kV "A" Board was contracted following the connection application of [redacted] Windfarm ([redacted]) which triggered the establishment of a 132kV double busbar substation and 132kV OHL circuit towards the wind farm substation. Given the volume of connections within the Borders area, and the scheduled CMN3 works, the Teviot 400kV and 132kV substations have been considered in parallel in terms of determining an appropriately sized substation platform and it is likely advantageous for the Teviot 400 kV substation to be located based upon the proposed OHL corridor for CMN3.

This most appropriate switchgear technology will be determined following further development and be confirmed at in the appropriate uncertainty mechanism application.

Options	Map	Layout of Substation/ Connection	Layout of all Route Works	Relevant Survey Works	Narrative Consenting Risks	Narrative Preferred Option	Narrative Rejection
Preferred – Option 1 Teviot 400/132 kV Substation	To be developed as the project matures.	To be developed as the project matures.	N/A	N/A – substation location to be determined following further design development.	Early engagement with landowners and environmental bodies to secure necessary site permissions.	Necessary option to facilitate wider CNM3 and enable local generation works	N/A
Rejected – Baseline: Do Nothing / Delay	N/A	N/A	N/A	N/A	N/A	N/A	Inconsistent with SPT's various statutory duties and licence obligations.

System Design Table	Circuit/Project	**Preferred – Option 1: Teviot 400/132 kV Substation**	**Rejected – Baseline:** Do Nothing / Delay
Thermal and Fault Design	Existing Voltage (if applicable)	N/A	N/A
	New Voltage	400/132kV	N/A
	Existing Continuous Rating (if applicable)	N/A	N/A
	New Continuous Rating	5000/2500 A	N/A
	Existing Fault Rating (if applicable)	N/A	N/A
	New Fault Rating	63 kA / 31.5 kA	N/A
ESO Dispatchable Services	Existing MVAR Rating (if applicable)	N/A	N/A
	New MVAR Rating (if applicable)	N/A	N/A
	Existing GVA Rating (if applicable)	N/A	N/A
	New GVA Rating	N/A	N/A
System Requirements	Present Demand (if applicable)	N/A	N/A
	2050 Future Demand	N/A	N/A
	Present Generation (if applicable)	N/A	N/A
	Future Generation Count	4	N/A
	Future Generation Capacity	931MW	N/A
Initial Design Considerations	Limiting Factor	Land availability	N/A
	AIS/ GIS	TBC following further development	N/A
	Busbar Design	Double busbar	N/A
	Cable/ OHL/ Mixed	N/A	N/A
	SI	Additional bays to be included at either end of the 400kV and 132k substations for future connections. Maximum standard size of 400/132kV SGT to be included to ensure accommodation of future generation.	N/A

4. Proposed Works and Associated Cost

4.1. Project Summary

The selected option details the installation of a 400 kV substation, Teviot, with an accompanying 4 x 400/132 kV 360 MVA SGTs connected to two 132 kV double busbar substations, Teviot 132 kV “A” and “B”. This will be a single stage process to ensure the project is delivered in a safe and timely manner.

The Teviot 400kV substation is to be established to provide a connection point for the 4 x 400/132kV 360 MVA SGTs, connections for 400kV circuits and to facilitate the CMN3 route under SPT-RI-2417 and SPT-RI-1738 respectively, establishment of the 132kV double busbar with 7 bay 132 kV “A” Board for Teviot 132 kV substation, and establishment of the 132kV double busbar with 7 bays for the Teviot 132 kV “B” Board . The single line diagram for this stage of works is shown in Figure 8. Note that all works in Figure 8 highlighted in yellow and purple are to be completed during the works.

