MSIP Re-opener Applications Stage 1: SPT-RI 2060 Redshaw 400kV Substation; SPT-RI-2061 Redshaw 132kV Substation ('A' Board); and SPT-RI-2139 Redshaw 400/132kV SGT2.		
Ofgem Scheme References/ Name of Schemes	SPT200409 / SPT-RI 2060 Redshaw 400kV Substation; SPT200494/ SPT-RI-2061 Redshaw 132kV Substation ('A' Board); and SPT200497/98 /SPT-RI-2139 Redshaw 400/132kV SGT2.	
Investment Category	Local Enabling (Entry)	
Primary Investment Driver	Connection of customer driven onshore wind generation and Battery Energy Storage Systems	
Licence Mechanism/ Activity	Special Condition 3.14 Medium Sized Investment Projects Re-opener and Price Control Deliverable/ Clause 3.14.6 (a)	
Materiality Threshold exceeded (£3.5m)	Yes, as single projects due to the threshold for activity 3.14.6 (a)	
PCD primary Output	SPT-RI 2060 Redshaw 400kV Substation - Installation of Redshaw 400kV Substation SPT-RI-2061 Redshaw 132kV Substation ('A' Board) - Installation of Redshaw 'A' 132kV Substation SPT-RI-2139 Redshaw 400/132kV SGT2 - Installation of Redshaw SGT2	
Total Project Cost (£m)	SPT-RI 2060 Redshaw 400kV Substation - £47.167m SPT-RI-2061 Redshaw 132kV Substation ('A' Board) - £23.434m SPT-RI-2139 Redshaw 400/132kV SGT2 - £13.781m	
Funding Allowance (£m)	To be confirmed	Requested
Delivery Year	SPT-RI 2060 Redshaw 400kV Substation – 2027/28 SPT-RI-2061 Redshaw 132kV Substation ('A' Board) - 2027/28 SPT-RI-2139 Redshaw 400/132kV SGT2 – 2027/28	
Reporting Table	Annual RRP – PCD Table	
PCD Modification Process	Special Condition 3.14, Appendix 1	

Issue Date	Issue No	Amendment Details
31st January 2024	1	First issue of document.

This page is intentionally blank.

Table of Contents

1. Abbreviations / Terminology

Table 1: Table of Abbreviations

Abbreviation	Term
ACM	Asbestos Containing Material
AIS	Air Insulated Switchgear
BEIS	Department for Business, Energy & Industrial Strategy
CDM	Construction Design and Management
CEC	Connection Entry Capacity
CION	Connection and Infrastructure Options Note
CT	Current Transformer
GIS	Gas Insulated Switchgear
GSP	Grid Supply Point
ITT	Invitation to Tender
Km	Kilometre
kV	Kilovolt
LC	Licence Condition
LSpC	Licence Special Condition
MSIP	Medium Sized Investment Project
MW	Megawatt
NETS SQSS	National Electricity Transmission System Security and Quality of Supply Standard
NGET	National Grid Electricity Transmission
NGESO	National Grid Electricity System Operator
NOA	Network Options Assessment
OHL	Overhead Line
PoC	Point of Connection
PCD	Price Control Deliverable
RIIO	Revenue = Incentives + Innovation + Outputs
SCADA	Supervisory Control and Data Acquisition
SGT	Supergrid Transformer
SHET	Scottish Hydro Electric Transmission
SPT	SP Transmission
SPEN	SP Energy Networks
STC	System Operator – Transmission Owner Code
VDUM	Volume Driver Uncertainty Mechanism
VT	Voltage Transformer
WF	Windfarm

2. Reference Documents

Table 2: Table of Reference Documents

Document Reference	Title
SPEN-RIIO-T2_Business_Plan	SP Energy Networks RIIO T2 Business Plan 2021 - 2026

3. Introduction

This MSIP Re-opener submission sets out SP Transmission's (SPT) plans to establish: (i) Redshaw 400kV Substation; (ii) Redshaw 132kV Substation ('A' Board); and (iii) Redshaw 400/132kV SGT2. This submission supports three discrete MSIP Re-opener applications, one application for each of the three projects summarised above. The purpose of these projects is to facilitate the connection of contracted onshore wind generation and Battery Energy Storage Systems. These works are programmed to commence in the RIIO-T2 period (April 2021 – March 2026) and complete in 2027/28, during the RIIO-T3 period.

Forming part of the wider Redshaw 400/132kV Substation development in South Lanarkshire, the three discrete MSIP Re-opener applications to which this submission relates are as follows:

- SPT-RI-2060 – Redshaw 400kV Substation
- SPT-RI-2061 – Redshaw 132kV Substation ('A' Board)
- SPT-RI-2139 – Redshaw 400/132kV SGT2

Redshaw 400kV Substation (ref. SPT-RI-2060) will connect to the Strathaven – Harker 400kV (ZV) overhead line route between Coalburn and Elvanfoot 400kV Substations. As well as directly enabling the connection of 1030MW of contracted generation in the local area, Redshaw 400kV Substation will also facilitate the future extension of the transmission network from the planned Glenmuckloch 132kV Substation to Redshaw 400kV Substation (ref. SPT-RI-236), enabling the connection of a further 650MW of contracted renewable generation capacity in southwest Scotland.

The establishment of Redshaw 132kV Substation ('A' Board) (ref. SPT-RI-2061) and the provision of additional inter-bus transformer capacity (ref. SPT-RI-2139) together facilitate the connection of a further 288MW and 396MW respectively of contracted generation in the local area.

The proposed configuration of the wider Redshaw 400/132kV Substation will help to ensure the network is ready for the changes required by Net Zero targets. While capable of expansion, this configuration will help to reduce the risk of future busbar system extension requiring lengthy network outages and disruptive reconfiguration.

These (three) MSIP Re-opener applications are submitted in accordance with Licence Special Condition (LSpC) 3.14.6 and relate specifically to LSpC 3.14.6 activity (a):

"3.14.6 The licensee may apply to the Authority for a direction amending the outputs, delivery dates or associated allowances in Appendix1 in relation to one or more of the following activities:

(a) a Generation Connection project, including all infrastructure related to that project, the forecast costs of which are at least £4.24m more or less than the level that could be provided for under Special Condition 3.11 (Generation Connections volume driver)"

Applying the RIIO-T2 Generation Connections Volume Driver Uncertainty Mechanism (VDUM) individually to each project results in an underperformance such that an MSIP Re-opener application is required in each case. This is summarised in Table 3 below.

Table 3 - Project Cost Summary Table Vs. VDUM

Project	Forecast Cost, £m (18/19)	RIIO T2 VD Allowance, (£m) (18/19)	Over/Under (-) Performance, (£m)
SPT-RI-2060	47.167	18.300	- 28.867
SPT-RI-2061	23.434	5.300	- 18.134
SPT-RI-2139	13.781	5.300	- 8.481

The estimated total project costs may be subject to change. A second stage MSIP submission for each project will be made at the right time relating to the associated amendments to the outputs, delivery dates and allowances to be detailed as Price Control Deliverables (PCDs) in LSpC 3.14 Appendix 1.

The needs case for the Redshaw 400/132kV Substation development 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 options is presented, together with a detailed description of the proposed solutions.

3.1 Structure of Document

This MSIP Re-opener application is structured as follows:

Section 4 – Background and Needs Case

This section outlines the background to the proposed works and details the key project drivers.

Section 5 – Assessment of Options

This section sets out the approach taken to considering the distinct options available to address the need identified in Section 4. The results of an evaluation of the alternative options are presented and the reasoning behind the selection of the preferred investment options is summarised.

Section 6 – Proposed Works

This section provides a description of the proposed solutions. It sets out the project scopes and other key supporting information.

Section 7 – Project Cost Estimate

This section summarises the estimated cost of the selected options.

Section 8 – Project Delivery

This section outlines the approach which will be taken to deliver the projects.

Section 9 – Conclusions and Recommendations

This section summarises the conclusions and includes recommendations to be taken.

3.2 Requirements Mapping Table

Table 4 maps the requirements set out within Chapter 3 of the Re-opener Guidance and Application Requirements Document[1] against specific sections within this document.

Table 4 - Requirements Mapping Table

Section	Description	Relevant Section(s) in Re-opener Guidance and Application Requirements Document
3	Introduction	3.3, 3.4
4	Background and Needs Case	3.8, 3.9, 3.10, 3.11
5	Assessment of Options	3.13, 3.14, 3.21, 3.22
6	Proposed Works	3.14
7	Project Cost Estimate	3.12, 3.19, 3.20
8	Project Delivery	3.15, 3.16, 3.17

[1] Re-opener Guidance and Application Requirements Document: Version 3

4. Background and Needs Case

4.1 Statutory and Licence Obligations on SP Transmission plc

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

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

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

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

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

4.2 Key Project Drivers

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

Commitments by the UK Government in October 2021, to decarbonise the power system by 2035, further support the requirement for investment in the existing electricity transmission system to enable the timely connection and integration of the required renewable generation sources. In December 2022 the Scottish Government published its Onshore Wind Policy Statement[2], setting out its ambition to deploy 20GW of onshore wind capacity by 2030.

On 9th September 2021, the former Department for Business, Energy & Industrial Strategy (BEIS) announced a £265m[3] budget per year for the Contracts for Difference (CfD) Allocation Round 4, which

[2] Onshore wind: policy statement 2022 - gov.scot (www.gov.scot)
[3] Biggest ever renewable energy support scheme backed by additional £265 million - GOV.UK (www.gov.uk)

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[4]. The results of the CfD Allocation Round 5 were announced on 8th September 2023, with annual auction rounds expected thereafter.

4.3 ZV Route – Background

ZV route is a 126km 400kV double circuit overhead line route which connects SPT's Strathaven 400kV Substation, southeast of Glasgow, to NGET's Harker 400kV Substation, north of Carlisle.

Constructed in 1993 utilising L8 Type steel lattice towers and comprising a twin All Aluminium Alloy Conductor (AAAC) 500mm^2 'Rubus' phase conductor bundle, ZV route forms a strategic north - south power corridor between the south of Scotland and north of England.

The 2021/22 NOA Refresh Report, published in July 2022, supports two separate but related proposals to progress the replacement and uprating of the conductor system on ZV route with a HTLS conductor system (ref. NOA7 codes EHRE and VERE), identifying both as an 'HND essential option'. This recommendation continues to be supported by the 2023/24 NOA, due to be published in March 2024[5]. These projects are the subject of separate MSIP Re-opener applications, similarly submitted to Ofgem in January 2024.

Figure 1 provides a geographic indication of ZV route in the context of key transmission boundaries in the SPT area.

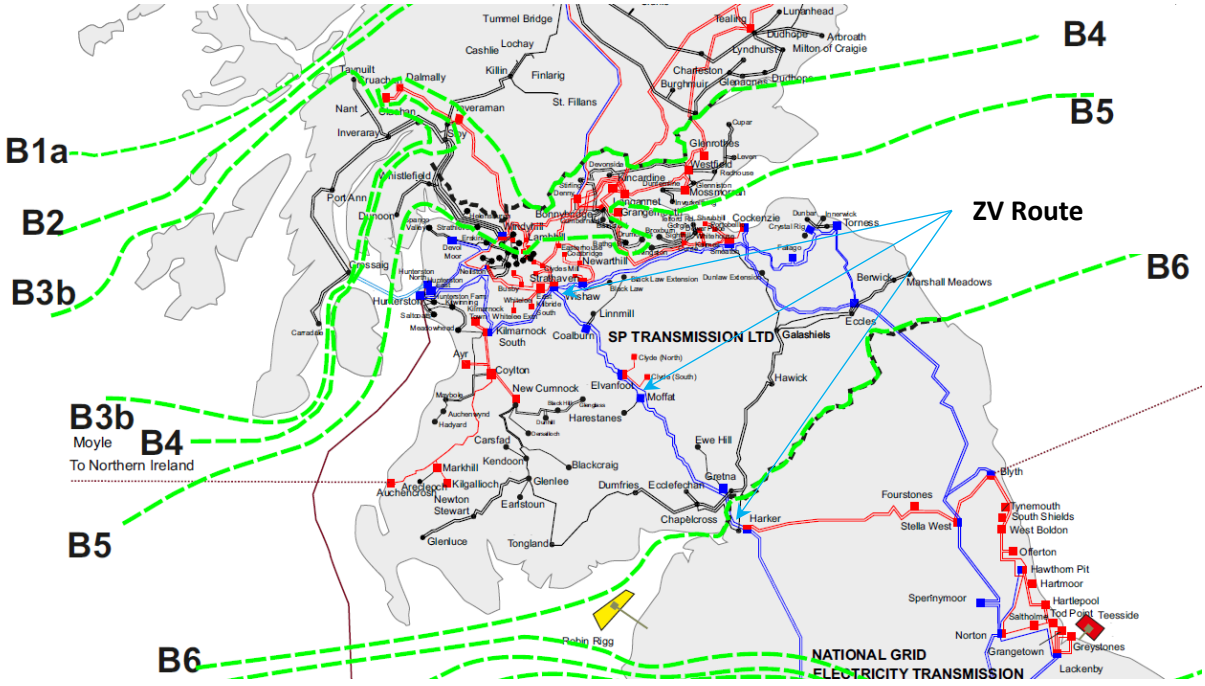

Figure 1 – Main Network Boundaries Across SP Transmission Area and ZV Route

[4] BEIS Electricity Generation Costs (2020) - GOV.UK (www.gov.uk)

[5] NGESO confirmed "Proceed" recommendation for EHRE and VERE at the NOA 2023 / TCSNP Governance meeting on 1st Dec 2023.

A geographic overview of the existing SPT system is provided in Appendix A. Figure 2 below shows an extract from this geographic overview, indicating ZV Route between Strathaven, Coalburn and Elvanfoot 400kV Substations.

