Windyhill – Lambhill – Denny North 400kV Reinforcement (DLUP)

NESO Driven EJP
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11/12/2024

Windyhill – Lambhill - Denny North 400kV Reinforcement (DLUP)			
Name of Scheme	SPT-RI-2085 Windyhill – Lambhill - Denny North 400kV Reinforcement (DLUP)		
Investment Driver	Wider Works		
NESO Review	ESO Comment: *no review*		
BPDT / Scheme Reference Number	SPT200406		
Outputs	400kV Circuit Breaker (AIS) 2 400kV Circuit Breaker (GIS) 10 400kV Disconnector (AIS) 4 Transformer 400kV>=500MVA 2 OHL (Tower Line) HTLS Conductor 400kV 32km OHL (Tower Line) HTLS Conductor 275kV 32km		
Cost	£131.27		
Delivery Year	2029		
Applicable Reporting Tables	BPDT (Section 5.1 - Project Meta Data, Section 6.1 - Scheme C&V Load Actuals, and 11.10 Contractor Indirects)		
Historic Funding Interactions	N/A		
Interactive Projects	N/A		
Spend Apportionment	**ET2**	**ET3**	**ET4**
	£8.0	£123.27	£0

Table of Contents

1. Executive Summary

This Engineering Justification Paper (EJP) sets out SP Transmission (SPT)'s plans to update a single side of the existing Windyhill – Lambhill – Denny North 275kV circuit to 400kV operation, install a new 400kV GIS substation within the existing Windyhill compound and replace the existing overhead line conductor on the Lambhill-Denny section of the circuit with HTLS conductor. This project provides boundary capability across system boundaries B4 and B5 required to accommodate the connection of renewable generation in order to meet government targets and ultimately meet Net Zero by 2050.

The project has been supported by economic analysis via the Network Options Assessment (NOA) and was identified as Required for 2030 in order to support the connection of offshore wind connections by 2030.

The project is programmed for completion in 2029 with a cost estimate of £131.27m (2023/24).

This EJP is submitted to Ofgem for the assessment of the need case, for the provision of preconstruction and early enabling works funding, and a full cost submission will be made to Ofgem at an appropriate time within the RIIO-T3 period via the Load Related Reopener.

2. Introduction

This EJP sets out SPT's plans to establish Windyhill 400kV Substation and uprate the Denny North – Lambhill – Windyhill 275kV circuit to 400kV operation, thus modernising and maximising the capability of the existing XD and XE overhead line routes. The purpose of the project is to facilitate increased power transfer into and through the SPT network from renewable developments across the north of Scotland.

XD route is an L2 construction using a twin Zebra ACSR (core only greased) overhead line (OHL) conductor system between Denny North and Lambhill 275kV.

XE Route is an 18km route between Lambhill and Windyhill which is already insulated for 400kV operation with existing twin Totara AAAC conductor system suitable for operation at 90°C. The diagram indicating geographical location of the proposed scheme can be found in Figure 1. The current configuration of transmission network in the area is also shown in Figure 2. In Figure 3a, the current configuration can be seen with respect to the local area, whilst Figure 3b depicts the development of the system creating the new 400kV circuit between Windyhill – Lambhill – Denny North.

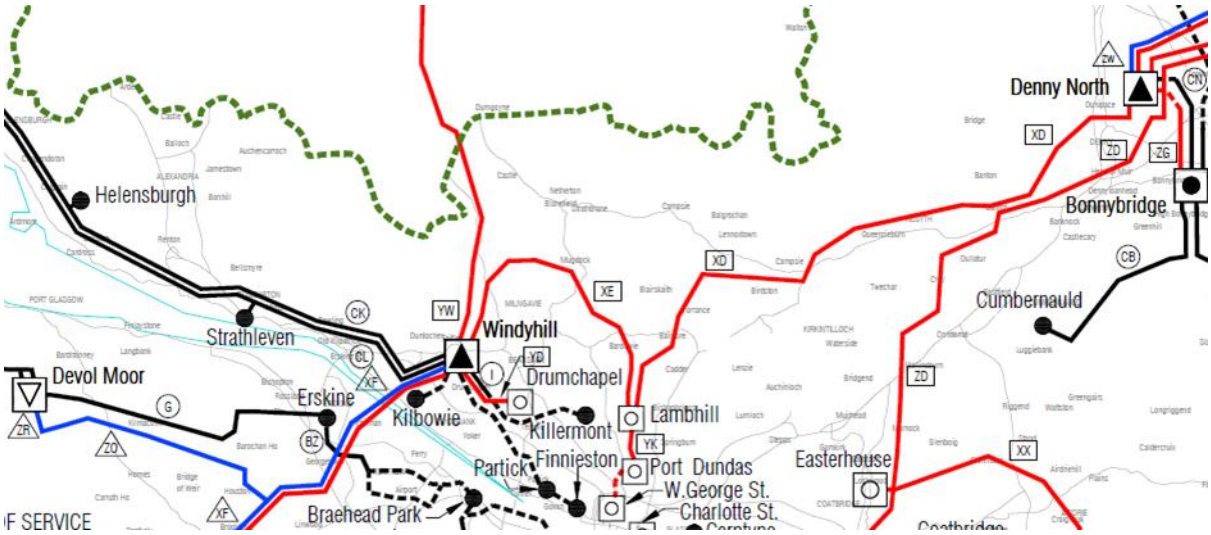

Figure 1: Geographical location of the proposed scheme with respect to the wider network in Northwest Scotland area - extracted from Networks Diagram Geographical Layout shown in Appendix A (Figure A-1).

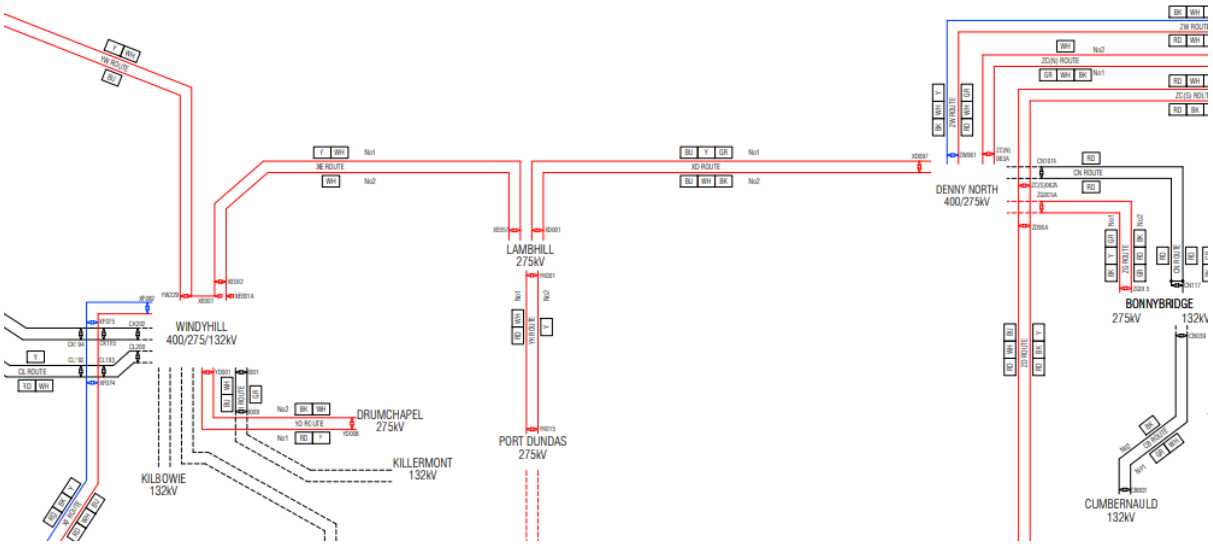

Figure : The existing transmission network in the area – extracted from Networks Diagram of the Existing SPT System shown in Appendix A (Figure A-2)

As part of the Windyhill – Lambhill – Denny North 400kV Reinforcement, the development of Windyhill 400kV Substation represents a significant new 400kV substation development, utilising Gas Insulated Switchgear (GIS), in the north-west of the SPT network. It is proposed that Windyhill 400kV Substation is constructed initially to provide:

- Four circuits to Devol Moor, Lambhill/ Denny North, Windyhill SGT4 and SGT5; and
- Future capability for the connection of up to a further ten circuits.

Subject to separate regulatory approval, it is proposed that two of these further ten bays form part of the initial contract award and site development (two bays for the future connection of 400/132kV inter-bus transformers to serve a future Windyhill B 132kV Substation and support new generation connections in the Windyhill transmission group), with space retained within the GIS building for the future population of up to eight bays (four at each end of the building), as required.

The proposed configuration of Windyhill 400kV Substation will help to ensure the network is ready for the changes required by Net Zero targets. While capable of expansion, this configuration and tendering approach will help to reduce the risk of future busbar system extension requiring lengthy network outages and disruptive reconfiguration.

It is proposed to replace the existing 1962 vintage twin Zebra ACSR (core only greased) overhead line conductor systems on XD route with a modern High Temperature Low Sag (HTLS) conductor system which will maximise the capacity of the route. Condition based major refurbishment of this route would be required in the RIIO-T3 period in order to ensure the assets remain fit for purpose and the associated circuits can remain in service.

The needs case for the uprating of the existing Denny North – Lambhill – Windyhill 275kV circuit to 400kV operation and the factors that have an impact on the timing and scope of works are discussed in the following sections. Full justification for the preferred investment option is presented, together with a detailed description of the proposed solution.

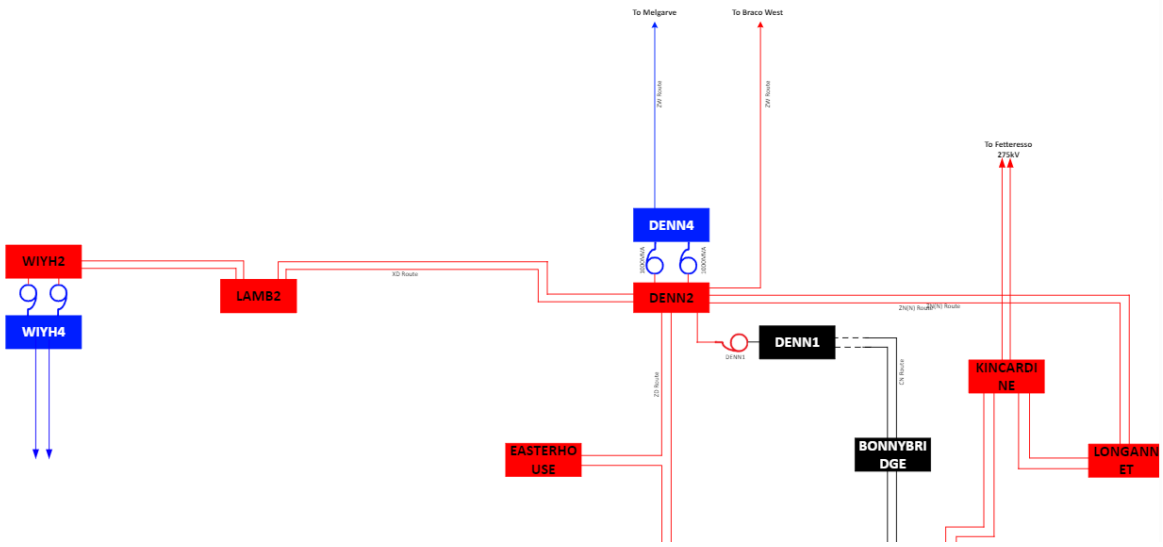

Figure 3a: Single Line Diagram of the current electrical system in the area (As shown in Appendix Figure A-3).

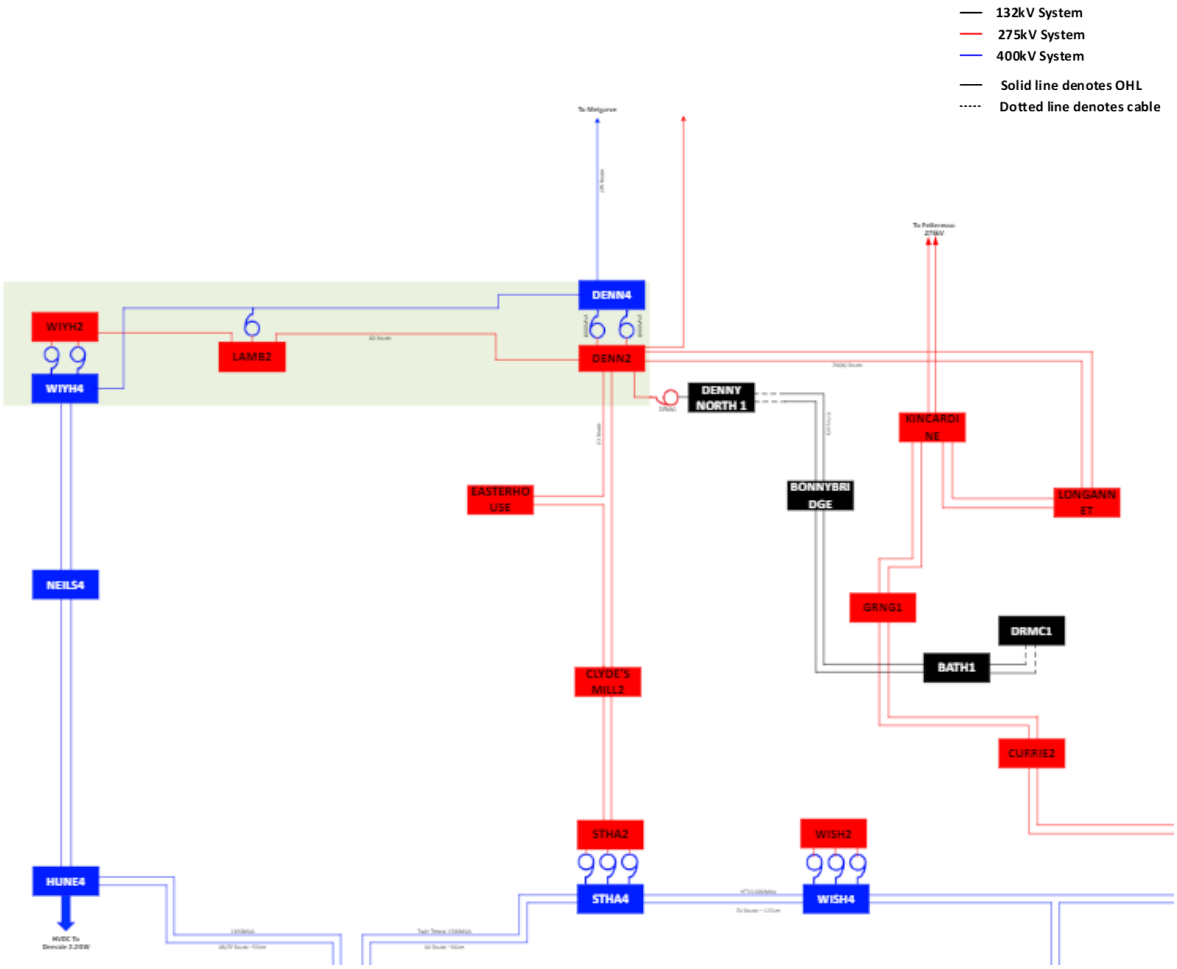

Figure 3b: Single Line Diagram of the proposed scheme with respect to the wider electrical system in the area (As seen in Appendix Figure A-4).

