Scottish & Southern Electricity Networks

RIIO ED2 Engineering Justification Paper (EJP)

Drimore Primary Substations

Worst Served Customer Proposal

Investment Reference No: 349_SHEPD_REGIONAL_WSC_DRIMORE

Contents

Definitions and Abbreviations

Acronym	Definition
EJP	Engineering Justification Paper
CBA	Cost Benefit Analysis
IDP	Investment Decision Pack
WSC	Worst Served Customer
NoSR	North of Scotland Resilience
SSEN	Scottish and Southern Electricity Network
NRN	Network Reference Number
EHV	Extra High Voltage (33kV)
CBRM	Condition Based Risk Management
MDG	Mobile Diesel Generator

1 Executive Summary

This Engineering Justification Paper (EJP) covers the strategic investment required to address the high volume of interruptions on the Drimore network which serves the north area of the Isle of South Uist, Western Isles. Drimore primary supplies 457 customers of which 453 are WSCs. Customers at Drimore have experienced up to 26 interruptions over the three consecutive years between 2017 and 2019 with average interruption length of up to two hours.

Following optioneering and detailed analysis, as set out in this EJP, the proposed scope of works to address the WSC issue at Drimore are as follows:

- Install a new 33kV 3 CB switchboard in Drimore Primary with an auto-changeover scheme.

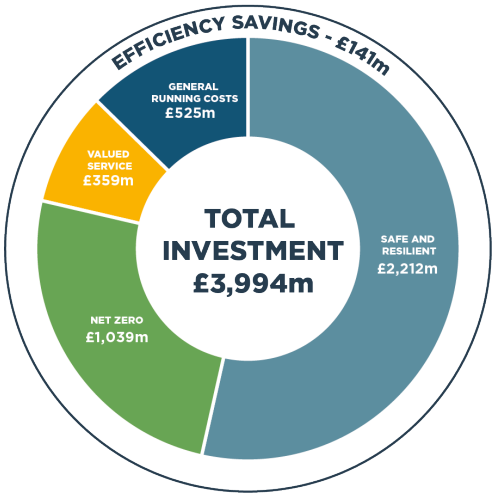
Delivering a safe, resilient and responsive network

The anticipated cost to deliver the proposed solution is £0.70m. The area has a higher network investment priority score, indicating higher vulnerability. The scheme is therefore prioritised for delivery in the third year in ED2 with the refinement phase commencing in the first year in ED2.

The scheme delivers following outputs and benefits:

- Improved network performance for the 453 WSCs at Drimore by installing a new 33kV 3 CB switchboard at Drimore Primary; this is expected to take all 453 WSC out of this classification;
- Improved CI/CML performance as a result of the works with expected volume reductions of 2228 CIs and 25685 CMLs in the SHEPD area per year;
- Significantly improves the fault resilience of the Drimore Primary when 33kV faults do occur by having a changeover scheme which ensures robust security of supply.

This Non-Load investment sits within the Safe and Resilient totex spend.



2 Investment Summary Table

Table 1 below provides a high level summary of the key information relevant to this Engineering Justification Paper (EJP).

Table 1: Investment Summary

Name of Scheme/Programme	Drimore Substation WSC Proposal					
Primary Investment Driver	North of Scotland Resilience					
Scheme reference/mechanism or category	349_SHEPD_REGIONAL_WSC_DRIMORE					
Output reference/type	As above					
Cost	Cost for the selected Investment is £0.70m					
Delivery year	2024/25					
Reporting Table	CV15 North of Scotland Resilience (SHEPD)					
Outputs included in RIIO ED1 Business Plan	**No**					
Spend Apportionment (£m)	**2023**	**2024**	**2025**	**2026**	**2027**	**Total**
	0	0	0.70	0	0	**0.70**

3 Introduction

This EJP provides high-level background information for this proposed WSC scheme explaining the data and analysis undertaken, the existing network arrangement, the proposed works and improvements to the network, the expected outcomes from these works and justifications for the proposals with the Paper.