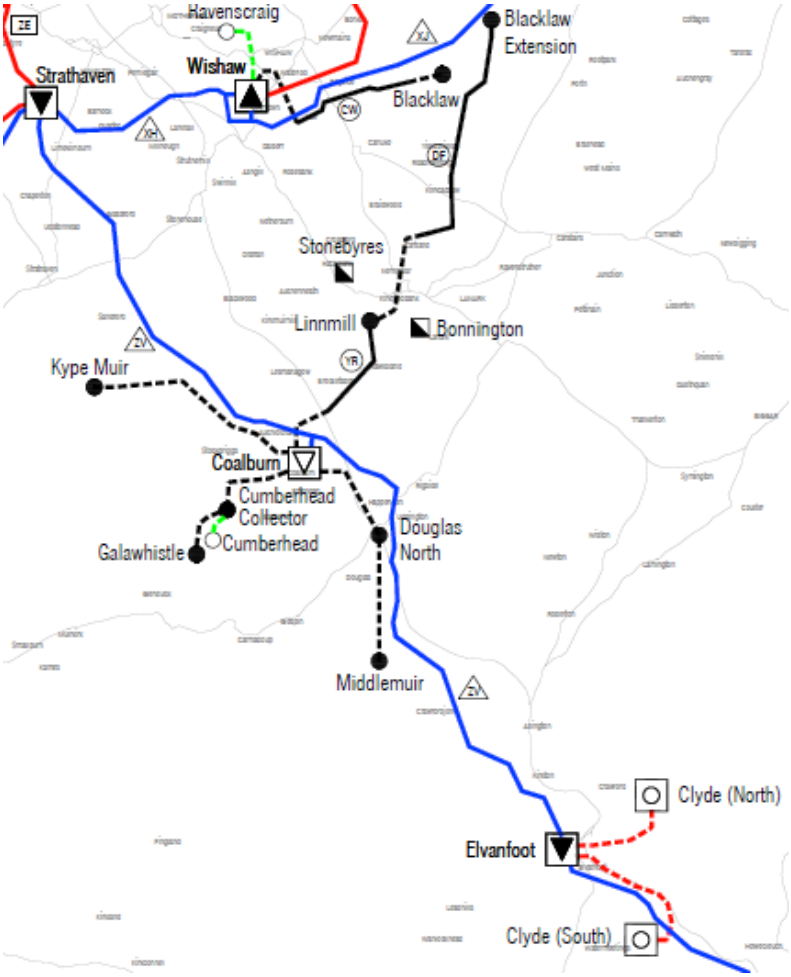

Figure 2 - Geographic View of ZV Route Between Strathaven and Elvanfoot Substations

The existing 400kV substation sites at Coalburn and Elvanfoot support significant existing and planned onshore wind and Battery Energy Storage System (BESS) capacity.

4.4 Existing System at Coalburn

This section provides background relating to the existing Coalburn 400/132kV Substation and planned Coalburn North 400kV Substation, connected and contracted connections into this location as well as physical considerations associated with its development.

Coalburn 400/132kV Substation forms part of the Main Interconnected Transmission system (MITS) in southern Scotland, situated to the south of Lesmahagow in South Lanarkshire. Coalburn 400/132kV Substation forms part of the west coast onshore electrical interconnection between Scotland and England and serves Linnmill 132/33kV Grid Supply Point (GSP). It utilises Air Insulated Switchgear (AIS) with 400kV and 132kV equipment in a double busbar configuration. South Lanarkshire is an area rich in wind energy resource. Both Linnmill GSP and Coalburn 400/132kV Substations serve as 'collector' sites for onshore wind energy developments.

Coalburn substation has existing and contracted connections at both 400kV and 132kV. Further significant extension of the existing substation platform is not considered feasible due to local considerations, most notably the Coalburn Moss Site of Special Scientific Interest (SSSI), which makes both extension of the substation platform and physically achieving connections into the substation extremely challenging from an environmental planning and circuit routing perspective.

The development of 'Coalburn North' 400kV Substation, a planned 400kV AIS double busbar development to the north of the existing compound and on the northern (eastern) side of ZV route, is considered feasible, and provides the means of connecting several contracted BESS developments in the area, totalling 1520MW (as per Table 5 below) as well as a 1400MW contracted demand facility. The Coalburn North 400kV Substation project will be the subject of a separate MSIP Re-opener application in due course.

The continued renewable generation activity in the South Lanarkshire area however, together with the need to accommodate additional generation in southwest Scotland, result in the need for the development of Redshaw 400/132kV Substation, to the south of Coalburn.

4.4.1 Contracted Position at Coalburn and Coalburn North 400kV Substations

Several planned battery storage developments have contracted for connection directly into Coalburn 400kV Substation and the planned Coalburn North 400kV Substation.

The first connection to contract for connection directly into Coalburn 400kV Substation was the planned 500MW Coalburn Battery Storage Facility (SPT-TOCO-1785)[6]. The subsequent connections require the establishment of the planned Coalburn North 400kV Substation (ref. SPT-RI-2058). As noted in SPT's RIIO-T2 MSIP Re-opener Application re SPT-RI-263 – Coalburn SGT4 of January 2022, it is proposed to develop a new Coalburn North 400kV Substation due to the need to manage loss of infeed risk and challenges in relation to further extending the existing 400kV compound.

Table 5 below outlines the generation projects contracted to connect into Coalburn 400kV and Coalburn North 400kV Substations. All direct generation connections into Coalburn 400kV and Coalburn North 400kV Substations relate to planned BESS developments.

Table 5 – Contracted Generation into Coalburn and Coalburn North 400kV Substations

Site	Connection Status	Consent Status	Capacity (MW)	Contracted Energisation Date	Connecting Substation
Coalburn Battery Storage Facility	Contracted	Consented	500	31/10/2025	Coalburn 400kV
Zenobe Coalburn Battery Storage	Contracted	Application	220	30/06/2026	Coalburn North 400kV
Rawhills Battery Energy Storage Facility	Contracted	Application	500	16/04/2027	Coalburn North 400kV
Roger Hill Farm	Contracted	Application	300	31/10/2031	Coalburn North 400kV
Total			**1520**		

Figure 3 below shows the contracted position of generation connections into Coalburn and Coalburn North substations.

[6] Copenhagen Infrastructure Partners takes FID on 1,000 MWh

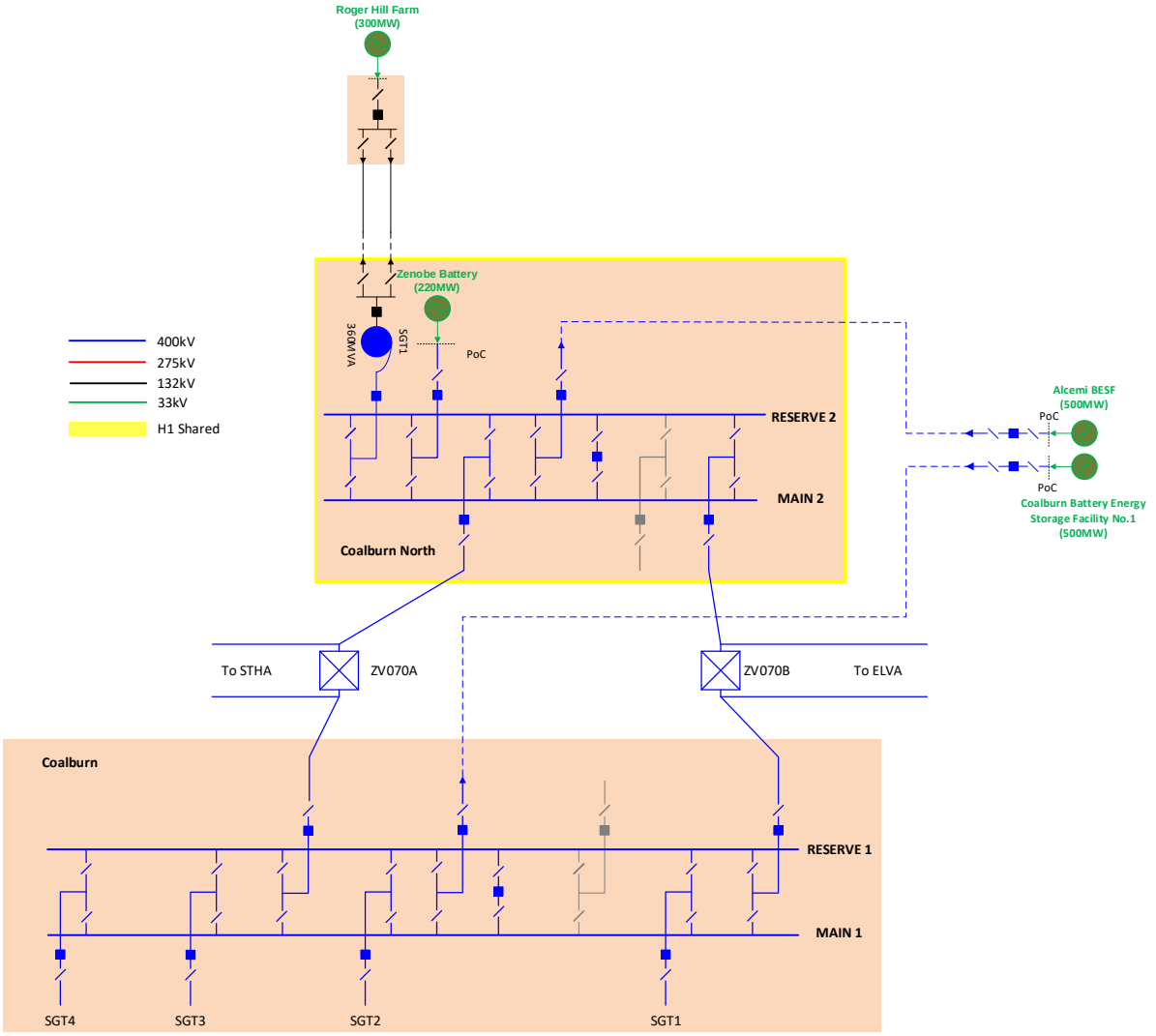

Figure 3 – Contracted Position of Connections into Coalburn and Coalburn North Substations

In addition to the generation developments detailed in Table 5 and indicated schematically in Figure 3 above, a 1400MW demand facility has also recently accepted an offer for connection via Coalburn North 400kV Substation. The further infrastructure required to accommodate this development is not indicated in Figure 3 above.

4.4.2 Contracted Position at Coalburn 132kV Substation

Coalburn 132kV Substation supports fifteen directly connected transmission windfarms as well as accommodates embedded renewable generation connected via Linnmill GSP.

Table 6 below indicates all connected and contracted generation into Coalburn 132kV Substation.

Table 6 - Connected/Contracted Generation into Coalburn 132kV Substation

Site	Connection Status	Consent Status	Capacity (MW)	Contracted Energisation Date
Blacklaw Extension	Connected	-	69.0	-
Douglas West	Connected	-	45.0	-
Galawhistle	Connected	-	55.2	-
Kennoxhead Extension	Connected	-	60.0	-
Kype Muir	Connected	-	88.4	-
Linnmill GSP (Embedded)	Connected	-	171.5[7]	-
Middlemuir WF	Connected	-	51.0	-
Dalquhandy WF	Connected	-	45.0	-
Cumberhead WF	Connected	-	50.0	-
Harting Rig	Connected	-	67.2	-
Broken Cross	Connected	-	48.0	-
Kennoxhead	Contracted	Consented	112.0	27/02/2024
Hagshaw Hill Repower Phase 1	Contracted	Consented	30.0	30/05/2024
Hagshaw Hill Repower Phase 2	Contracted	Consented	54.0	30/05/2024
Douglas West Extension	Contracted	Consented	60.0	31/07/2024
Cumberhead West	Contracted	Consented	114	01/11/2024
TOTAL			**1120.3**	

At Coalburn 132kV Substation, a total of 1200MVA of transformer capacity will exist upon the commissioning of Coalburn SGT4 (across two 240MVA units and two 360MVA units). Noting the connected and contracted generation position in Table 6 above means that these transformers are committed to circa 98% of their total thermal capacity. This coupled with the physical challenges associated with further infrastructure in the Coalburn area, beyond that already planned, means the scope for any further generation capacity at Coalburn 132kV Substation is extremely limited.

Figure 4 below shows a single line diagram of all the connections into the Coalburn 'A' and 'B' 132kV boards.

[7] Linnmill GSP has a total of 171.5MW of embedded renewable capacity, together with a maximum demand of approximately 55MW and minimum demand of approximately 14MW.

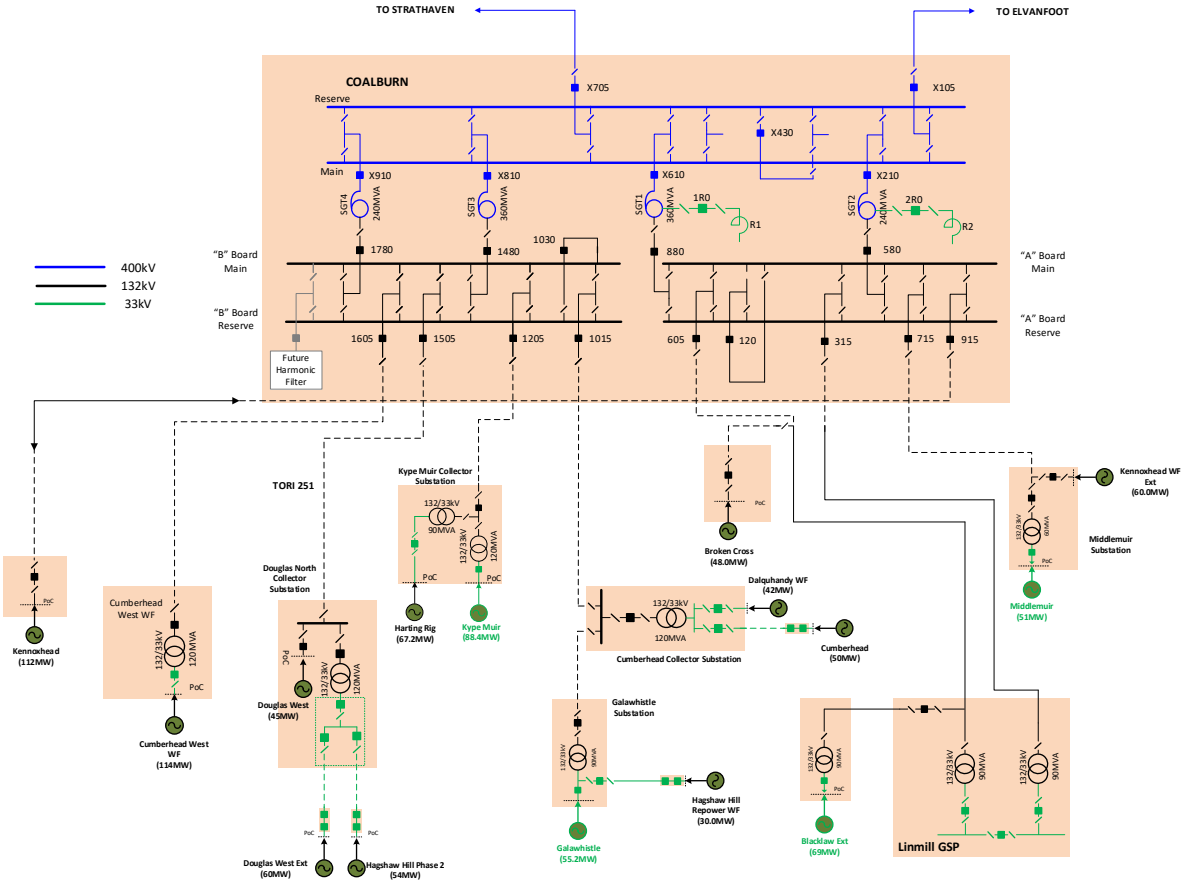

Figure 4 - Coalburn 'A' and 'B' Boards Connected/Contracted Position

4.5 Existing System at Elvanfoot

This section provides background relating to the existing Elvanfoot 400/275kV Substation, connected and contracted connections as well as physical considerations associated with its development.