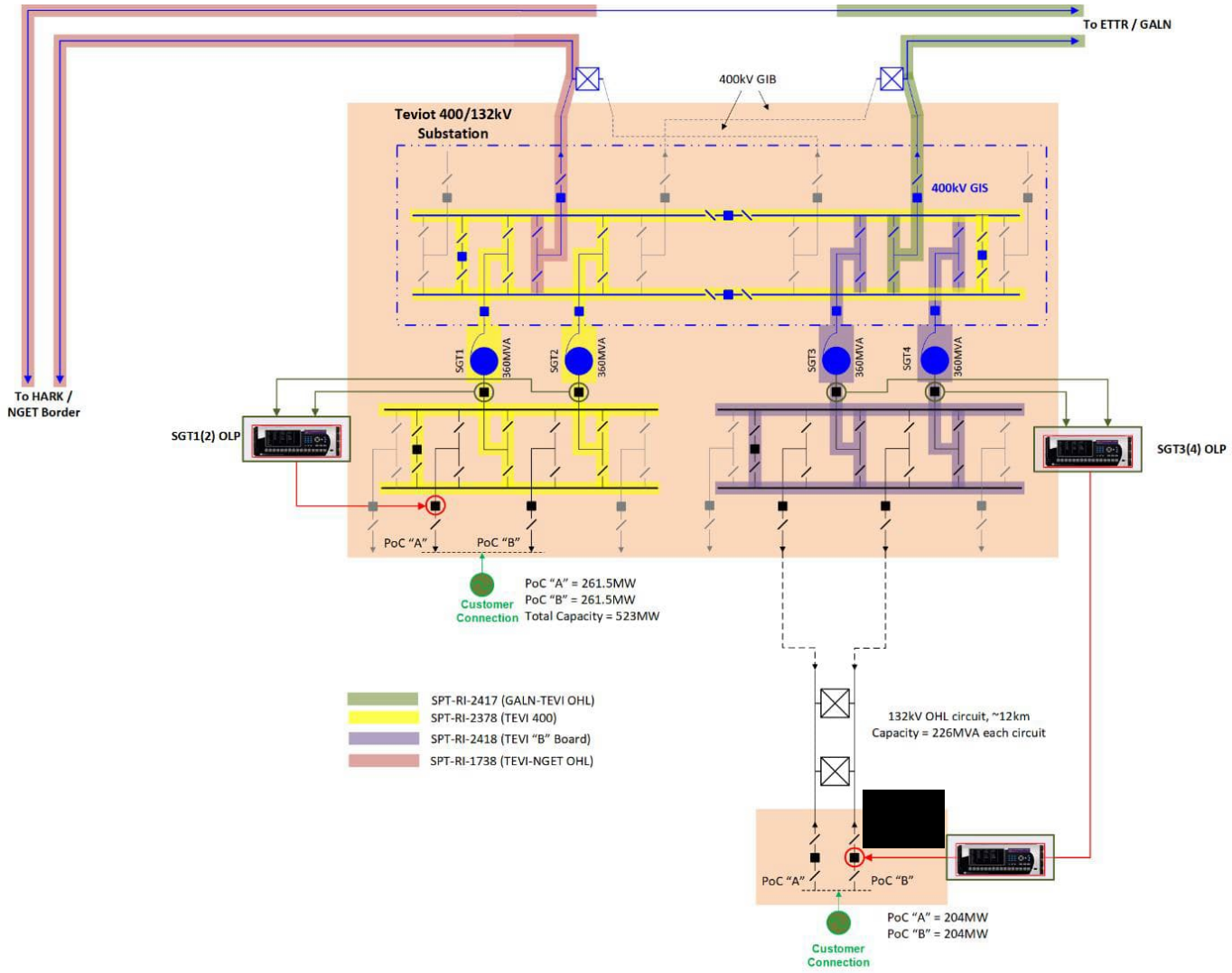

Figure 8: Stage 1 Indicative Works - Single Line Diagram

The associated works for Stage 1 are detailed below:

Pre-Engineering Works

The following list is indicative based on previous experience of such sites and as such should not be read as definitive. . The following surveys will be carried out:

- Topographical survey of the site
- GPR survey of areas to be excavated to validate approximate locations of buried services.
- Ground bearing capacity checks
- Geo Environmental Investigation to identify the relevant geotechnical parameters to facilitate the civil engineering design works
- Earthing Study
- Insulation Co-ordination Study
- Transport Survey to assess the access of the new equipment
- Environmental Study.