In order to establish the most economic and efficient solution, the EJP provides an exhaustive list of the options considered through the optioneering process. This is based on the background information and fault data analysis detailed in section 4. Each option is described in detail in section 6, with the EJP setting out the justification for those options which are deemed unviable solutions, and therefore not taken forward to the Option Analysis in section 7.

The Primary Investment Driver described within this EJP is CV15 – North of Scotland Resilience and the proposed investment will improve the Drimore network. Post improvement works, due to lower numbers of faults impacting the Drimore customers, all customers will be removed from WSC classification. Drimore has consistently featured in the WSC list ED1. In year 2019, 453 customers out of total 457 customers at Drimore are in the WSC category. These customers experienced high number of interruptions, with interruptions of up to 17 over the 3-year period.

4 Background Information and Analysis

4.1 Existing Network

Drimore is located on the Isle of South Uist, normally supplied from Loch Carnan 665-206 33kV circuit via a single 33kV connection. It is not directly connected to the Loch Carnan 665-205 33kV circuit which bypasses the Drimore substation, however it runs in proximity. The 33kV circuit between Loch Carnan and Drimore consists of 9km of overhead line and one section of approximately 1km of subsea cable. The Loch Carnan 665-206 circuit is far more extensive and also supplies Clachan, Aird and Pollachar primary substations, however all of these primary substations have a direct connection from both of the Loch Carnan 33kV circuits. The geographic map shown these sites are in figure 1 below.

Drimore Primary has two 11kV circuits 011 and 012.

The 11kV circuit details are summarised in the table below.

Table 2: Drimore WSCs 11KV Feeder

11kV Circuit	Number of connected customers	Number of PSR customers	Length of OHL (km)	Length of UG cable (km)
644-011	114	24	9.83	5.34
644-012	343	59	48.79	2.43