Elvanfoot substation is a 400kV double busbar substation. Both sides of ZV route are turned in to Elvanfoot 400kV Substation and, a single 400kV 225MVAr Mechanically Switched Capacitor Damping Network (MSCDN) provides voltage support under high power transfer conditions from Scotland to England.

The substation was established to maintain traction supplies to the West Coast Mainline (via two 400/25kV 80MVA transformers), as well as to integrate the 374.5MW Clyde North and 128.8MW Clyde South Wind Farm connections (via two 400/275kV 500MVA transformers, one for each connection).

4.5.1 Contracted Position at Elvanfoot 400kV Substation

There are currently no connections proposed to connect directly into the 400kV double busbar substation at Elvanfoot. Extension of the substation platform could only be achieved to the west, however space in this direction is extremely limited by virtue of the given the nearby Elvan Water and associated topography.

4.5.2 Contracted Position at Elvanfoot 275/132kV Substation

As noted above, both Clyde North and Clyde South Wind Farms are connected into Elvanfoot via 400/275kV transformers. Further applications for connection have been received in the area; a small compound extension is required to create space for a 275/132kV transformer in order to facilitate the Priestgill Wind Farm, Elvanfoot (9.8MW) Energy Storage, North Lowther Energy Initiative, Elvanfoot (25MW) Energy Storage and Elvanfoot (50MW) Energy Storage connections.

Table 7 below shows the connected and contracted generation connected into Elvanfoot substation.

Table 7 - Connected/ Contracted Generation into Elvanfoot 400/275kV Substation

Site	Connection Status	Consent Status	Capacity (MW)	Contracted Energisation Date	Connecting SGT
Clyde North	Connected	-	374.5	-	SGT1A
Clyde South	Connected	-	128.8	-	SGT2A
Whitelaw Brae Wind Farm	Contracted	Consented	57.0	28/06/2024	SGT2A
Priestgill Wind Farm	Contracted	Application	43.63	06/12/2024	SGT2A
Elvanfoot (9.8MW) Energy Storage	Contracted	Application	9.8	06/12/2024	SGT2A
Whitelaw Brae BESS	Contracted	Pre-Application	1.0	31/07/2026	SGT2A
North Lowther Energy Initiative	Contracted	Application Refused	151.2	01/04/2028	SGT2A
Elvanfoot (25MW) Energy Storage	Contracted	Application	25.0	26/10/2029	SGT2A
Elvanfoot (50MW) Energy Storage	Contracted	Application	50.0	26/10/2029	SGT2A
TOTAL			**840.93**		

At Elvanfoot a total of 1000MVA transformer capacity is available across two 500MVA units. Table 8 below indicates the prospective loadings on these units.

Table 8 - Elvanfoot SGT Loadings

	Capacity (MVA)	Loading (MVA)	%
ELVA SGT1A	500	394	79%
ELVA SGT2A	500	491	98%

The continued renewable generation activity in the South Lanarkshire area, together with the need to accommodate additional generation in southwest Scotland, result in the need for the development of Redshaw 400/132kV Substation, to the north of Elvanfoot.

4.6 Contracted Position Between Coalburn and Elvanfoot 400kV Substations

As indicated, South Lanarkshire is an area rich in wind energy resource. In addition to the renewable generation detailed in Sections 4.4 and 4.5 above, connected and contracted to connect via Coalburn the planned Coalburn North, and Elvanfoot 400kV Substations, SPT has also received a significant volume of connection applications for further renewable generation developments in South Lanarkshire, generally in the area between Coalburn and Elvanfoot.

Table 9 below indicates the further contracted generation for connection in South Lanarkshire, which is planned to be connected via the proposed Redshaw 400/132kV Substation.

Table 9 - Further Contracted Generation for Connection in South Lanarkshire

Site	Connection Status	Capacity (MW)	Energisation Date	SPT-RI-2060	SPT-RI-2061	SPT-RI-2139
Glentaggart Wind Farm	Contracted	42.0	31/10/2027	Y	Y	-
Hare Craig Wind Farm	Contracted	46.2	31/10/2027	Y	Y	-
Spirebush Wind Farm No.1	Contracted	200.0	01/07/2028	Y	Y	-
Spirebush Wind Farm No.2	Contracted	200.0	01/07/2028	Y	Y	Y
M74 West Wind Farm	Contracted	249.9	27/10/2028	Y	-	-
Bodinglee Wind Farm	Contracted	280.0	30/04/2029	Y	-	-
Hagshaw Hill Phase 3 Wind Farm	Contracted	84.0	26/04/2029	Y	Y	Y
Hawkwood Wind Farm	Contracted	34.0	30/04/2030	Y	Y	Y
Bankend Rig III Wind Farm	Contracted	78.0	30/04/2030	Y	Y	Y
Red Moss Farm BESS	Contracted	300.0	30/10/2030	Y	-	-
Conexus North BESS	Contracted	200.0	31/10/2031	Y	-	-
Contracted Total		***1714.1***		***1714.1***	***684.2***	***396.0***
[redacted]						

4.7 Alignment with RIIO-T2 Strategic Goals

As described in our RIIO-T2 plan[8] for the five-years to the end of March 2026, to mitigate the impacts of climate change and achieve a low-carbon energy system requires a level of focused effort and commitment never seen before. The mass electrification of transport and heat has only started and there is a huge amount required to build on the timely progress already made in the electricity sector.

Energy networks are critical to achieving the wider Net Zero emissions targets and with continued engagement with consumers, network users and our wider stakeholders, we've set a progressive plan in place to facilitate a Net Zero future. Our RIIO-T2 plan sets out four strategic goals – informed by our stakeholder priorities – that will keep us moving towards this sustainable future. These goals and their alignment with the SPT-RI-2060 - Redshaw 400kV Substation, SPT-RI-2061 - Redshaw 132kV Substation ('A' Board) and SPT-RI-2139 - Redshaw 400/132kV SGT2 projects are summarised in Figure 5 below.

Further detail regarding how these proposals align to our four Strategic Goals is outlined below:

Take a leading role in delivering a Net Zero future that is consistent with government objectives.

By establishing a new Redshaw 400kV Substation, a new Redshaw 132kV Substation ('A' Board) and a 400/132kV Redshaw SGT2, it will enable the connection of an additional 1714MW of contracted generation capacity in the surrounding area. This will contribute towards a reduced reliance on fossil fuel electricity generation sources. It will also enable the connection of a further 650MW upon completion of other works (ref. SPT-RI-173 and SPT-RI-236).

Deliver the benefits of increased cost-efficiency to network users and consumers by continually innovating and applying whole system solutions.

[8] SP Energy Networks RIIO-T2 Business Plan

SPT's intention is to construct Redshaw 400kV and Redshaw 132kV as GIS substations employing alternative Insulation and Interrupting Gases, avoiding the addition of SF_6 to SPT's inventory, as far as technology maturity permits. This is in accordance with SPT's RIIO-T2 Environmental Action Plan[9].

Maintain world-leading resilience and system operability to ensure security of supplies throughout the energy transition.

The works will help maintain system resilience and operability by delivering the capability to connect new sources of renewable generation.

Keep network users and consumers at the heart of all our investment plans and decisions.

The completion of Redshaw 400kV Substation and Redshaw 132kV Substation ('A' Board), together with the 400/132kV Redshaw SGT2, is required to maintain and operate an economic and efficient transmission system and allow SPT to satisfy network users requests for connection, consistent with our statutory and licence responsibilities.

Key stakeholders have been consulted during the development of the proposed solution and we will continue to engage with stakeholders throughout the project development and delivery process. More detail on stakeholder engagement can be found in Section 8.4.

The completion of Redshaw 400kV Substation and Redshaw 132kV Substation ('A' Board), together with 400/132kV Redshaw SGT2 will continue to align with our future strategic ambitions.

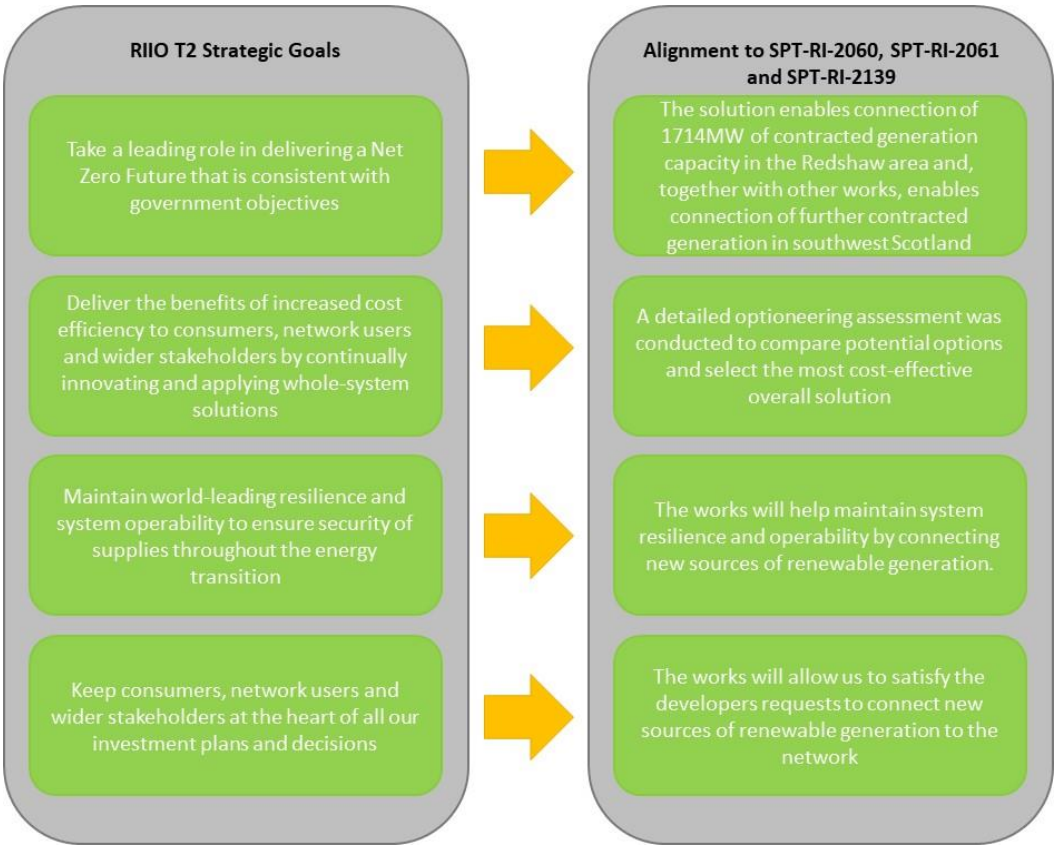

Figure 5 - Alignment of with SPT RIIO-T2 Strategic Goals

[9] https://www.spenergynetworks.co.uk/userfiles/file/RIIO-T2_Annex_7_Environmental_Action_Plan.pdf

5. Assessment of Options

Various options were considered to accommodate the contracted generation developments in the area between Coalburn and Elvanfoot (as per Table 9) and the connection of the planned 400kV double circuit from Glenmuckloch (ref. SPT-RI-236). This included a 'Do Nothing' option, options that involve reinforcement at existing SPT substation sites, and variations on configurations at the proposed Redshaw 400/132kV Substation site. These are outlined in the sections below.

5.1 Overview of Options

This section provides a description of each reinforcement option and details the key considerations. A summary of each option is described at the end of this section.

Options 2, 3 and 4 detail why extending the closest SPT substations at Coalburn, the planned Coalburn North and Elvanfoot were considered and ultimately discounted. Options 5a, 5b, 5c and 5d detail the various options explored for the proposed Redshaw 400kV and 132kV double busbar substations e.g. the use of Air Insulated Switchgear (AIS) equipment and/or Gas Insulated Switchgear (GIS) equipment.

5.1.1 Option 1 – Do Nothing

A 'Do Nothing' or 'Delay' option is not credible in relation to this project and would be inconsistent with SPT's various 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 STC and associated Construction Planning Assumptions provided by NGESO. The proposed works are identified as Enabling Works in the connection agreements relating to the projects in Table 9.

5.1.2 Option 2 – Extend Coalburn 400/132kV Substation

As outlined in Section 4.4 circa 180MW of thermal capacity could theoretically be connected into Coalburn before the 1800MW infrequent infeed loss risk is exceeded and the 400kV substation needs to be extended further. As outlined in Section 3 there are multiple reinforcement drivers, including: the connection of the planned 400kV double circuit from the Glenmuckloch area under SPT-RI-236; the need to connect 1520MW of contracted generation in the Coalburn area (as per Table 5); and the need to connect 1714MW of contracted generation in the area between Coalburn and Elvanfoot (as per Table 9).

In order to connect in excess of 180MW at Coalburn substation a third busbar section and third 400kV circuit would need to be connected into the substation such that compliance with clauses 2.6.3 and 2.6.6 of the NETS SQSS can be maintained. An indicative layout arrangement is shown overleaf in Figure 6 with the new works noted in yellow. This substation extension accommodates the local battery storage connections into Coalburn which were in flight at the time (Zenobe Coalburn Battery Storage and Rawhills Battery Energy Storage Facility), and the planned Glenmuckloch 400kV double circuit. It does not however accommodate the contracted Roger Hill Farm development or any of the further contracted generation detailed in Table 9**.**

The extent of compound extension to Coalburn 400kV substation indicated in Figure 6 is not considered feasible due to the nearby Site of Specific Scientific Interest (SSSI), Coalburn Moss, which limits expansion abilities to the west of the site (over and above the platform extension work which has already been carried out).