Teviot 400 kV Substation and 132 kV "A" Board

The works at Teviot 400kV substation shall, as indicated in Figure 8, include:

- Installing a new 400kV DBB with 12 bays including space for 2 × bus couplers, 2 × bus sections, 2 × 400/132 kV 360 MVA SGTs, 2 × feeder bays for CMN3 route 400kV circuits, 2 x feeder bays for future circuits, and 2 x spare feeder bays. Note that the 400kV DBB substation will consist of 14 bays, of which two bays will be installed as part of Stage 2.
- Installing a new 132 kV DBB with 2 x 132 kV transformer feeder bays, 1 x 132 kV bus coupler, 1 x bus section, and space for 4 x feeder bays.
- All control and protection work
- All environmental and civil works.

Teviot 132kV "B" Board Substation

The works at Teviot 132 kV "B" Board substation shall, as indicated in Figure 8, include:

- Installing 2 × 400/132kV 360 MVA SGTs, 2 × 400 kV feeder bays for CMN3 route 400kV circuits
- Installing a new 132 kV DBB with 2 x 132 kV transformer feeder bays, 1 x 132 kV bus coupler, 1 x bus section, and space for 4 x feeder bays.
- All control and protection work
- All environmental and civil works.

4.2. Further Development at New Substation

Indicators from SP Distribution's Distribution Future Energy Scenarios (DFES) indicate growth in both demand and generation going forward in the area local to this proposed new substation, therefore provision will be made at the site to allow the establishment of a new grid supply point (GSP) which can be interconnected with the existing local distribution system to provide additional capacity. Engagement with SPD on this will continue as the project develops, to ensure the best solution for the GB consumer, at both Transmission and Distribution levels.

One of the key drivers for this project is to enable a new 400kV corridor over the B6 boundary to increase the bulk power transfer though the system. As this power transfer increases, there will be a requirement to install additional equipment at key locations to ensure the system remains operable.

In order to support economic, efficient and coordinated development of the future network recently identified through the tCSNP2, space allowance will be made for compensation equipment at Teviot.

The specific size and type of the compensation will be determined through ongoing analysis. For sizing purposes allowance has been made based on the existing series compensation platforms at Eccles. It is noted that the technology selected to provide the required compensation equipment, whilst not having a significant effect on the overall footprint of the site, will have a significant effect on the layout of the substation.

4.3. Estimated Total Project Cost

The estimated cost of the project is indicated in the following table. Costs below are referred as "Direct", so neither risk contingency nor indirect have been included in the project cost. Project costs are summarised in the Cost Breakdown below for SPT_RI-2378 and SPT-RI-2418:

Table 7: Project Cost Breakdown

Item	Description	Estimated Direct CAPEX (£m 23/24)
[redacted]		
[redacted]		
[redacted]		

Expenditure incidence is summarised below:

Table 8: Summary of Expenditure Incidence

Energ-isation Year	Yr. 2025	Yr. 2026	Yr. 2027	Yr. 2028	Yr. 2029	Yr. 2030	Yr. 2031	Yr. 2032	Yr. 2033	RIIO-T2 Total	RIIO-T3 Total	RIIO-T4 Total	Total:
2033	£0.02m	£0.08m	£0.16m	£0.23m	£0.34m	£3.11m	£22.10m	£28.48m	£13.04m	£0.11m	£25.94m	£41.54m	£67.57m

4.4. Regulatory Outputs

The indicative primary asset outputs are identified in table below:

