Holmhill 132kV Substation

Site Strategy EJP
Version: 1.0
11/12/2024

SP Energy Networks
RIIO-T3 Business Plan

SP Energy Networks

<table>
<tr><th colspan="5">Holmhill 132kV Substation</th></tr>
<tr><td>Name of Scheme</td><td colspan="4">SPT-RI-1507 Holmhill 132kV Substation;
SPT-RI-211 [redacted] Wind Farm Junction to Holmhill 132kV Circuit;
SPT-RI-2094 Quantans Hill to Holmhill 132kV Circuit; and
SPT-RI-292 [redacted] to [redacted] Tee 132kV Circuit</td></tr>
<tr><td>Investment Driver</td><td colspan="4">Local Enabling (Entry)</td></tr>
<tr><td>BPDT / Scheme Reference Number</td><td colspan="4">SPT200706;
SPT200346;
SPT200719; and
SPT200277</td></tr>
<tr><td>Outputs</td><td colspan="4">• 132kV Platform creation – 2 unit
• 132kV CB (Air Insulated Busbar) – 2 units
• 132kV Disconnector (Switchgear - Other) – 5 units
• 132kV Air Insulated Busbar (Switchgear - Other) – 2 units
• 132kV Substation Cable (2 core per phase) – 250m
• 132kV OHL (Pole Line) High Temperature Low Sag (HTLS) Conductor – 24km
• 132kV Pole (Overhead Pole Line) – 247 each
• 132kV Fittings (Overhead Line Fittings) – 247 each</td></tr>
<tr><td>Cost</td><td colspan="4">SPT-RI-1507 Holmhill 132kV Substation - £5.36m
SPT-RI-211 [redacted] Wind Farm Junction to Holmhill 132kV Circuit - £9.78m
SPT-RI-2094 Quantans Hill to Holmhill 132kV Circuit - £14.10m
SPT-RI-292 [redacted] to [redacted] Tee 132kV Circuit - £6.88m</td></tr>
<tr><td>Delivery Year</td><td colspan="4">SPT-RI-1507 Holmhill 132kV Substation - 2028
SPT-RI-211 [redacted] Wind Farm Junction to Holmhill 132kV Circuit - 2027
SPT-RI-2094 Quantans Hill to Holmhill 132kV Circuit - 2029
SPT-RI-292 [redacted] to [redacted] Tee 132kV Circuit - 2027</td></tr>
<tr><td>Applicable Reporting Tables</td><td colspan="4">BPDT (Section 5.1 – Project Meta Data, Section 6.1 – Scheme C&V Load Actuals, and Section 11.10 Contractor Indirects)</td></tr>
<tr><td>Historic Funding Interactions</td><td colspan="4">N/A</td></tr>
<tr><td>Interactive Projects</td><td colspan="4">N/A</td></tr>
<tr><td>Spend Apportionment per TORI</td><td>ET1</td><td>ET2</td><td>ET3</td><td>ET4</td></tr>
<tr><td>SPT-RI-1507</td><td>£0.00m</td><td>£0.73m</td><td>£4.63m</td><td>£0.00m</td></tr>
<tr><td>SPT-RI-211</td><td>£0.65m</td><td>£1.53m</td><td>£7.60m</td><td>£0.00m</td></tr>
<tr><td>SPT-RI-2094</td><td>£0.00m</td><td>£0.35m</td><td>£13.75m</td><td>£0.00m</td></tr>
<tr><td>SPT-RI-292</td><td>£0.01m</td><td>£1.06m</td><td>£5.81m</td><td>£0.00m</td></tr>
</table>

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1. Executive Summary

This engineering justification paper (EJP) sets out the need case for:

- development of a new Holmhill 132kV substation in the south west Scotland (SWS) area of SP Transmission's (SPT) network and construction of an underground cable with 2000mm^2 Cu conductor, two cores per phase, between this new substation and the existing DE route (ref. SPT-RI-1507);
- development of a new Quantans Hill 132kV collector substation and approximately 6km of 132kV overhead line (OHL) circuit with 'EAGLE' High Temperature Low Sag (HTLS) conductor between the new Quantans Hill and Holmhill substations (ref. SPT-RI-2094);
- construction of approximately 8km of 132kV OHL circuit with 'EAGLE' HTLS conductor between Holmhill substation and [redacted] tee (ref. SPT-RI-211); and
- construction of approximately 10km of 132kV OHL circuit with 'LARK' HTLS conductor between [redacted] tee and [redacted] wind farm (ref. SPT-RI-292).

The driver behind this project is to accommodate the significant amount of renewable generation applications received near Holm Hill in SWS. This reinforcement scheme is the Enabling Work required for connection of circa 477MW renewable generation to the wider SWS network.

The expected project delivery year for the proposed scheme is:

- SPT-RI-1507 – Holmhill 132kV Substation - 2028;
- SPT-RI-2094 – Quantans Hill to Holmhill 132kV Circuit - 2029;
- SPT-RI-211 – [redacted] Wind Farm Junction to Holmhill 132kV Circuit – 2027; and
- SPT-RI-292 – [redacted] to [redacted] Tee 132kV Circuit – 2027.

The estimated project cost breakdown for the proposed scheme is:

- SPT-RI-1507 - Holmhill 132kV Substation - £5.36m;
- SPT-RI-2094 - Quantans Hill to Holmhill 132kV Circuit - £14.10m;
- SPT-RI-211 - [redacted] Wind Farm Junction to Holmhill 132kV Circuit - £9.78m; and
- SPT-RI-292 - [redacted] to [redacted] Tee 132kV Circuit - £6.88m.

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. It is anticipated that the projects described within this paper will be funded through the RIIO-T3 Use It Or Lose It (UIOLI) pot due to cost estimates less than £25.00m.

2. Introduction

This EJP sets out SPT's plans to:

(i) establish the new Holmhill 132kV substation in the SWS area;
(ii) construct approximately 250m of underground cable with 2000mm^2 Cu conductor, two cores per phase, with summer continuous rating of 563MVA, between the new Holmhill 132kV substation and the existing DE route (i.e., DE68) in SWS;
(iii) establish a new Quantans Hill 132kV collector substation;
(iv) construct approximately 6km of 132kV OHL circuit with 'EAGLE' HTLS conductor, with summer pre-fault rating of 295MVA, on wood poles between the Quantans Hill 132kV collector substation and the Holmhill 132kV substation;
(v) construct approximately 8km of 132kV OHL circuit with 'EAGLE' HTLS conductor on wood poles between Holmhill 132kV substation and [redacted] tee (also known as [redacted] wind farm junction); and
(vi) construct approximately 10km of 132kV OHL circuit with 'LARK' HTLS conductor, with summer pre-fault rating of 227MVA, on wood poles between [redacted] tee and [redacted] wind farm.

DE route is an existing 132kV circuit comprising of approximately 24.5km of twin 'UPAS' OHL conductor built on L7 towers (i.e., 352MVA capacity per circuit). DE route connects New Cumnock 275/132kV substation (board 'B') to a point (tee off point) approximately 3km north of Kendoon 132/11kV substation, where it splits into two sections, one extended to Kendoon substation (on N route) and the other to Blackcraig 132kV substation (on DG route). At the location of tower 68 on the existing DE route (i.e., in between New Cumnock Substation and the DG - N junction) it is proposed to tee off the 132kV circuit to connect the new Holmhill 132kV substation to DE route via approximately 250m of underground cable (2000mm^2 Cu conductor, 2 cores per phase). The current schematic configuration of transmission network in the area is shown in Figure 1. The diagram indicating geographical location of the proposed scheme can be found in Figure 2.

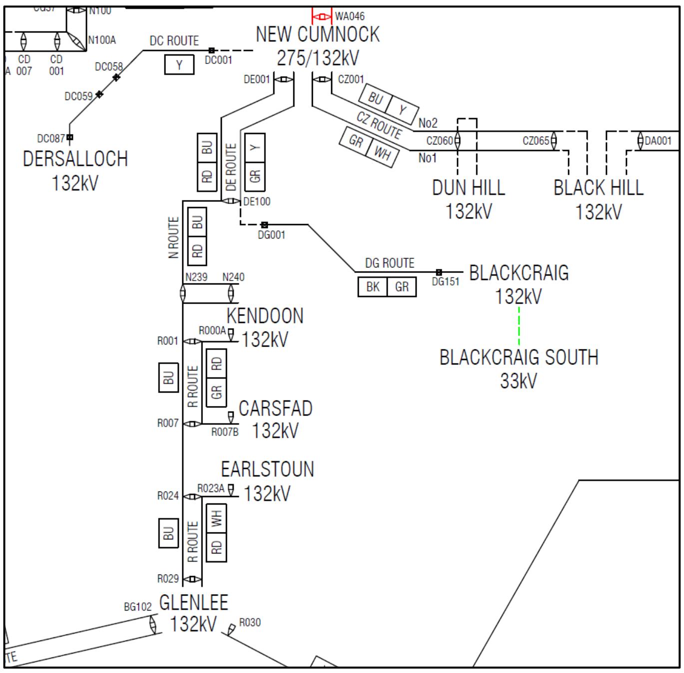

Figure 1: The existing transmission network in the area – extracted from Networks Diagram of the Existing SPT Systems shown in Appendix A (Figure A-1).

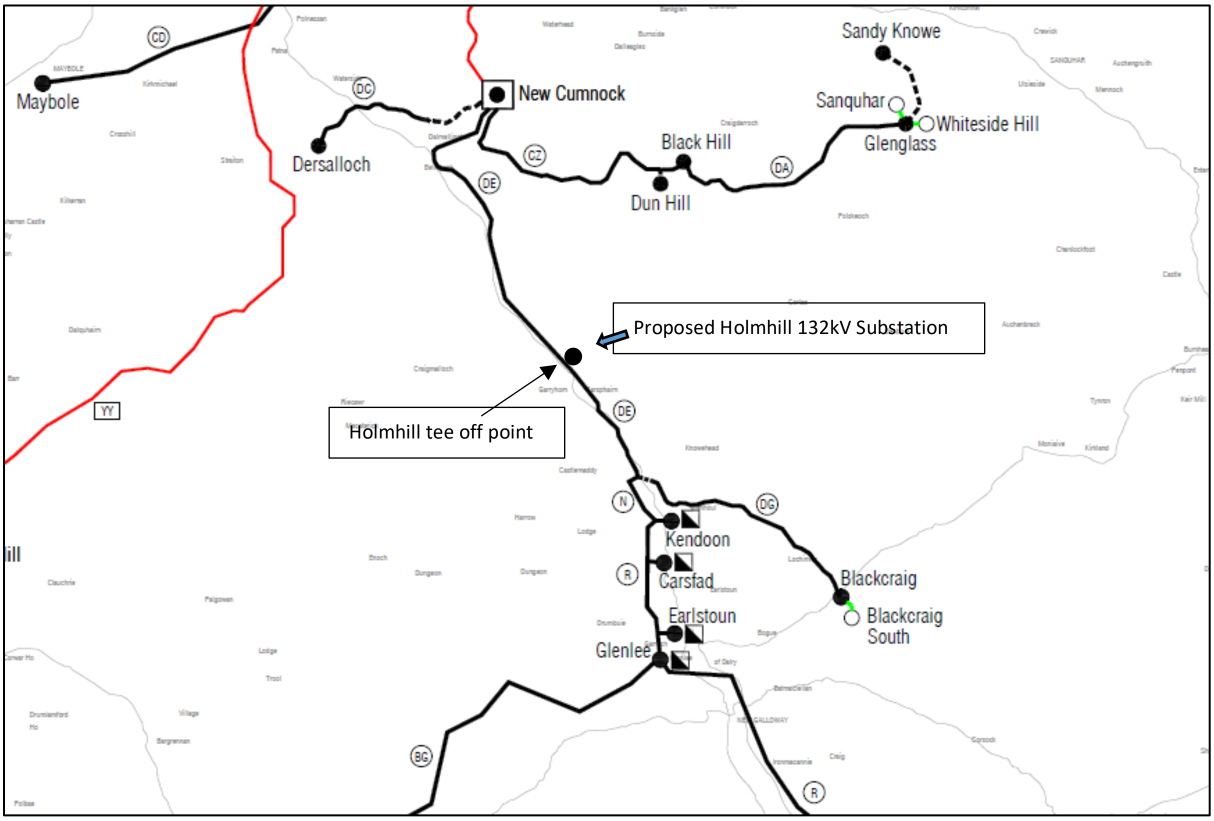

Figure 2: Geographical location of the proposed scheme with respect to the wider network in area - extracted from Networks Diagram Geographical Layout shown in Appendix A (Figure A-2).