The planned development of Coalburn North 400kV Substation (ref. SPT-RI-2058), is described in Section 5.1.3 below, and mitigates the risk to the SSSI area and the effects on the hydrology of the area associated with extending the existing Coalburn 400kV Substation platform. By establishing the new Coalburn North site the infrequent infeed loss risk remains below 1800MW.

For the reasons above, trying to facilitate the generation connections detailed in Table 9**,** as well as the new Glenmuckloch 400kV connection under SPT-RI-236 at Coalburn, was ultimately discounted due to the routing and environmental planning challenges coupled with the local works required to maintain compliance with the NETS SQSS.

In summary, accommodating the SPT-RI-236 connection and the further contracted generation detailed in Table 9 at Coalburn 400kV Substation was discounted for the following reasons:

- The infrequent infeed loss risk at Coalburn 400kV substation would exceed 1800MW without a substantial extension to the substation for which insufficient space exists; and
- Routing of the new SPT-RI-236 double circuit to Coalburn would be extremely challenging, noting the Coalburn Moss SSSI located to the south of the existing substation, as well as existing wind farm infrastructure.

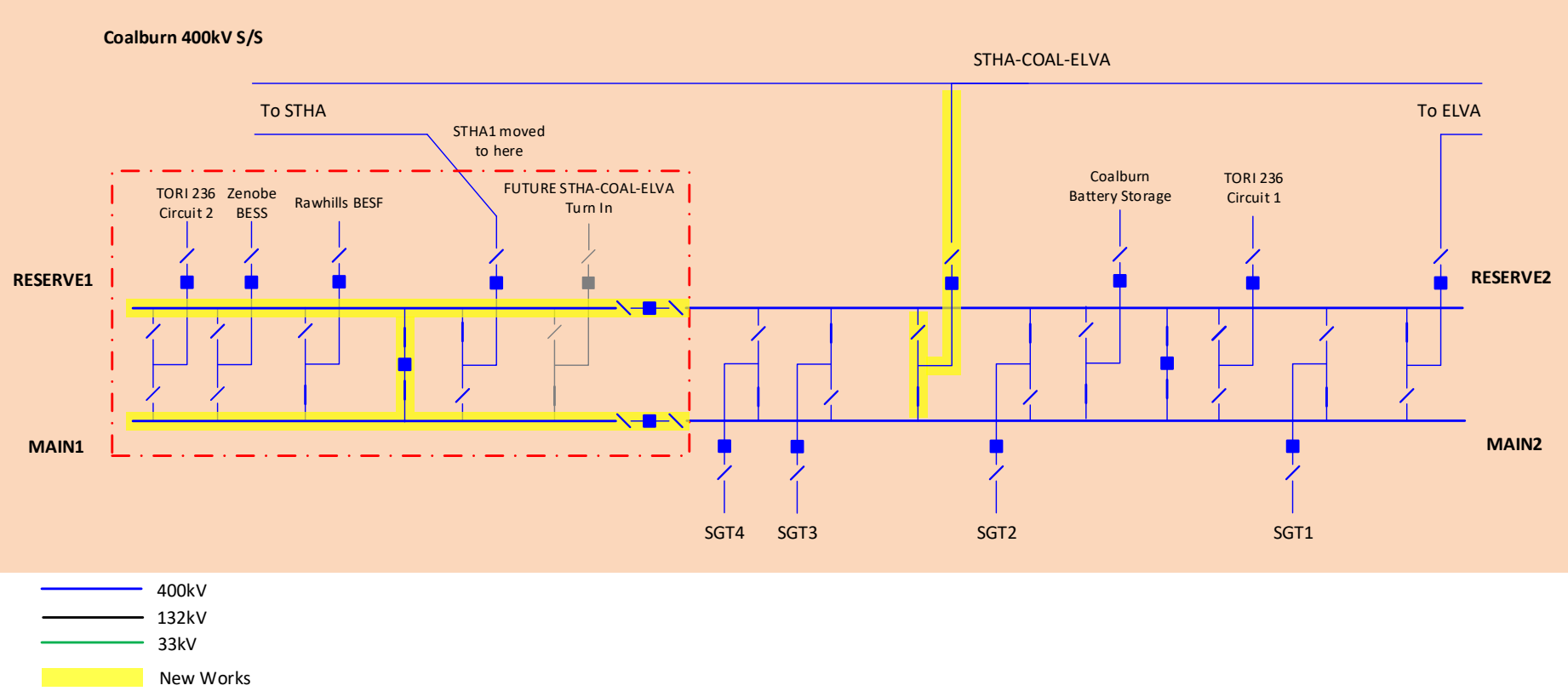

Figure 6 - Coalburn 400kV Substation Extension Single Diagram

5.1.3 Option 3 – Connection into Coalburn North Substation

As outlined in Section 5.1.2 the existing Coalburn 400/132kV substation's ability to facilitate new contracted generation and demand developments leads to the need for the planned Coalburn North 400kV substation (ref. SPT-RI-2058) to accommodate the contracted developments in Section 4.4.1.

This new Coalburn North substation was considered as a location to facilitate: the connection of the planned 400kV double circuit from the Glenmuckloch area under SPT-RI-236; the connection of 1520MW of contracted generation in the Coalburn area (as per Table 5); and the connection of 1714MW of contracted generation in the area between Coalburn and Elvanfoot (as per Table 9). However, this was ultimately discounted for the reasons outlined below:

- Similar to the existing Coalburn 400kV Substation site described in Section 5.1.2, the ability to route a new 400kV double circuit into Coalburn North proved extremely challenging given the existing wind farm infrastructure in the area, the SSSI Coalburn Moss site as well as the existing ZV Route, which any new route would need to cross. Figure 7 below shows the operational, and planned, transmission windfarm connections into Coalburn substation (note there are other smaller, distribution connections in the area). On the bottom left-hand corner of this figure is the indicative location of the new Glenmuckloch 400/132kV substation.
- From a generation connection application standpoint, given the locations of these developments, routing and construction of 400kV and 132kV circuits from each site towards the Coalburn North substation would result in longer, and more challenging, routes to Coalburn/ Coalburn North given the existing connections/windfarms into this substation as compared to a connection to a new site located in the area between Coalburn and Elvanfoot. Figure 15 within Section 6.1 shows an indicative Google Earth map view of the new connections in this area in addition to those shown in Figure 7 below.

Figure 7 - Connected/Contracted Connections in Coalburn/Redshaw/Glenmuckloch Area

5.1.4 Option 4 – Extend Elvanfoot Substation

As noted in Table 7 in order to accommodate the contracted generation in this area the reinforcement project under SPT-RI-226 is in delivery. This involves the extension of the substation platform as shown in yellow below in Figure 8. This platform extension has been completed in line with the project programme with the delivery of the 275/132kV transformer due in May 2024. This area cannot be extended further given the existing 275kV cable circuit serving the Clyde South windfarm connection. Further east on Figure 8 the pipeline infrastructure in this area is shown and the associated standoff corridors.

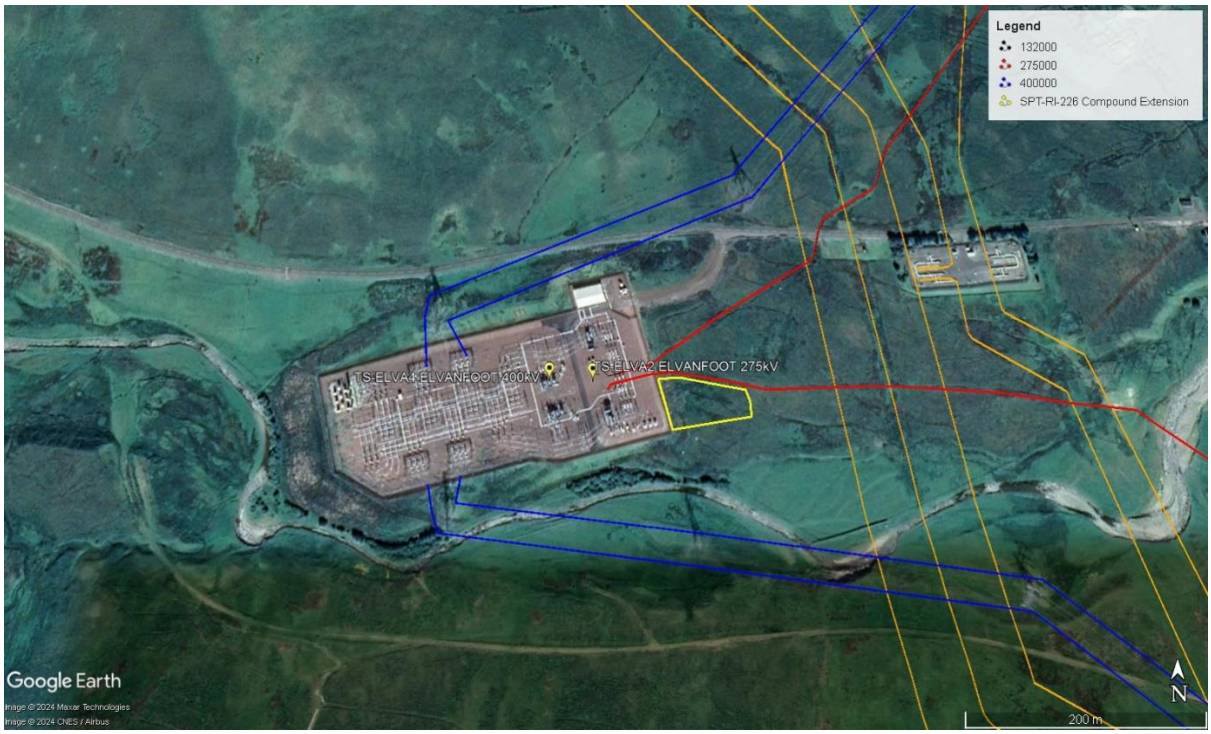

Figure 8 - Google Earth of Elvanfoot Substation

The layout of the 400kV substation at Elvanfoot no longer has any spare bays to which the new 400kV double circuit from Glenmuckloch could be connected into, therefore the substation would need to be extended to do so. Given the existing 400/275kV infrastructure to serve the Clyde North and Clyde South windfarm connections, and the layout of the existing busbar system, the only direction in which the substation could be extended is to the west, however as shown in Figure 8, there is a river located to the west of the substation, Elvan Water. In order to extend the substation such that the new SPT-RI-236 double circuit could be accommodated a substantial platform extension would be required and likely diversion of the Elvan Water. Then, to establish a 132kV double busbar substation for any local generation applications it is likely that the Elvan Water would need diverted south such that space for new Supergrid transformers and a new 132kV substation could be created.

Given the civil engineering and environmental planning challenges associated with extending Elvanfoot substation this option was discounted. In addition to this, the location of Elvanfoot is also some distance south of where the generation applications in this area are, thus longer 400kV and 132kV circuits would require to be routed towards this location, which would add cost and potential programme disadvantages relative to the proposed solution.

5.1.5 Option 5 – Creation of Redshaw 400/132kV Substation

Recognising the requirement for the location of a 400kV substation to enable the planned SPT-RI-236 400kV double circuit overhead line to be routed into the area, as well as the ability to establish 400/132kV infrastructure to facilitate the connection of 1714MW of contracted generation in the area between Coalburn and Elvanfoot (as per Table 9), this option proposes the development of Redshaw 400/132kV Substation. Noting the inability to connect further new generation into either Coalburn or Elvanfoot substations as outlined in the previous sections, Redshaw 400/132kV Substation is proposed to be located approximately 12km south from Coalburn and 15km north from Elvanfoot.

Through the early development phases of this option, four sub-options were evaluated, weighing up the relative advantages and disadvantages of using Air Insulated Switchgear (AIS) or Gas Insulated Switchgear (GIS) for both the 400kV and 132kV installations, hence the sections detailing Options 5a, 5b, 5c and 5d below.

5.1.6 Option 5a – AIS Solution for 400kV and 132kV Substations

The use of Air Insulated Switchgear (AIS) equipment was considered for use across both substation voltages. Initially an eight bay 400kV AIS development was considered. These 8 bays were allocated as follows:

- 2 x 400kV bays for Coalburn/Coalburn North circuits
- 2 x 400kV bays for Elvanfoot circuits
- 2 x 400kV bays for Glenmuckloch circuits
- 1 x 400kV bus section circuit breaker
- 1 x 400kV bus coupler circuit breaker

A double busbar "wraparound" solution was considered as part of the initial Redshaw design options, as this enables the incoming circuits into the substation to enter at the same point, however the wraparound configuration allows these to be split across the 400kV bus section without busbar or cable crossings as the circuits can run under the Main/Reserve busbars. This kind of arrangement can be advantageous as no crosses are required to split the circuits across the bus section circuit breaker. It was considered that the site could be set up with a Coalburn, Elvanfoot and Glenmuckloch circuit selected to the Main 1 busbar with the other Coalburn, Elvanfoot and Glenmuckloch circuit selected to the Reserve busbar. This would mean that under the scenario of a fault outage on either the bus section breaker or bus coupler breaker, a "North/South" power corridor would remain intact. The 400/132kV SGTs would also be split across these two busbars as the site developed.

Upon receiving significant connection applications in this area however, it became apparent that a 132kV substation would be required. Learning lessons from other substations across the system it was anticipated that this new 132kV board may ultimately require in excess of two 400/132kV transformers and as such at the early stages provision for four 400/132kV transformers was planned, together with a second bus section and bus coupler. This increased the number of 400kV bays from 8 to 12. For the 132kV substation this was initially considered to utilise AIS equipment also. Figure 9 below shows an initial single line diagram of Redshaw 400kV and 132kV substations. Note the inclusion of the Glentaggart Wind Farm 132kV bay, as this was one of the first connection applications received requiring the establishment of Redshaw 132kV Substation.

