

G ROUTE: DEVOL MOOR TO ERSKINE MODERNISATION	
Name of Scheme/Programme	Devol Moor-Erskine 132 KV Overhead Line
Primary Investment Driver	Asset Health
Scheme reference/ mechanism or category	SPNLT20110/Overhead (Tower) Line
Output references/type	NLRT2SP20110: 132kV OHL (Pole Line) Conductor/132kV OHL (Tower Line) Conductor/ 132kV Fittings/132kV Pole/132kV Tower
Cost	£5.3m Total (£3m in RIIO-T2)
Delivery Year	2023
Reporting Table	C0.7/C2.2a_AP/C2.2a_CI/C2.3/C2.4b/C2.5/C2.5a
Outputs included in RIIO T1 Business Plan	Yes

Issue Date	Issue No	Amendment Details
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Table of contents

1. Introduction	3
2. Background Information	3
2.1 Data Analysis and Interpretation	4
2.2 CBRM Summary	4
3. Optioneering	4
4. Detailed analysis	5
4.1 Option 1: Replacement of G Route with a new wood pole single circuit overhead line between Devol Moor and Erskine	5
5. Conclusion.....	6
6. Future Pathways – Net Zero	7
6.1 Primary Economic Driver	7
6.2 Payback Periods	7
6.3 Pathways and End Points.....	7
6.4 Asset Stranding Risks	7
6.5 Sensitivity to Carbon Prices.....	7
6.6 Future Asset Utilisation.....	7
6.7 Whole Systems Benefits.....	7
7. Outputs included in RIIO T1 Plans.....	7

1. Introduction

This justification paper supports a proposal to carry out the following works:

1. Construction of a new Trident wood pole single circuit 132kV OHL with 'SYCAMORE' conductor from Devol Moor to Erskine substation.
2. Decommission existing single circuit tower line route 132kV OHL from Devol Moor to Erskine substation (G Route).

The proposed 132kV outputs to be delivered in this project are:

Asset	Type of Activity	Disposal (cct. Km/sets/each)	Addition/Activity (cct. Km/set/each)
132kV OHL (Pole Line) Conductor	Replacement		16 cct km
132kV OHL (Tower Line) Conductor	Replacement	16.6 cct km	
132kV OHL Fittings	Replacement	62 sets	124 sets
132kV Poles	Replacement		124 each
132kV Towers	Replacement	62 each	

2. Background Information

The existing G Route was built in 1929 as a 132kV single circuit overhead line using the PL-1 suite of towers between Devol Moor and Erskine substations traversing predominately agricultural land. The route has performed well since construction, requiring few major interventions (mainly cyclic components; insulators and earthwire fittings). The route is close to the coast and the steelwork and interfaces with foundations are now in extremely poor condition being beyond economic refurbishment.

The project was a named scheme within RIIO-T1 submission (Reinforcement) and was part of the agreed RIIO-T1 baseline allowance under load investment. A full review of the scheme was undertaken in 2016. The design analysis has shown that a double circuit overhead line is no longer necessary due to demand reduction in the two related demand groups and cancellation of area wind farm contracts. The proposal is to replace the existing G route OHL with a wood pole 132kV overhead line due to the deterioration of steelwork condition. This replacement is urgently required to prevent failure of structural components on the G route. It is considered that without intervention, the 'end of life' of this asset will accelerate due to the continual deterioration of the line components. The main objective of the project is the replacement of deteriorated end-of-life assets.

The project has been initiated during the RIIO-T1 period but most of the construction of the project is programmed to take place in RIIO-T2 enabling the removal of G route.

2.1 Data Analysis and Interpretation

A design study was carried out to provide details on the suitability of the 132kV overhead line route to satisfy the network development proposals in respect of upgrading and or modification, taking into consideration their condition and design.

The main conclusions arising from the study were:

- The condition of the existing supports and certain key components of the conductor system is such that their residual service life is limited and correspondingly there is an immediate and high risk that reliability levels will have been compromised.
- The existing PL1 single circuit tower support designs are 1920s vintage and as such any intended design modifications would require compliance with current standards, particularly in respect of upgrading (i.e. strengthening). This would apply even if the existing route was to be re-conducted on a 'like for like' basis or with a larger conductor.
- The effect of any redesign of the existing supports (including foundations) in relation to the strengthening and or modification would generally result in impractical and uneconomic solutions when compared with the option of full support replacement using currently available designs.

2.2 CBRM Summary

CBRM extract is shown below indicating End of Life (EoL) for each of the identified asset for replacement:

Asset Description	Year of Installation	EoL*	Monetised Risk (£R)*
Phase Conductor G Route 132kV	1960	9.96	245,820.58
Phase Fittings G Route 132kV	1960	15.00	23,780,426.76
Steel Tower G Route 132kV	1929	11.72	972,858.53

*Values at the end of the RIIO-T2 period with no intervention as per NOMs methodology.

3. Optioneering

Options have been considered based on the requirements identified within the condition assessments produced for the existing overhead line route, where option 1 below has been recognised as the only viable option which meets the project objectives.