The driver behind this project is to accommodate the significant amount of renewable generation applications received into this part of the network. The existing system arrangement in this part of the SWS area is significantly constrained and does not have the thermal capability to facilitate the contracted generation applications. Therefore, it is proposed to extend the transmission system near Holm Hill. The development of Holmhill 132kV substation and the circuit between this substation and DE route (ref. SPT-RI-1507) is the Enabling Work required for connecting 6 wind farm (WF) developments, with total generation capacity of circa 477MW, to the wider SWS network. These renewable developments are [redacted]), [redacted]), [redacted]), [redacted]), [redacted]) and [redacted]).

With respect to geographical location of these developments, connection of 3 wind farms (i.e., [redacted]) to the Holmhill 132kV substation requires establishment of a new Quantans Hill 132kV collector substation and approximately 6km of 132kV OHL circuit with 'EAGLE' HTLS conductor in between the two substations. The need case for this scheme is included in SPT-RI-2094 and elaborated further as part of this EJP in the following sections.

Enabling connection of Lorg WF requires installation of approximately 18km of 132kV OHL circuit between Lorg WF and the new Holmhill 132kV substation. [redacted] WF is located between Holmhill substation and [redacted] WF. It is proposed to connect [redacted] WF to a tee off point (also known as [redacted] tee) on the 132kV OHL circuit between the Holmhill substation and [redacted] WF - making this section of the circuit a Shared Use asset. There is a need to install approximately 8km of 132kV OHL circuit with 'EAGLE' HTLS conductor on wood poles between the Holmhill substation and [redacted] tee, which is captured under SPT-RI-211. To allow connection of [redacted] development to the Holmhill 132kV substation, it is proposed to tee [redacted] WF at [redacted] WF substation; hence, making the section from [redacted] WF to [redacted] tee a Shared Use asset. As included in SPT-RI-292, this section is approximately 10km of 132kV OHL circuit with ‘LARK’ HTLS conductor on wood poles. A schematic of the proposed new Holmhill 132kV substation is depicted in Figure 3, where the work scope of SPT-RI-1507, SPT-RI-2094, SPT-RI-211 and SPT-RI-292 have been highlighted.

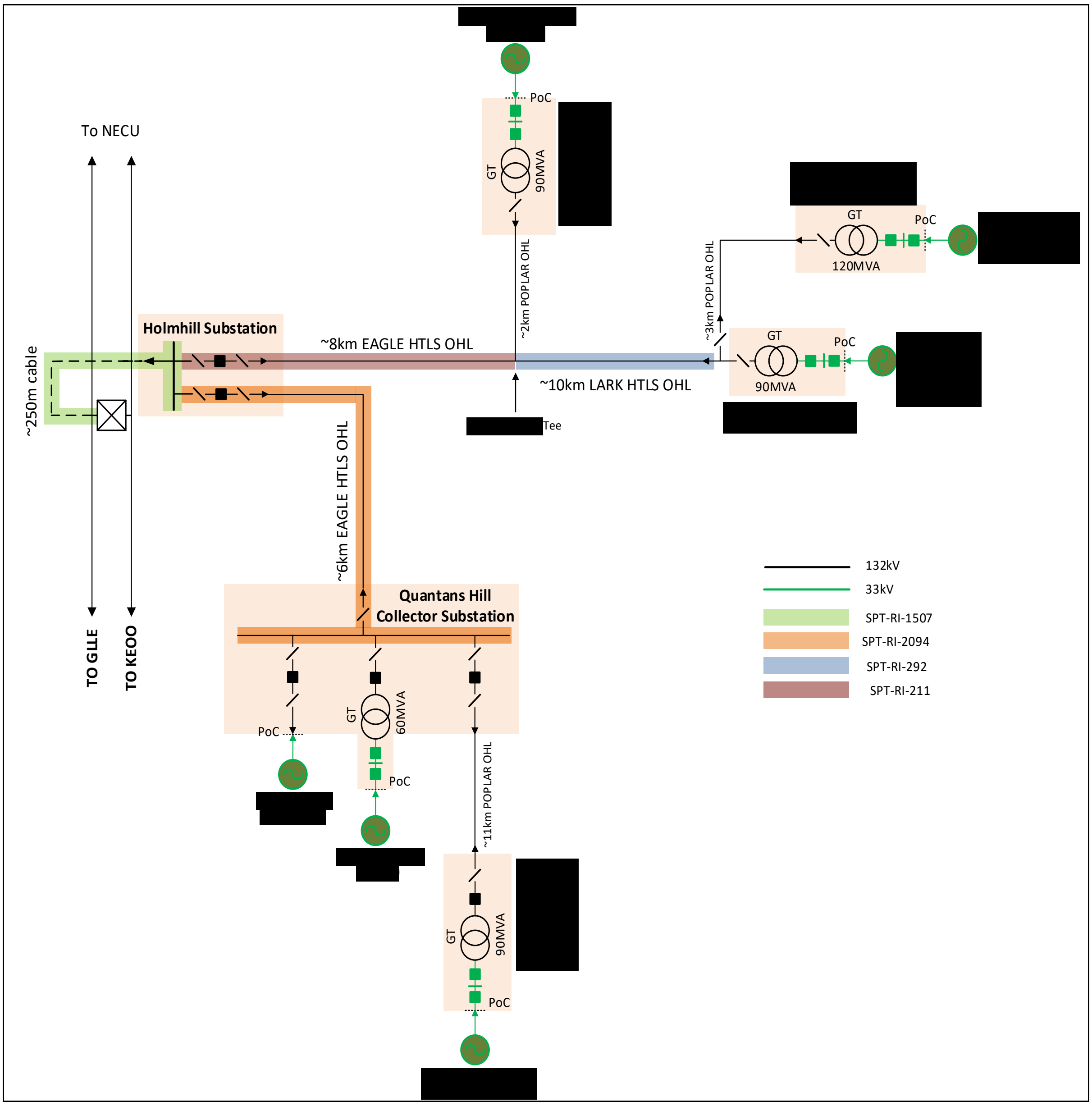

Figure 3: Single Line Diagram of the proposed Holmhill 132kV substation. The work scope of SPT-RI-1506, SPT-RI-2094, SPT-RI-211 and SPT-RI-292 have been depicted with highlights.

Enabling the connection of the contracted wind farm developments requires providing additional transmission capacity to the local and wider network. To facilitate this, incremental reinforcements are proposed for the system in the area. The proposed schemes in this EJP are contingent on:

- Kendoon to Tongland 132kV Reinforcement (KTR) Project – This project includes SPT-RI-221 Kendoon to Glenlee 132kV Reinforcements, SPT-RI-222 Glenlee to Tongland 132kV modernisation and SPT-RI-213 New Cumnock SGT2B reinforcements. The KTR project will radialise the 132kV network from around 3km north of Kendoon to Glenlee and then to

Tongland and hence removing the interconnected 132kV network and providing much needed capacity to Dumfries and Galloway. It is estimated that the KTR project will be completed in 2029, however it is currently subject to a public inquiry and therefore likely to change. The completion date will be updated once the outcome is known.

- New Cumnock 132kV substation extension (SPT-RI-158) – This project focuses on extending the New Cumnock 132kV substation to create a new 132kV board at New Cumnock (board 'C') by adding two new 275/132kV 360MVA SGTs. It is programmed to complete this project in 2025.
- Glenglass extension and Glenmuckloch collector (SPT-RI-173) – In this project the 132kV network is extended from Glenglass substation to Glenmuckloch substation. This will allow the establishment of another collector substation near Glenmuckloch. It is planned to complete this project in 2027.
- Glenmuckloch to ZV route (SPT-RI-236) – This project establishes a new 400kV route for the generation in SWS area to the ZV route. This project is proposed to be completed in 2029. It should be noted that although the new Holmhill substation will be delivered in 2027, the development of SPT-RI-236 provides capacity in the wider SWS network, enabling increased system access for contracted generation at Holmhill substation. Complete detail on the energisation dates of developments contracted for connection to Holmhill has been provided in Appendix B.

Figure A-3, in Appendix A depicts the single line diagram of the network in the area where these reinforcement projects have been highlighted. The above-mentioned reinforcement projects (i.e., KTR, SPT-RI-158, SPT-RI-173 and SPT-RI-236) are outside the scope of this paper.

A complete description of the need case for development of Holmhill 132kV substation, TORI 2094, TORI 211 and TORI 292 as well as full justification for the selected reinforcement option are provided in the following sections. At a high level, however, the scheme will comprise the following:

- Establish the substation platform for the new Holmhill 132kV substation and install a 132kV single busbar, two 132kV circuit breakers and associated disconnectors.
- Install an underground cable, approximately 250m, from Tower 68 on the DE route to the new Holmhill 132kV substation.
- Establish the substation platform for the new Quantans Hill 132kV collector substation and install a 132kV single busbar and associated disconnectors.
- Construct approximately 6km of 132kV OHL circuit with 'EAGLE' HTLS conductor on wood poles between the Holmhill and Quantans Hill 132kV substations.
- Construct approximately 8km of 132kV OHL circuit with 'EAGLE' HTLS conductor on wood poles between the Holmhill 132kV substation and Shepherds Rig tee.
- Construct approximately 10km of 132kV OHL circuit with 'LARK' HTLS conductor on wood poles between [redacted] tee and [redacted] wind farm.

The expected project delivery year for development of the proposed scheme is[1]:

- SPT-RI-1507 – Holmhill 132kV Substation – 2028;

[1] The proposed scheme in this EJP is contingent on Kendoon to Tongland 132kV Reinforcement (KTR) Project. It is estimated that the KTR project will be completed in 2029; however, it is currently subject to a public inquiry and therefore likely to change. The proposed completion dates in this EJP will be updated once the outcome is known.

- SPT-RI-2094 – Quantans Hill to Holmhill 132kV Circuit – 2029;
- SPT-RI-211 – [redacted] Wind Farm Junction to Holmhill 132kV Circuit – 2027; and
- SPT-RI- 292 – [redacted] to [redacted] Tee 132kV Circuit – 2027.

The estimated project cost breakdown is:

- Development of Holmhill substation and cable run from tower 68 of DE route to Holmhill substation (SPT-RI-1507) - £5.36m;
- Development of Quantans Hill 132kV collector substation and installation of approximately 6km of OHL circuit between Quantans Hill and Holmhill substations and works associated to connecting the OHL circuit to the Holmhill substation (SPT-RI-2094) - £14.10m;
- Construction of approximately 8km of OHL circuit between Holmhill substation and [redacted] wind farm junction and works associated to connecting the OHL circuit to the Holmhill substation (SPT-RI-211) - £9.78m; and
- Construction of approximately 10km of OHL circuit between [redacted] wind farm and [redacted] tee (SPT-RI-292) - £6.88m.

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.

3. Background Information

The south west Scotland area is sparsely populated but rich in natural wind resources. It has therefore attracted a strong interest from developers wishing to connect significant wind farm generators to the transmission system. The existing system in SWS has reached its thermal capability and network reinforcement is necessary to facilitate connection of renewable developments in the area. As the focus of this EJP, Figure A-4 in Appendix A shows the volume of existing wind farm generators near Holm Hill area of SWS. The Figure A-5 in Appendix A indicates the scale of currently contracted and existing wind farm developments in the area. Considering the volume of contracted wind farm generators in the Holmhill area, a new Holmhill 132kV substation is proposed for connection to the New Cumnock B – Kendoon 132kV circuit (i.e., DE route). The main purpose of this substation is collecting the generation of multiple wind farms as a connection point to the network of the area.

Bilateral Connection Agreements are in place between NESO and the developers of the wind farm generator projects detailed in Table 1 for connection to the new Holmhill 132kV substation. In each case, the SPT-RI-1507 Holmhill substation project is identified as the Enabling Work in combination with SPT-RI-2094, SPT-RI-211, and SPT-RI-292, corresponding to Transmission Owner Construction Agreements that are in place between NESO and SPT.