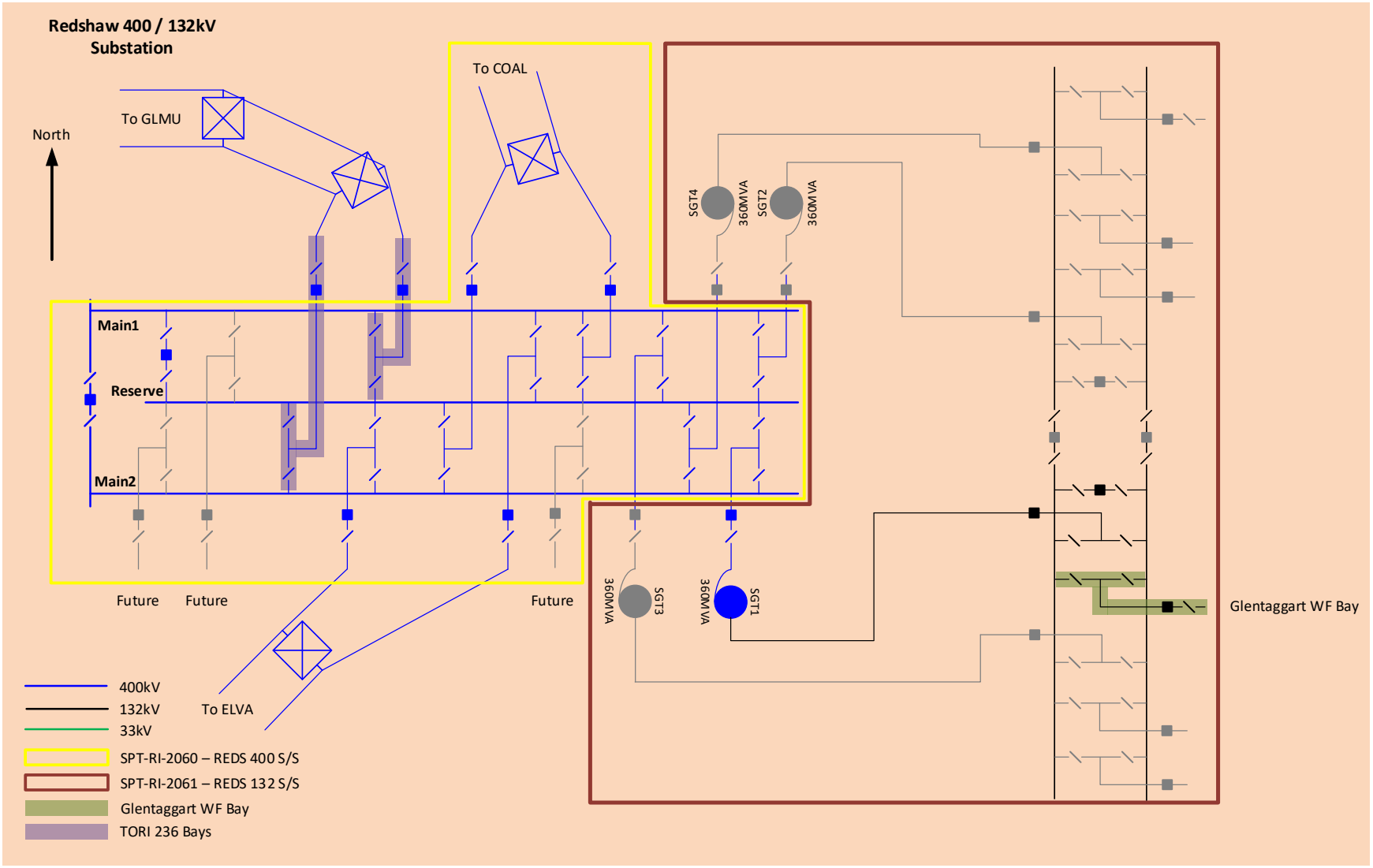

Figure 9 - Single Line Diagram of Redshaw 400/132kV Substation Considering AIS 400kV and 132kV Equipment

5.1.7 Option 5b – GIS Solution for 400kV and AIS 132kV Substation

Following on from Section 5.1.6 the use of GIS equipment for the 400kV substation is considered in this Option 5b, with the 132kV substation continuing to utilise AIS equipment (spatially the length of the substation was determined by the number of 400/132kV Supergrid transformers i.e. since the length of the substation would need to accommodate (at least) four transformers, a 132kV AIS double busbar substation could occupy the same width).

Figure 10 below shows an indicative layout drawing produced for this Option 5b. This shows the 400kV GIS substation connecting the three 400kV double circuit overhead line routes, as well as provision for up to four 400/132kV Supergrid transformer connections to a 132kV AIS substation. At the time this drawing was produced (noting the subsequent evolution in the contracted generation background) the platform size was 255m x 215m.

Figure 10 - Redshaw 400/132kV Substation - GIS 400kV SS and AIS 132kV SS

5.1.8 Option 5c – GIS Solution for 400kV and 132kV Substations

As outlined in Section 5.1.7 the initial design and development of Redshaw considered a 400kV GIS substation and an accompanying 132kV AIS substation, however given the continued generation applications received and evolution of the contracted generation background, a change to a 132kV GIS configuration is considered appropriate. Figure 11 below shows the layout drawing created when considering both the 400kV and 132kV substations being constructed utilising GIS equipment.

At the time when this drawing was produced the platform size was 237m x 159m, which represents a circa 34% reduction in platform size and contributes to a more economic, efficient and coordinated solution relative to that in Option 5b

The figures shown below outline the evolution of the substation design, incorporating a future 'B' 132kV substation alongside the 400kV substation under SPT-RI-2060 and the 'A' substation under SPT-RI-2061 and SPT-RI-2139. Figure 11 shows the layout when considering both the 400kV and 132kV substations as GIS installations.

Noting the continued generation activity in the Redshaw area, there is a need to plan for a 132kV 'B' substation. For similar reasons to the above, a future 'B' Board was considered initially as an AIS solution. A layout drawing was created for this arrangement and is shown in Figure 12, outlining the 132kV 'A' board as a GIS installation and the future 'B' board as an AIS installation.

Civil platform savings can be achieved however if both the 132kV 'A' board and future 132kV 'B' board ultimately utilise GIS equipment and are located within the same building, as indicated in Figure 13.

What is clear from the progression of the layout drawings is the number of 400/132kV Supergrid transformers. It is noteworthy that four Supergrid transformers are indicated for new 132kV board(s) required at Redshaw. The additional transformers shown in Figure 12 and Figure 13 are related to connections coming into Redshaw at the 132kV voltage level, but will be connected via a dedicated 400/132kV transformer. The reason for this is some of schemes, given the capacity they are connecting, would take up a large portion of the shared SGT capacity across the 132kV board(s) and this would prevent other (smaller) connections proceeding, as additional transformers would be required to be connected to each board, but this is not possible given the fault level constraints these transformer connections would create.

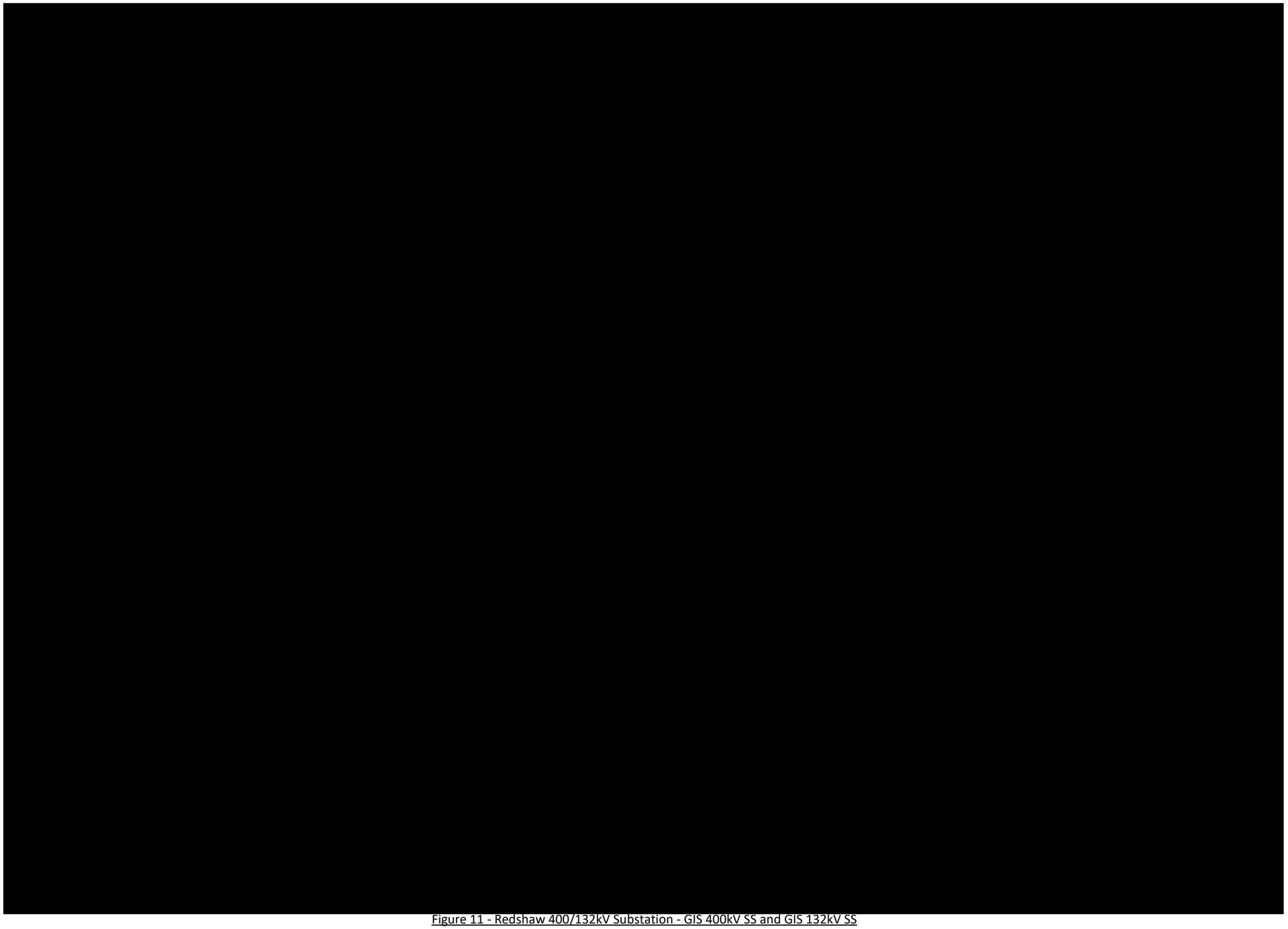

Figure 11 - Redshaw 400/132kV Substation - GIS 400kV SS and GIS 132kV SS

Figure 12 - GIS 400kV SS and GIS "A" 132kV Board and AIS "B" Board

Figure 13 - Redshaw 400/132kV Substation - GIS 400kV SS and GIS 132kV "A" and "B" Boards

5.1.9 Option 5d – AIS Solution for 400kV and GIS 132kV Substation

For completeness the final iteration was evaluated which considered establishing Redshaw 400kV Substation utilising AIS equipment, with the 132kV substation utilising GIS equipment. This solution was explored but discounted in line with the option in Section 5.1.6 due to the land requirements and economics associated with establishing a 400kV AIS substation.

5.2 Option Assessment

As described in our RIIO-T2 Business Plan Annex 8[10], while most engineering justification papers have a Cost Benefit Analysis (CBA) aligned with the RIIO-T2 CBA model, projects in the following categories do not:

- Live projects rolling over from RIIO-T1, since they have already initiated, with decisions made during the previous price control.
- Customer connection projects, as the proposed approach is based on agreement with the connecting party as they will bear a sizeable proportion of the costs incurred.
- TO Reinforcements associated with new connections, where the options considered are evaluated purely based on the lowest cost solution, which meets the project objectives, as the benefits are all comparable.
- Projects justified through the Network Options Assessment Process as these are subject to an extensive and rigorous CBA process by the Electricity System Operator who can consider market options, and different options which may be offered by Transmission Owners.

Projects in the four categories above have an associated document (this MSIP Re-Opener application in respect of the Redshaw 400kV Substation (SPT-RI-2060), Redshaw 132kV Substation (SPT-RI-2061) and Redshaw SGT2 (SPT-RI-2139) projects) explaining the feasible options and the reasoning behind the selection of the preferred investment option.

The options relating to the coordinated development of the transmission system are described in Section 5.1 above, while Table 10 below summarises the key benefits and disadvantage of each option, together with an indication of estimated cost.

As described above in Section 5.1, and as outlined in Table 10, SPT evaluated four options to establish the optimum switchgear technology type to be utilised at Redshaw, considering Air Insulated Switchgear (AIS) and Gas Insulated Switchgear (GIS) across the two voltage levels (400kV and 132kV). SPT undertook an exercise whereby the equipment cost, platform size and total costs were evaluated and compared. Given the number of 400kV bays required at the new substation this would have led to an extremely large 400kV compound being required if AIS equipment was to be used, however the use of 400kV GIS equipment means that a smaller overall platform is required, leading to significantly lower overall costs when compared with the AIS alternative.

Similarly, for the 132kV equipment both technology types were considered. The design and development options for Redshaw 132kV substation initially considered the use of AIS equipment. Similar to the 400kV substation however, the use of GIS equipment leads to significantly lower overall costs, driven by the reduced substation platform size required. As such it is proposed to develop Redshaw 400kV and 132kV substations utilising GIS equipment, as per Option 5c.

[10] Annex 8 - Cost Benefit Analysis Methodology (spenergynetworks.co.uk)

Table 10 - Option Benefits, Drawbacks and Selection Outcome

No.	Option	Estimated Capital Cost[11]	Key Advantage	Key Disadvantage	Option Outcome
1	Do Nothing or Delay	-	None	Failure to comply with statutory duties and licence obligations.	**Rejected**
2	Extend Coalburn 400/132kV Substation to Facilitate Both SPT-RI-236 and Future Connections	Discounted in advance of a detailed cost estimating exercise, as per Section 5.1.2	Would make use of existing SPT substation.	The extension required is not feasible due to the platform encroaching on a nearby SSSI, Coalburn Moss.	**Rejected**
3	Connection into Coalburn North Substation	Discounted in advance of a detailed cost estimating exercise, as per Section 5.1.3	Adjacent to existing 400kV substation infrastructure.	The location of Coalburn North is not feasible with respect to the routing corridors for the SPT-RI-236 400kV OHL as well as the generation applications which would lead to longer overhead line circuits needing to be routed.	**Rejected**
4	Extend Elvanfoot Substation to Facilitate Both SPT-RI-236 and Future Connections	Discounted in advance of a detailed cost estimating exercise, as per Section 5.1.4	Would make use of existing SPT substation.	Extension of substation platform to connect new SPT-RI-236 double circuit as well as the 132kV board is not feasible, noting in part the need for diversion of a watercourse and the challenges associated with this.	**Rejected**
5a	Redshaw Substation - AIS Solution for 400kV and 132kV Substations	£105.449m	Creation of new Redshaw substation creates connection point for the SPT-RI-236 double circuit as well as being more centrally located for the wind generation applications in this area. The AIS design for both the 400kV and 132kV substations would provide maximum flexibility	The construction of a 400kV AIS substation and up to two 132kV AIS boards would result in a very large substation platform being required. From a cost point of view the establishing of a substation platform compromising of solely AIS equipment leads to significantly higher cost when compared to Options 5b and 5c.	**Rejected**

[11] All values are estimated Direct capital costs in 2018/19 values.