Option	Status	Reason for rejection
Baseline - Do Minimum <ul style="list-style-type: none"> • Do nothing. 	Rejected	The health of the towers and conductor system has reached its end of operational life. An intervention is required immediately to maintain system reliability.
Option 1 – Replacement of G Route with a new wood pole OHL single circuit complete in RIIO-T2	Proposed	Accepted as the most economical and efficient scheme to achieve the project objectives

Option 2 – Replacement of G Route with a like for like new single circuit tower line complete in RIIO-T2	Rejected	The cost of this option is greater than Option 1 with an appreciably greater environmental impact.
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4. Detailed analysis

Option 1 achieves the main objective of replacing G Route OHL thereby reducing the overall risks to the network and costs before the end of RIIO-T2.

4.1 Option 1: Replacement of G Route with a new wood pole single circuit overhead line between Devol Moor and Erskine

This proposal is to use a wood pole design ENA Specification 43:50 (Trident) which will reduce the visual impact along the route and overcome environmental and landowner issues that currently exist on the existing line.

The following interventions are proposed in a staged manner in this option:

- Build a new Trident(woodpole) OHL with double circuit, single SYCAMORE conductor, from Devol Moor to Erskine substation.
- Decommission existing G route.
- Update all OHL records to reflect the works carried out.
- Carry out condition assessments on sections of removed conductor/insulators and towers.
- Provide report to the Asset manager to include condition of all redundant conductors, steelwork and foundations along with associated tests logs for existing/new concrete.

The proposed conductor system, single 250mm² AAAC (Sycamore) system thermal ratings**:

Season / State	Amps	MVA
Winter Pre-Fault	780	179
Winter Post-Fault	930	213
Spring / Autumn Pre-Fault	745	170
Spring / Autumn Post-Fault	885	203
Summer Pre-Fault	680	156
Summer Post-Fault	810	185

** At 75°C Maximum Operating Temperature (From old schedules – New rating schedule required)

Specific factors attributable to this option which results in additional costs are listed below:

- Allowances for the undergrounding/diversion of distribution lines within the new proposed corridor.
- Ground conditions along the proposed route corridor.
- Wayleave and environmental restrictions along the proposed route corridor.

The following specific risks have been identified for this option:

- Overhead crossings to be mitigated through scaffolding and traffic management systems or deployment of a catenary support system.
- Utilities within working areas and woodpole positions to be addressed through procurement of records for duration of the project.
- Access routes to be addressed through early engagement with landowners, employing low bearing pressure ground vehicles and trackway where possible to mitigate extents of stone tracks.
- Foundation designs to meet ground condition.
- Network operability/wayleave/environmental restrictions which impact on the progression of works as planned.

5. Conclusion

The options proposed have been reviewed in terms of scope feasibility, cost, timescales and construction risks with Option 1 demonstrating the primary objective of lead assets replacement whilst affording greatest reduction in risk to the network.

In line with the costs prepared, the proposed scope of works for option 1 replacement of G Route with a new Trident OHL single circuit is the selected option:

- Scheme Total Cost: £5.28M
- Timing of investment: 2017-2023
- Declared outputs:

Asset	Type of Activity	Disposal (cct. Km/sets/each)	Addition/Activity (cct. Km/set/each)
132kV OHL (Pole Line) Conductor	Replacement		16.0cct km
132kV OHL (Tower Line) Conductor	Replacement	16.6 cct. km	
132kV OHL Fittings	Replacement	62 sets	124 sets
132kV Poles	Replacement		124 each
132kV Towers	Replacement	62 each	

- Long term risk benefit (LR£m):

Asset Description	Long Term Risk Benefit (LR£m)
132kV OHL (Tower Line) Conductor	£16.75
132kV OHL Fittings	£163.26
132kV Tower	£35.43

- Price control period of outputs: 2023

6. FUTURE PATHWAYS – NET ZERO

6.1 Primary Economic Driver

The primary driver for this investment is asset condition and risk. The investment does not have a strong reliance on environmental benefits.

6.2 Payback Periods

Consumers will benefit from reduced network risk immediately on completion of the project.

6.3 Pathways and End Points

The network capacity and capability that result from the proposed option has been tested against and has been found to be consistent with the network requirements determined from the ETYS and NOA processes. Additionally, the proposed option is consistent with the route-specific capacity requirements from SPT's Energy Scenarios.

6.4 Asset Stranding Risks

Electricity generation, demand and system transfers are forecast to increase under all scenarios. The stranding risk is therefore considered to be very low.

6.5 Sensitivity to Carbon Prices

The proposals for this project were not sensitive to carbon prices.

6.6 Future Asset Utilisation

It has been assessed that the preferred option is consistent with the future generation and demand scenarios and that the risk of stranding is very low.

6.7 Whole Systems Benefits

Whole system benefits have been considered as part of this proposal. The capacity and capability of the preferred option is consistent with the provision of whole system solutions.

7. OUTPUTS INCLUDED IN RIIO T1 PLANS

The proposed reinforcement included in the RIIO-T1 baseline was not progressed due to the generation and demand background not developing as forecast. Therefore the existing network configuration remained compliant with the SQSS. The original scheme allowance in RIIO-T1 was re-allocated in full to construction works associated with Kendoon – Glenlee reinforcement as a substitute scheme. Therefore, the asset replacement works under this scheme have no funding in RIIO-T1.