The completion of the DLUP 400kV works provides the following benefits, albeit not limited to the SPT system:

1. Allowing for the increasing demand within the network.

2. Providing future connections and expansion of the network.

A complete description of the need case for Windyhill – Lambhill – Denny North uprating and a full justification for the selected reinforcement option are provided in the following sections.

3. Background Information and Needs Case

In recent months, applications for connections totalling over 1,250MW of Battery Energy Storage System capacity have been submitted for the Lambhill 275kV transmission group. Additionally, there is substantial capacity seeking connection in the Windyhill and Denny North 275kV transmission groups.

3.1. Statutory and Licence Obligations on SP Transmission plc

SP Transmission plc (SPT) is licensed under section 6(1)(b) of the Electricity Act 1989 to transmit electricity. This license is subject to standard and special conditions. According to section 9(2) of the Act, SPT must develop and maintain an efficient, coordinated, and economical electricity transmission system and facilitate competition in electricity supply and generation. These responsibilities are outlined in SPT's transmission license.

The license conditions (LCs) include several key obligations:

- System Operator-Transmission Owner Code (STC) (LC B12): Ensures coordination in the planning of the transmission system.
- National Electricity Transmission System Security and Quality of Supply Standard (NETS SQSS) (LC D3): Requires the planning and development of the transmission system to align with the obligations of the National Grid Electricity System Operator (NGESO).
- Transmission System Availability (LC D2): Ensures that parts of the transmission system are available and fit for their intended purpose.
- Connection Agreements (LC D4A): Mandates the offering of agreements for new or modified connections upon request.

Furthermore, Section 38 and Schedule 9 of the 1989 Act impose additional duties on SPT when formulating proposals. SPT must ensure that the transmission system is developed and maintained in an economic, efficient, and coordinated manner. This involves balancing technical, economic, and environmental factors to serve the interests of both current and future electricity consumers. This comprehensive approach ensures that SPT meets its statutory and license obligations while supporting a reliable and competitive electricity market.

3.2. Key Project Drivers - Load Related

In June 2019, the UK Parliament set a binding target to reach net zero greenhouse gas emissions by 2050, while the Scottish Parliament aims for net zero by 2045. To achieve these goals, timely connections of low-carbon energy sources, particularly onshore and offshore wind, are essential.

In October 2020, the UK Government announced its commitment to becoming a leader in green energy, raising the offshore wind target from 30 GW to 40 GW by 2030. The Scottish Government seeks 20 GW of onshore wind and 11 GW of offshore wind by the same year. Additional commitments include plans to decarbonise the power system by 2035 and a target of 50 GW of offshore wind by 2030 per the British Energy Security Strategy[1]. This underscores the need for significant investment in the electricity transmission system to support renewable energy integration.

On 9th September 2021, the former Department for Business, Energy & Industrial Strategy (BEIS) announced a £265m[2] budget per year for the Contracts for Difference (CfD) Allocation Round 4, which launched on 13th December 2021 and concluded on 7th July 2022. For the first time since 2015, established technologies, including onshore wind, were able to bid. Given lowering technology costs and a favourable subsidy regime, this will support a considerable number of onshore renewables projects to successfully transition from project inception and development through to energisation[3]. The results of the CfD Allocation Round 6 were announced on 3rd September 2024, with annual auction rounds now expected[4].

Furthermore, on the 4th November 2024, NESO published the 'Clean Power 2030' paper as advice to the UK Government on how to achieve a low-carbon power system by 2030 where demand is met by clean sources (primarily renewables) with gas fired generation only to be used to ensure security of supply (primarily during periods of low wind). While subject to a decision by the UK Government, this publication reaffirmed the need to continue to invest in the wider transmission network to ensure that 2030 and later targets are met.

3.3. Future Energy Scenarios

Each year, NESO 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 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 Scottish Hydro Electric Transmission (SHET) and SPT areas (Boundary B4), and through the central belt of Scotland in the SPT area (Boundary B5).

[1] British energy security strategy - GOV.UK (www.gov.uk)
[2] Biggest ever renewable energy support scheme backed by additional £265 million - GOV.UK (www.gov.uk)
[3] BEIS - Electricity Generation Costs (2020)
[4] Total Capacity of CFD Round 6 across the UK was 9.65GW

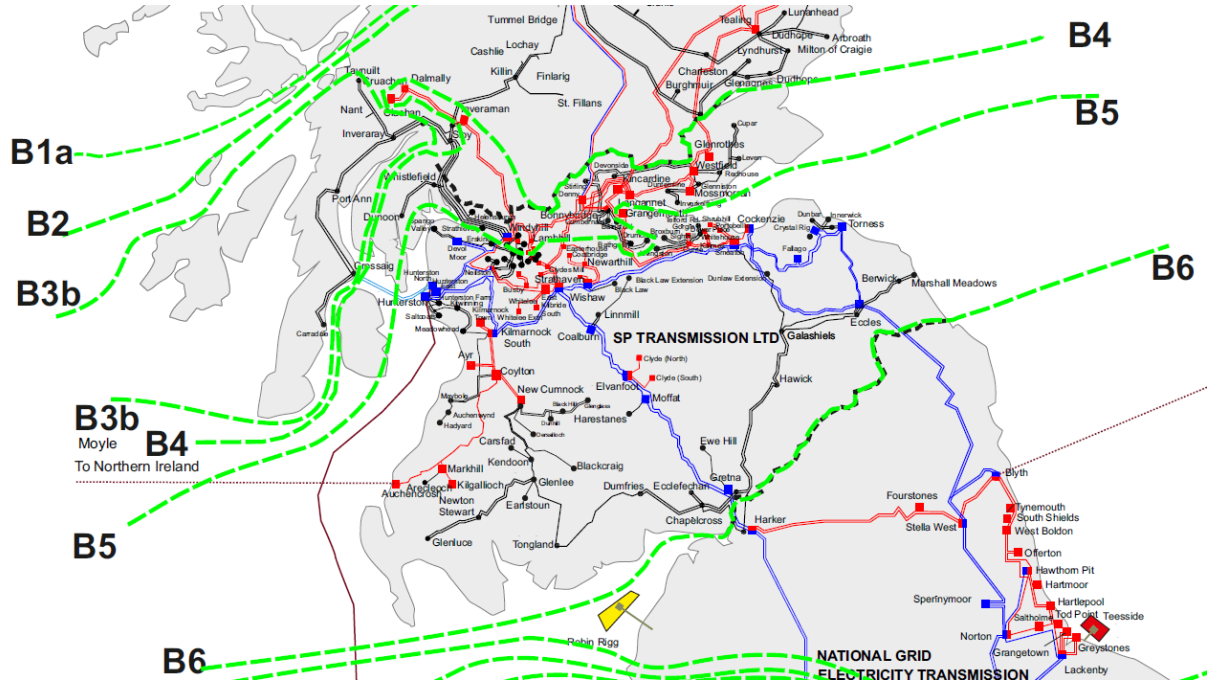

Figure 4: Network boundaries across SPT's network

Figure 5 indicates the 2023 FES and 2024 FES required transfer capability on the B4 boundary. Existing capability is already exceeded, broadly consistent with all Scotland and North England boundaries, driven by generation developments under the Connect and Manage regime[5], with the difference becoming extremely pronounced by the mid to late 2020s in all scenarios.

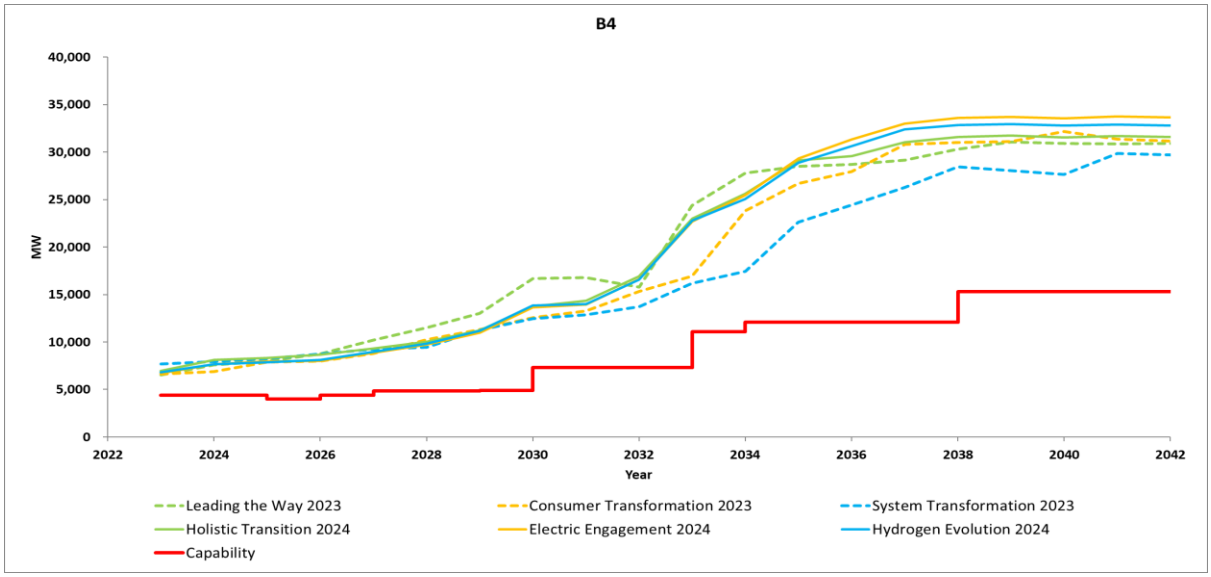

Figure 5: Required Transfer and Base Capability for boundary B4

The current capability of transmission network boundary B4 is approximately 3,400MW. Figure 5 above shows a required transfer of up to 17GW by 2030 and up to approximately 30GW by 2035.

[5] The Connect and Manage transmission access regime was introduced by government in August 2010 and implemented on 11th February 2011. Its aim was to improve access to the electricity transmission network for generators by offering generation customers connection dates ahead of the completion of wider transmission system reinforcements. This allows them to connect earlier to the transmission system, but may result in additional constraint costs.

Figure 6 indicates the 2023 FES and 2024 FES required transfer capability on the B5 boundary. The trends below are similar to those on the B4 boundary and are predominantly due to the connection of onshore and offshore wind across the north of Scotland. Generation connecting in the north of the SPT area and parts of SHE Transmission's Argyll and Kintyre area drive further increase in the required transfer capability on this boundary.

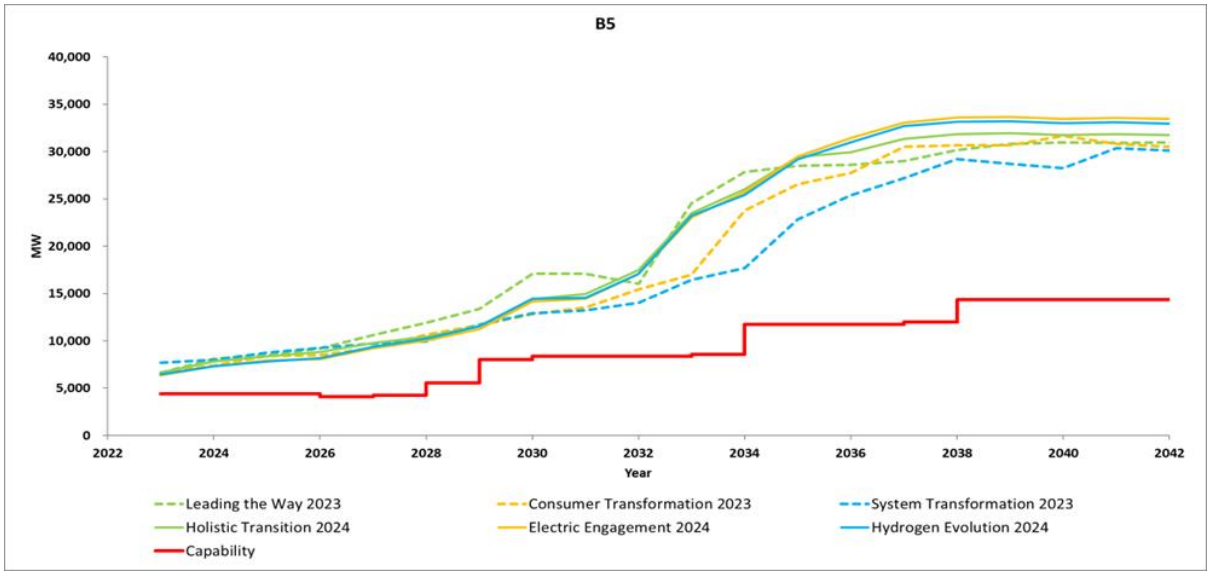

Figure 6: Required Transfers and Base Capability for boundary B5

The current capability of transmission network boundary B5 is approximately 3,900MW. Figure 6 above shows a required transfer of up to 17.6GW by 2030 and up to approximately 30GW by 2035.

Figures 5 and 6 show that in the coming years the unconstrained boundary flows on B4 and B5 are set to increase significantly. 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.

3.4. Network Options Assessment (NOA)

The Network Options Assessment process (ref. Standard Licence Condition C27) demonstrates the need to make significant investment in the capability of the existing transmission system through Scotland and the north of England to accommodate significant growth in renewable generation. This is required to maintain and operate an economic and efficient transmission system. It is critical that the network is ready to accommodate the scale of projected renewable capacity growth, required to support legislated Net Zero targets, whilst also enabling significant constraint savings.

The 2021/22 NOA Report, published in January 2022[6], supports the proposal in this paper to progress the reinforcement of the network between Denny North and Windyhill via the uprating of an existing 275kV circuit to 400kV operation (ref. NOA7 code DLUP), giving the project a "Proceed" recommendation. This recommendation continued to be supported through the NOA Refresh, published in July 2022.

Furthermore, the 2021/22 NOA Report and associated NOA Refresh[7] recommended that additional network investment projects across the B4 and B5 boundaries are also required as part of a wider strategy comprising a series of co-ordinated projects, enabled initially by the development of

[6] Network Options Assessment 2021/22, January 2022
[7] Network Options Assessment (NOA) | National Energy System Operator

Kincardine North 400kV Substation (ref. NOA code LWUP) and aligned with and including this project (ref. NOA code DLUP), maximising transfer capability via existing transmission overhead line routes (ref. NOA codes DWUP, LCU2, TKUP and BDUP), while recognising the need for the construction of new overhead line and subsea HVDC cable systems e.g. the Denny to Wishaw 400kV Reinforcement and the second eastern HVDC link between the SPT and NGET areas (ref. NOA code TGDC). These related projects are the subject of separate regulatory submissions.