No.	Option	Estimated Capital Cost[11]	Key Advantage	Key Disadvantage	Option Outcome
			in terms of bay configuration and future extensions.		
5b	Redshaw Substation - GIS Solution for 400kV and AIS 132kV Substation	£89.373m	The creation of a 400kV GIS substation helps to minimise the substation platform required in and significantly reduce cost relative to Option 5a. Establishing the 132kV substation as an AIS construction will maintain maximum flexibility in terms of bay configuration and future extensions.	The space required to establish up to two 132kV boards would continue to result in a very large substation platform being required, leading to a significantly higher cost when compared to Option 5c.	**Rejected**
5c	Redshaw Substation - GIS Solution for 400kV and 132kV Substations	£84.481m	The creation of a 400kV GIS substation and up to two 132kV boards using GIS equipment helps to minimise the size of the substation platform, minimising overall cost.	Flexibility to add future bays is more limited, however this risk can be mitigated through the detailed design of the initial installation e.g. through provision for a future 132kV 'B' substation.	**Proposed**
5d	Redshaw Substation - AIS Solution for 400kV and GIS 132kV Substation	£102.594m	The 400kV AIS substation would provide maximum flexibility in terms of adding more bays to the site in future whilst the 132kV GIS board(s) would help to minimise the substation platform size as much as possible.	As outlined above the construction of a 400kV AIS substation would require a very large platform to be established which leads to significantly higher cost when compared to Options 5b and 5c.	**Rejected**

6. Proposed Works

Forming part of the wider Redshaw 400/132kV Substation development in South Lanarkshire, the three discrete MSIP Re-opener applications to which this submission relates are as follows:

- SPT-RI-2060 – Redshaw 400kV Substation
- SPT-RI-2061 – Redshaw 132kV Substation ('A' Board)
- SPT-RI-2139 – Redshaw 400/132kV SGT2

Table 11 below summarises the scope of each of these three projects.

Table 11 – Redshaw Substation Works

Project Ref	Project Name	Scope of Project
SPT-RI-2060	Redshaw 400kV Substation	This project will establish a new 400kV substation, enabling direct generation connections in the local area, as well as the SPT-RI-236 double circuit OHL from the Glenmuckloch 400kV substation.
SPT-RI-2061	Redshaw 132kV Substation ('A' Board)	To facilitate generation applications in this area a new 132kV board is required to be established at Redshaw. This project shall connect into the 400kV substation via one 400kV bay.
SPT-RI-2139	Redshaw 400/132kV SGT2	Following further generation applications into the 'A' board the capacity of the first Supergrid transformer (SGT) is fully committed, giving rise to the need for a second unit. This project shall connect into the 400kV substation via one 400kV bay.

The inclusion of 132kV works across multiple projects is due to the evolution of the generation background in the local area e.g. SPT-RI-2061 was triggered with a single 360MVA transformer being specified. Once this unit was fully committed by contracted generation development, a second SGT was triggered under SPT-RI-2139.

[redacted]

The sections below detail the works under each of the three projects forming part of this re-opener submission. The associated new connections are noted in Table 12 below. The table shows the relevant connections and the works they require to connect. It can be seen that all new connections into Redshaw require the SPT-RI-2060 works. The applicable 132kV works varies between SPT-RI-2061 and SPT-RI-2139 depending on the timing of the connection applications.

Table 12 - Generation Applications into Redshaw 400/132kV Substation

Site	Connection Status	Capacity (MW)	Energisation Date	SPT-RI-2060	SPT-RI-2061	SPT-RI-2139	Connection Voltage into Redshaw
Glentaggart Wind Farm	Contracted	42.0	31/10/2027	Y	Y	-	132kV
Hare Craig Wind Farm	Contracted	46.2	31/10/2027	Y	Y	-	132kV
Spirebush Wind Farm No.1	Contracted	200.0	01/07/2028	Y	Y	-	132kV
Spirebush Wind Farm No.2	Contracted	200.0	01/07/2028	Y	Y	Y	132 kV
M74 West Wind Farm	Contracted	249.9	27/10/2028	Y	-	-	400 kV
Bodinglee Wind Farm	Contracted	280.0	30/04/2029	Y	-	-	400 kV
Hagshaw Hill Phase 3 Wind Farm	Contracted	84.0	26/04/2029	Y	Y	Y	132 kV
Hawkwood Wind Farm	Contracted	34.0	30/04/2030	Y	Y	Y	132 kV
Bankend Rig III Wind Farm	Contracted	78.0	30/04/2030	Y	Y	Y	132 kV
Red Moss Farm BESS	Contracted	300.0	30/10/2030	Y	-	-	400 kV
Conexus North BESS	Contracted	200.0	31/10/2031	Y	-	-	400 kV
Contracted Total		***1714.1***		***1714.1***	***684.2***	***396.0***	
[redacted]							

The new Redshaw 400/132kV Substation facilitates the SPT-RI-236 project, which will establish a new 400kV double circuit OHL from Glenmuckloch substation to ZV Route. Connecting the Glenmuckloch substation to ZV Route enables increased renewable generation in this area given the thermal constraints between New Cumnock, Coylton and Kilmarnock South substations. The proposed location of the Redshaw 400/132kV Substation site has been informed by routing work associated with the planned 400kV overhead line from Glenmuckloch.

6.1 Connections into Redshaw 400kV Substation

The connections which are planned/contracted into the Redshaw 400kV Substation under SPT-RI-2060 are outlined in the sections below. Given the planned reinforcements and contracted generation applications into Redshaw substation it is proposed that Redshaw 400kV Substation is constructed initially to be capable of expansion to a 21 bay 400kV development. Below is a list of the bays the site shall be designed to accommodate:

- 2 x 400kV feeder bays for the circuits north towards Coalburn/Coalburn North
- 2 x 400kV feeder bays for the circuits south towards Elvanfoot
- 2 x 400kV feeder bays for the planned circuits west towards Glenmuckloch
- 2 x 400kV bus section circuit breakers
- 2 x 400kV bus couplers
- 2 x 400kV transformer bays for 'A' board SGTs (SGT2 and SGT3)
- 2 x 400kV transformer bays for future 'B' board SGTs (SGT1 and SGT4)
- 1 x feeder bay for Bodinglee SGT (SGT5)
- 1 x feeder bay for M74 West WF SGT (SGT6)
- 1 x feeder bay for Red Moss Farm SGT (SGT8)
- 1 x feeder bay for Conexus North connection
- 1 x feeder bay for [redacted]
- 4 x spare bays total

6.1.1 Connection of SPT-RI-236 (Glenmuckloch to ZV Route 400kV OHL)

As indicated, the 400kV double circuit OHL from Glenmuckloch substation is due to connect into Redshaw 400kV substation meaning that two 400kV feeder bays within the substation will be allocated to this connection.

6.1.2 Direct Connections to Redshaw 400kV Substation

A summary of each connection which are planned to connect directly onto the 400kV busbars at Redshaw is outlined below.

Bodinglee Windfarm – SPT-TOCO-2297

Bodinglee windfarm is a contracted 280MW development located 2km north from Redshaw substation. The scope of works to facilitate this connection is to install a new 400kV GIS bay at Redshaw 400kV substation as well as a 400/132kV 360MVA Supergrid transformer (SGT5) and a 132kV circuit breaker. From here a 132kV cable circuit shall be installed out to the windfarm, approximately 2km, where a 132kV metering circuit breaker shall be installed to form the Point of Connection (PoC) between SPT and the User.

M74 West Windfarm – SPT-TOCO-2531

M74 West windfarm is a contracted 249.9MW development located 1.7km south from Redshaw substation. The scope of works to facilitate this connection is to install a new 400kV GIS bay at

Redshaw 400kV substation as well as a 400/132kV 360MVA Supergrid transformer (SGT6) and a 132kV circuit breaker. From here a 132kV cable circuit shall be installed out to the windfarm, approximately 1.7km, where a 132kV metering circuit breaker shall be installed to form the PoC between SPT and the User.

Red Moss Farm – SPT-TOCO-2891

Red Moss Farm is a contracted 300MW battery storage facility located 5.3km north from Redshaw substation. The scope of works to facilitate this connection is to install a new 400kV GIS bay at Redshaw 400kV substation as well as a 400/132kV 360MVA Supergrid transformer (SGT8) and a 132kV circuit breaker. From here a 132kV cable circuit shall be installed out to the battery site, approximately 5.5km, where a 132kV metering circuit breaker shall be installed to form the PoC between SPT and the User.

Conexus North – SPT-TOCO-3054

Conexus North is a contracted 200MW battery storage facility located 8km north from Redshaw substation. The scope of works to facilitate this connection is to install a new 400kV GIS bay at Redshaw 400kV substation and from here install a new 400kV cable circuit out the User's site which is approximately 8.4km in length. At the User's site a 400kV metering circuit breaker shall be installed to form the PoC between SPT and the User.

6.1.3 132kV Connection of Generation via SPT-RI-2061 and SPT-RI-2139

Below provides a summary of the connections contracted to connect into the new 132kV 'A' board at Redshaw via both SPT-RI-2061 and SPT-RI-2139.

Figure 14 below shows the planned single line diagram. The new 400kV substation triggered under SPT-RI-2060 is shown coloured in yellow with SPT-RI-2061 shown in red and SPT-RI-2139 in orange.

Figure 15 provides an indicative map view of the various connections in this area of South Lanarkshire, which indicates the proposed Redshaw 400/132kV substation location helps to ensure an efficient and

coordinated approach for the nearby connections in relation to the already existing 400kV double circuit. In this figure all connections shown with a red boundary are proposed to connect into Redshaw substation whilst the connections shown with a green boundary are either already connected or planned to connect into Coalburn.

Glentaggart Wind Farm – SPT-TOCO-2052

Glentaggart Wind Farm is a 42MW development located 3km west from Redshaw substation. The scope of works to facilitate this connection is to install a new 132kV GIS bay at Redshaw 132kV "A" substation as well as a 132/33kV 60MVA grid transformer and a 33kV circuit breaker. From here a 33kV cable circuit shall be installed out to the windfarm, approximately 3.5km, where a 33kV 2 Panel board shall be installed to form the PoC between SPT and the User.

Hare Craig Wind Farm - SPT-TOCO-2101

Hare Craig Wind Farm is a 46.2MW development located 15km west from Redshaw substation. The scope of works to facilitate this connection is to install a new 132kV GIS bay at Redshaw 132kV 'A' substation as well as a 132/33kV 60MVA grid transformer and a 33kV circuit breaker. From here a dual 33kV OHL/cable circuit shall be installed out to the windfarm, approximately 18km, where a 33kV 2 Panel board shall be installed to form the PoC between SPT and the User.

Spirebush Renewable Energy Project - SPT-TOCO-2100

Spirebush Renewable Energy Park is a 400MW development consisting of windfarm, solar and battery storage located 18km west from Redshaw substation. The scope of works to facilitate this connection is to install two new 132kV GIS bays at Redshaw 132kV 'A' substation. This connection also triggered the requirement for SPT-RI-2139 (Redshaw SGT2) which involves the installation of a second 360MVA SGT at Redshaw 132kV 'A' Substation. From Redshaw two 132kV cable/OHL circuits, approximately 21.5km, shall be installed out to the User's site. Two circuits are required given the total capacity being connected of 400MW. At the User's site two 132kV metering circuit breakers shall be installed to form two PoCs between SPT and the User.

Hagshaw Hill Phase 3 Wind Farm - SPT-TOCO-2496

Hagshaw Hill Phase 3 Wind Farm is an 84MW development located 6.5km northwest from Redshaw substation. As the name notes this is third phase of repowering of the original Hagshaw Hill WF. Phases 1 and 2 connect into Coalburn 132kV substation. The scope of works to facilitate this connection is to install a new 132kV GIS bay at Redshaw 132kV 'A' substation and from here a 132kV OHL/cable circuit shall be installed out to the windfarm. Part of this 132kV circuit is specified under SPT-RI-2827 as other connections are planned to make use of this 132kV circuit to Redshaw (Bankend Rig III and Hawkwood Wind Farms, as outlined below). At the Hagshaw Hill Phase 3 Wind Farm substation a 132kV metering circuit breaker shall be installed to form the PoC between SPT and the User.

Bankend Rig III Wind Farm – SPT-TOCO-2630

Bankend Rig III windfarm is a 78MW development located 21km west from Redshaw substation. The scope of works to facilitate this connection is to utilise the 132kV circuit being installed for the Hagshaw Hill Phase 3 Wind Farm connection. At an appropriate point on this 132kV circuit towards Hagshaw Hill Phase 3, the circuit will be extended and routed towards the Bankend Rig III Wind Farm site. The portion of the 132kV circuit between Redshaw substation and the Hagshaw Hill Ph3 WF tee off is noted under SPT-RI-2827. From the tee off point to Bankend Rig Collector substation the works

are noted under SPT-RI-2826. This is noted as a shared infrastructure project as the assets are planned to be utilised by both Bankend Rig III Wind Farm and Hawkwood Wind Farm. At the Bankend Rig Collector substation a 132/33kV 120MVA grid transformer shall be installed alongside a 33kV 3 Panel Board. This 3 Panel board shall provide a 33kV circuit breaker for the grid transformer and a 33kV circuit breaker for Bankend Rig III Wind Farm and Hawkwood Wind Farm. The 33kV circuit breaker installed at Bankend Rig Collector substation for the Bankend Rig III Wind Farm connection will be the PoC between SPT and the User for this connection.