Table 9: Indictive Primary Asset Outputs

Asset Category	Asset Sub-Category Primary	Voltage	Forecast Additions[10]	Forecast Disposal
Substation Platform	Platform Creation	400/132kV	1 unit	-
Circuit Breaker	CB	400kV	12 units	-
Circuit Breaker	CB	132kV	8 units	-
Switchgear	Disconnector	400kV	22 units	-
Switchgear	Disconnector	132kV	12 units	-
Wound Plant	Transformer	400kV <= 500MVA	4 units	-

5. Deliverability

We have applied SPT project management approach to ensure that this project work is delivered safely, and in line with the agreed time, cost and quality commitments. We have a proven track record of delivering essential transmission network upgrade projects and will draw upon this knowledge and experience to effectively manage these works. We have assigned a dedicated Project Manager to the works at every stage who is responsible for overall delivery of the scope and is the primary point of contact for all stakeholders.

5.1. Delivery Schedule

A standard approach has been applied to the planning phase of these works and that will continue for the reporting and the application of processes and controls throughout the lifecycle. Figure 9 below summarises the key milestones within the delivery schedule for Stage 1 of this project.

[10] Forecast Additions are indicative pending further detail design.

SP ENERGY NETWORKS

Scottish Power Energy Networks

CMN3 - Cross Border Connection - Gala North to Scottish Border (TOCO 1504, Incl TORIs 2418, 2378, 1738 & 2417)

Project Status Date Mon 30/09/24
Printed On Thu 26/09/24 at 08:41

ID	Task Name	Duration	Start	Finish	% Comp	Predecessors
0	**CMN3 - Cross Border Connection - Gala North to Scottish Border (TOCO 1504, Incl TORIs 2418, 2378, 1738 & 2417)**	**3650 days**	**Thu 30/07/20**	**Mon 13/11/34**	**10%**	
1	**Key Milestones**	**3650 days**	**Thu 30/07/20**	**Mon 13/11/34**	**0%**	
2	**Project Design / Environmental Planning**	**996 days**	**Thu 30/07/20**	**Fri 05/07/24**	**100%**	
3	Project Start	0 days	Thu 30/07/20	Thu 30/07/20	100%	
4	IP1 Approved (KPI)	0 days	Thu 30/07/20	Thu 30/07/20	100%	3
5	IP2 Approved (KPI)	0 days	Fri 05/07/24	Fri 05/07/24	100%	37,38
6	**Engineering Development / Contract Placement**	**2178 days**	**Thu 04/03/21**	**Fri 05/10/29**	**0%**	
7	ASTI Stage 1 Submission (KPI)	0 days	Thu 04/03/21	Thu 04/03/21	100%	37FS+120 days
8	IP3 (Stage 1) Approved (KPI)	0 days	Mon 09/05/22	Mon 09/05/22	100%	278,281
9	Early Construction Funding Submission (KPI)	0 days	Thu 12/12/24	Thu 12/12/24	0%	286
10	OHL S.A. Stage 1A call-off (KPI)	0 days	Tue 15/04/25	Tue 15/04/25	0%	135
11	Necessary Wayleaves Submitted (KPI)	0 days	Thu 04/12/25	Thu 04/12/25	0%	227SS
12	S/S SCA Approved (KPI)	0 days	Fri 18/09/26	Fri 18/09/26	0%	81
13	OHL SCA Approved (KPI)	0 days	Fri 16/10/26	Fri 16/10/26	0%	87
14	S.S S.A. design call-off (KPI)	0 days	Fri 27/11/26	Fri 27/11/26	0%	117
15	IP3 (Stage 2) Approved (KPI)	0 days	Wed 15/03/28	Wed 15/03/28	0%	279,282
16	S.A. detailed design & cost received (KPI)	0 days	Wed 15/03/28	Wed 15/03/28	0%	103,122,149
17	Planning Application Submitted (KPI)	0 days	Wed 17/05/28	Wed 17/05/28	0%	201
18	S37 Submitted (KPI)	0 days	Wed 17/05/28	Wed 17/05/28	0%	201
19	ASTI PA Stage 2 Submission (KPI)	0 days	Wed 17/05/28	Wed 17/05/28	0%	293
20	CPO Submitted (KPI)	0 days	Wed 17/05/28	Wed 17/05/28	0%	239
21	ASTI PA Stage 2 Decision (KPI)	0 days	Wed 29/11/28	Wed 29/11/28	0%	295
22	S.S S.A. main call-off (KPI)	0 days	Mon 08/01/29	Mon 08/01/29	0%	297
23	OHL S.A. Stage 1B call-off (KPI)	0 days	Mon 08/01/29	Mon 08/01/29	0%	299
24	S37 Received (KPI)	0 days	Mon 21/05/29	Mon 21/05/29	0%	202
25	Consents Obtained (KPI)	0 days	Fri 05/10/29	Fri 05/10/29	0%	224,208
26	**Delivery**	**1323 days**	**Mon 08/10/29**	**Mon 13/11/34**	**0%**	
27	Site Access Gained OHL (KPI)	0 days	Mon 08/10/29	Mon 08/10/29	0%	355SS
28	Site Access Gained S/S (KPI)	0 days	Wed 06/02/30	Wed 06/02/30	0%	343SS
29	Plant Commissioned (KPI)	0 days	Mon 31/10/33	Mon 31/10/33	0%	360
30	IP6 Signed Off (KPI)	0 days	Mon 13/11/34	Mon 13/11/34	0%	376