Table 1: Contracted Generation for Connection to Holmhill Substation

Connecting Substation	Contracted Development	Consent Status	TECA Score[2]	Contracted Energisation Date	SPT-RI-211 & SPT-RI-292	SPT-RI-2094	SPT-RI-1507
[redacted]							
Total Capacity (MW)		-	-	-	266.1MW	211MW	477MW

*NB – The KTR project is an Enabling Work required for energisation of these contracted renewable generations. It is estimated that the KTR project will be completed in 2029; however, it is currently subject to a public inquiry and therefore likely to change. The completion dates in this EJP will be updated once the outcome is known.

TECA Legend

TECA Probability	Designated Colour
High	
Medium	
Low	

To enable connection of the contracted wind farm developments, within Table 1, to the wider network in SWS installation of approximately 250m of a new underground cable ($2000mm^2$ Cu conductor, two cores per phase) with summer continues rating of 563MVA (2474A), between the Holmhill substation and tower number 68 on the existing DE route is necessary (ref. SPT-RI-1507 Holmhill 132kV substation). It should be noted that post KTR project completion, tower DE68 will be located on the New Cumnock to Glenlee circuit of the DE route. Considering the location of the New Cumnock-Glenlee OHL circuit with respect to the Holmhill substation (as can be found in Figure 3) an underground cable circuit has been proposed over OHL circuit. Enabling substation access to the New Cumnock-Glenlee circuit requires a cable dip under the New Cumnock-Kendoon circuit of DE route. Selecting an OHL circuit for connection to DE route would necessitate establishment of an

[2] Transmission Economic Connections Assessment (TECA) – this assessment represents SPT's best view of the contracted generation landscape to 2036 and forms the basis for evaluating the 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.

additional cable sealing end compound which adds to the project cost and footprint; therefore, a cable circuit is the most economical solution in this case.

To collect 211MW renewable generation from [redacted] wind farms it is proposed to create a new Quantans Hill 132kV substation and install approximately 6km of 132kV OHL circuit with 'EAGLE' HTLS conductor between Quantans Hill and Holmhill substations (ref. SPT-RI-2094 Quantans Hill to Holmhill 132kV circuit). The summer pre-fault rating of 'EAGLE' HTLS OHL conductor is 295MVA at 190°C. Facilitating connection of Shepherds Rig 84.6MW wind farm generation to Holmhill substation necessitates installation of approximately 8km of 132kV OHL circuit with 'EAGLE' HTLS conductor between the [redacted] junction) to the new Holmhill substation (ref. SPT-RI-211 [redacted] Wind Farm Junction to Holmhill 132kV Circuit). It is also proposed to install approximately 10km of 132kV OHL circuit with 'LARK' HTLS conductor between [redacted] wind farm and [redacted] tee to enable connection of [redacted] and [redacted] wind farms to Holmhill substation (ref. SPT-RI-292 [redacted] to [redacted] Tee 132kV Circuit). The summer pre-fault rating of 'LARK' HTLS OHL conductor is 227MVA at 190°C.

As depicted in Figure 3, the new Holmhill 132kV substation consists of one feeder for connection to the wider network (i.e., connection to DE route through cable), and two bays to facilitate connection of Quantans Hill Collector substation and contracted wind farm developments. As per customers' requests the connection of [redacted], [redacted] and [redacted] wind farms will be at 33kV through the local 132/33kV transformers installed in the respective customer substations. The new Quantans Hill collector substation consists of one feeder for connection to Holmhill 132kV substation and three bays to facilitate connection of renewable generators. Connection of [redacted] WF will be at 132kV. Based on the customers' requests, connection of [redacted] wind farms will be at 33kV through local transformers. The local transformer required for [redacted] WF will be installed in the new Holmhill 132kV substation and for [redacted] WF will be in the customer's substation.

The Holmhill 132kV substation (SPT-RI-1507) project, in combination with SPT-RI-2094 Quantans Hill to Holmhill 132kV Circuit, SPT-RI-211 [redacted] Wind Farm Junction to Holmhill 132kV Circuit, and SPT-RI-292 [redacted] to [redacted] Tee 132kV Circuit are Enabling Works for connection of circa 477MW of wind farm generators (i.e., renewable generation) to the transmission network, corresponding to Transmission Owner Construction Agreements that are in place between NESO and SPT.

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

The system requirements and design parameters of the proposed scheme are summarised in Table 2.

Table 2: System Requirements and Design Parameters

System Design Table	Circuit/Project	Holmhill 132kV Substation
Thermal and Fault Design	Existing Voltage (if applicable)	N/A
	New Voltage	132kV
	Existing Continuous Rating (if applicable)	N/A
	New Continuous Rating	2474A (Cable- Summer rating) 1290A (EAGLE HTLS OHL- Summer pre-fault rating) 995A (LARK HTLS OHL- Summer pre-fault rating)
	Existing Fault Rating (if applicable)	N/A
	New Fault Rating	20/25kA
ESO Dispatchable Services	Existing MVAR Rating (if applicable)	N/A
	New MVAR Rating (if applicable)	N/A
	Existing GVA Rating (if applicable)	N/A
	New GVA Rating	N/A
System Requirements	Present Demand (if applicable)	N/A
	2050 Future Demand	N/A
	Present Generation (if applicable)	N/A
	Future Generation Count	6
	Future Generation Capacity	477MW
Initial Design Considerations	Limiting Factor	Capacity of DE route maximised.
	AIS / GIS	AIS
	Busbar Design	Single Busbar
	Cable / OHL / Mixed	Mixed
	SI	By developing this project, we are already maximising the system capacity in the area, therefore it can't have SI.

4. Optioneering

This section provides a description of the options that have been considered to accommodate connection of renewable generation developments in the Holmhill area of SWS. A summary of each option is described, at the end of this section, in Table 3, while the system requirements and design parameters for the considered options are outlined in Table 4.

4.1. Baseline: Do Nothing / Deferral

A 'Do Nothing' or 'Delay' option is not viable for this project and would be inconsistent with SPT's statutory duties and licence obligations, including Licence Conditions D3 and D4A. These 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, in line with the System Operator Transmission Owner Code (STC) and the associated Construction Planning Assumptions provided by NESO. The proposed works are identified as Enabling Works in the connection agreements relating to the projects in Table 1.

4.2. Option 1: Separate connection of each wind farms to DE route

This option proposes to install isolated connection circuits between each contracted wind farm development (detailed in Table 1) and the wider 132kV network in the area. In this option, the wind farm developments need to be separately connected to the DE route, as their nearest transmission circuit in the area. Employing this option, each connection requires an individual assessment and planning for the suitable connection to the DE route, which makes the connections costly, time consuming and increases the overall footprint.

In this option, the isolated circuit ends connected to the network is also increased. Based on the design policy for the complexity of transmission circuits [SPEN Policy ESDT-01-002] which is consistent with Appendix B of the NETS SQSS, for a good design practice no 132kV circuit shall have isolating facilities on more than four different sites. Following this policy the number of wind farms connected directly to the DE route can't be higher than two hence the contracted wind farm developments shown in Table 1 can't be separately connected to the network.

Considering these reasons, this option was discounted in advance of detailed cost estimating exercise.

4.3. Option 2: Development of a new double busbar substation

The geographical location considered for development of Holmhill 132kV substation, with respect to DE route, is depicted in Figure A-6 in Appendix A. This option is to build a double busbar substation at the proposed location. As shown in Appendix A, Figure A-7, this option mainly entails the following:

- Establishing a new Holmhill 132kV substation at a location near DE route as shown in Figure A-6 in Appendix A.
- Installing a 132kV double busbar with a bus coupler and six 132kV circuit breakers to accommodate termination of the 132kV DE OHL circuits, termination of Holmhill-Quantans Hill 132kV OHL circuit as well as termination of Holmhill-Shepherds Rig tee-Lorg 132kV OHL circuit.
- Turning in the northern end circuits at tower DE67 into the Holmhill substation via two circuits of approximately 250m of 2000mm^2 Cu cable, two cores per phase, with summer continuous rating of 480MVA.

- Turning in the southern end circuits at tower DE68 into the Holmhill substation via two circuits of approximately 250m of 2000mm^2 Cu cable, two cores per phase, with summer continuous rating of 480MVA.
- Dismantling the existing OHL circuit between towers 67 and 68 of DE route.
- Establishing a new Quantans Hill 132kV collector substation and installing a 132kV busbar with one 132kV circuit breaker to accommodate the connotation between Quantans Hill and Holmhill substations.
- Terminating the Quantans Hill-Holmhill 132kV OHL circuit at the Holmhill substation.
- Terminating the Shepherds Rig tee-Lorg 132kV OHL circuit at the Holmhill substation.

The overall cost associated with this option is approximately £51.99m.

In this option underground cable circuits have been selected to enable connection of the double busbar substation to towers DE67 and DE68 because building OHL circuits into the double busbar substation would require addition of terminal towers at Holmhill substation, which increases the substation footprint and cost.

4.4. Option 3: Development of a new single busbar substation

The geographical location considered for development of Holmhill 132kV substation, with respect to DE route, is depicted in Figure A-6 in Appendix A. This option is to build a single busbar substation which as shown in Appendix A, Figure A-8, mainly entails the following:

- Establishing a new Holmhill 132kV substation at a location near DE route, as shown in Figure A-6 in Appendix A.
- Installing a 132kV single busbar with two 132kV circuit breakers and associated disconnectors to accommodate termination of Holmhill-Quantans Hill 132kV OHL circuit as well as Holmhill-Shepherds Rig tee-Lorg 132kV OHL circuit.
- Establishing a cable sealing end (CSE) at tower 68 of DE route to tee the DE route to Holmhill substation.
- Installing a 132kV cable run of approximately 250m of underground circuit with 2000mm^2 Cu conductor, two cores per phase, with summer continuous rating of 563MVA, to Holmhill substation.
- Establishing a new Quantans Hill 132kV collector substation and installing a 132kV busbar with one 132kV disconnector to accommodate the connection between Quantans Hill and Holmhill substations.
- Terminating the Quantans Hill-Holmhill 132kV OHL circuit at the Holmhill substation.
- Terminating the Shepherds Rig tee-Lorg 132kV OHL circuit at the Holmhill substation.

The overall cost associated with this option is approximately £36.12m. Complete detail on the project's delivery, requirements and cost have been provided in Section 5.2.

4.5. Whole System Outcomes

Our optioneering approach has identified 'Whole System' interactions with other electricity network in the area, i.e., SP Distribution (SPD), in the development of our proposed solution and has considered the appropriate 'Whole System' outcome. This is with consideration that it is not expected that there is any future requirement for SP Distribution (SPD) connections at this location, as the DNO in the area.

4.6. Selected Option – Holmhill 132kV single busbar Substation (Option 3)

Given the overall cost and ability to meet project objectives, the most appropriate option to enable the economic, efficient, and co-ordinated connection of the proposed renewable generation developments in the Holmhill area in south west Scotland is to establish a new Holmhill 132kV substation with a single busbar (i.e., Option 3). A single busbar is consistent with the non-firm connections as per the customers' requirements. Establishing a new DBB substation would in theory provide additional capacity at this site for future connections, however this is limited by the capacity on DE route which is already at its maximum. As a result there is no additional benefit to establishing a DBB substation at this location.

The Holmhill 132kV substation will be established near the existing DE route, as shown in Figure A-6 in Appendix A. The substation platform size is [redacted] with an approximate OS coordinate of [redacted] as shown in Appendix A, Figure A-9. The connection between the new Holmhill 132kV substation and the existing DE route will be via approximately 250m of underground cable ($2000mm^2$ Cu conductor, two cores per phase) with summer continuous rating of 563MVA teed off from tower 68 of the DE route.