4. Assessment of Options

4.1. Existing System Configuration

Existing transmission assets in the central area are indicated in Figure 7 below (and Appendix A).

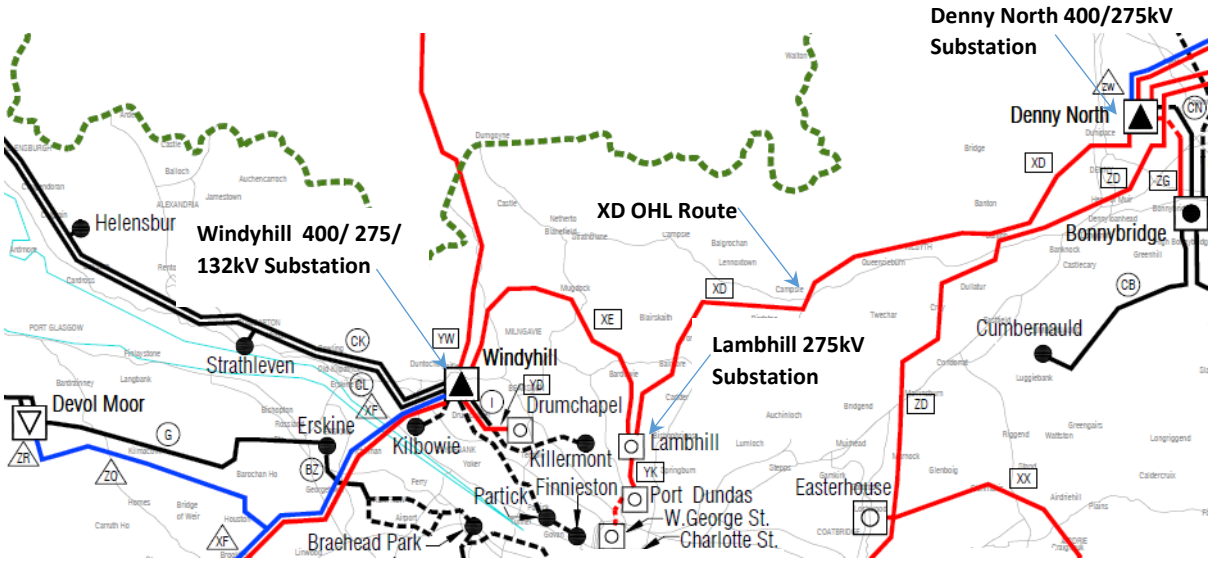

Figure 7: Geographic Indication of Transmission Configuration in Northwest Area[8]

Denny North 400/275/132kV Substation is connected to the Main Interconnected Transmission System (MITS) via five double circuit overhead line routes operating at 400kV, 275kV and 132kV. It is an outdoor substation utilising Air Insulated Switchgear (AIS) with 400kV and 275kV busbar systems configured in a double busbar arrangement.

As detailed in Figure 8, Denny North 400/275/132kV Substation connects the following circuits:

- Melgarve 400kV
- Denny North Supergrid Transformer No.1 (SGT1), 400/275kV 1000MVA
- Braco West 275kV
- Lambhill/ Windyhill No.1 275kV
- Lambhill No.2 275kV
- Longannet No.1 275kV
- Longannet No.2 275kV
- Bonnybridge No.1 275kV
- Bonnybridge No.2 275kV
- Denny North Supergrid Transformer No.3 (SGT3), 275/132kV 240MVA
- Bonnybridge No.3 132kV

[8] Assets indicated in blue operate at 400kV, assets in red operate at 275kV and assets in black operate at 132kV.

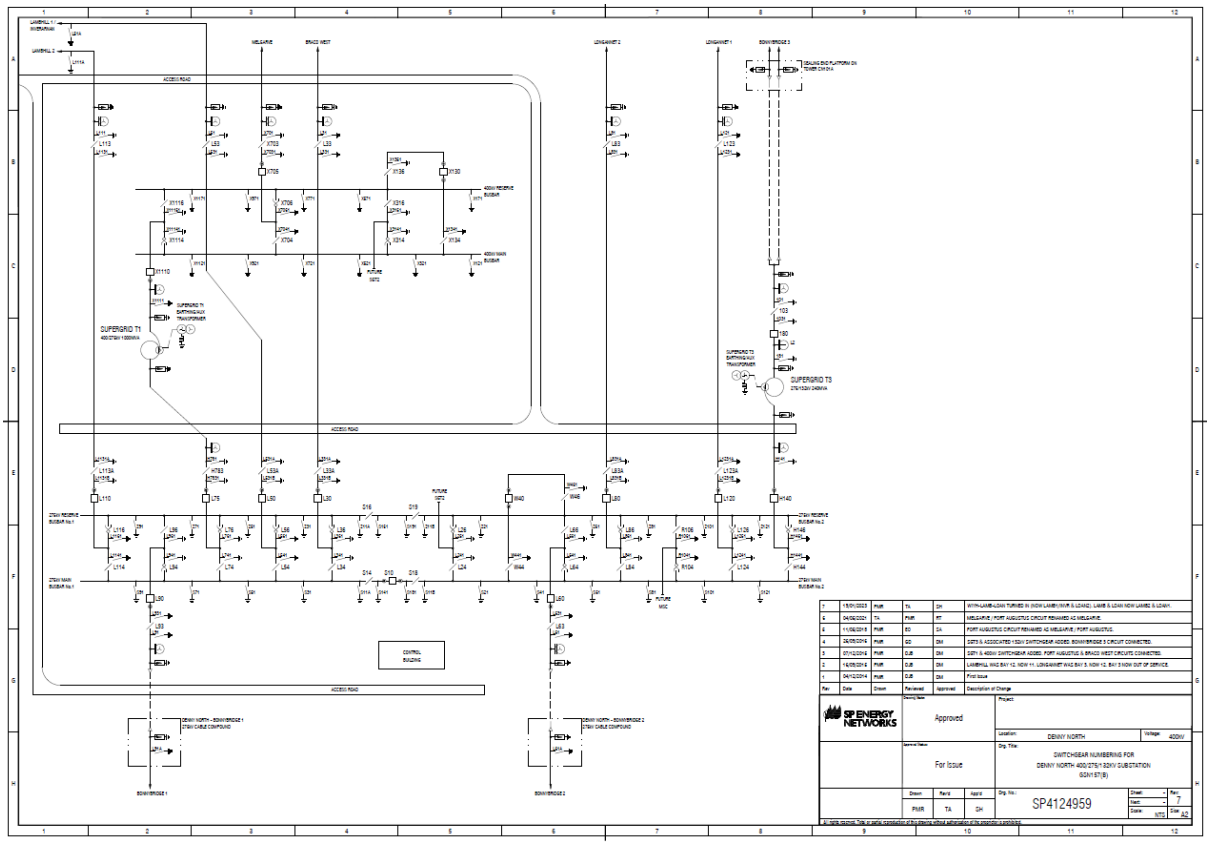

Figure 8: Existing Configuration – Denny North 400/275/132kV Substation

The configuration at Denny North 400/275kV Substation will be modified by the Kincardine North 400kV Substation project (NOA ref. LWUP[9]), with the existing Longannet No.1 and No.2 275kV circuits being uprated to 400kV operation and connected into an extension to the existing 400kV double busbar arrangement. It will also be modified by the Denny SGT2 project (NOA ref. DNEU), with the installation of a second 400/275kV 1000MVA inter-bus transformer, and uprating of the existing Denny – Braco West 275kV circuit to 400kV operation (NOA ref. BDUP).

Lambhill 275kV Substation is connected to the MITS via two double circuit overhead line routes operating at 275kV (XD and XE routes). It is an outdoor AIS double busbar substation which, as detailed Figure 9, connects the following circuits:

- Denny North 275kV
- Denny North/ Windyhill 275kV
- Windyhill 275kV
- Port Dundas/ West George Street No.1 275kV
- Port Dundas/ West George Street No.2 275kV

Lambhill 275kV Substation radially serves two Grid Supply Points (GSPs) in Glasgow city centre at Port Dundas and West George Street.

[9] Kincardine North 400kV Substation - MSIP Reopener

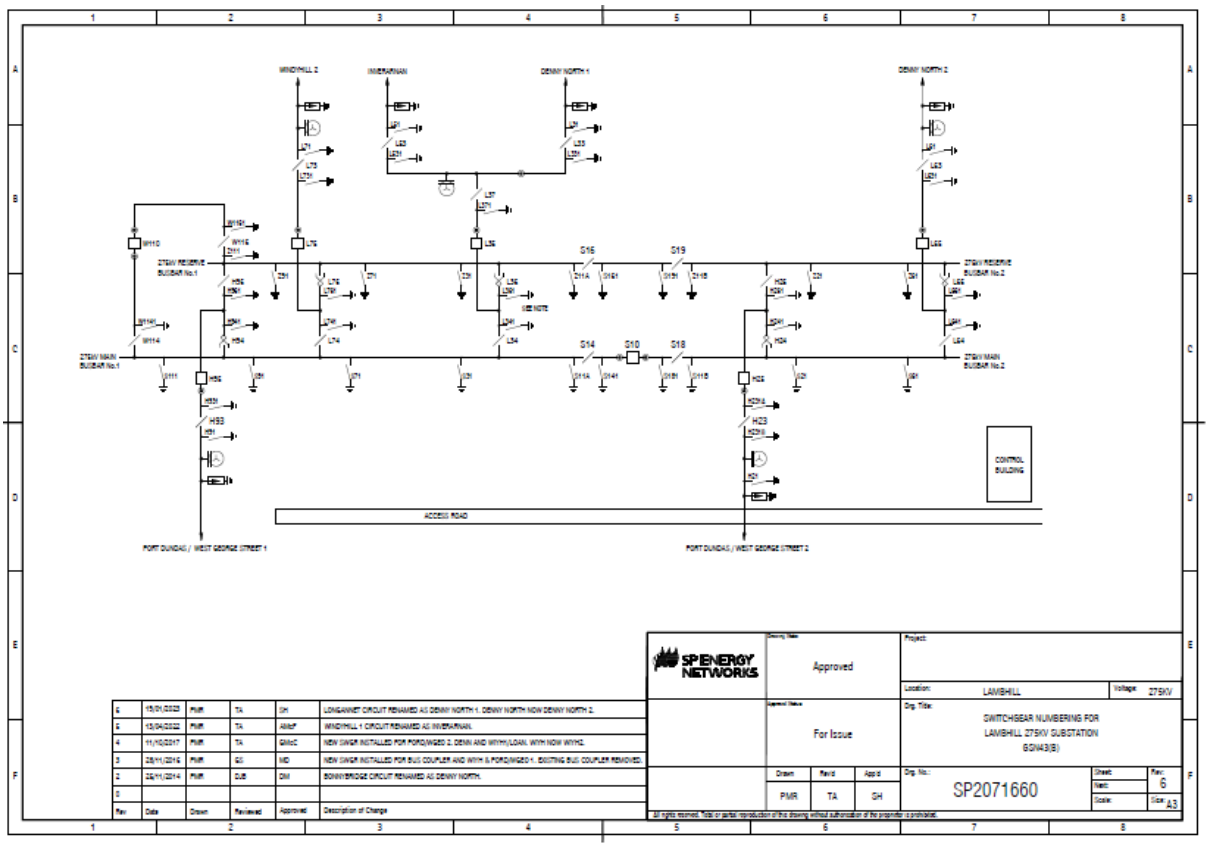

Figure 9: Existing Configuration – Lambhill 275kV Substation[10]

Windyhill 275kV Substation, located to the northwest of Glasgow, is presently an outdoor AIS substation, constructed in the 1960s and configured in a double busbar arrangement.

Windyhill 275kV Substation is connected to the MITS via three double circuit overhead line routes operating at 275kV: XF route to Neilston; XE route to Lambhill; and YW to Dalmally. With vital transmission circuits to Devol Moor and Neilston crossing Boundary B5, and circuits to Lambhill and Denny North, Windyhill 275kV Substation plays an important role in east – west and north – south power flows. The substation has connection to Cruachan Generating Station via the Dalmally and Inverarnan 275kV circuits and serves seven GSPs to the north and west of Glasgow.

Via a RIIO-T2 non-load related project (ref. SPNLT2033), Windyhill 275kV Substation is presently being replaced with modern GIS equipment, similarly configured in a double busbar arrangement.

As detailed Figure 10, Windyhill 275kV Substation connects the following circuits:

- Drumchapel No.1 275kV
- Drumchapel No.2 275kV
- Windyhill Supergrid Transformer No.1 (SGT1), 275/132kV 240MVA
- Windyhill Supergrid Transformer No.2 (SGT2), 275/132kV 240MVA
- Windyhill Supergrid Transformer No.3 (SGT3), 275/132kV 240MVA
- Windyhill MSCDN 1 150MVAr

[10] Note: Reference to Inverarnan reflects the current, temporary, running arrangement at Lambhill during construction works at Windyhill 275kV Substation. Circuit is normally Windyhill – Lambhill – Denny North 275kV.