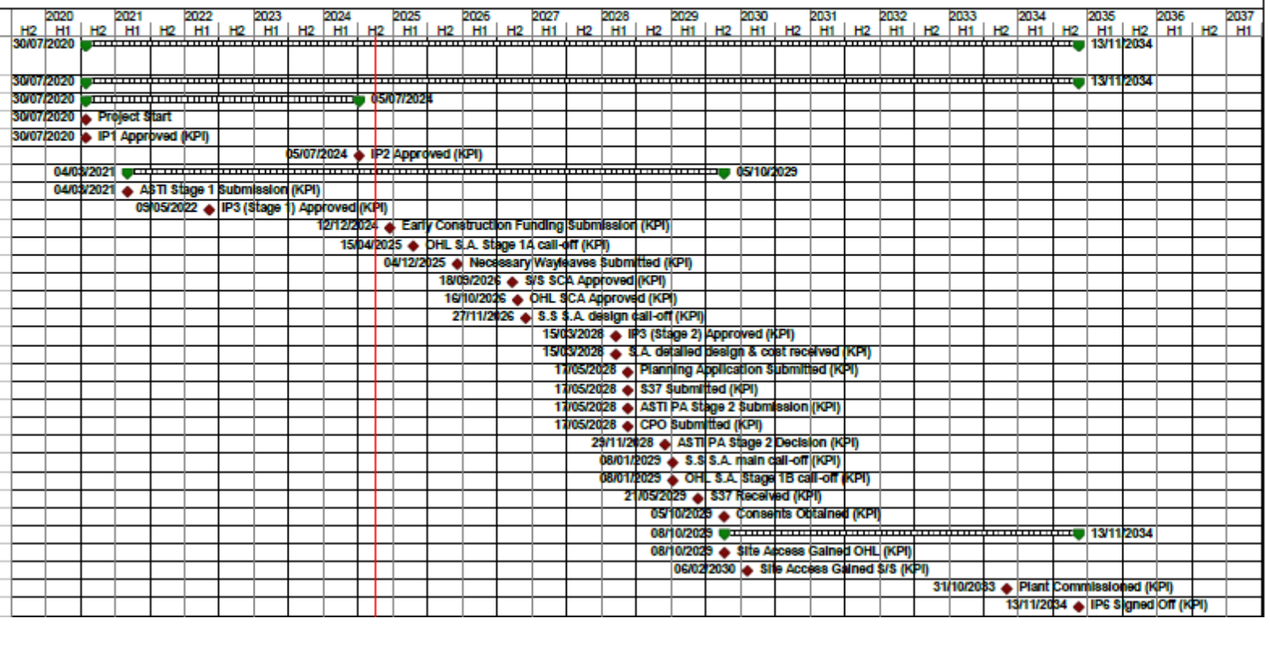

Figure 9: Summary of Key Milestones within Project Delivery Schedule

Meetings with the Project and Construction Management Teams shall be undertaken to assess the ongoing effectiveness of the Project Management interfaces.

The Project Manager will facilitate internal Project Team Meetings, in which project progress and deliverables will be reviewed and any arising risks or issues will be discussed and addressed.

5.2. Risk and Mitigation

A Project Risk Register was generated collaboratively during the initial project kick-off meeting to identify any risks, which if realised, could result in deviation from the delivery plan. Mitigation strategies have also been developed to manage the risks identified and these will be implemented by the Project Manager. The risk register shall remain a live document and will be updated regularly by the project team. Currently, the top scheme risks are:

- Ground Conditions – Ground investigations have not yet been carried out for Teviot Substation. Poor ground conditions could have a great impact on the foundation/platform design which will impact cost and timeline of delivery.
- Design/Scope Uncertainty – Substation configuration needs to accommodate both 400kV and two 132kV substations which will include additional bays. This is at risk if land access is not agreed in a timely fashion and could impact cost and delivery timeline.
- Servitudes, Lease, Wayleaves – Discussions with the Land Owners are yet to commence and may impact cost and timeline if not agreed.
- Servitudes, Lease, Wayleaves – Dependent upon the outcome of discussion with the Land Owner, a compulsory purchase order may be required which could impact the timeline of the development of the CMN3 scheme.

5.3. Quality Management

SPT adopts a “life cycle” approach to Quality Management in major project delivery. Our Management Systems are certified to ISO 9001, ISO 14001 and ISO 45001. Various areas applicable to these standards ensure a quality product is delivered. The significant areas detailed below:

5.3.1. Quality Requirements During Project Development

Any risk or opportunity that may affect the quality of the product are detailed in the Project Risk Register. The suppliers of main equipment may also receive a Factory Acceptance Test Inspection when the asset is being built.

5.4. Quality Requirements in Tenders

Each contract that SPT issues has a standard format. Specifically in relation to quality, this will include a Contractors’ Quality Performance Requirement (CQPR). This CQPR represents a specification that details roles and responsibilities for all parties during the works, frequency and format of reporting. It will also specify the document management process to be adhered to during the delivery of the project. In addition to the CQPR, each project has a contract specific Quality Management Plan, detailing the inspection and testing regime for works as well as the records to be maintained.

5.4.1. Monitoring and Measuring During Project Delivery

SPT Projects undertake regular inspections on projects and contractors to monitor and measure compliance with SPT Environmental, Quality and Health and Safety requirements, as detailed in the contract specifications for the work. All inspections are visual, with the person undertaking the inspection ensuring that evidence of the inspection and any actions raised are documented.

The following inspections are completed:

- Quality Inspections (monthly)
- Environmental Inspections (monthly, with weekly review by third party Environmental Clerk of Works)
- Safety Assessments & Contractor Safety Inspection (daily, with full time Site Manager)
- Project Management Tours (monthly)

The scope of audits and Inspections is to determine compliance with:

- Procedures & Guides
- Planned arrangements for ISO 9001, 14001 & 18001
- Legal and other requirements.

5.4.2. Post Energisation

SPT Projects and SPT Operations carry out a Defect Liability Period Inspection within the Contract Defect Liability Period with the aim of identifying any defects and rectifying them with the contractors.