Table 3: Summary of Considered Options

Options	Map	Layout of Substation/ Connection	Layout of all Route Works	Relevant Survey Works	Narrative Consenting Risks	Narrative Preferred Option	Narrative Rejection
Preferred – Option 3: Establishment of the new Holmhill 132kV single busbar substation	Refer to Figure A-8, Appendix A	Refer to Appendix A, Figure A-10	N/A	N/A	Early engagement with landowners, environmental bodies and employing low bearing pressure ground vehicles and trackway where possible to minimise extents of stone tracks.	Four options have been reviewed in terms of scope feasibility, cost, delivery timescales, land requirements, system limitations and restoring SQSS compliant limit with option 3 demonstrating a network capacity reinforcement whilst affording the least project deliverability risk.	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.
Rejected – Option 1: Separate connection of each wind farm to the DE route	N/A	N/A	N/A	N/A	Increased consenting risks developing individual connection sites.	N/A	It requires an individual assessment and planning to find the suitable connection corridor route for each wind farms hence will be costly and time-consuming. Considering the number of contracted wind farms in the area, this option will not be compliant with the SPEN design policy ESDT-01-002. This option will result in an increased land intake and footprint for the connections.
Rejected – Option 2: Establishment of the new Holmhill 132kV double busbar substation	Refer to Figure A-7, Appendix A	N/A	N/A	N/A	N/A	N/A	The cost associated with this option is approximately £51.99m, i.e., circa £15.87m more expensive than Option 3. It is also more challenging to construct compared with the proposed scheme, with no benefit for future substation expansion.

Table 4: System Requirements and Design Parameters for the considered Options

System Design Table	Circuit/Project	**Preferred – Option 3:** Establishment of the new Holmhill 132kV single busbar substation	**Rejected – Baseline:** Do Nothing / Delay	**Rejected – Option 1:** Separate connection of each wind farms to the DE route	**Rejected – Option 2:** Establishment of the new Holmhill 132kV double busbar substation
Thermal and Fault Design	Existing Voltage (if applicable)	N/A	N/A	N/A	N/A
	New Voltage	132kV	N/A	N/A	132kV
	Existing Continuous Rating (if applicable)	N/A	N/A	N/A	N/A
	New Continuous Rating	2474A (Cable- Summer rating) 1290A (EAGLE HTLS OHL- Summer pre-fault rating) 995A (LARK HTLS OHL- Summer pre-fault rating)	N/A	N/A	2193A (Cable- Summer rating) 1290A (EAGLE HTLS OHL- Summer pre-fault rating) 995A (LARK HTLS OHL- Summer pre-fault rating)
	Existing Fault Rating (if applicable)	N/A	N/A	N/A	N/A
	New Fault Rating	20/25kA	N/A	N/A	20/25kA
ESO Dispatchable Services	Existing MVAR Rating (if applicable)	N/A	N/A	N/A	N/A
	New MVAR Rating (if applicable)	N/A	N/A	N/A	N/A
	Existing GVA Rating (if applicable)	N/A	N/A	N/A	N/A
	New GVA Rating	N/A	N/A	N/A	N/A
System Requirements	Present Demand (if applicable)	N/A	N/A	N/A	N/A
	2050 Future Demand	N/A	N/A	N/A	N/A
	Present Generation (if applicable)	N/A	N/A	N/A	N/A
	Future Generation Count	6	6	6	6
	Future Generation Capacity	477MW	477MW	477MW	477MW

Initial Design Considerations	Limiting Factor	Capacity of DE route maximised.	N/A	It will be more expensive and time-consuming than the preferred option. Considering the number of contracted wind farms in the area, this option will not be compliant with the SPEN design policy ESDT-01-002. This option will result in an increased land intake and footprint for the connections.	It is more expensive and challenging to construct in comparison with the proposed scheme. Capacity of DE maximised.
	AIS / GIS	AIS	N/A	N/A	TBC (depending on further design work)
	Busbar Design	Single Busbar	N/A	N/A	Double Busbar
	Cable / OHL / Mixed	Mixed	N/A	Mixed	Mixed
	SI	By developing this project, we are already maximising the system capacity in the area, therefor it can't have SI.	N/A	No SI due to individual connections for each project.	Option for expansion of DBB for further connections, but limited by capacity on DE route, therefore no benefit.

5. Proposed Works & Associated Cost

5.1. Project Summary

As discussed above, the proposed scheme entails establishment of the new Holmhill 132kV single busbar substation. The proposed electrical layout of the new Holmhill substation can be found in Appendix A, Figure A-10. The associated Works in this stage are summarised in the following –

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:

- Topological survey of the sites.
- GPR survey of areas to be re-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.
- Define final wood poles positions for circuits from Holmhill to Quantans Hill substation and to [redacted] tee and from [redacted] tee to [redacted] wind farm.
- Transport Survey to assess the access of the new Equipment.
- Environmental Study.

Holmhill 132kV Substation

Considering the connections to the new Holmhill 132kV substation, there will be a requirement to establish a 132kV single busbar with three bays for installation of one disconnector, two 132kV SF_6-free Live Tank Circuit Breakers (CBs) and associated disconnectors. As shown in Figure A-10, Appendix A, these accommodate the following connections:

- 132kV cable circuit to DE route (via disconnector).
- 132kV OHL circuit from Quantans Hill 132kV substation (via CB and associated disconnector).
- 132kV OHL circuit from [redacted] tee (via CB and associated disconnector).

The works at the new Holmhill 132kV substation shall include:

- Establishing the 132kV single busbar, installing the disconnectors and SF_6-free Live Tank CBs based on the requirements discussed in the previous paragraph for connection to DE route, Quantans Hill and [redacted] tee-[redacted] WF circuits.
- At tower DE68 establish a CSE to tee the DE route to the Holmhill substation.
- Install a 132kV cable run of approximately 250m to the new Holmhill substation. This will be an underground cable (2000mm^2 Cu conductor, two cores per phase) with summer continuous rating of 563MVA.
- Terminating the 132kV 'EAGLE' HTLS OHL circuit into the Holmhill 132kV busbar to facilitate the connection to Quantans Hill substation.
- Terminating the 132kV 'EAGLE' HTLS OHL circuit into the Holmhill 132kV busbar to facilitate the connection from the [redacted] tee.
- All control and protection works.
- All environmental and civil works.

The civil engineering works associated with this element of the project entail:

- The design and construction of foundations and structures necessary to construct the site civil platform in the new Holmhill substation area.
- The design and construction of foundations and structures necessary to support the equipment within the substation area.
- Enabling works to achieve the above requirements to facilitate temporary and/or enduring accesses for construction, operation, and maintenance purposes.

Quantans Hill 132kV Collector Substation

Considering the connections to the new Quantans Hill 132kV collector substation, there will be a requirement to establish a 132kV single busbar with four bays for installation of one disconnector, three 132kV circuit breakers and associated disconnectors to accommodate the following connections:

- 132kV OHL circuit from Holmhill 132kV substation (via disconnector).
- Connection to [redacted]WF (via CB and associated disconnector).
- 132/33kV 60MVA transformer - for connection of [redacted]WF (via CB and associated disconnector).
- 132kV OHL circuit for connection of [redacted]WF (via CB and associated disconnector).

The works at the new Quantans Hill 132kV substation shall include:

- Establishing the 132kV single busbar, installing one disconnector for connection to Holmhill substation and three dedicated bays for the contracted generation.
- Terminating the 132kV 'EAGLE' HTLS OHL circuit into the Quantans Hill 132kV busbar to facilitate the connection to Holmhill substation.

The civil engineering works associated with this element of the project entail:

- The design and construction of foundations and structures necessary to construct the site civil platform in the new Quantans Hill substation area.
- The design and construction of foundations and structures necessary to support the equipment within the substation area.
- Enabling works to achieve the above requirements to facilitate temporary and/or enduring accesses for construction, operation, and maintenance purposes.

Holmhill to Quantans Hill 132kV OHL

New 132kV OHL circuit will be established between Holmhill substation and Quantans Hill 132kV collector substation. The proposed route for this OHL circuit is approximately 6km in length and will be constructed using approximately 67 new wood poles. The proposed 132kV OHL route from Holmhill substation to Quantans Hill substation is indicated in Appendix A, Figure A-11; however, is subject to change based on planning and consenting processes.

- The overhead line works are summarised as follows:
- Establish a 132kV OHL circuit between Holmhill and Quantans Hill 132kV substations, approximately 6km.
- Install 'EAGLE' HTLS conductor operating at 190°C with the following rating:

Table 5: Rating of EAGLE HTLS Conductor at 132kV and Operating at 190°C

Season / State	Amps	MVA
Winter Pre Fault	1340	305
Winter Post Fault	1600	365
Spring/Autumn Pre Fault	1320	300
Spring/Autumn Post Fault	1570	360
Summer Pre Fault	1290	295
Summer Post Fault	1530	350

Holmhill to Shepherds Rig Tee 132kV OHL

New 132kV OHL circuit will be established between Holmhill substation and [redacted] tee. The proposed route for this OHL circuit is approximately 8km in length and will be constructed using approximately 86 new wood poles. The proposed 132kV OHL route is indicated in Appendix A, Figure A-11; however, is subject to change based on planning and consenting processes.

The overhead line works are summarised as follows:

- Establish a 132kV OHL circuit between Holmhill and Quantans Hill 132kV substations, approximately 8km.
- Install 'EAGLE' HTLS conductor operating at 190°C with the rating as shown in Table 5.

Shepherds Rig Tee to Lorg Wind Farm 132kV OHL

New 132kV OHL circuit will be established between [redacted] tee and [redacted] WF. The proposed route for this OHL circuit is approximately 10km in length and will be constructed using approximately 94 new wood poles. The proposed 132kV OHL route is indicated in Appendix A, Figure A-11; however, is subject to change based on planning and consenting processes.

The overhead line works are summarised as follows:

- Establish a 132kV OHL circuit between Holmhill and Quantans Hill 132kV substations, approximately 10km.
- Install 'LARK' HTLS conductor operating at 190°C with the following rating:

Table 3: Rating of LARK HTLS Conductor at 132kV and Operating at 190°C

Season / State	Amps	MVA
Winter Pre Fault	1040	237
Winter Post Fault	1240	285
Spring/Autumn Pre Fault	1020	234
Spring/Autumn Post Fault	1220	280
Summer Pre Fault	995	227
Summer Post Fault	1180	270

5.2. Project Cost

5.2.1. Estimated Total Project Cost

Holmhill 132kV Substation (SPT-RI-1507)

The estimated cost of the Holmhill 132kV substation project is indicated in the following table. Costs provided in Table 7 include direct, indirect and contingency costs.
Project costs for Holmhill 132kV substation are summarised in the cost breakdown below:

Table 4: Project Cost Breakdown – SPT-RI-1507

Item	Description	Estimated CAPEX (£m 23/24)
[redacted]		
[redacted]		
[redacted]		
[redacted]		
Total		£5.36

Expenditure incidence is summarised in Table 8:

Table 5: Summary of Expenditure Incidence – SPT-RI-1507

Energisation Year	Yr. 2023: CAPEX	Yr. 2024: CAPEX	Yr. 2025: CAPEX	Yr. 2026: CAPEX	Yr. 2027: CAPEX	Yr. 2028: CAPEX	RIIO-T2 Total: CAPEX	RIIO-T3 Total: CAPEX	Total: CAPEX
2028	£0.00m	£0.02m	£0.10m	£0.60m	£4.49m	£0.15m	£0.73m	£4.63m	£5.36m

Quantans Hill to Holmhill 132kV Circuit (SPT-RI-2094)

The estimated cost of the Quantans Hill to Holmhill 132kV circuit project is indicated in the following table. Costs provided in Table 9 are direct, indirect and contingency costs.
Project costs for Quantans Hill to Holmhill 132kV substation are summarised in the cost breakdown below:

Table 9: Project Cost Breakdown – SPT-RI-2094

Item	Description	Estimated CAPEX (£m 23/24)
[redacted]		
[redacted]		
[redacted]		
[redacted]		
[redacted]		
Total		£14.01

Expenditure incidence is summarised in Table 10:

Table 10: Summary of Expenditure Incidence – SPT-RI-2094

Energisation Year	Yr. 2023: CAPEX	Yr. 2024: CAPEX	Yr. 2025: CAPEX	Yr. 2026: CAPEX	Yr. 2027: CAPEX	Yr. 2028: CAPEX	Yr. 2029: CAPEX	Yr. 2030: CAPEX	RIIO-T2 Total: CAPEX	RIIO-T3 Total: CAPEX	Total: CAPEX
2029	£0.00m	£0.01m	£0.20m	£0.14m	£0.33m	£4.10m	£8.39m	£0.93m	£0.35m	£13.75m	£14.10m