- Lambhill No.1/ Denny North 275kV
- Lambhill No.2 275kV
- Inverarnan 275kV
- Dalmally 275kV
- Devol Moor 400kV (via Windyhill Supergrid Transformer No.4 (SGT4), 400/275kV 1000MVA)
- Neilston 275kV

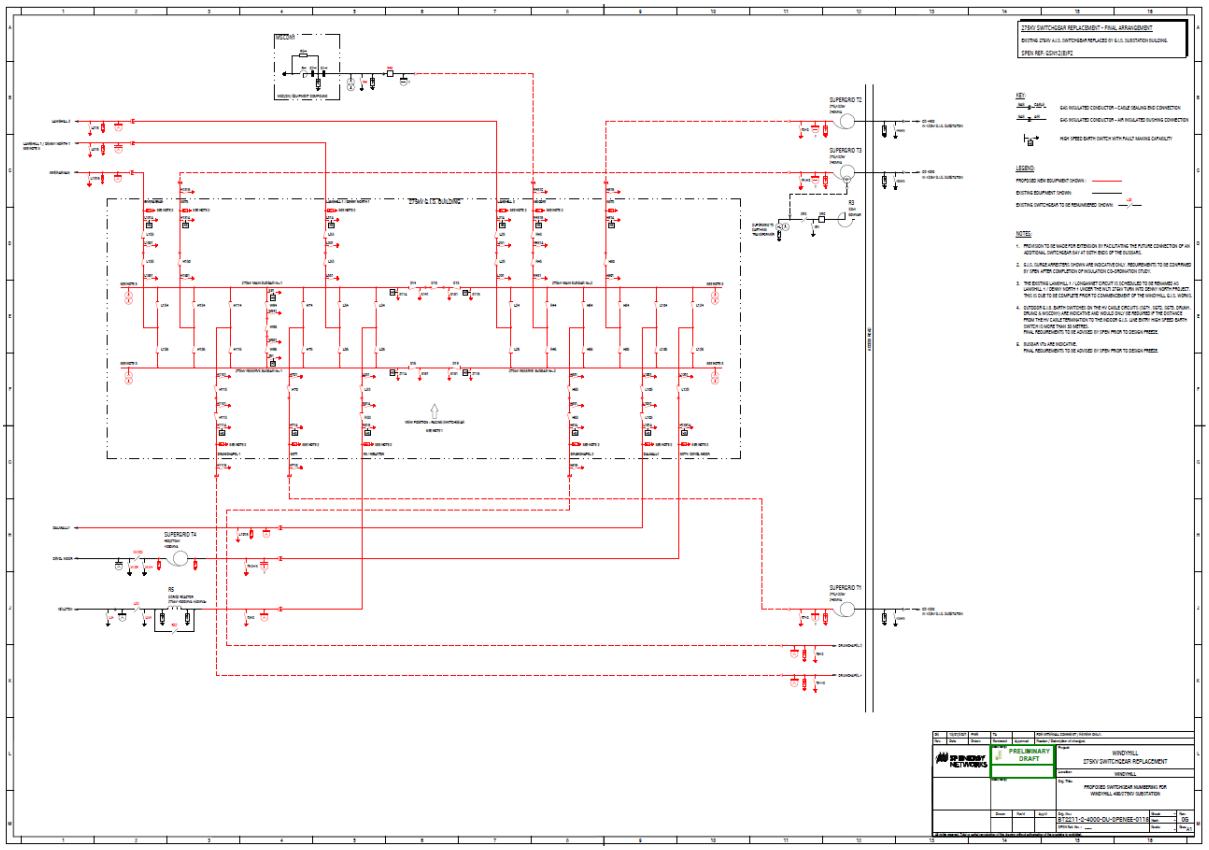

Figure 10: Configuration – Windyhill 400/275kV Substation[11]

[11] Note – Figure 8 indicates the Windyhill 275kV configuration upon completion of the ongoing construction works at Windyhill 275kV Substation as part of project ref. SPNLT2033.

4.2. Planned System Configuration – HND/ NOA Projects

Following the ESO's publication of the HND and NOA7 Refresh on 7th July 2022, the following projects were highlighted for progression within SPT's network area.

Table 1: Status within HND – Required for 2030 Targets

NOA7R Code	Description	NOA7 EISD
DNEU	Installation of a new 400/275kV 1000MVA Supergrid transformer (SGT2) at Denny North 400kV substation.	2025
DWUP	Establish a 400kV single circuit corridor south from Kincardine North, on existing overhead line (OHL) routes, to Clyde's Mill substation.	2026
E2DC	Establish a High Voltage Direct Current (HVDC) subsea link from a new Branxton 400kV Substation (near Torness) to Hawthorn Pit in the northeast of England. Branxton will facilitate the connection of offshore renewable developments as well as the reinforcement of capacity between Scotland and England.	2027
LWUP	Establish a new 400kV substation north of Kincardine and connect to Denny North at 400kV, integrating load and non-load related investment drivers and enabling significant reinforcement of transfer capacity through central Scotland.	2027
VSRE	Replace existing OHL conductor on the strategic east-west Strathaven - Smeaton (XH/XJ route) corridor with modern high temperature low sag (HTLS) conductor.	2027
DWNO	Establish a new 400kV OHL from Bonnybridge substation to an existing OHL north of Glenmavis, together with associated substation works, conductor replacement and voltage uprating on existing OHL routes.	2028
EHRE	Replace existing OHL conductor on the southern (Elvanfoot - Harker) section of the strategic north-south Strathaven - Harker (ZV route) corridor with modern high temperature low sag (HTLS) conductor.	2028
BDUP	Uprate the Beauly - Denny OHL route to double circuit 400kV operation.	2029
DLUP[12]	**Establish a new 400kV substation at Windyhill and a 400kV single circuit corridor, on existing overhead line routes, between Windyhill, Lambhill and Denny North.**	**2029**
VERE	Replace existing OHL conductor on the northern (Strathaven - Elvanfoot) section of the strategic north-south Strathaven - Harker (ZV route) corridor with high temperature low sag (HTLS) conductor.	2030
TGDC	Creation of a second new High Voltage Direct Current (HVDC) Eastern subsea link from the SPT area to south of the Humber estuary, in the northeast of England, together with associated onshore works.	2031
TKUP	Establish new 400kV substations at Mossmorran, Westfield and Glenrothes to establish a 400kV double circuit corridor, on existing overhead line routes, between Kincardine North and the SSEN Transmission Tealing substation. Scope includes further works within the SSEN-T area.	2032

[12] This project.

Further to the HND, the NESO published the results of the Transitional Centralised Network Plan 2 (tCSNP2) within their Beyond 2030 report[13] which was to ensure an additional circa 17GW of ScotWind generation can be accommodated on the network. Within the studies, the 'Required for 2030' projects were included within the background, and the results are shown in Table 2 below.

Table 2: tCSNP2 – Recommended within Beyond 2030

tCSNP2 Ref	Proposed Works	tCSNP2 EISD
CMN3	New 400kV circuit between Gala North and Carlisle area	2033
WCN2	New 400kV circuit between Ayrshire and Carlisle area via new substation(s) within Dumfries and Galloway	2037
HGNC	New 400kV circuit between Harburn and Gala North	2036
NHNC	New 400kV circuit between New Deer and Harburn	2038
EHRE	Reconductor Elvanfoot – Harker with HTLS conductor	2030
VERE	Reconductor Strathaven – Elvanfoot with HTLS conductor	2030
WCD4	A new 2GW HVDC subsea link from southwest Scotland to northwest Wales, incl. connection of Machair 2GW Offshore Wind Farm (SW_W1).	2035
CVUP	Clydesmill to Strathaven 400kV Reinforcement	2031
LCU2	Kincardine North - Currie B5 Reinforcement	2033
HBNS	Establish a new substation at Harburn	2031

As shown above, in addition to the already significant suite of works recommended by the HND, a number of new 400kV corridors over all of the SPT boundaries are required to accommodate the level of generation expected within Scotland.

It is important to note that there is also a need to deliver non-load related asset replacement on associated overhead line routes within the RIIO-T3 period, a number of which will be reconductored within the projects detailed above. For this reason, we continue to review and refine the scope and timing of these works with a view to continuing to integrate load and non-load related drivers in an economic, efficient and co-ordinated manner minimising system access requirement.

[13] NESO's Beyond 2030 Report

4.3. Overview of Options

This section provides a description of the options considered to integrate load and non-load related drivers in an economic, efficient and co-ordinated manner, facilitating increased power transfer into and through the SPT network from renewable developments across the north of Scotland, and details the key considerations.

These works form part of a wider suite of reinforcement works designed to increase power transfer into and through the SPT network from renewable developments across the north of Scotland in an economic, efficient and co-ordinated manner.

Table 5 below presents a summary of the options considered.

Table 5: 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
Option 1: Rejected – Baseline: Do Nothing / Delay	Refer to figure 11.	N/A	N/A	N/A	N/A	N/A	Inconsistent with SPT's various statutory duties and licence obligations.
Preferred – Option 2: New 400kV GIS Substation at Windyhill	Refer to Figure 16.	Figure A-5	N/A	N/A		Lower capital cost relative to Option 2. Delivers B5 boundary capability as per Option 2.	N/A
Rejected – Option 3: New 400kV AIS Substation at Windyhill	Refer to figure 17.	N/A	N/A	N/A	N/A	N/A	Higher capital cost relative to Option 2. Increased consenting and programme risk relative to Option 2. Reduced operational flexibility and scope for future development.

4.3.1. Base System Configuration

Figure 11 indicates the planned configuration of the system upon completion of works forming part of the Kincardine North 400kV Substation MSIP project (ref. LWUP) and Kincardine – Wishaw (Clyde's Mill) 400kV Reinforcement MSIP project (ref. DWUP).

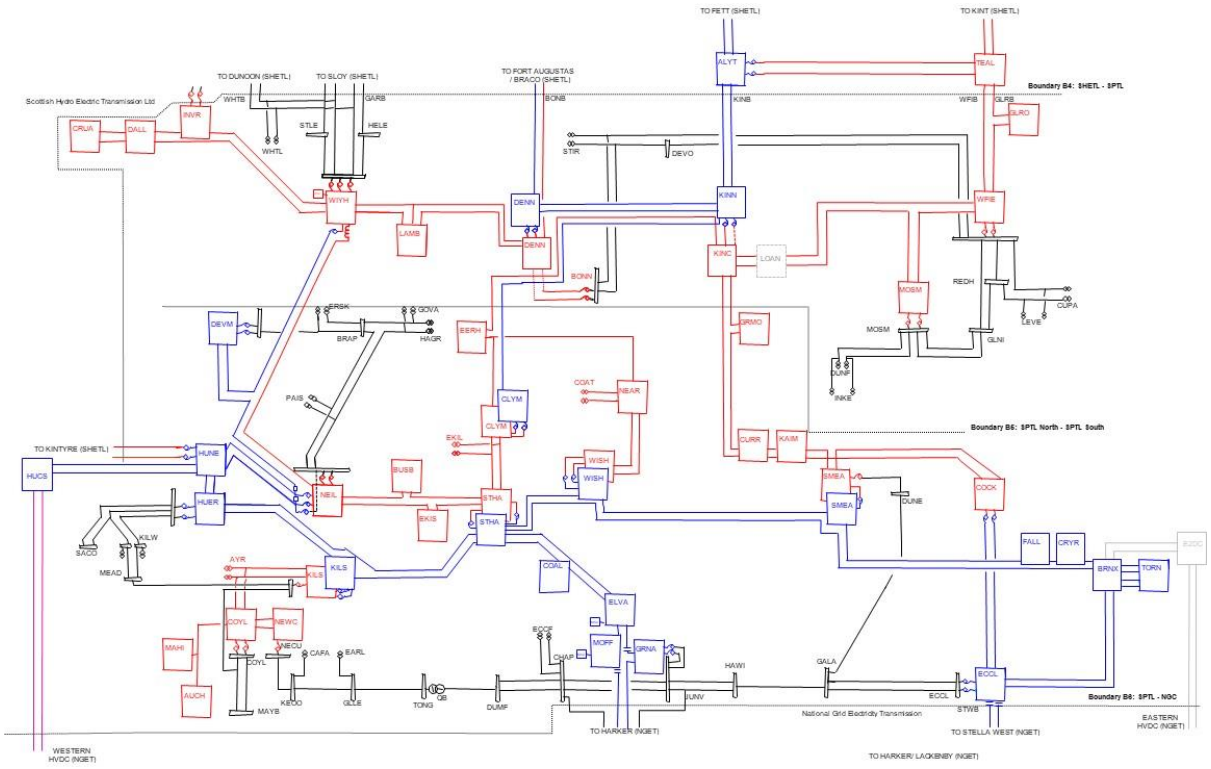

Figure 11: Single Line Diagram post Kincardine North 400kV Substation (ref. NOA code LWUP) and post Kincardine – Wishaw (Clyde's Mill) 400kV Reinforcement (re. NOA code DWUP)

4.3.2. Works Common to Options 2 and 3

This section provides a description of the options that were considered to accommodate connection of renewable generation developments in the area. A summary of each option is described in Table 5. Also, the system requirements and design parameters for the considered options are summarised in Table 6.

Before considering the different options to consider, both Options 2 and 3 would initially involve the following:

Denny North - The installation at Denny North 400kV Substation of one bay of 400kV double busbar Air Insulated Switchgear (AIS). This will enable the termination of the northern side of XD route in the 400kV busbar system at Denny North.

XD Route - For circuit thermal rating purposes, and recognising non-load related asset condition requirements, the existing 1962 vintage twin Zebra ACSR (core only greased) OHL conductor system on the 32km L2 specification XD route between Denny North and Lambhill, will be replaced with a modern High Temperature Low Sag (HTLS) conductor system, maximising the capacity of the route. Condition based major refurbishment of this route would be required in the RIIO-T3 period to ensure the assets remain fit for purpose and the associated circuits can remain in service. The northern side of XD route shall be uprated to 400kV operation.

Lambhill - The installation at Lambhill 275kV Substation of one new 400/275kV 1000MVA inter-bus transformer. This unit shall replace the infeed to Lambhill 275kV Substation presently provided by the existing Denny North – Lambhill – Windyhill 275kV circuit. The new 400/275kV 1000MVA inter-bus transformer shall be controlled by a dedicated 400kV AIS circuit breaker with Point on Wave control.

XE Route - The northern side of the 18km XE route between Lambhill and Windyhill shall be uprated to 400kV operation. XE route is already insulated for 400kV operation. Clearances associated with the existing twin Totara AAAC conductor system on XE route shall be verified as suitable for operation at 90°C. Any necessary clearance related works shall be undertaken to ensure this capability.