Hawkwood WF – SPT-TOCO-2626

Hawkwood windfarm is a 34MW development located 21km northwest from Redshaw substation (and 4.5km north of Bankend Rig III Wind Farm). This connection will be supplied from the Bankend Rig III Wind Farm connection. This connection requires the 132kV works specified under SPT-RI-2827 and SPT-RI-2826. The connection will make use of the third 33kV circuit breaker installed at the Bankend Rig Collector substation. From here a 33kV cable circuit shall be installed, approximately 4.5km, from the new collector substation out to the Hawkwood Wind Farm substation where a 33kV 2 Panel board shall be installed to form the PoC between SPT and the User.

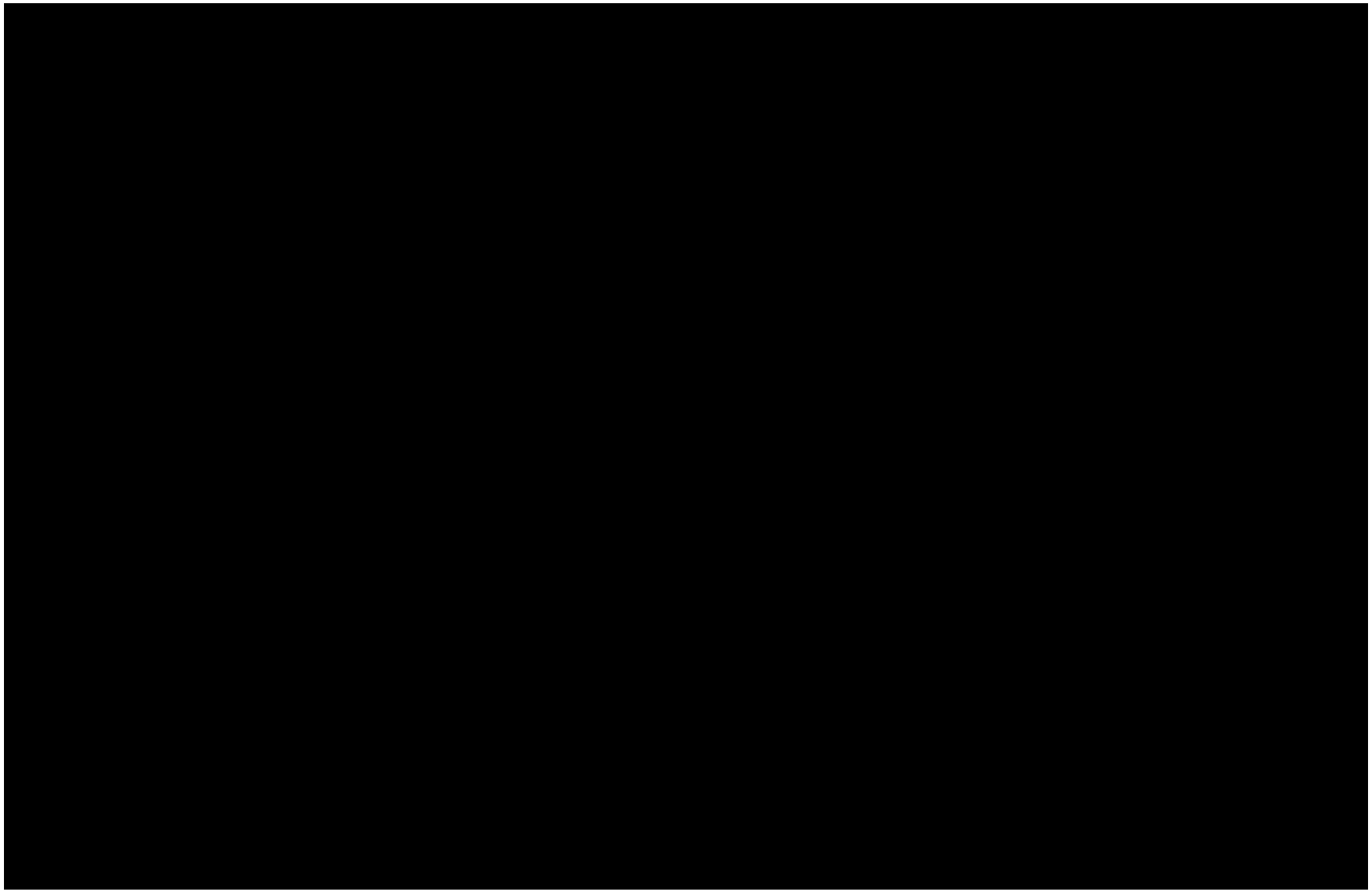

Figure 14 - Redshaw 400/132kV Single Line Diagram

Figure 15 – Indicative Map View Showing Coalburn and Redshaw Connections

6.2 SPT-RI-2060 - Redshaw 400kV Substation - Project Summary

SPT-RI-2060 will establish a new 400kV double busbar substation in the South Lanarkshire area which shall connect into the existing 400kV double circuit (ZV Route). It will also provide the ability for local renewable generation connections to be made to the system via connection to a lower voltage double busbar substation. Figure 16 below shows an indicative view of the positioning of the new Redshaw 400/132kV substation in relation to the existing 400kV double circuit in this area.

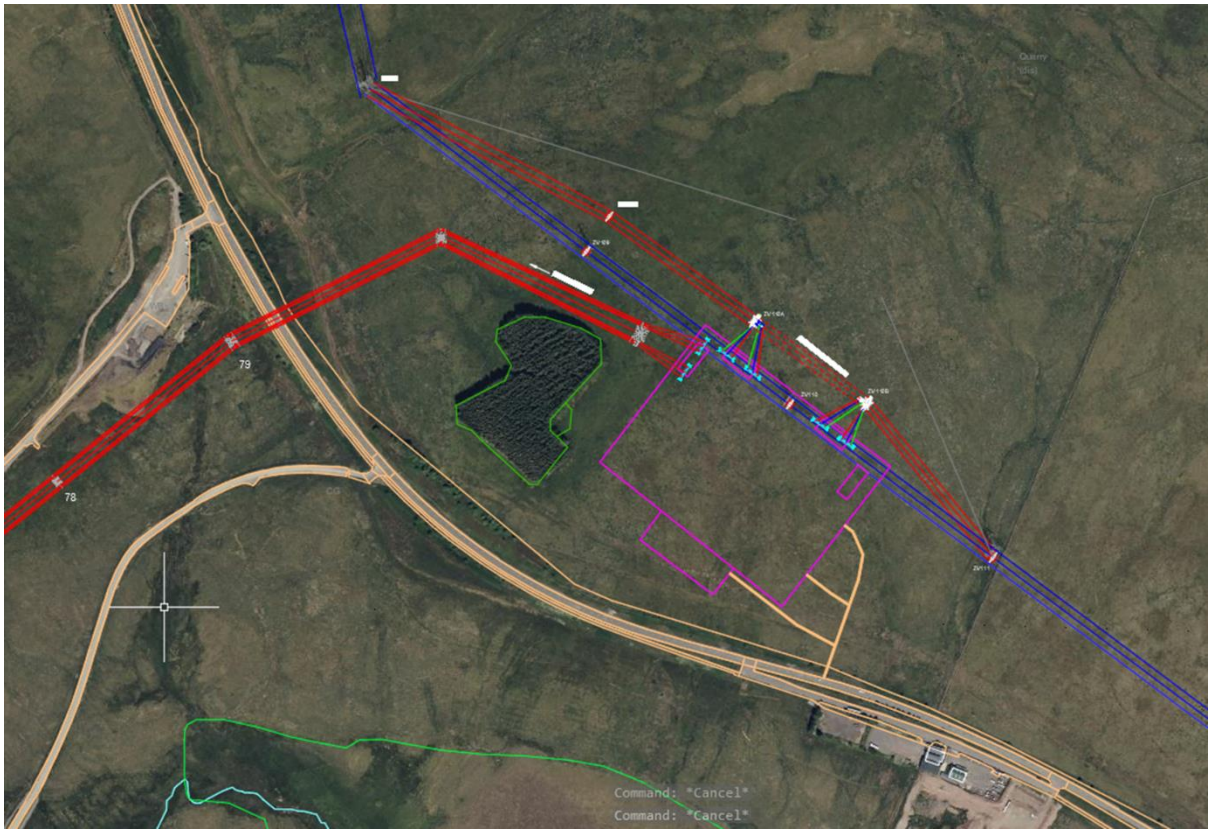

Figure 16 - Indicative View of Positioning of Redshaw Substation and ZV Route OHL Diversion Works

The sections below outline the key element required to complete this project.

6.2.1 Overhead Line Works

Diversion of the existing 400kV ZV Route double circuit is required to enable the turning in of these circuits into the new substation. Figure 16 shows an indicative view of the positioning of the new Redshaw substation outlined in pink. The existing 400kV double circuit which passes by is shown in blue and as noted, existing spans will need to be diverted to enable their turn into the new substation. This will require the installation of three new 400kV towers and the associated OHL conductor between each span. The overhead line route coming in from the left-hand side of the image is the proposed SPT-RI-236 (Glenmuckloch to Redshaw) 400kV double circuit route.

6.2.2 Cable Works

No cable works identified as part of SPT-RI-2060.

6.2.3 Substation Works

Substation works required for SPT-RI-2060 include the following 400kV GIS bays:

- 2 x 400kV feeder bays for the circuits north towards Coalburn/Coalburn North
- 2 x 400kV feeder bays for the circuits south towards Elvanfoot
- 2 x 400kV feeder bays for the planned circuits west to Glenmuckloch (funded via SPT-RI-236)
- 2 x 400kV bus section circuit breakers
- 2 x 400kV bus couplers
- 2 x 400kV transformer bays for 'A' board SGTs (funded via SPT-RI-2061 and SPT-RI-2139)
- Space for 2 x 400kV transformer bays for future 'B' board SGTs (as part of SPT-RI-3060)
- Space for 1 x feeder bay for Bodinglee SGT (SGT5) (part of associated connection works)
- Space for 1 x feeder bay for M74 West SGT (SGT6) (part of associated connection works)
- Space for 1 x feeder bay for Red Moss Farm SGT (SGT8) (part of associated connection works)
- Space for 1 x feeder bay for Conexus North
- Space for 1 x feeder bay for [redacted]
- Space for 2 x spare bays at either end of substation
- Associated protection and control works
- Associated civil works

As outlined in Section 5, given the number of bays required in the new 400kV substation, the use of Gas Insulated Switchgear (GIS) is proposed given the project specific relative economic advantage and smaller overall footprint this technology provides compared with Air Insulated Switchgear (AIS).

6.2.4 Civil Works

Works will be required to establish the new 400kV substation platform as well as the construction of the 400kV GIS building required to house the new switchgear, protection and control panels and other associated equipment.

6.3 SPT-RI-2061 - Redshaw 132kV Substation ('A' Board) - Project Summary

SPT-RI-2061 shall establish a new 132kV double busbar substation at Redshaw to enable local generation connections in this area. It is proposed utilise 132kV GIS equipment and via coordinated and efficient design, house any future 132kV 'B' switchboard within the same building.

The sections below outline the key element required to complete this project.

6.3.1 Overhead Line Works

No overhead line works identified as part of SPT-RI-2061.

6.3.2 Cable Works

No cable works identified as part of SPT-RI-2061.

6.3.3 Substation Works

Substation works required for SPT-RI-2061 include the following:

- 1 x 400kV transformer feeder bay connecting to SGT3
- 1 x 400/132kV 360MVA Supergrid transformer (SGT3)
- 1 x 132kV transformer feeder bay connecting to SGT3
- 1x 132kV bus coupler bay
- 1 x 132kV bus section bay
- Space for 1 x 132kV feeder bay for Hagshaw Hill Phase 3/Bankend Rig III/Hawkwood connections under SPT-RI-2827
- Space for 1 x 132kV feeder bay for GT1 to connect Hare Craig/Glentaggart under SPT-RI-3547

- Space for 2 x 132kV feeder bays for the Spirebush connection under SPT-TOCO-2100
- 2 x spare bays (one at each end)
- Associated protection and control works
- Associated civil works

6.3.4 Civil Works

Works will be required to establish the new 132kV substation platform as well as the construction of the 132kV GIS building required to house the new 132kV GIS switchgear, protection and control panels and other associated equipment.

6.4 SPT-RI-2139 - Redshaw SGT2 - Project Summary

SPT-RI-2139 shall establish a second Supergrid transformer connection into the 'A' board at Redshaw. This was triggered given the continued renewable applications in this area. Given that SPT-RI-2061 will establish the new 132kV double busbar, the works associated with SPT-RI-2139 are limited to the new 400/132kV transformer and associated 400kV and 132kV bays as outlined below.

The sections below outline the key element required to complete this project.

6.4.1 Overhead Line Works

No overhead line works identified as part of SPT-RI-2139.

6.4.2 Cable Works

No cable works identified as part of SPT-RI-2139.

6.4.3 Substation Works

In terms of substation works required for SPT-RI-2139 the following works are required:

- 1 x 400kV transformer feeder bay connecting to SGT2
- 1 x 400/132kV 360MVA Supergrid transformer (SGT2)
- 1 x 132kV transformer feeder bay connecting to SGT2
- Associated protection and control works
- Associated civil works

6.4.4 Civil Works

Associated civil works in line with the scope outlined for SPT-RI-2139.

6.5 Environmental and Consents Works

Planning Permission will be sought from South Lanarkshire Council. Relevant landowner agreements will also need to be secured.

The proposed substation site is located within a rural location. Whilst the proposed development does not fall explicitly within the 'descriptions of development' set out in Schedule 1 or Schedule 2 of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 ('the EIA Regulations'), consideration has been given to the nature, size and location of the proposed development and the potential for significant effects in accordance with Schedule 3 (Regulation 7(2) of the EIA Regulations.

The scale, nature and location of the proposed development are such that, to allow the environmental effects of the projects to be appropriately considered and understood, SPEN has taken the decision to prepare an EIA in support of the planning application to the local authority. As such, no Screening

Opinion has been sought from the Council. A Scoping Opinion to determine the scope of the EIA will be requested from South Lanarkshire Council.

Access to the site will be via the B7078 and consideration will be given for traffic management for the access and egress of vehicles.

7. Project Cost Estimates

A further submission will be made at the right time relating to the associated amendments to the outputs, delivery dates and allowances to be detailed in LSpC 3.14 Appendix 1, for each of the three projects. The detail in this section is therefore indicative pending these further submissions.