[redacted] Wind Farm Junction to Holmhill 132kV Circuit (SPT-RI-211)

The estimated cost of the [redacted] Wind Farm Junction to Holmhill 132kV circuit project is indicated in the following table. Costs provided in Table 11 include direct, indirect, and contingency costs. Project costs for [redacted] Wind Farm Junction to Holmhill 132kV circuit are summarised in the cost breakdown below:

Table 11: Project Cost Breakdown – SPT-RI-211

Item	Description	Estimated CAPEX (£m 23/24)
[redacted]		
[redacted]		
[redacted]		
[redacted]		
Total		£9.78

Expenditure incidence is summarised in Table 12:

Table 12: Summary of Expenditure Incidence – SPT-RI-211

Energisation Year	RIIO-T1 Total: CAPEX	Yr. 2022: CAPEX	Yr. 2023: CAPEX	Yr. 2024: CAPEX	Yr. 2025: CAPEX	Yr. 2026: CAPEX	Yr. 2027: CAPEX	Yr. 2028: CAPEX	RIIO-T2 Total: CAPEX	RIIO-T3 Total: CAPEX	Total: CAPEX
2027	£0.65m	£0.14m	£0.11m	£0.07m	£0.45m	£0.75m	£7.30m	£0.30m	£1.53m	£7.60m	£9.78m

[redacted] to [redacted] Tee 132kV Circuit (SPT-RI-292)

The estimated cost of the [redacted] to [redacted] tee 132kV circuit project is indicated in the following table. Cost provided in Table 13 include direct, indirect, and contingency costs.
Project cost for [redacted] to [redacted] tee 132kV circuit is summarised in the cost breakdown below:

Table 13: Project Cost Breakdown – SPT-RI-292

Item	Description	Estimated CAPEX (£m 23/24)
[redacted]	[redacted]	
[redacted]		
Total		£6.88

Expenditure incidence is summarised in Table 14:

Table 14: Summary of Expenditure Incidence – SPT-RI-292

Energisation Year	RIIO-T1 Total: CAPEX	Yr. 2022: CAPEX	Yr. 2023: CAPEX	Yr. 2024: CAPEX	Yr. 2025: CAPEX	Yr. 2026: CAPEX	Yr. 2027: CAPEX	Yr. 2028: CAPEX	RIIO-T2 Total: CAPEX	RIIO-T3 Total: CAPEX	Total: CAPEX
2027	£0.01m	£0.03m	£0.09m	£0.06m	£0.03m	£0.85m	£5.80m	£0.01m	£1.06m	£5.81m	£6.88m

5.3. Regulatory Outputs

Holmhill 132kV Substation (SPT-RI-1507)

The indicative primary asset outputs for the Holmhill 132kV substation project are identified in Table 15:

Table 15: Indicative Primary Asset Outputs – SPT-RI-1507

Asset Category	Asset Sub-Category Primary	Voltage	Intervention	Forecast Addition[3]	Forecast Disposal
Substation Platform	Platform Creation	132kV	Addition	1 unit	-
Other Switchgear	Air Insulated Busbar	132kV	Addition	1 unit	-
Cable	Substation Cable – 2 cores per phase	132kV	Addition	250m	-

Quantans Hill to Holmhill 132kV Circuit (SPT-RI-2094)

The indicative primary asset outputs for the Quantans Hill to Holmhill 132kV circuit project are identified in Table 16:

Table 16: Indicative Primary Asset Outputs – SPT-RI-2094

Asset Category	Asset Sub-Category Primary	Voltage	Intervention	Forecast Addition[4]	Forecast Disposal
Circuit Breaker	CB (Air Insulated Busbar)	132kV	Addition	1 unit	-
Other Switchgear	Disconnector (AIB)	132kV	Addition	3 units	-
Substation Platform	Platform Creation	132kV	Addition	1 unit	-
Other Switchgear	Air Insulated Busbar	132kV	Addition	1 unit	-
Overhead Pole Line	OHL (Pole Line) High Temperature Low Sag (HTLS) Conductor	132kV	Addition	6km	-
Overhead Pole Line	Pole	132kV	Addition	67 each	-
Overhead Line Fittings	Fittings	132kV	Addition	134 each	-

[redacted] Wind Farm Junction to Holmhill 132kV Circuit (SPT-RI-211)

The indicative primary asset outputs for the [redacted] Wind Farm Junction to Holmhill 132kV circuit project are identified in Table 17:

Table 17: Indicative Primary Asset Outputs – SPT-RI-211

Asset Category	Asset Sub-Category Primary	Voltage	Intervention	Forecast Addition[5]	Forecast Disposal
Circuit Breaker	CB (Air Insulated Busbar)	132kV	Addition	1 unit	-
Other Switchgear	Disconnector (AIB)	132kV	Addition	2 units	-

[3] Forecast Additions are indicative pending further detail design.
[4] Forecast Additions are indicative pending further detail design.
[5] Forecast Additions are indicative pending further detail design.

Overhead Pole Line	OHL (Pole Line) High Temperature Low Sag (HTLS) Conductor	132kV	Addition	8Km	-
Overhead Pole Line	Pole	132kV	Addition	86 each	-
Overhead Line Fittings	Fittings	132kV	Addition	172 each	-

[redacted] to [redacted] Tee 132kV Circuit (SPT-RI-292)

The indicative primary asset outputs for the [redacted] to [redacted] tee 132kV circuit project are identified in Table 18:

Table 18: Indicative Primary Asset Outputs – SPT-RI-292

Asset Category	Asset Sub-Category Primary	Voltage	Intervention	Forecast Addition[6]	Forecast Disposal
Overhead Pole Line	OHL (Pole Line) High Temperature Low Sag (HTLS) Conductor	132kV	Addition	10Km	-
Overhead Pole Line	Pole	132kV	Addition	94 each	-
Overhead Line Fittings	Fittings	132kV	Addition	188 each	-

5.4. Environmental and Consents Works

Section 37 consent will be sought from the Scottish Ministers to construct the new underground cable (2000mm^2 Cu conductor, two cores per phase) between the Holmhill substation and DE68 as well as constructing 132kV 'EAGLE' HTLS OHL between Quantans Hill substation and Holmhill, constructing 132kV 'EAGLE' HTLS OHL between [redacted] tee and Holmhill substation, and constructing 132kV OHL 'LARK' HTLS OHL between [redacted] tee and [redacted] wind farm. The OHL circuits will be installed on new wood poles. Deemed planning permission is also being sought for the 132kV OHL, underground cable and the proposed Holmhill and Quantans Hill substations, as well as the ancillary development. Relevant landowner agreements will also need to be put in place where required.

The Section 37 application to the Energy Consents Unit will be accompanied by an Environmental Impact Assessment Report (EIA Report). The information contained in the EIA Report fulfils the requirements of the EIA Regulations and will enable Scottish Ministers as the decision-making authority, to make their decisions on the application for Section 37 consent and deemed planning permission.

The EIA Report details the findings of the assessment of the likely significant effects of the proposals on the environment in terms of its construction and operation. The assessment forms part of the wider process of EIA, which is undertaken to ensure that the likely significant effects, both positive and negative of certain types of development are considered in full by the decision maker prior to the determination of an application for Section 37 consent and for deemed planning permission.

The main strategy for minimising adverse environmental effects of the proposals will be through careful OHL routeing. While some environmental effects can be avoided through careful routeing,

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

other effects are best mitigated through local deviations of the route, the refining of pole locations and appropriate construction practices. Additionally, in certain cases, specific additional mitigation measures will be required, and these have been identified through the EIA process.

Consultation has taken place with statutory stakeholders including SEPA and Nature Scot in relation to the proposals. Consultation was also undertaken with all other relevant stakeholders including the wider public and landowners.

6. 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 work closely with our supply chain partners and this relationship is critical to the successful delivery of our plans. Our supply chain provides the support and agility to respond to changes in workload over the course of a price review. Further information is contained within our Workforce & Supply Chain Resilience Annex. 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. The project manager responsibilities, albeit not limited, include:

- Handing over the project from development phase to delivery phase and ensuring minimum requirements of the SPT project handover are met.
- System and customer updates to reflect transfer of ownership.
- Leading tender activities during development phase.
- Provision of a comprehensive resource plan to encompass all contractor and SPT operational activities.
- Booking outages and risks of trip with operational planning.
- Ensure all offline works are completed prior to any outage being taken to reduce system risk.
- Co-ordinate all site commissioning issues.
- Chair commissioning panel meetings.
- Chair progress meetings.
- Maintain the site quality plan.

Some further responsibilities of the project manager are discussed in the following sub-sections.

6.1. 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. Table 19 summarises the key milestones within the delivery schedule of Holmhill 132kV substation project. Complete detail on the energisation dates and delivery schedules for the contracted developments connecting to Holmhill substation can be found in Appendix B.

Table 6: Summary of Key Milestones within the Project Delivery Schedule

Item	Project Milestone	Estimated Completion Date
1	SCA Approved	June 2024
2	S37 Planning Submitted	October 2024
3	Town & Country Planning Application	November 2024
4	Issue of ITT (Earthworks)	March 2025
5	Town & Country Planning	May 2025
6	Contract Award (Earthworks)	September 2025
7	S37 Decision Received	November 2025
8	Issue of ITT (OHL)	December 2025
9	Site Set Up	March 2026
10	Commence Site Substation Works	April 2026
11	Contract Award (OHL)	August 2026
12	Commence OHL Works	October 2026
13	Completion Site Substation (Holmhill 132kV Substation)	July 2027

SP Energy Networks (SPEN) for its procurement process follows a generic global process (INS 00.08.04) for supplier pre-qualification, product technical assessment, manufacturing factory capability assessment and quality audit. The SPEN's equipment approval procedure is to:

- identify and select candidate equipment.
- ensuring the candidate equipment is assessed to meet the specific requirements of SPEN.
- ensuring a structured and consistent approach is adopted for the approval of candidate equipment prior to energisation.
- Ensuring no equipment is installed on SPEN's network without first having been examined in accordance with the procedure and issued with a formal internal approval.

ASSET-02-002 specifies the SPEN's approval process inclusive of assessment scope and business processes for various equipment.

Regular meetings with the project and construction management teams will 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.

6.2. Risk and Mitigation

A Project Risk Register has been developed, collaboratively, during the initial project kick-off meeting to identify any risks to the delivery plan. Mitigation strategies have 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 by the project team on an ongoing basis. The top scheme risks as currently identified are as follows:

Table 20 - Main Scheme Risks and Mitigation Plans

Risk Title	Risk Description	Mitigation Plan
Planning Consent	Delay in submission of Section 37 application and receiving approvals from Scottish Ministers may delay the project delivery plans.	Regular meetings will be held with developers and/or landowners to satisfy the stakeholders requirements, manage an in-time submission of Section 37 application and frequent follow ups with Scottish Ministers to ensure receiving the approvals on time.
Compulsory Purchase Order (CPO)	CPO being sought due to being unable to secure voluntary land rights for 132kV substation platform and parts of the underground cable and OHL circuit route.	Regular meetings will be held with SPEN's planning and permission team to ensure SPEN's underground cable and OHL route principles have been met.

6.3. 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. The key quality management areas are detailed below:

6.3.1. Quality Requirements During Project Development

Any risk or opportunity that may affect the quality of the product is 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.

6.3.2. 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.

6.3.3. Monitoring and Measuring During Project Delivery

SPT Projects undertake regular inspections on projects to monitor and measure compliance with SPT Environmental, Quality and Health and Safety requirements, as detailed in the contract specifications for the work. This also includes oversight of contractors. 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 set to ensure compliance with the following:

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

6.3.4. Post Energisation

SPT Projects and SPT Operations, within SPEN, 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.

6.4. 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 (TBC) 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.

The proposed design solution is also resilient to future climate change risks, such as substation flooding or potential faults from vegetation along the route.