The resulting system configuration between Windyhill, Lambhill and Denny North is indicated schematically in Figure 12 below:

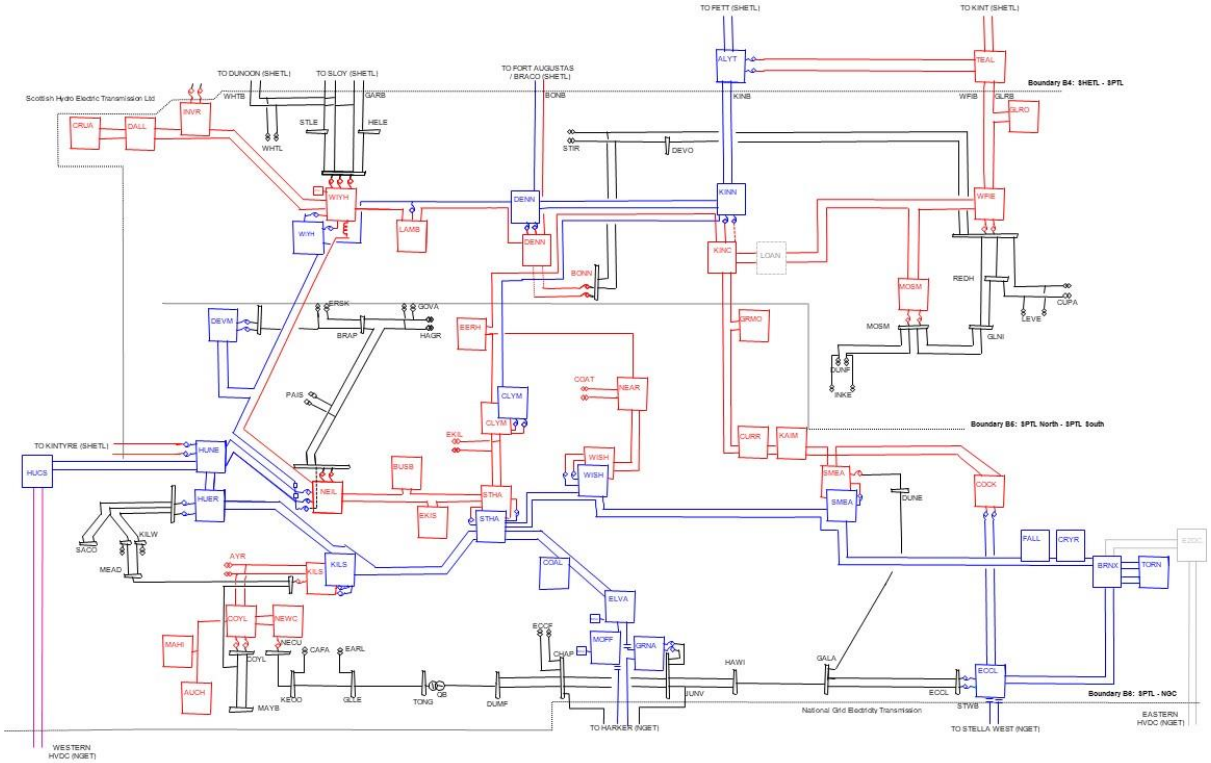

Figure 12: As Figure 11with Windyhill – Lambhill – Denny North 400kV Reinforcement (ref. NOA code DLUP)

4.3.3. Option 1: Baseline – Do Nothing or Delay

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 NESO. The proposed works are identified as Enabling Works in the connection agreements relating to the projects in Table 1.

4.3.4. Option 2: New 400kV GIS Substation at Windyhill

This option involves establishing new 10-bay Windyhill 400kV GIS Substation within the existing Windyhill 275kV Substation compound, indicative layout in Figure A-5, thereby avoiding the requirement to purchase land, establish a new substation civil platform and divert the existing overhead line entries on XF, YW and XE routes. The new 400kV GIS substation will initially connect the following circuits:

- Devol Moor 400kV
- Denny North – Lambhill 400kV
- Windyhill SGT4 (circuit breaker to be equipped with Point on Wave control)
- Windyhill SGT5 (circuit breaker to be equipped with Point on Wave control)

The substation will be equipped with two bus section circuit breakers and two bus coupler circuit breakers, providing security and operational flexibility and helping to minimise future outage requirements. The detailed design of the site will incorporate provision for the termination of up to a further ten circuits:

- Subject to separate regulatory approval, it is proposed that two of these ten bays form part of the initial GIS contract award and site development (these two bays to facilitate the future installation of 2 x 400/132kV transformers to support new connections activity in the wider Windyhill transmission group – ref. SPT-RI-3314).
- It is proposed that space is retained within the GIS building for four future feeder bays at each end of the GIS.

One new 400/275kV 1000MVA inter-bus transformer will be installed at Windyhill 400/275kV Substation (SGT5), replacing the infeed to Windyhill 275kV Substation presently provided by the existing Denny North – Lambhill – Windyhill 275kV circuit.

The proposed configuration as installed on day 1 is indicated schematically in Figure 13.

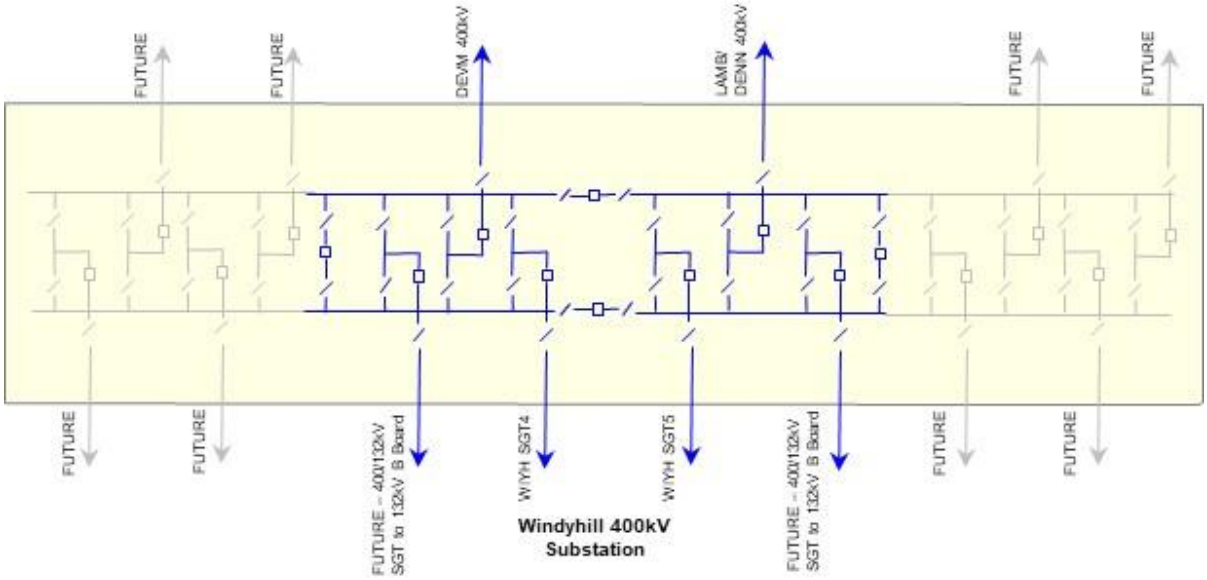

Figure 13: Single Line Diagram, Option 2

4.3.5. Option 3: New 400kV AIS Substation at Windyhill

This option involves establishing new 7-bay Windyhill 400kV AIS Substation to the north of the existing Windyhill 275kV Substation compound, indicative layout in Figure A-6. This option requires land purchase, significant earthworks in order to establish the new substation civil platform, and the diversion of the existing overhead line entries on XF, YW and XE routes. A new terminal tower will be required on YW route (to Dalmally) adjacent to new 275kV cable sealing end compounds, facilitating new line rated cable sections on the Dalmally and Inverarnan 275kV circuit line entries to Windyhill 275kV Substation.

The new 400kV AIS substation would initially connect the following circuits:

- Devol Moor 400kV
- Denny North – Lambhill 400kV
- Windyhill SGT4 (circuit breaker to be equipped with Point on Wave control)
- Windyhill SGT5 (circuit breaker to be equipped with Point on Wave control)

The substation would be equipped with one bus section circuit breaker only, due space constraints, limiting security and operational flexibility. The detailed design of the site would incorporate provision for the termination of up to a further four circuits:

- Subject to separate regulatory approval, it is proposed that two of these four bays form part of the initial AIS contract award and site development (these two bays to facilitate the future installation of 2 x 400/132kV transformers to support new connections activity in the wider Windyhill transmission group – ref. SPT-RI-3314).
- It is proposed that space is retained within the AIS compound for two future feeder bays.

One new 400/275kV 1000MVA inter-bus transformer will be installed at Windyhill 400/275kV Substation (SGT5), replacing the infeed to Windyhill 275kV Substation presently provided by the existing Denny North – Lambhill – Windyhill 275kV circuit.

The proposed configuration is indicated schematically in Figure 14.

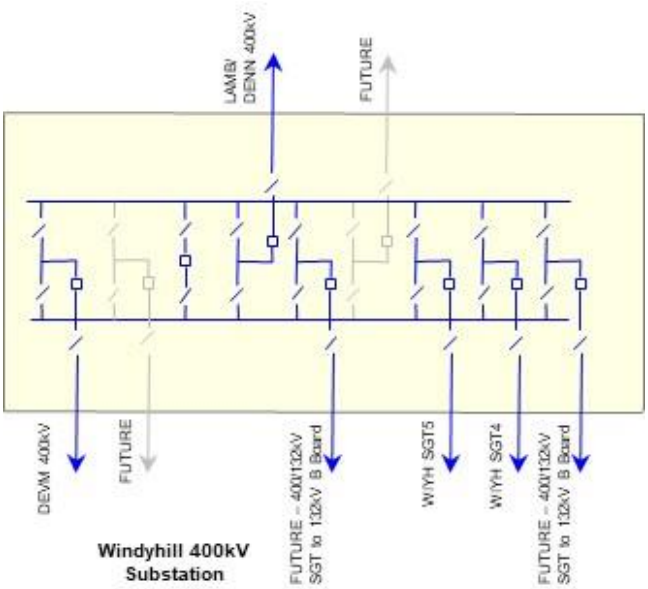

Figure 14: Single Line Diagram, Option 3

4.3.6. Selected Option Discussion- New 400kV GIS Substation at Windyhill and uprating network between Windyhill to Lambhill to Denny North to 400kV.

The GIS option, as discussed within 4.3.4 above has been chosen as the preferred option, primarily due to the significant cost increase required to establish the AIS solution outlined in 4.3.5, with the AIS option being approximately £40m more expensive than the GIS solution. This significant difference is due to the requirement of earth works to extend the substation to the north to accommodate the AIS solution and the 400kV incoming circuits. The land to the north of the substation has a significant gradient which makes this option uneconomic, when compared to the GIS solution, which can be accommodated within the existing Windyhill site (on the area occupied by the old 275kV AIS substation once these works are complete).

Additionally, with the required earthworks for Option 3, it is unlikely that the EISD of 2029 could be achieved due to the additional work this entails, and there would be additional programme risk due to required planning and consenting to extend outwith the existing footprint.

Table 6: System Requirements and Design Parameters of Windyhill - Lambhill - Denny North Reinforcement options

System Design Table	Circuit/Project	**Preferred – Option 2:** New 400kV GIS Substation at Windyhill	**Rejected – Baseline:** Do Nothing / Delay	**Rejected – Option 3:** New 400kV AIS Substation at Windyhill
Thermal and Fault Design	Existing Voltage (if applicable)	275kV	N/A	275kV
	New Voltage	400kV	N/A	400kV
	Existing Continuous Rating (if applicable)	XE Route 2580A / XD Route 1600A	N/A	XE Route 2580A / XD Route 1600A
	New Continuous Rating	XE Route 2580A / XD Route 4000A	N/A	XE Route 2580A / XD Route 4000A
	Existing Fault Rating (if applicable)	40/40kA	N/A	40/40kA
	New Fault Rating	50/55kA	N/A	50/55kA
ESO Dispatchable Services	Existing MVAR Rating (if applicable)	N/A	N/A	N/A
	New MVAR Rating (if applicable)	N/A	N/A	N/A
	Existing GVA Rating (if applicable)	N/A	N/A	N/A
	New GVA Rating	N/A	N/A	N/A
System Requirements	Present Demand (if applicable)	N/A	N/A	N/A
	2050 Future Demand	N/A	N/A	N/A
	Present Generation (if applicable)	N/A	N/A	N/A
	Future Generation Count	N/A	17	N/A
	Future Generation Capacity	N/A	0.9GW	N/A
Initial Design Considerations	Limiting Factor	Thermal capacity of OHL	N/A	Thermal capacity of OHL
	AIS/ GIS	GIS (at WIYH)	N/A	AIS (at WIYH)
	Busbar Design	Double busbar	N/A	Double busbar
	Cable/ OHL/ Mixed	OHL	N/A	OHL
	SI	Use of HTLS on XD route (reconductoring for asset condition purposes) for additional capacity to prevent further intervention.	N/A	Use of HTLS on XD route (reconductoring for asset condition purposes) for additional capacity to prevent further intervention.

5. Selected Option - New 400kV GIS Substation at Windyhill and uprating network between Windyhill to Lambhill to Denny North to 400kV.

This project will establish the following circuits: Devol Moor – Windyhill 400kV; Windyhill – Lambhill – Longannet 400kV; Windyhill SGT4 and Windyhill SGT5.

5.1. Overhead Line Works

Overhead line works as part of the Windyhill - Lambhill - Denny North 400kV Reinforcement will include the following:

5.1.1. Denny North – Lambhill (XD) Route

The northern side of XD route between Denny North and Lambhill will be uprated to 400kV operation.

The existing 1962 vintage twin Zebra ACSR (core only greased) conductor system on the 32km XD route between Denny North and Lambhill shall be replaced with a modern equivalent conductor system delivering a continuous rating not less than that achieved by a twin 'Drake' HTLS conductor system, so as not to restrict the 3150A capability on the Denny North - Lambhill 275kV circuit, and deliver a post-fault rating not less than 4000A on the Denny North - Lambhill 400kV section of the Denny North - Lambhill - Windhill 400kV circuit. While subject to detailed engineering, a High Temperature Low Sag (HTLS) conductor system is expected to be the most economic and efficient solution for this application (on L2 type towers). Insulators shall be replaced, however replacement of the (2004 vintage) earth wire is not proposed to form part of this major refurbishment.

Noise Surveys shall be undertaken to obtain a background reference noise level at various times at sensitive locations.

5.1.2. Lambhill – Windyhill (XE) Route

The northern side of the 18km XE route between Windyhill and Lambhill will be uprated to 400kV operation. Both sides of XE route are already insulated for 400kV operation.

Clearances associated with the existing twin Totara AAAC conductor system on XE route shall be verified as suitable for operation at 90°C on both sides of the route i.e. 400kV on the northern side, 275kV on the southern side. Any necessary clearance related works shall be undertaken to ensure this capability. Where required, relevant land consents and planning permissions shall be sought for these clearance infringement mitigation works.

Noise Surveys shall be undertaken to obtain a background reference noise level at various times at sensitive locations.

5.2. Substation Works

Substation works as part of the Windyhill – Lambhill – Denny North 400kV Reinforcement will include the following:

5.2.1. Substation Works at Denny North 400/275kV Substation

At Denny North 400kV Substation, one bay of 400kV double busbar Air Insulated Switchgear (AIS) will be installed to facilitate the termination of the northern side of XD route in the 400kV busbar system and establish a Denny North – Lambhill – Windyhill 400kV circuit. The Denny North site was originally designed to accommodate this development.

Figure 15 provides an indication of the proposed configuration of Denny North 400/275/132kV Substation.