7.1 SPT-RI-2060 - Redshaw 400kV Substation

7.1.1 Estimated Total Project Cost

Aligned with the format of the Re-Opener Pipeline Log, Table 13 details expected energisation year and our current view of potential direct capital expenditure in RIIO-T2.

Table 13 - Estimated Incidence of Expenditure

	Potential direct capex value per year, £m, 18/19 price base									
Energisation Year	Pre-RIIO-T2: direct capex	Yr. 21/22: direct capex	Yr. 22/23: direct capex	Yr. 23/24: direct capex	Yr. 24/25: direct capex	Yr. 25/26: direct capex	Yr. 26/27 (T3): direct capex	Yr. 27/28 (T3): direct capex	RIIO-T2 Total: direct capex	Total: direct capex
2027/28	0.000	0.000	0.050	0.294	3.041	19.739	18.601	5.443	23.124	47.167

7.1.2 Volume Driver Allowance

Applying the RIIO-T2 Generation Connections VDUM to this project results in a £16.500m allowance provided by the VDUM. The allowance is calculated as per Table 14 below. Please note that this excludes the further allowance permitted under Licence Special Condition 3.36 Opex escalator to provide a better comparison to direct expenditure.

Table 14 - Volume Driver Allowance for SPT-RI-2060

SPT-RI-2060 - Volume Driver (*2018/19 price base*)		£m/unit	Unit	Volume Driver Allowance (£m)
Project	Fixed Cost	1.700	1	1.700
Shared Use	General Substation Works, per MVA	0.010	1660*	16.600
Total				**18.300**

*Note: The value of 1660MVA has been applied based on the summer pre-fault continuous rating of the 400kV OHL circuits that the new Redshaw 400kV substation will connect to.

Table 15 - Comparison of Volume Driver Allowance and Estimated Cost

		Potential direct capex value per year, £m, 18/19 price base								
Description	Pre-RIIO-T2: direct capex	Yr. 21/22: direct capex	Yr. 22/23: direct capex	Yr. 23/24: direct capex	Yr. 24/25: direct capex	Yr. 25/26: direct capex	Yr. 26/27 (T3): direct capex	Yr. 27/28 (T3): direct capex	RIIO-T2 Total: direct capex	Total: direct capex
Allowance	0.000	0.000	0.000	0.000	0.000	4.575	4.575	4.575	4.575	18.300
Cost	0.000	0.000	0.050	0.294	3.041	19.739	18.601	5.443	23.124	47.167
Variance	0.000	0.000	-0.050	-0.294	-3.041	-15.164	-14.026	-0.868	-18.549	-28.867

The potential VDUM allowance for the project is lower than the estimated cost by £28.867m. This is more than £4.24m, which is the threshold set in LSpC 3.14.6(a) for consideration under this uncertainty mechanism.

7.1.3 Regulatory Outputs

The indicative primary assets outputs are identified in Table 16 below:

Table 16 - Regulatory Outputs Table (Volumes)

Asset Category	Asset Sub-Category Primary	Voltage	Forecast Additions	Forecast Disposals
Circuit Breaker	CB (Gas Insulated Busbars) (ID)	400kV	8	-
Overhead Tower Line	Tower	400kV	4	2
Overhead Tower Line	OHL (Tower Line) Conductor	400kV	0	2.36
Overhead Tower Line	OHL (Tower Line) HTLS Conductor	400kV	2.2	-

Note that as part of this Stage 1 submission the table above is indicative of primary asset additions and disposals only and will be further developed at Stage 2.

7.2 SPT-RI-2061 - Redshaw 132kV Substation ('A' Board)

7.2.1 Estimated Total Project Cost

Aligned with the format of the Re-Opener Pipeline Log, Table 17 details expected energisation year and our current view of potential direct capital expenditure in RIIO-T2.

Table 17 - Estimated Incidence of Expenditure

	Potential direct capex value per year, £m, 18/19 price base									
Energisation Year	Pre-RIIO-T2: direct capex	Yr. 21/22: direct capex	Yr. 22/23: direct capex	Yr. 23/24: direct capex	Yr. 24/25: direct capex	Yr. 25/26: direct capex	Yr. 26/27 (T3): direct capex	Yr. 27/28 (T3): direct capex	RIIO-T2 Total: direct capex	Total: direct capex
2027/28	0.000	0.000	0.005	0.216	1.820	10.000	8.913	2.481	12.041	23.434

7.2.2 Volume Driver Allowance

Applying the RIIO-T2 Generation Connections VDUM to this project results in a £5.300m allowance provided by the VDUM. The allowance is calculated as per Table 18 below. Please note that this excludes the further allowance permitted under Licence Special Condition 3.36 Opex escalator to provide a better comparison to direct expenditure.

Table 18 - Volume Driver Allowance for SPT-RI-2061

SPT-RI-2061 - Volume Driver (*2018/19 price base*)		£m/unit	Unit	Volume Driver Allowance (£m)
Project	Fixed Cost	1.700	1	1.700
Shared Use	General Substation Works, per MVA	0.010	360	3.600
Total				**5.300**

Table 19 - Comparison of Volume Driver Allowance and Estimated Cost

		Potential direct capex value per year, £m, 18/19 price base								
Description	Pre-RIIO-T2: direct capex	Yr. 21/22: direct capex	Yr. 22/23: direct capex	Yr. 23/24: direct capex	Yr. 24/25: direct capex	Yr. 25/26: direct capex	Yr. 26/27 (T3): direct capex	Yr. 27/28 (T3): direct capex	RIIO-T2 Total: direct capex	Total: direct capex
Allowance	0.000	0.000	0.000	0.000	1.325	1.325	1.325	1.325	0.000	5.300
Cost	0.000	0.000	0.005	0.216	1.820	10.000	8.913	2.481	12.041	23.434
Variance	0.000	0.000	-0.005	-0.216	-0.495	-8.675	-7.588	-1.156	-12.041	-18.134

The potential VDUM allowance for the project is lower than the estimated cost by £18.134m. This is more than £4.24m, which is the threshold set in LSpC 3.14.6(a) for consideration under this uncertainty mechanism.

7.2.3 Regulatory Outputs

The indicative primary assets outputs are identified in Table 20 below:

Table 20 - Regulatory Outputs Table (Volumes)

Asset Category	Asset Sub-Category Primary	Voltage	Forecast Additions	Forecast Disposals
Circuit Breaker	CB (Gas Insulated Busbars) (ID)	132kV	3	-
Circuit Breaker	CB (Gas Insulated Busbars) (ID)	400kV	1	-
Wound Plant	Transformer	400kV<500MVA	1	-

Note that as part of this Stage 1 submission the table above is indicative of primary asset additions and disposals only and will be further developed at Stage 2.

7.3 SPT-RI-2139 - Redshaw 400/132 SGT2

7.3.1 Estimated Total Project Cost

Aligned with the format of the Re-Opener Pipeline Log, Table 21 details expected energisation year and our current view of potential direct capital expenditure in RIIO-T2.

Table 21 - Estimated Incidence of Expenditure

		Potential direct capex value per year, £m, 18/19 price base									
Cost Classification	Energisation Year	Pre-RIIO-T2: direct capex	Yr. 21/22: direct capex	Yr. 22/23: direct capex	Yr. 23/24: direct capex	Yr. 24/25: direct capex	Yr. 25/26: direct capex	Yr. 26/27 (T3): direct capex	Yr. 27/28 (T3): direct capex	RIIO-T2 Total: direct capex	Total: direct capex
H1 Shared	2027/28	0.000	0.000	0.000	0.104	1.539	4.888	5.484	1.766	6.531	13.781
[redacted]											

*One-Off Cost - The total cost of the installation of the second SGT at Redshaw includes a load management scheme (LMS) across the two transformers, such that following a planned or unplanned outage on one unit, appropriate generators will reduce output and/or trip to ensure the remaining in-service unit does not become overloaded.

7.3.2 Volume Driver Allowance

Applying the RIIO-T2 Generation Connections VDUM to this project results in a £5.300m allowance provided by the VDUM. The allowance is calculated as per Table 22 below. Please note that this excludes the further allowance permitted under Licence Special Condition 3.36 Opex escalator to provide a better comparison to direct expenditure.

Table 22 - Volume Driver Allowance for SPT-RI-2139

SPT-RI-2060 - Volume Driver (*2018/19 price base*)		£m/unit	Unit	Volume Driver Allowance (£m)
Project	Fixed Cost	1.700	1	1.700
Shared Use	General Substation Works, per MVA	0.010	360	3.600
Total				**5.300**

Table 23 - Comparison of Volume Driver Allowance and Estimated Cost

	Potential direct capex value per year, £m, 18/19 price base									
Description	Pre-RIIO-T2: direct capex	Yr. 21/22: direct capex	Yr. 22/23: direct capex	Yr. 23/24: direct capex	Yr. 24/25: direct capex	Yr. 25/26: direct capex	Yr. 26/27 (T3): direct capex	Yr. 27/28 (T3): direct capex	RIIO-T2 Total: direct capex	Total: direct capex
Allowance	0.000	0.000	0.000	0.000	1.325	1.325	1.325	1.325	0.000	5.300
Cost	0.000	0.000	0.000	0.104	1.539	4.888	5.484	1.766	6.531	13.781
Variance	0.000	0.000	0.000	-0.104	-0.214	-3.563	-4.159	-0.441	-6.531	-8.481

The potential VDUM allowance for the project is lower than the estimated cost by £8.579m. This is more than £4.24m, which is the threshold set in LSpC 3.14.6(a) for consideration under this uncertainty mechanism.

7.3.3 Regulatory Outputs

The indicative primary assets outputs are identified in Table 24 below:

Table 24 - Regulatory Outputs Table (Volumes)

Asset Category	Asset Sub-Category Primary	Voltage	Forecast Additions	Forecast Disposals
Circuit Breaker	CB (Gas Insulated Busbars) (ID)	132kV	1	-
Circuit Breaker	CB (Gas Insulated Busbars) (ID)	400kV	1	-
Wound Plant	Transformer	400kV<500MVA	1	-

Note that as part of this Stage 1 submission the table above is indicative of primary asset additions and disposals only and will be further developed at Stage 2.

8. Project Delivery

We have applied our project management approach to ensure that these projects are 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 projects. We have assigned a dedicated Project Manager to these projects who will be responsible for overall delivery of the scope and is the primary point of contact for all stakeholders.

8.1 Delivery Schedule

A standard approach has been applied to the planning phase of these projects and that will continue for the reporting and the application of processes and controls throughout the project lifecycles. Table 25 summarises the key project milestones within the delivery schedule.

Table 25 - Key Project Milestone

Milestone	Phase	Estimated Completion Date
1	Award Transformer Contract	Jan-24
2	ITT Issued for Long Lead Time Items (GIS Equipment)	Mar-24
3	Planning Application Submission (Overhead Line ZV diversion)	Jun-24
4	Planning Application Submission (Substation)	Aug-24
5	Award GIS Contract	Aug-24
6	ITT Issued for Enabling Civil Works (Redshaw Substation Platform)	Oct-24
7	Planning Decision Received (Overhead Line ZV diversion)	Feb-25
8	Award Enabling Civil Works Contract (Redshaw Substation Platform)	May-25
9	ITT Issued for Other Works (e.g. Civils, non-GIS plant, Installation, Commissioning)	Jul-25
10	Transfer Existing Circuits ZV diversion works	Aug-25
11	Planning Decision Received (Substation)	Aug-25
12	Works Start on Redshaw Substation Site	Oct-25
13	Award Contract for Other Works (Civils, non-GIS plant, Installation, Commissioning)	Feb-26
14	Commissioning 400kV Board, 132kV Board A & SGT2	Oct-27

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.

8.2 Project Risk and Mitigation

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

8.3 Quality Management

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

8.3.1 Quality Requirements During Project Development

Any risk or opportunity that may affect the quality of the product are detailed in the Project Risk Register (that is noted in Section 6.5 above).

The suppliers of main equipment may also receive a Factory Acceptance Test Inspection when the asset is being built.

8.3.2 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.

8.3.3 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
- Environmental Inspections
- Safety Assessments & Contractor Safety Inspection
- Project Management Tours

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

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

8.3.4 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.

8.4 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 NatureScot - and the third-party landowner. We have also engaged with the other stakeholders and local residents. Three consultation events were held in Abington, Crawfordjohn and Douglas.

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.

9. Conclusion and Recommendations

This MSIP Re-opener submission demonstrates the need to establish: (i) Redshaw 400kV Substation; (ii) Redshaw 132kV Substation ('A' Board); and Redshaw 400/132kV SGT2. This submission supports three discrete MSIP Re-opener applications, one application for each of the three projects summarised above. Works are programmed to commence in the RIIO-T2 period (April 2021 – March 2026) and complete in the RIIO-T3 period.

Redshaw 400kV Substation (ref. SPT-RI-2060) will enable the timely and efficient connection of 1030MW of contracted generation in the local area, and will also facilitate the future extension of the transmission network from the planned Glenmuckloch 132kV Substation to Redshaw 400kV Substation (ref. SPT-RI-236), enabling the connection of a further 650MW of contracted renewable generation capacity in southwest Scotland.

The establishment of Redshaw 132kV Substation ('A' Board) (ref. SPT-RI-2061) and the provision of additional inter-bus transformer capacity (ref. SPT-RI-2139) together facilitate the connection of a further 288MW and 396MW respectively of contracted generation in the local area.

The main conclusions of this submission are:

- The timely connection of low carbon generation, including onshore wind, will play a vital role in reaching legislated net zero targets, and is aligned with SPT's RIIO-T2 strategic goals.
- It is necessary to invest in transmission infrastructure at Redshaw 400/132kV Substation, to facilitate the connection of contracted onshore generation, this having been identified as the most economic and efficient option.
- An MSIP Re-opener application is required in respect of each of the three projects summarised above. Submission of these MSIP Re-opener applications is aligned with the contracted connection programme.

We, respectfully, request Ofgem's agreement to the following:

- The option being progressed addresses a clear customer need and represents value to GB consumers, therefore, the works should proceed based on the preferred solution (Option 5c).
- Efficient expenditure is fully funded, as necessary to maintain programme timelines and mitigate project delivery risk e.g., order long-lead equipment, prior to the second stage MSIP submissions and assessment.

Appendix A - SP Transmission System, Geographic Overview