SPEN policy to eliminate risk of substation flooding entails:

- Substations shall be designed such that there is no loss of supply or damage to strategic equipment during a 0.1% annual exceedance probability (AEP) flood event. Access routes to the substation shall also be considered to ensure access will be available during flood conditions and consideration of staff access to the key plant and buildings during the 0.1% annual flood event.
- In those instances where there is a compelling reason to locate a substation inside this zone and this is accepted by SPEN Network Planning & Regulation the substation design shall eliminate or mitigate against the risk of such a flood impacting the operation of the substation (access requirements, loss of supply, or damage to equipment).
- The 400kV substation platforms shall be constructed at a minimum level of 600mm above the 0.1% designed flood level, the 600mm freeboard allows for uncertainties in data and modelling. The designed flood level shall include an allowance for climate change for a 50-year design life, in accordance with the requirements of the relevant national environment agency. Where climate change guidance is not available then a minimum of 200mm shall be applied. The flood design should consider Pluvial, Fluvial, Coastal and Reservoir flooding, as well as combinations of these.

SUB-01-018 gives detailed specific guidance on SPEN's substation flood resilience policy.

Also, SPEN policy to reduce the number of vegetation related OHL faults entails:

In SPEN to reduce the number of vegetation related OHL faults, the route will be surveyed, consented, and cut on a per kilometre basis. The cutting specification entails:

- Falling distance plus 5m (i.e., Vicinity Zone) to the conductor and maintain 5 years clear from that distance.
- Clearance as 5.3m to be achieved from conductor positioned at 45° blowout and maximum sag condition. Maintain 5 years clear from that distance.

- All vegetation directly below the OHL with the potential to breach the Vicinity Zone before the next cut cycle shall be removed.
- Hedgerows shall be maintained. Species identified with no threat to breach the Vicinity Zone at any point in the future shall continue to be managed as part of the 3-year vegetation management programme.
- Tower bases shall be kept free of all scrub to a distance of 5m from the base.

OHL-03-080 gives detailed specification for OHL vegetation management in SPEN.

Additionally, the preferred OHL route for the project needs to be identified after extensive evaluation of the length of route, biodiversity and geological conservation, landscape, and visual amenity (including recreation and tourism), cultural heritage, land use, forestry, and flood risk.

If routing the OHLs in areas of forestry the guideline is to -

- Avoid areas of landscape sensitivity;
- Not follow the line of sight of important views;
- Be kept in valleys and depressions;
- Not divide a hill in two similar parts where it crosses over a summit;

- Cross skylines or ridges where they dip to a low point;
- Follow alignments diagonal to the contour as far as possible, and;
- Vary in the alignment to reflect the landform by rising in hollows and descending on ridges.

The overall project design objective is to minimise the extent of felling required and woodland areas and individual trees are to be avoided where possible during the routeing phase. Where routeing through woodland has been unavoidable, a 'wayleave' corridor is required for safety reasons to ensure that trees do not fall onto the line and for health and safety of forestry operatives. SPEN has statutory powers to control tree clearance within the wayleave corridor. Where possible the design of the new OHLs and associated infrastructure must be sought to avoid/minimise felling where possible, when balancing with other technical and environmental objectives.

6.5. Stakeholder Engagement

SPT is committed to delivering optimal solutions in all the projects it undertakes. A key part of this is engaging with relevant stakeholders throughout the project development and delivery process. SPT's stakeholder engagement plan for this reinforcement project will be closely aligned to our wider stakeholder engagement commitments as outlined in our RIIO-T3 business plan. Stakeholders includes 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.

Due to the location and nature of this project, no particular sensitivities or community impact issues have been identified, but a general level of interest from local representatives has been noted and we will continue to engage with them throughout the project. Stakeholder engagement to date has informed the details of the construction and permanent drainage details for the works.

7. Conclusion

This EJP demonstrates the need to establish a new Holmhill 132kV substation in SWS area, install approximately 250m of underground cable with 2000mm^2 Cu conductor, two cores per phase (summer continuous rating of 563MVA) between Holmhill substation and the existing DE route, establish a new Quantans Hill 132kV collector substation, construct approximately 6km of 'EAGLE' HTLS OHL circuit (summer pre-fault rating of 295MVA) between Holmhill and Quantans Hill substations, construct approximately 8km of 'EAGLE' HTLS OHL circuit between Holmhill substation and [redacted] tee, and construct approximately 10km of 'LARK' HTLS OHL circuit (summer pre-fault rating of 227MVA) between [redacted] tee and [redacted] wind farm.
This reinforcement scheme primarily serves as enabling work required for connection of circa 477MW contracted renewable generation (wind farm development) in the SWS area, providing a new point of connection in Holm Hill area of SWS.

The main conclusions of this EJP are:

- It is necessary to invest in transmission infrastructure near Holm Hill area in SWS, to enable the connection of circa 477MW of contracted wind farm developments, this having been identified as the most economic and efficient option.
- 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. It is anticipated that each of the projects detailed within this paper will be funded through the RIIO-T3 Load UIOLI, due to their cost estimates being below £25.00m.

8. Appendices

Appendix A – Maps and Diagrams

[redacted]

Appendix A: Maps and Diagrams

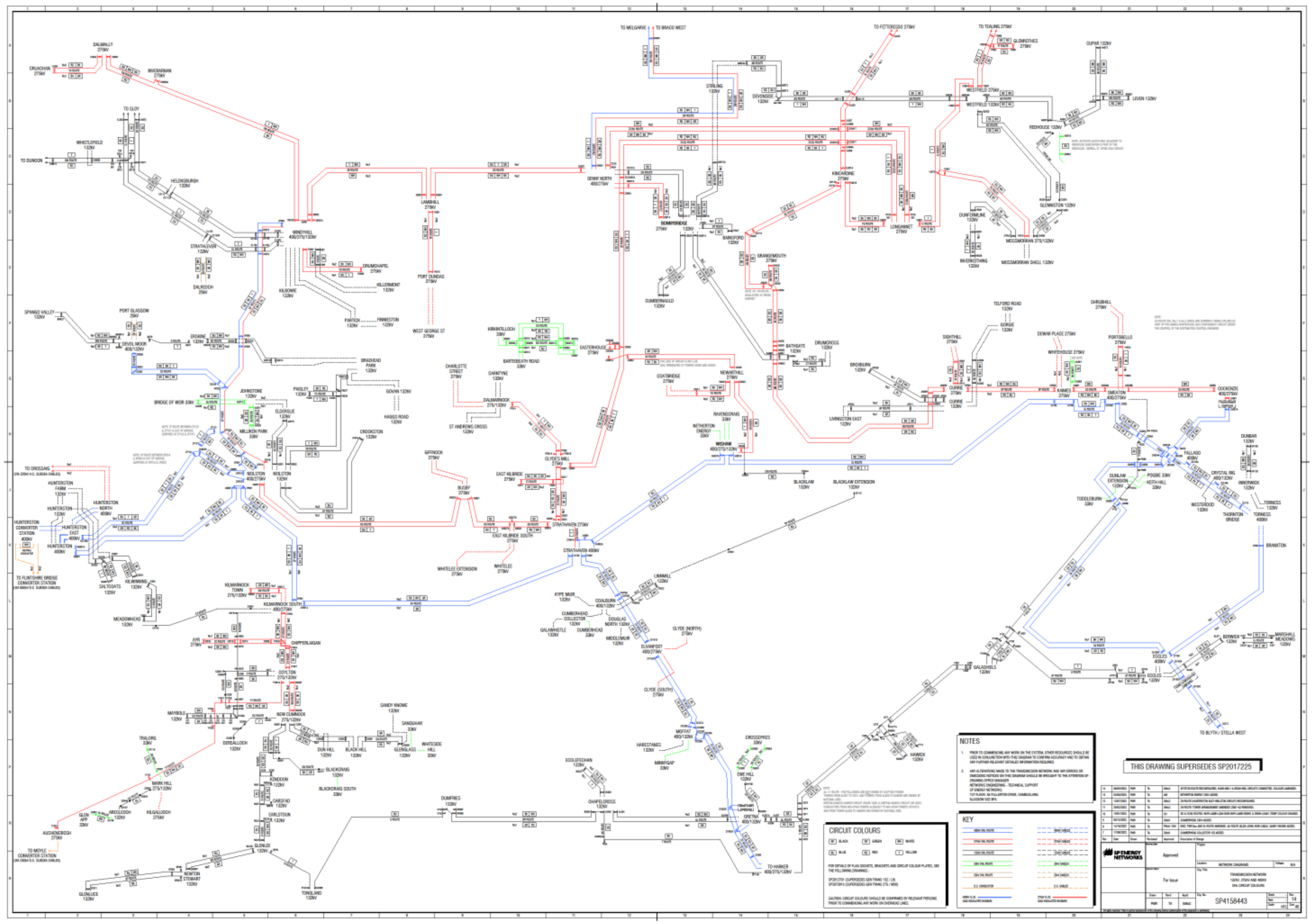

Figure A-1: Networks Diagram of the existing SPT systems – Single Line Diagram.

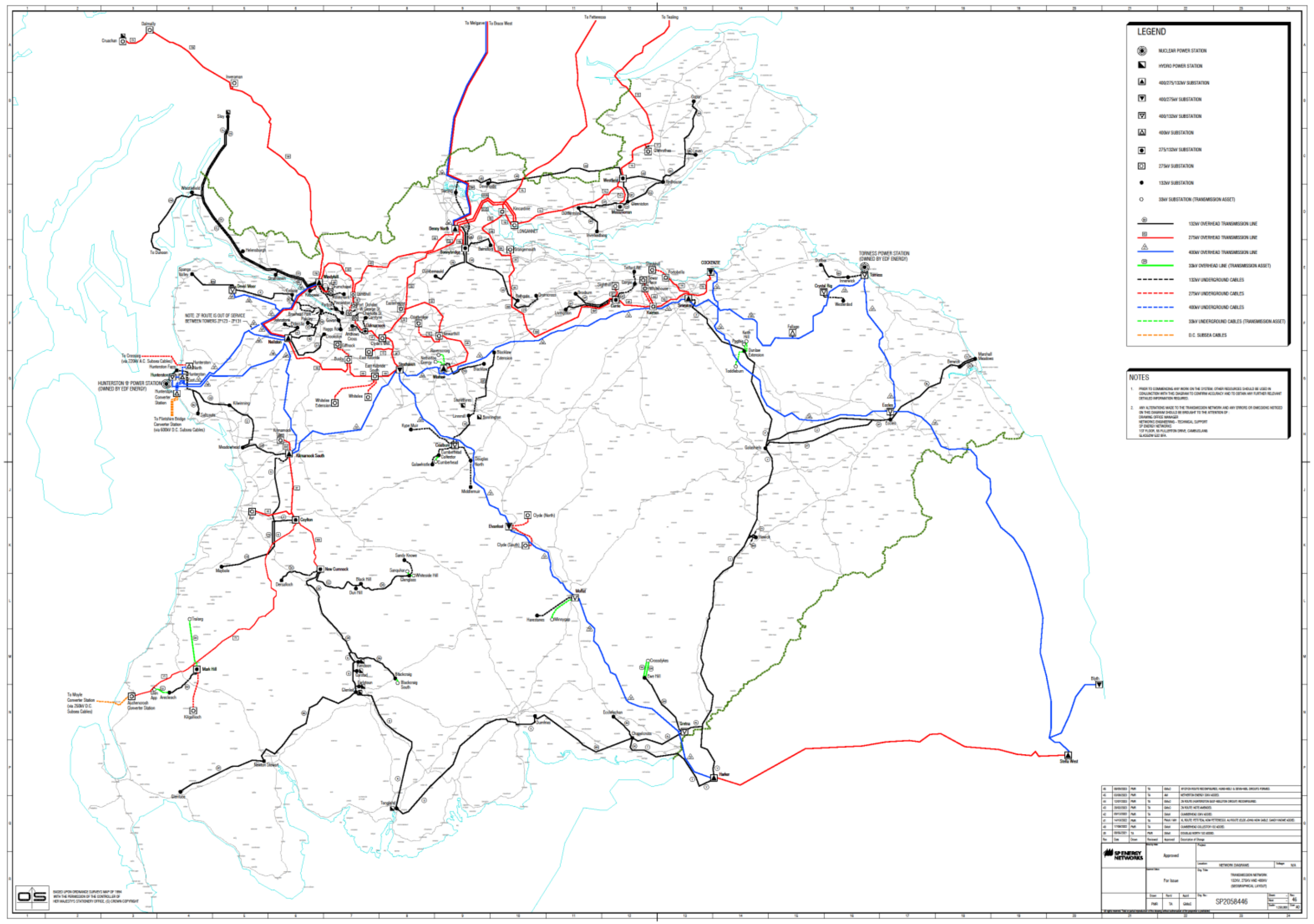

Figure A-2: Networks Diagram of the existing SPT system - Geographical Layout.