5.5. Environmental Sustainability

IMS-01-001 encompasses all activities undertaken within and in support of SP Energy Networks three Licences. This includes operational and business support functions concerned with management of SP Transmission, SP Distribution and associated regulatory and commercial interfaces, products, services and their associated environmental, social and economic impacts. The policy makes the following commitments which shall be respected in any works associated with this scheme.

SP Energy Networks will incorporate environmental, social and economic issues into our business decision-making processes, ensuring compliance with or improvement upon legislative, industry, regulatory and other compliance obligations. We will deliver this by being innovative and demonstrating leadership on the issues which are important to us and our stakeholders, and will:

- Ensure the reliability and availability of our Transmission and Distribution network whilst creating value and delivering competitiveness by increasing efficiency and minimising losses.
- Reduce greenhouse gas emissions in line with our Net Zero Science Based GHG target, which is a target of 90% reduction in GHG emissions by 2035 from a 2018/19 baseline.
- Integrate climate change adaptation requirements into our asset management and operations processes to support business resilience and reduce the length and time of service interruptions.
- Consider whole life cycle impacts to reduce our use of resources to sustainable levels, improve the efficiency of our use of energy and water and aim for zero waste.
- Improve land, air and watercourse quality by preventing pollution and contamination and protecting and enhancing biodiversity in our network areas.
- Improve our service to local communities, supporting their economic and social development, protecting vulnerable customers, and respecting human rights.

ENV-04-014 gives specific guidance on the management of incidents with environmental consequence, or potential for environmental consequences, over and above the general requirements for the management of incidents.

5.6. Stakeholder Engagement

SPT is committed to delivering optimal solutions in all the projects we undertake. A key part of this is engaging with relevant stakeholders throughout the project development and delivery process.

Stakeholders can include customers, regulatory bodies and other statutory consultees, national and local government, landowners, community groups, and local residents and their representatives (e.g., MPs, MSPs and councillors). Community impacts associated with construction activities are considered at project initiation by completion of a Community Communications Plan, which details the stakeholders relevant to the project, the communication channels that will be used to engage with them, the information that will be provided to and sought from them, and the timescales over which this will happen. It considers any sensitivities that may require increased stakeholder consultation and details specific events that will be held with stakeholders during the development of the project.

As part of this project, SPT will engage with statutory consultees associated with the planning application for these works - the Local Authority, SEPA and Nature Scot - and the third-party landowner.

6. Eligibility for Competition

Under the RIIO-T3 Business Plan Guidance, Ofgem has requested that projects that are above £50m and £100m should be flagged as being eligible for being suitable for early and late competition respectively. The overall costs if the projects within the EJP were to be bundled are above the Early Competition threshold (£50m), however, is not suitable due to:

- A number of new connections projects are dependent on the completion date, therefore delays through any project tender exercise will delay these connections.

7. Conclusion

This EJP demonstrates the need to establish the new Teviot 400/132kV substation. This reinforcement scheme primarily serves as enabling work required for connection of 931 MW of contracted renewable generation in the Borders region of Scotland, providing a new point of interconnection in the region.

Construction of the proposed Teviot 400kV substation can form part of the 400kV double circuit corridor between Scotland and the North of England (with the project reference CMN3).

The main conclusions of this submission are:

- It is necessary to invest in transmission infrastructure in creation of the Teviot 400/132kV Substation, to enable the connection of 931 MW of contracted renewable generation, this having been identified as the most economic and efficient option.
- The staging of the construction of the proposed Teviot 400/132kV substation has been established to reflect the growing needs in the area and enable the timely and efficient connection of contracted generation as well as future network needs i.e. the expansion of the 400kV system.
- The proposed reinforcement scheme plays a vital role in reaching legislated net zero targets and is aligned with SPT's RIIO-T3 strategic goals.

This EJP is submitted for Ofgem's assessment of the need case for the project and the selection of the preferred option in order to provide sufficient funding for pre-construction and early construction activities.