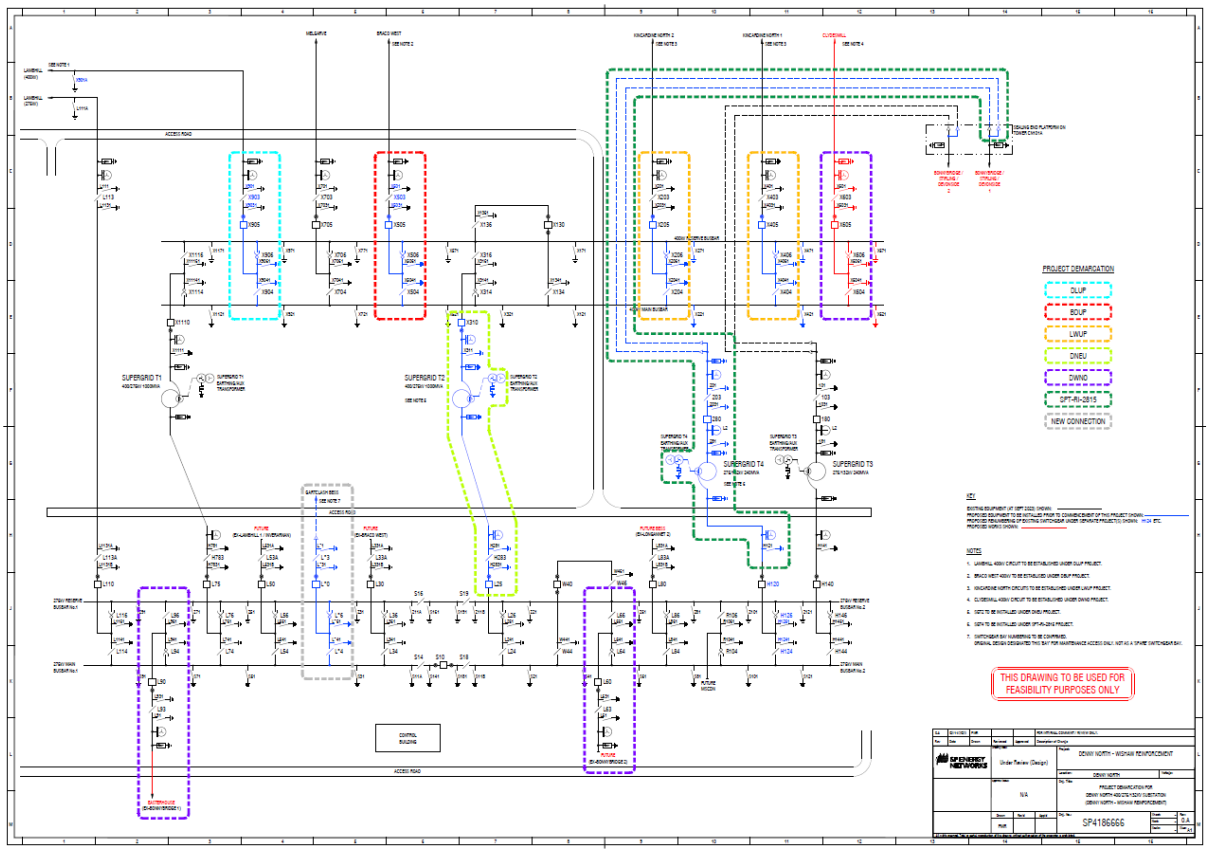

Figure 15: Denny North 400/275/132kV Proposed Configuration

5.2.2. Substation Works at Lambhill 275kV Substation

The project shall involve the installation of one new 400/275kV 1000MVA inter-bus transformer at Lambhill 275kV Substation. This unit shall replace the infeed to Lambhill 275kV Substation presently provided by the existing Denny North – Lambhill – Windyhill 275kV circuit.

The new 400/275kV 1000MVA inter-bus transformer shall be controlled by a dedicated 400kV AIS circuit breaker, equipped with Point on Wave control.

Space shall be retained within the wider site design for a future tertiary connected 33kV 60MVAr shunt reactor, R1, to be connected to the tertiary winding of the new Lambhill SGT1. At this time, the installation of this unit does not form part of this project.

Figure 16 provides an indication of the proposed configuration of Lambhill 400/132kV Substation.

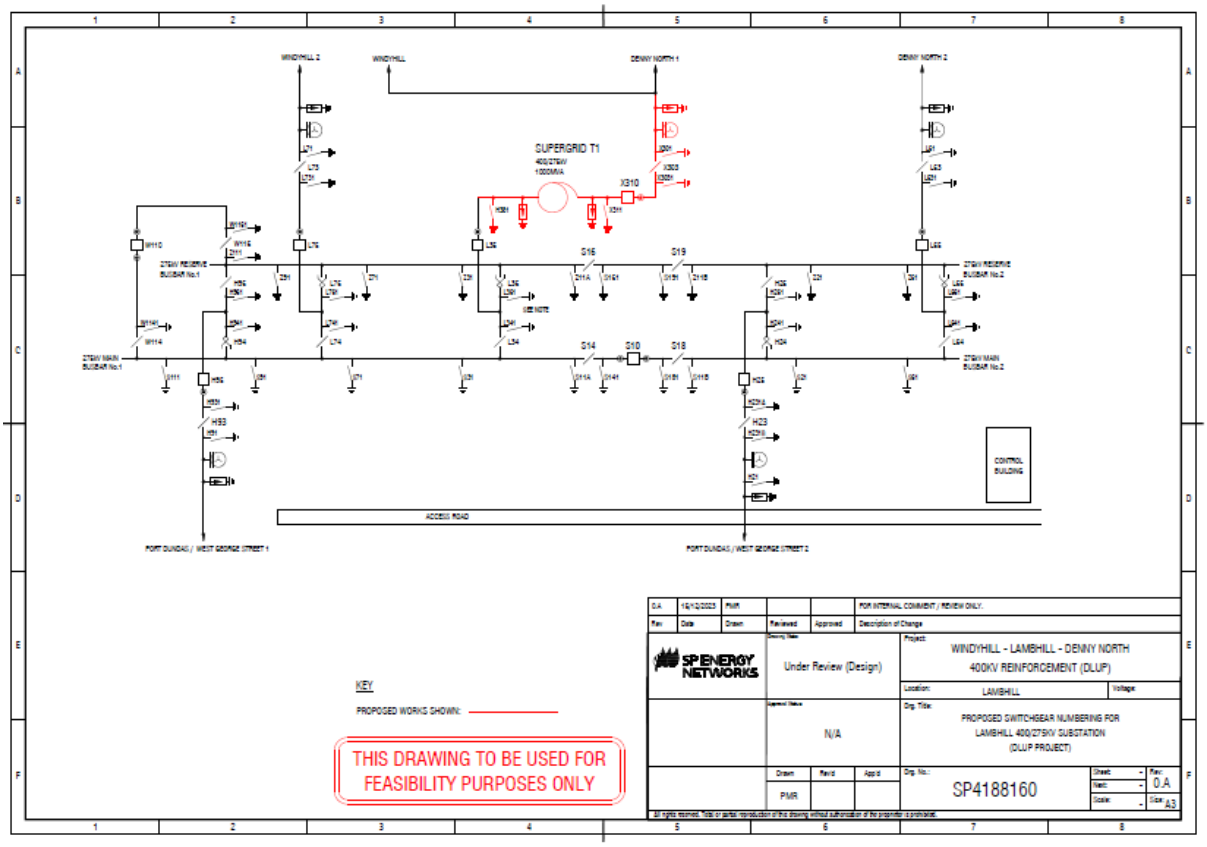

Figure 16: Lambhill 400/275kV Proposed Configuration

5.2.3. Substation Works at Windyhill 400kV Substation

The project shall involve the installation of one new 400/275kV 1000MVA inter-bus transformer at Windyhill 400/275kV Substation. This unit shall replace the infeed to Windyhill 275kV Substation presently provided by the existing Denny North – Lambhill – Windyhill 275kV circuit.

A new Windyhill 400kV GIS Substation shall be established within the existing Windyhill 275kV Substation compound. It will initially connect the following circuits:

- Devol Moor 400kV
- Denny North – Lambhill 400kV
- Windyhill SGT4 (circuit breaker to be equipped with Point on Wave control)
- Windyhill SGT5 (circuit breaker to be equipped with Point on Wave control)

The substation will be equipped with two bus section circuit breakers and two bus coupler circuit breakers, providing security and operational flexibility.

The detailed design of the site will incorporate provision for the termination of up to a further ten circuits:

- Subject to separate regulatory approval, it is proposed that two of these ten bays form part of the initial GIS contract award and site development (these two bays to facilitate the future installation of 2 x 400/132kV transformers to support new connections activity in the wider Windyhill transmission group – ref. SPT-RI-3314).
- It is proposed that space is retained within the GIS building for four future feeder bays at each end of the GIS.

Space shall be retained within the wider site design for the future connection of reactive compensation equipment - the installation of such equipment does not form part of this project.

Figure 17 provides an indication of the proposed configuration of Windyhill 400kV Substation.

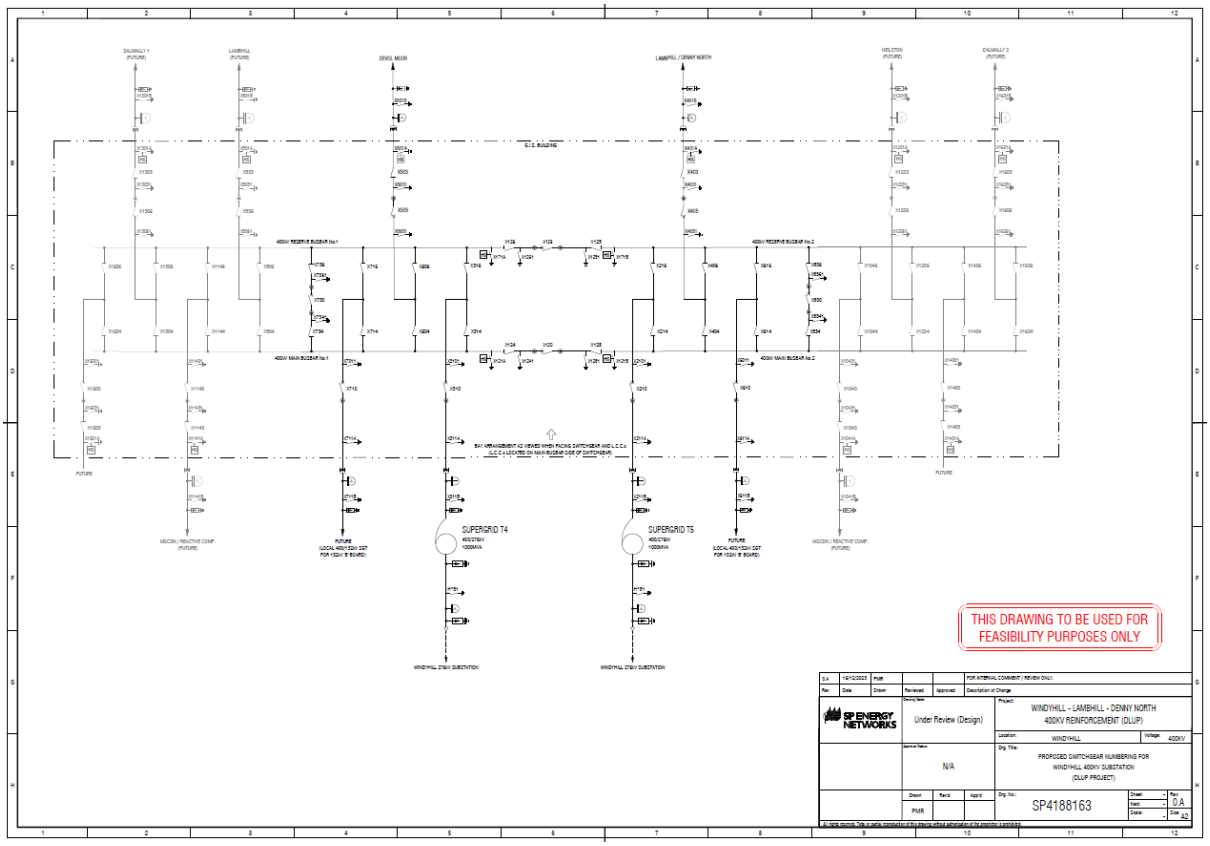

Figure 17: Windyhill 400kV Substation Proposed Configuration

5.2.4. Substation Works at Remote Ends

Works will be required at various remote end substation sites to deliver the primary system configuration above. These sites include Devol Moor 400kV Substation and Windyhill 275kV Substation.

5.3. Civil Engineering Works/ Other

The primary civil engineering works forming part of the DLUP project will comprise:

- The design and construction of the GIS building at Windyhill;
- The design and construction of all foundations and structures necessary to support the equipment within the scope of this project.

5.4. Environmental and Consent Related Works

SPT will take a co-ordinated approach to all aspects of these works, both OHL and substations, in view of the need to deliver an overall and integrated solution which recognises potential interaction and cumulative impacts.

As part of the overhead line scope of works, the northern side of XE and XD routes between Windyhill, Lambhill and Denny North substations will be uprated to 400kV operation, requiring Section 37 consent.

Appropriate consents and land agreements will be required to facilitate operation of the existing XD and XE routes at 400kV, together with all necessary works to ensure acceptable clearances when operating at the higher voltage level.

The approach to consenting substation works at Windyhill and Lambhill shall be coordinated alongside wider OHL consenting approach.

5.5. Stakeholder Engagement

SPT's Stakeholder Engagement Plan for the Windyhill – Lambhill – Denny North 400kV Reinforcement will be closely aligned to our wider Stakeholder Engagement commitments as outlined in our RIIO-T2 business plan. It will centre around timely engagement with a wide range of stakeholders, including those involved in land and planning consents, to achieve mutually acceptable outcomes. We recognise that stakeholders' influence and interest in the project will vary as the project develops and that stakeholders' opinions may change over time.

5.6. Whole System Outcomes

Our optioneering approach has identified "Whole System" solutions in the development of our proposed options, for enabling connection of the proposed renewable generation developments in the area and has considered the appropriate "Whole System" outcome.