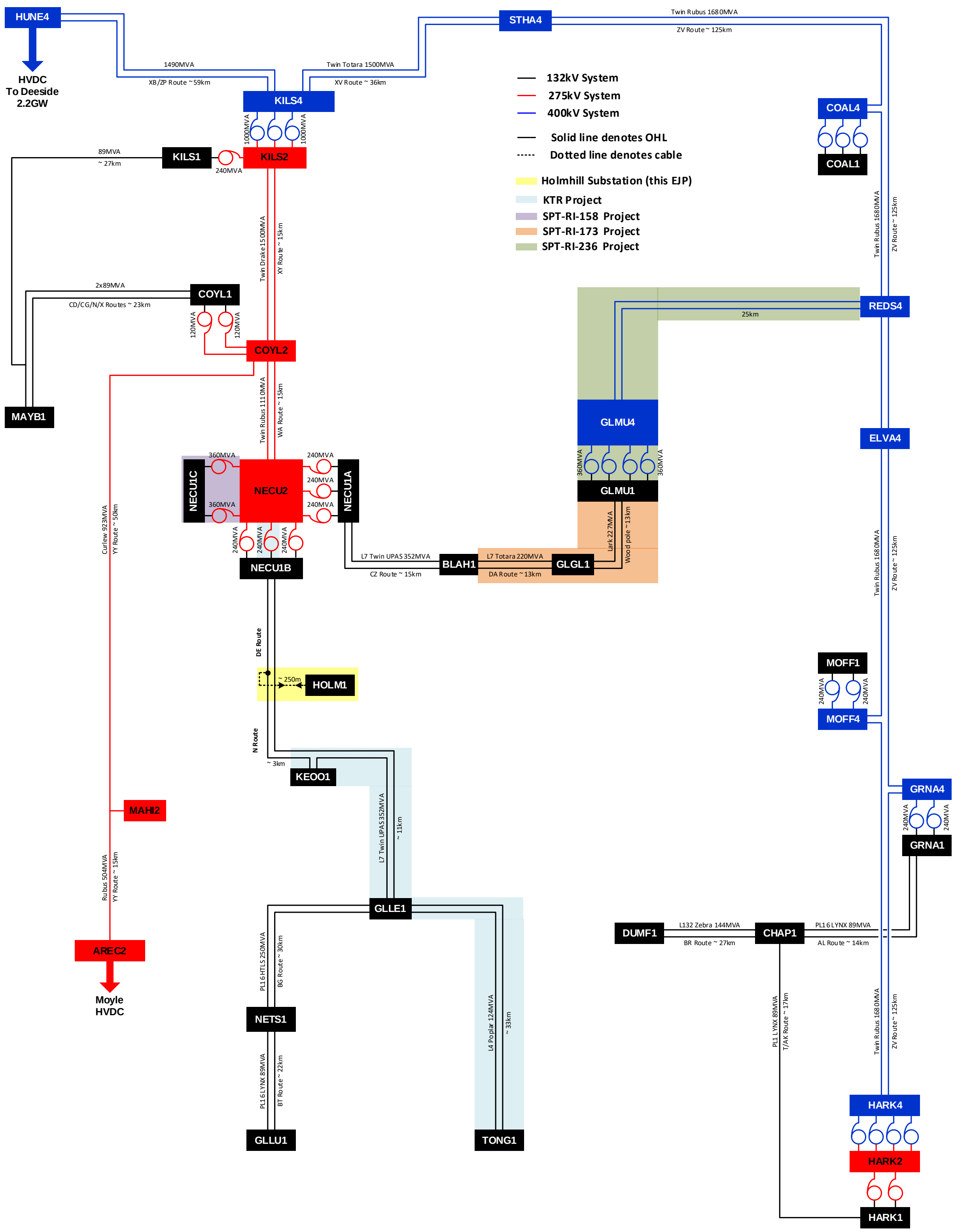

*Figure A-3: Single Line Diagram of the network in the area**

*NB – The Focus of this diagram is the Holmhill 132kV substation project. The rest of the network shown in subject to change as driven by other network needs. The reinforcement projects: KTR, SPT-RI-158, SPT-RI-173 and SPT-RI-236 have been / will be justified through separate need cases.

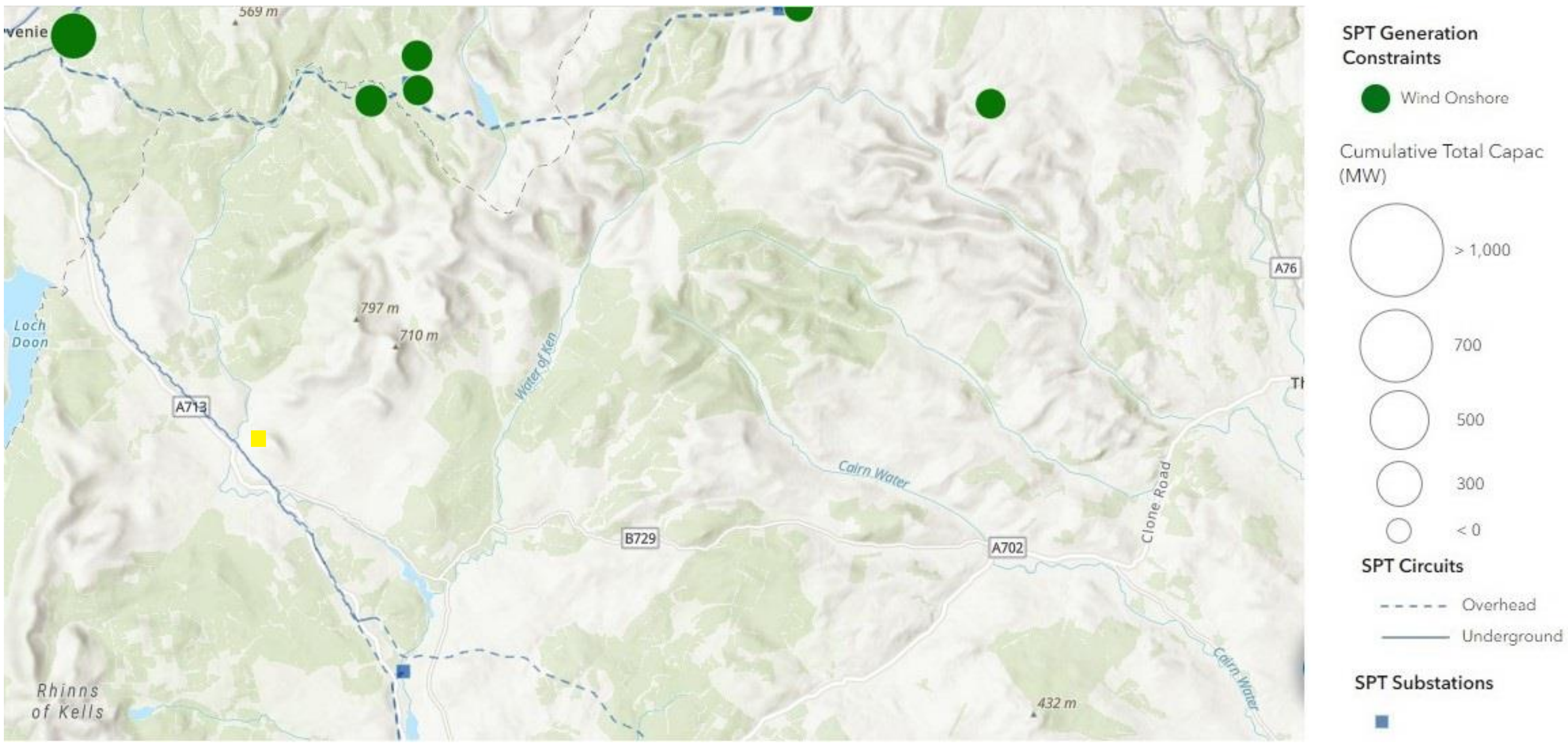

Figure A-4: Currently Connected Renewable Developments in Holm Hill area Extracted from Transmission Generation Heat Map*.

* NB – The proposed new Holmhill 132kV substation has been highlighted in yellow.

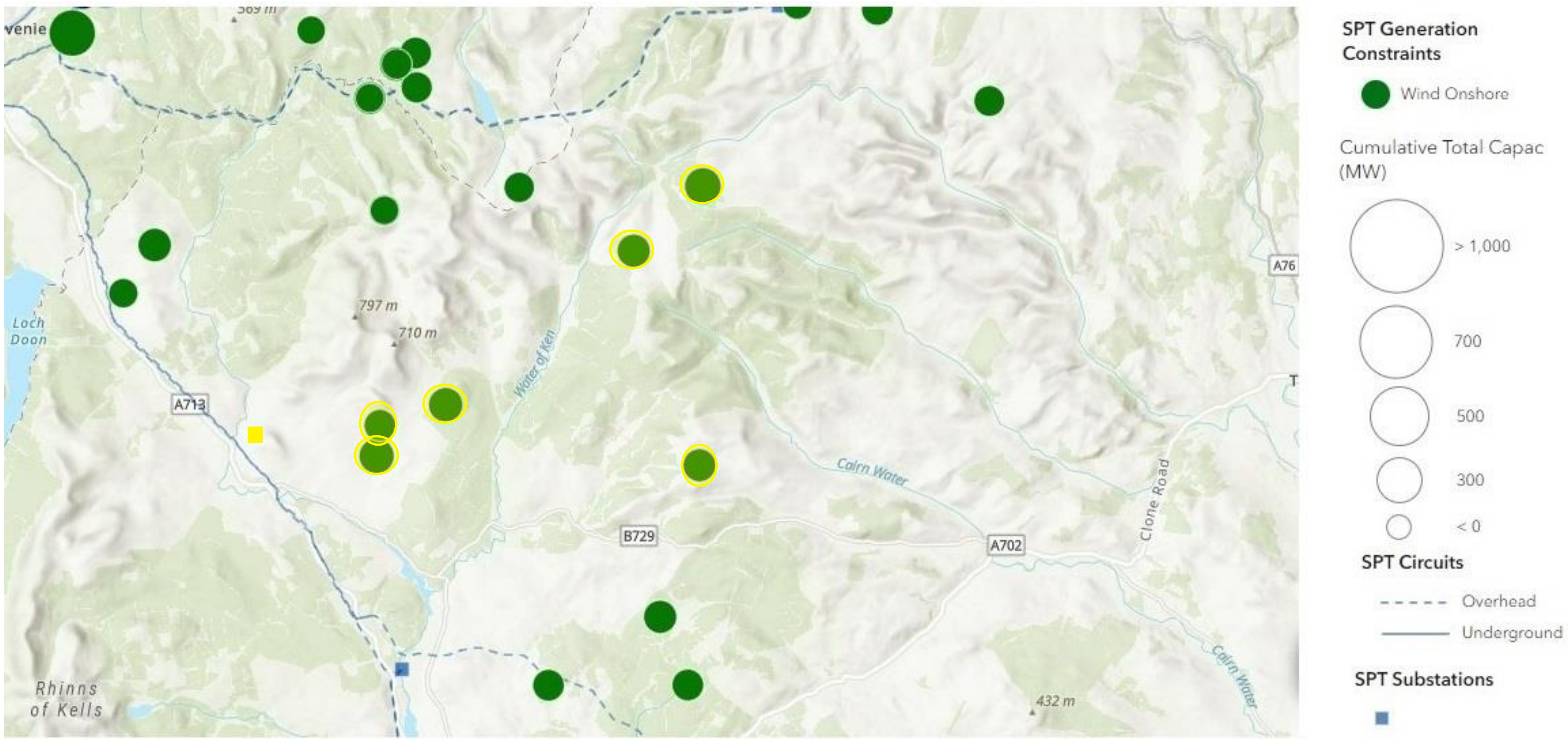

Figure A-25: Contracted and Connected Renewable Developments in Holm Hill area Extracted from Transmission Generation Heat Map.*

*NB – The proposed new Holmhill 132kV substation and all the wind farm developments contracted for connection to this substation have been highlighted in yellow. The connection of rest of developments in the area will be / has been facilitated via other reinforcement projects, which are outside the scope of this EJP.