5.7. Estimated Total Project Cost

A Business Plan provision and 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. The table provides the prime cost, this excludes Surveys and development costs. Project costs are summarised in the Cost Breakdown below:

Table 8: Project Cost Breakdown

[redacted]

Expenditure incidence is summarised below:

Table 9: Summary of Expenditure Incidence

Energisation Year	Yr. 23/24: Direct CAPEX	Yr. 24/25: Direct CAPEX	Yr. 25/26: Direct CAPEX	Yr. 26/27: Direct CAPEX	Yr. 27.28: Direct CAPEX	Yr. 28/29: Direct CAPEX	Yr. 29/30: Direct CAPEX	RIIO-T2 Total: Direct CAPEX	RIIO-T3 Total: Direct CAPEX	Total: Direct CAPEX
2029	£0.15m	£0.35	£7.49m	£18.20 m	£42.95 m	£45.88 m	£16.25 m	£8.00m	£123.27 m	£131.27 m

5.8. Regulatory Outputs

The indicative primary asset outputs are identified in Table 10 below:

Table 10: Regulatory Outputs Table (Volumes)

Asset Category	Asset Sub-Category Primary	Voltage	Forecast Additions/ Activity	Forecast Disposals
Denny North 400/275kV Substation:				
Circuit Breaker	CB (Air Insulated Busbar) (OD)	400 kV	1	0
Circuit Breaker	CB (Air Insulated Busbar) (OD)	275 kV	0	1*
Other switchgear	Disconnector (AIS) (OD)	400 kV	3	0
Other switchgear	Disconnector (AIS) (OD)	275 kV	0	3*
Lambhill 275kV Substation:				
Circuit Breaker	CB (Air Insulated Busbar) (OD)	400 kV	1	0
Other switchgear	Disconnector (AIS) (OD)	400 kV	1	0
Wound Plant	Transformer	400kV>=500MVA	1	0
Windyhill 400kV Substation:				
Circuit Breaker	CB (Gas Insulated Busbar) (ID)	400 kV	10	0
Wound Plant	Transformer	400kV>=500MVA	1	0
XD OHL:				
Overhead Tower Line	OHL (Tower Line) HTLS Conductor	400 kV	32.024 km	0
Overhead Line Fittings	Fittings	400 kV	102 each	0
Overhead Tower Line	Tower	400 kV	102 each	0
Overhead Tower Line	OHL (Tower Line) HTLS Conductor	275 kV	32.089 km	0
Overhead Tower Line	OHL (Tower Line) Conductor	275 kV	-	64.113 km
Overhead Line Fittings	Fittings	275 kV	102 each	204 each

** Assets to remain in situ for future re-energisation.*

Note that as part of this submission, the table above is indicative of primary asset additions and disposals only and will be further developed for the cost assessment submission e.g. the uprating of overhead line assets from 275kV to 400kV operation, such as on XE route, is not indicated above.

5.9. Environmental and Consents Works

SPT will take a co-ordinated approach to all aspects of these works, both OHL and substations, in view of the need to deliver an overall and integrated solution which recognises potential interaction and cumulative impacts.

As part of the overhead line scope of works, the northern side of XE and XD routes between Windyhill, Lambhill and Denny North substations will be uprated to 400kV operation, requiring Section 37 consent.

The approach to consenting substation works at Windyhill and Lambhill shall be coordinated alongside with wider OHL consenting approach.

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 environmental 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, other effects are best mitigated through local deviations of the route, the refining of tower 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 record of accomplishment 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. 4.1. 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 below summarises the key milestones within the delivery schedule for Stage 1 of this project.

Table 11: Summary of Key Milestones within the Project Delivery Schedule

Item	Project Milestone	Estimated Completion Date
1	GIS Invitation(s) to Tender Issued	Jan 2025
2	Award OHL Contract (Design / Construction)	May 2025 / Feb 2027

3	Award GIS	May 2025
4	Award S/S Contract (Design long-leads/Construct)	April 2025/ Feb 2027
5	Planning Application Submission (Overhead Line)	Feb 2026
6	Works start on Site (Substation)	Apr 2027
7	Planning Decision Received (Overhead Line)	Feb 2027
8	Works start on site (Overhead line)	Mar 2028
9	Completion of works	December 2029

Regular 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.

6.1. Risk and Mitigation

A Risk Register has been generated collaboratively during the initial design stages 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. Currently, the top scheme risks are:

- Securing planning and other consents;
- Supply chain for plant, materials and resources;
- Programme delays due to other works/projects with specific focus on the new 275kV GIS sub-station at Windyhill;
- Securing system access for construction outages;
- Confirmation of programme impact due to increase scope in comparison with NOA7 submission, aiming to maintain 2029 EISD (GIS building sized for 18 bays rather than 8 & additional 2*400kV GIS bays);
- Operation of XE at 400kV, current assumption is that this will present no issues with relation to Noise. (Baseline Surveys and post installation will be undertaken to confirm).

6.2. 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:

6.3. 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.

6.4. 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.

6.5. 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.

6.6. 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.

6.7. Environmental Sustainability

IMS-01-001 encompasses all activities undertaken within and in support of SPEN's 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.

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.

6.8. 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.

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. 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. This project is above both thresholds, however, is not suitable due to:

- Being significantly developed, therefore not suitable for early competition.

- A large portion of the works is integral to existing transmission circuits and substations and are therefore not identified as separable. Splitting of the project to remove these elements would result in works less than both early and late competition thresholds (£50m/£100m).

8. Conclusion

This EJP demonstrates the need for the Windyhill – Lambhill – Denny North 400kV Reinforcement project, with works commencing in the RIIO-T2 period (April 2021 – March 2026) and completing in the RIIO-T3 period. This project will enable the timely and co-ordinated increase in power transfer into and through the SPT network from renewable developments across the north of Scotland.

Key points include:

- Will help to ensure the network is ready for the changes required by Net Zero targets, facilitating new generation in Scotland and reducing constraint costs;
- Is aligned with other planned reinforcement of north to south transfer capability across Boundaries B4 and B5 which has also been recommended to proceed by the NOA process (e.g. ref. NOA7 codes LWUP, DWUP, TKUP, BDUP, TGDC and DWNO); and
- Supports the maximisation of transfer capability via the increased utilisation of existing transmission overhead line routes, helping to relieve thermal bottlenecks in the SPT network and enable the increased connection and transfer of renewable energy.

The submission concludes that:

- The timely connection of low carbon generation, including onshore and offshore wind, will play a vital role in reaching legislated net zero target.
- It is necessary to make significant investment in the capability of the existing transmission system through Scotland and the north of England to accommodate growth in renewable generation. This is required to maintain and operate an economic and efficient transmission system. It is critical to allow the network to keep pace with projected growth to support legislated Net Zero targets whilst also enabling significant constraint savings.
- Significant investment in the transmission system is needed to support renewable generation growth and maintain an efficient system.

Ofgem's agreement is requested to proceed with the preferred solution (Option 2) for the provision of preconstruction and early enabling works funding. A full cost submission will be made to Ofgem at an appropriate time within the RIIO-T3 period via the Load Related Reopener.

9. Appendices

Appendix A – Maps and Diagrams

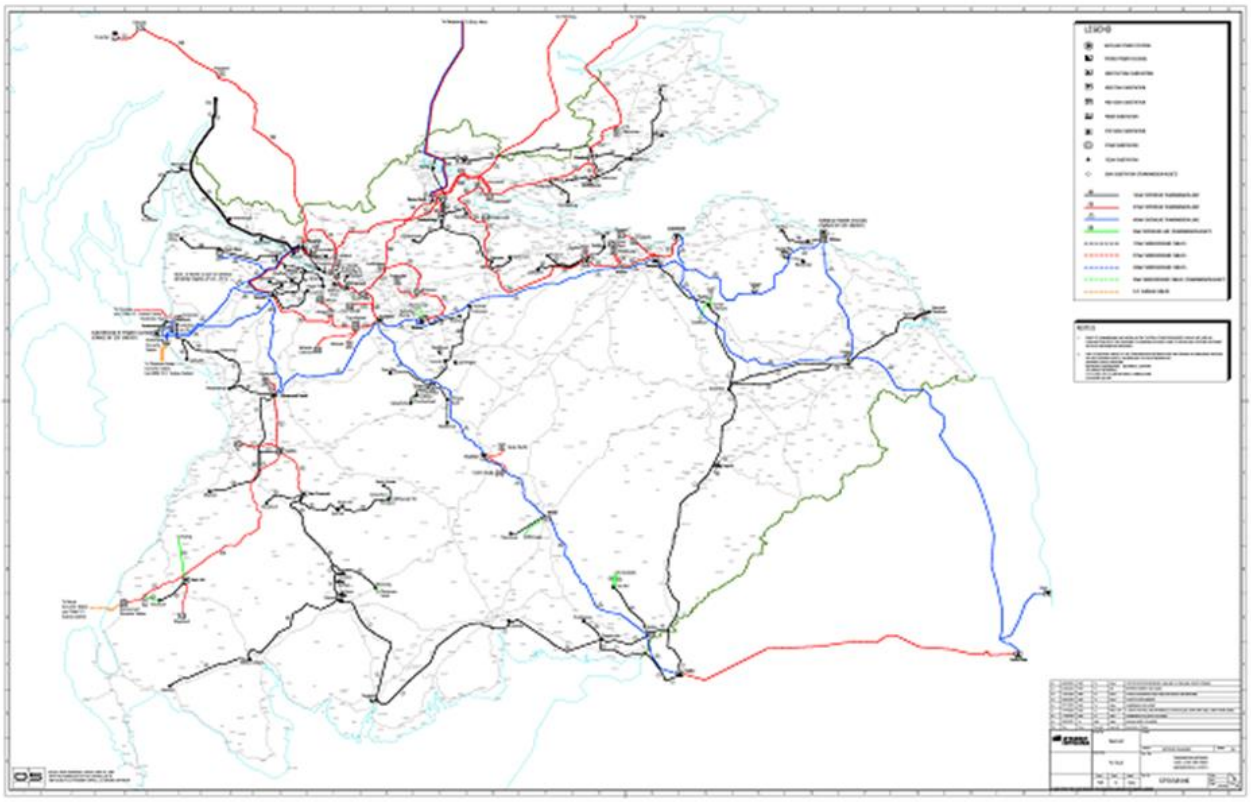

Figure A-1: Geographical layout of the wider SPT Network

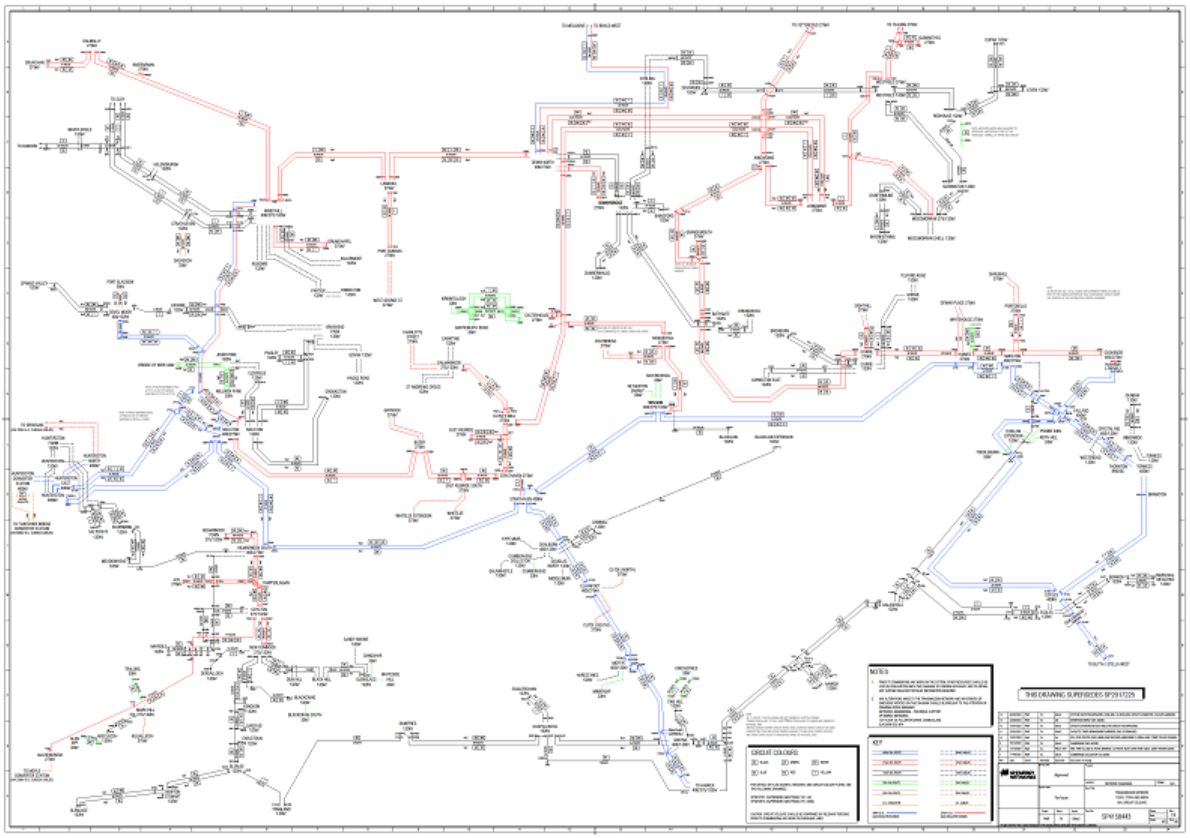

Figure A-2: Networks Diagram of the existing SPT systems – Single Line Diagram

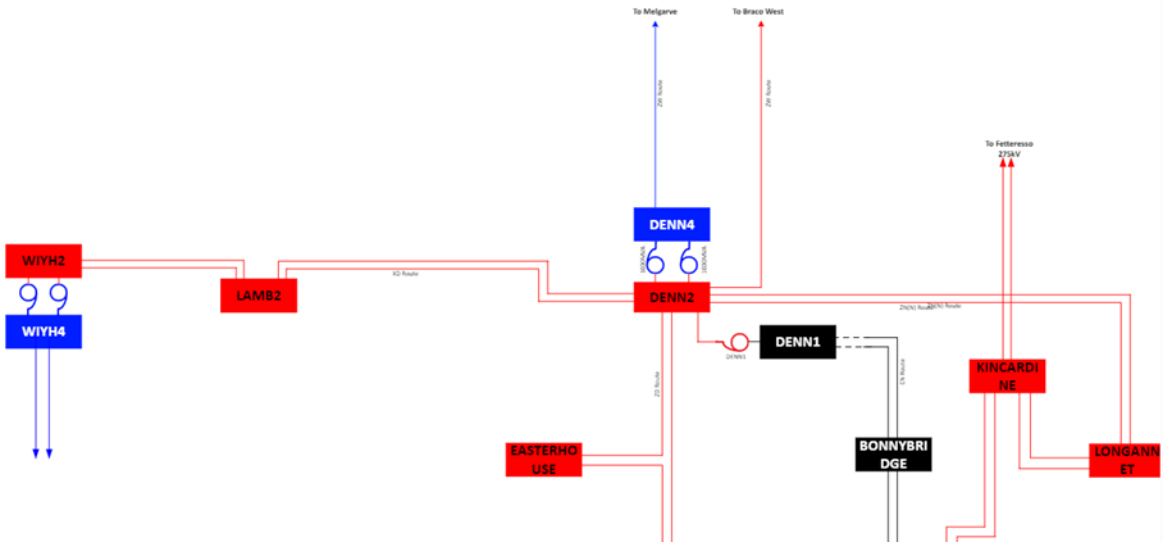

Figure A-3: Network Diagram of the existing SPT system in the Windyhill – Lambhill – Denny North area – Single Line Diagram

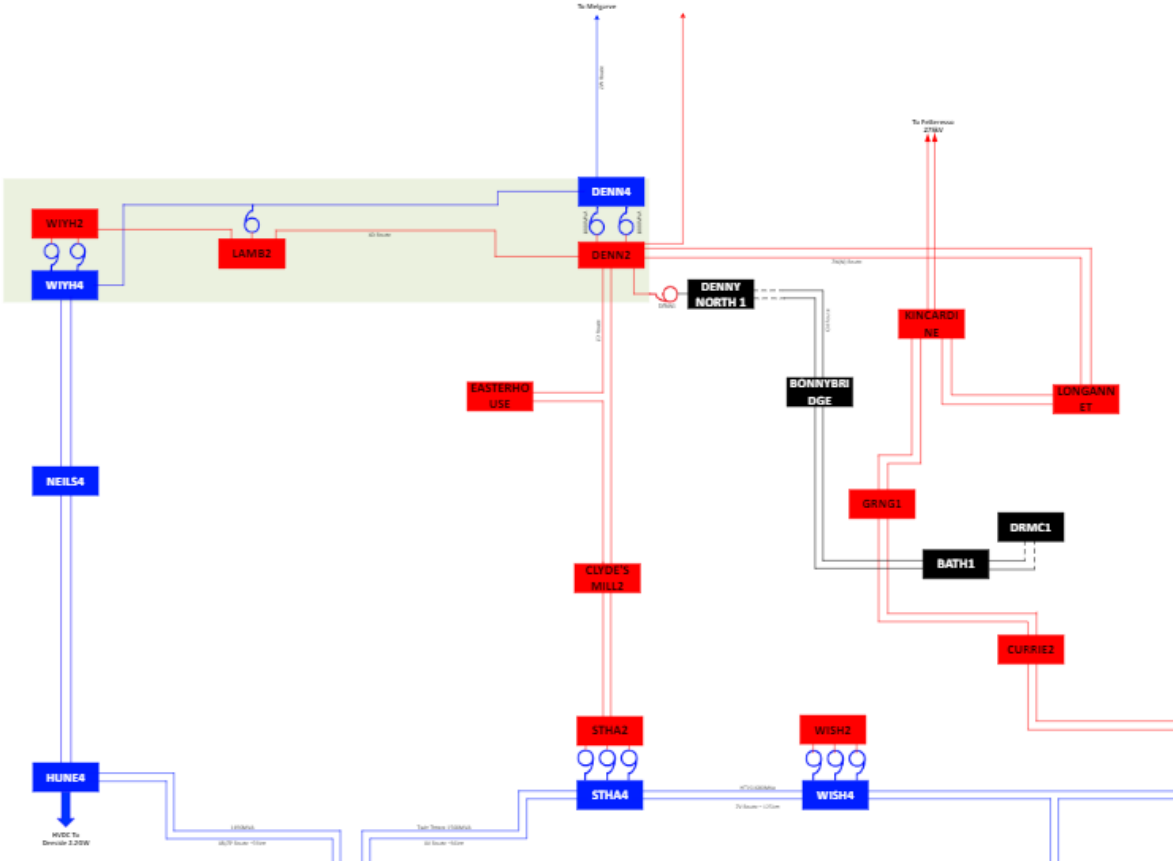

Figure A-4: Network diagram of the proposed SPT system in the Windyhill – Lambhill – Denny North area – Single Line Diagram

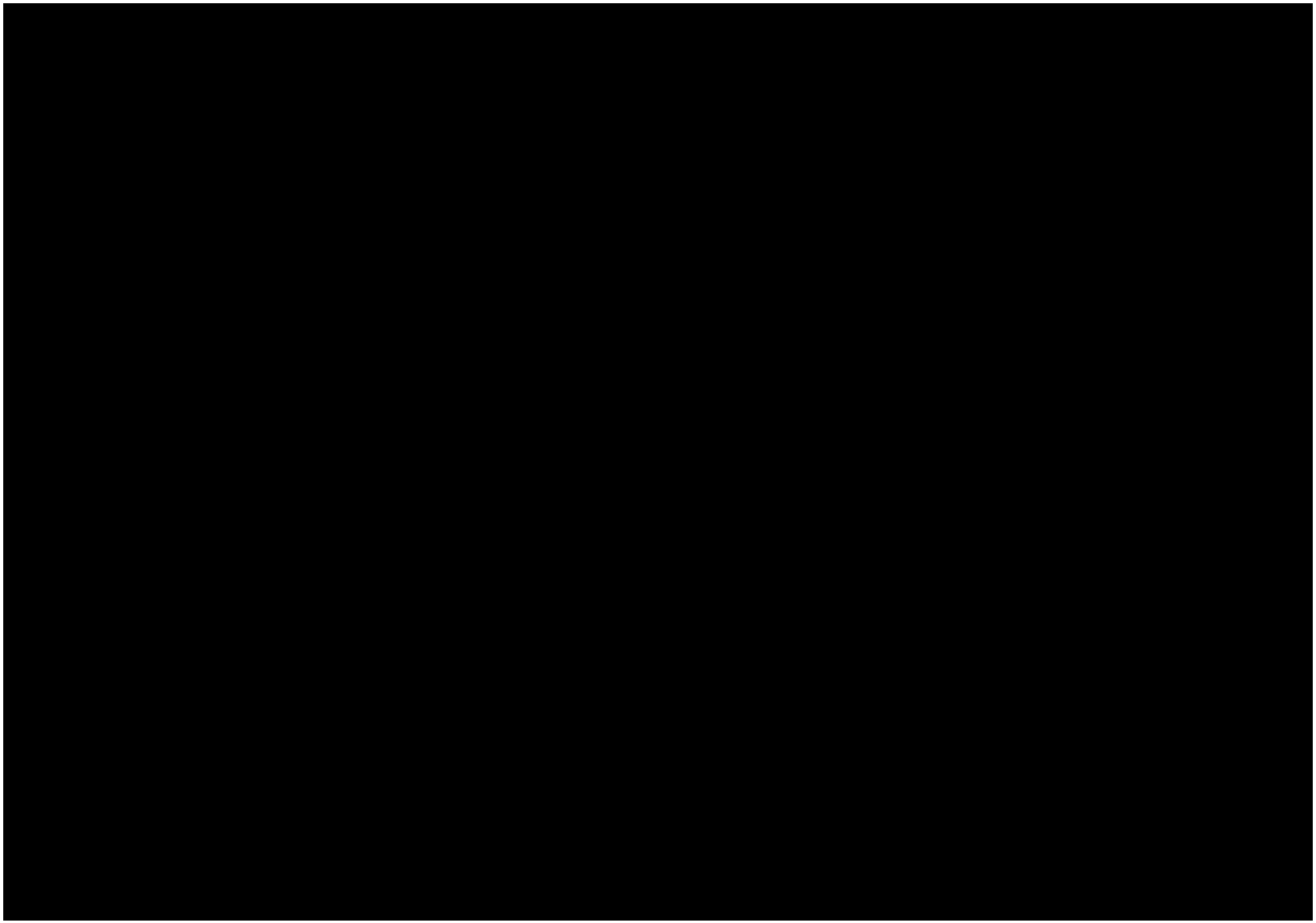

Figure A-5: Layout of Windyhill 400kV and 275kV substations - Option 2 400kV GIS

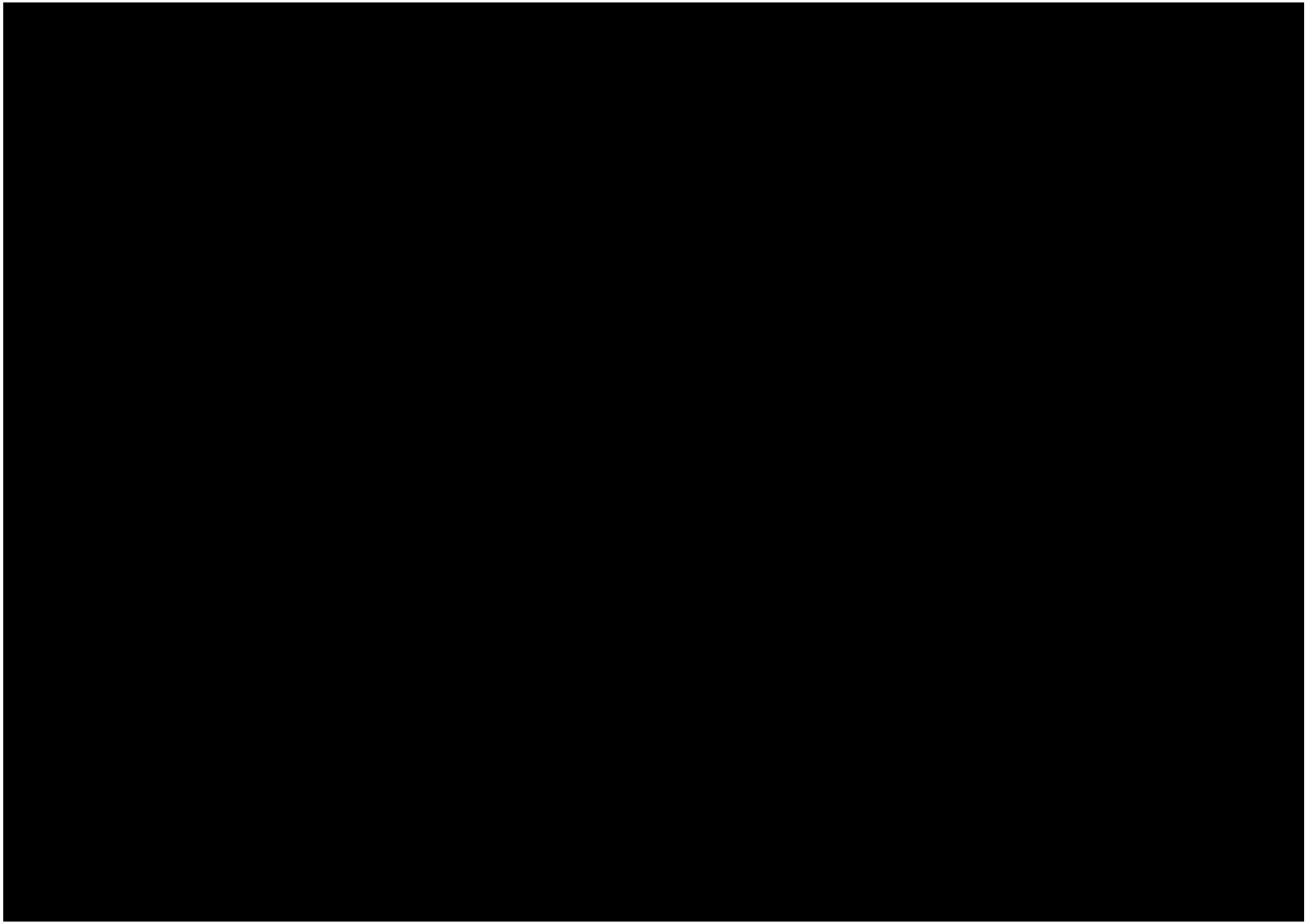

Figure A-6: Layout of Windyhill 400kV and 275kV substations - Option 3 400kV AIS

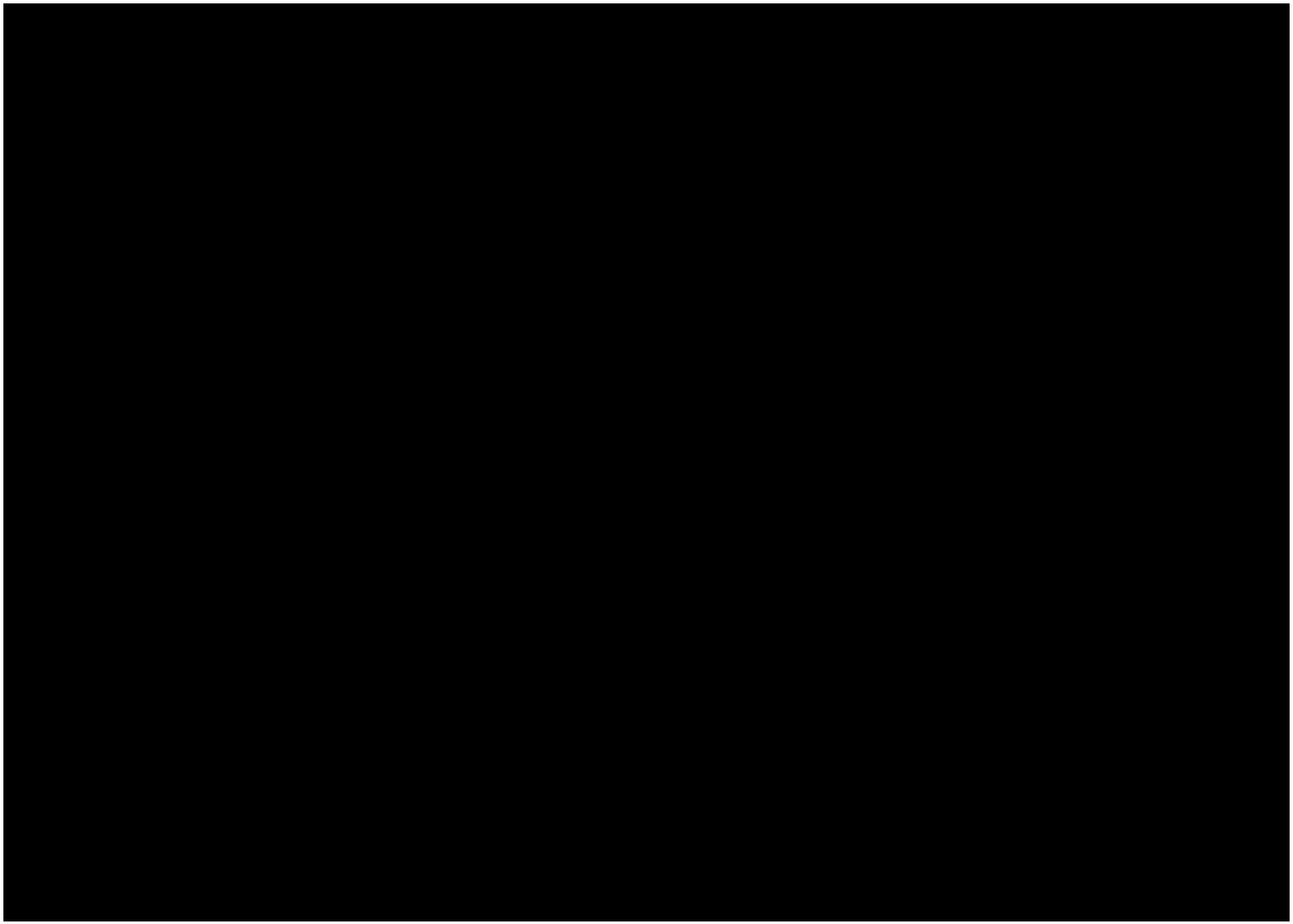

Figure A-7: Proposed layout of Lambhill with new 400/275kV transformer