[redacted]

Figure A-6: Geographical location of the proposed Holmhill 132kV substation with respect to tower number 68 (DE68) on DE route.

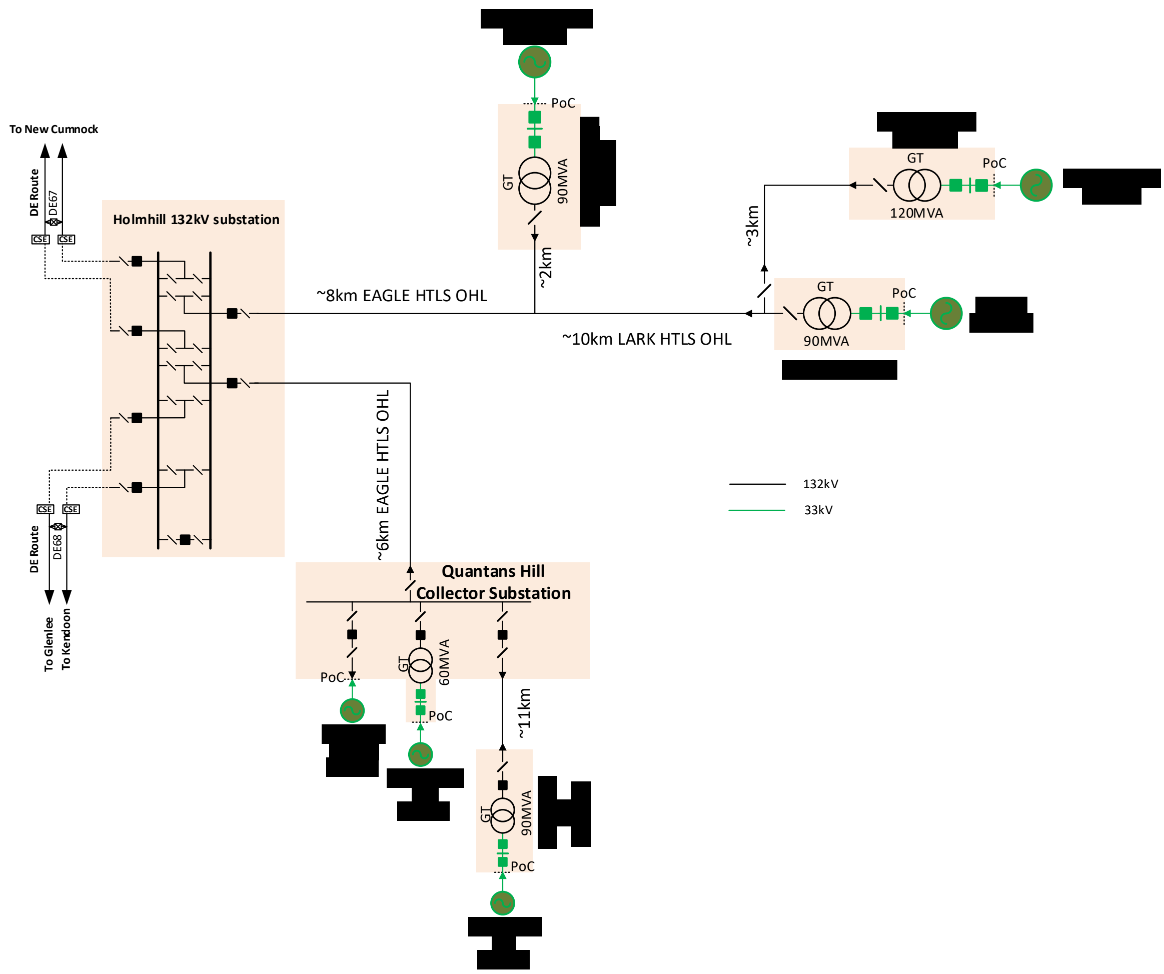

Figure A-7: Single line Diagram for option 2 (i.e., installing Holmhill 132kV double busbar substation).

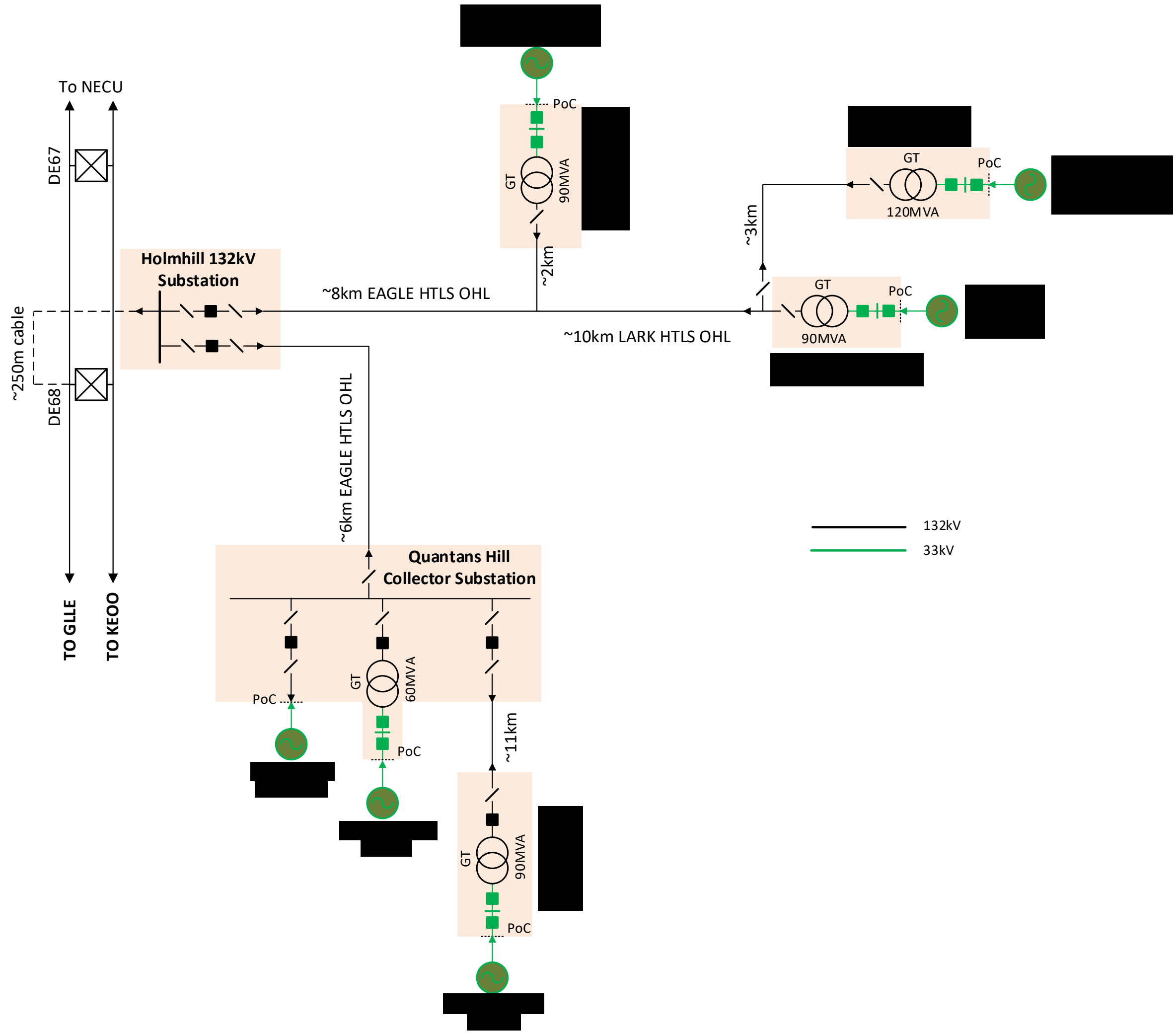

Figure A-8: Single line Diagram for option 3 (i.e., installing Holmhill 132kV single busbar substation).

[redacted]

Figure A-9: Geographical location and Electrical layout for option 3 (i.e., installing Holmhill 132kV single busbar substation).

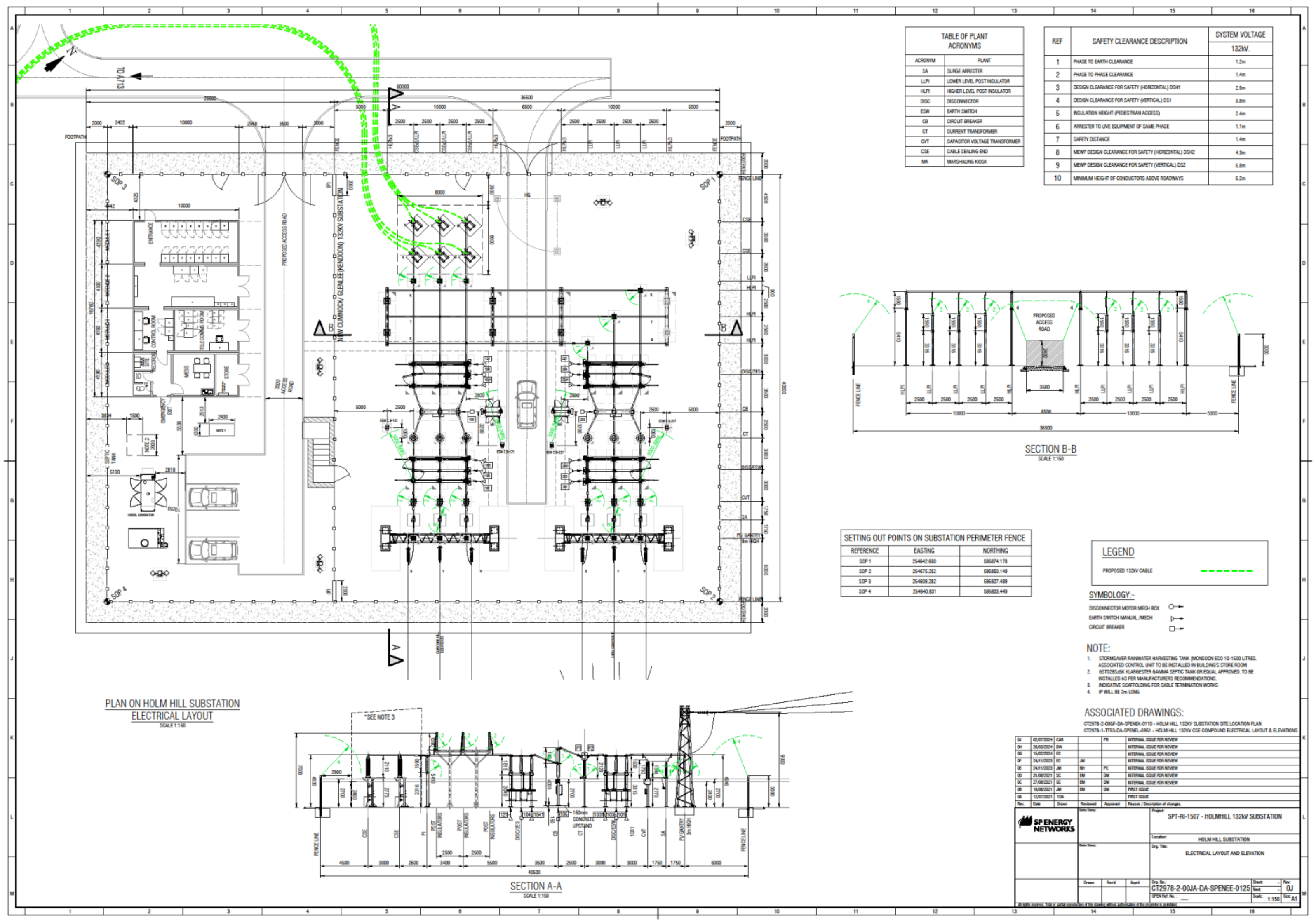

Figure A-10: Detailed Electrical layout for option 3 (i.e., installing Holmhill 132kV single busbar substation).

[redacted]

Figure A-11: Indicative Holmhill-Quantans Hill 132kV OHL route, subject to further routing activities.

[redacted]

Figure A-12: Proposed 132kV OHL route between Holmhill substation, Shepherds Rig Tee, and Lorg WF.