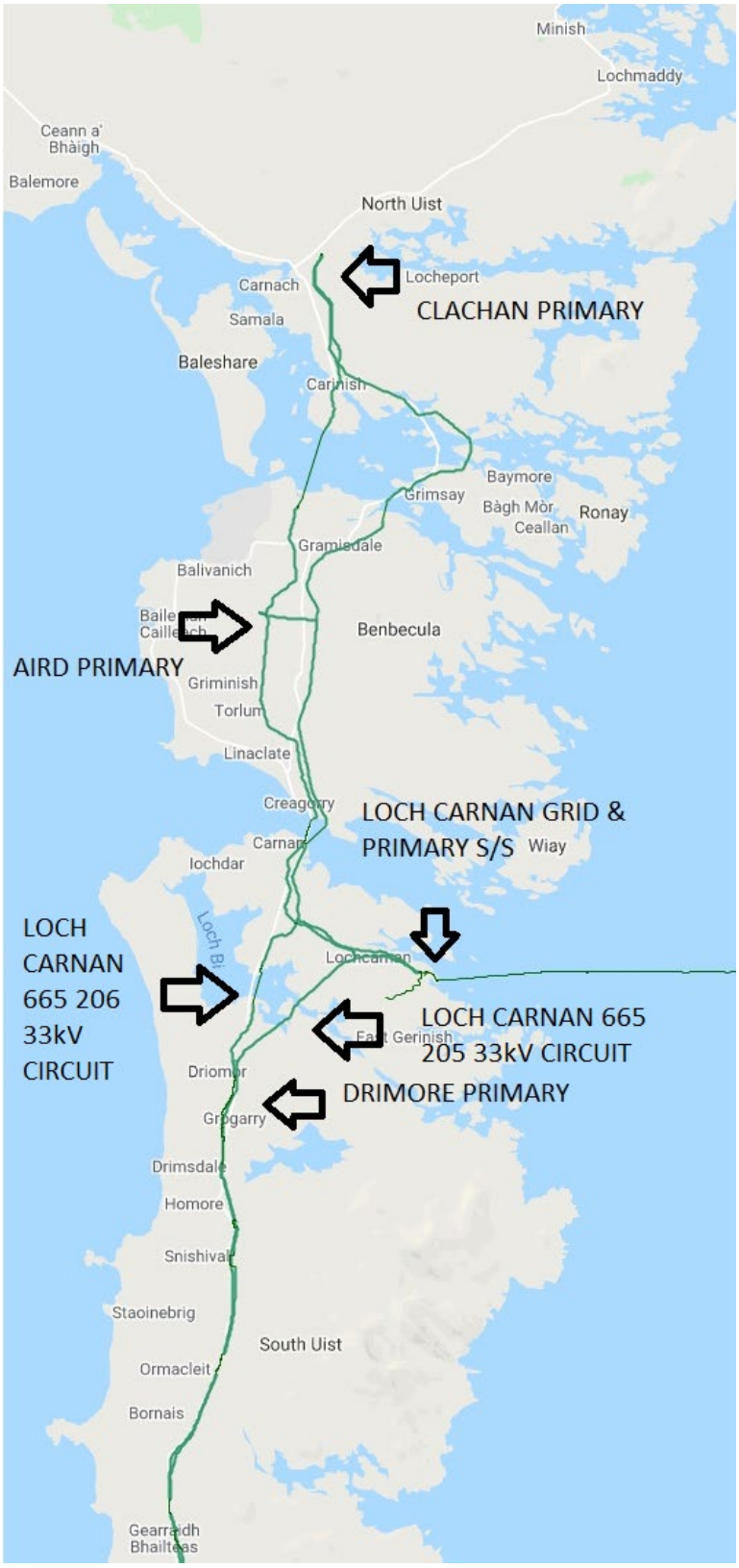


Figure 1: The existing 33kV networks of the Southern Western Isles.

4.2 WSC Network Performance

Out of the total 457 customers at Drimore, 453 are in the WSC category. 110 out of the 114 customers are WSC at feeder 011 whilst all 343 customers at feeder 012 are WSCs. All Drimore connected customers have experienced more than 20 interruptions with some customers on feeder 012 experiencing up to 26 interruptions over the 3-year period.

There are 83 PSR registered customers at this site and the network investment priority score is 4.3.

The table below shows the WSC network performance on the 11kV circuit basis (although this also counts 33kV interruptions which impacted the respective 11kV circuit as well). It shows the WSC number and the range of interruptions over the 3-year period from the reporting year 2019/20 against each circuit. As part of the feedback from the stakeholder engagement event, the interruption duration and the customer vulnerability are also considered as key factors in scheme proposal. These are also shown in the table.

Table 3: WSC Network Performance

11kV Circuit	**WSC No.**	**Range of interruption No. over 3-year**	**Average interruption length (mins)**	**Network Investment Priority score (high score = more vulnerable)**
644-011	110	22-26	71	4.3
644-012	343	20-21	112	4.3

4.3 Demand Forecast

Under the Consumer Transformation scenario, the demand forecast for Drimore is shown in the table below between 2021 and 2033. The average annual growth rates for Drimore is 3.38%.

Table 4: Drimore Demand Forecast

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Arisaig (MW)	0.96	0.96	0.97	0.99	1.02	1.06	1.10	1.15	1.20	1.27	1.34	1.38	1.42

4.4 Fault Data Analysis

The list below reflects where faults have affected higher customer numbers across the proposed area for investment, there are other lower customer number faults that have occurred during the identified WSC time period which have not been listed. Note that only 33kV faults have been shown in the below image and this list as they are predominantly the cause of WSC performance.

Table 5: Fault Data Analysis

Date	Fault Description	No. Customers Impacted
2017	33kV fault: Transient, Grid CBs operation	1006
2017	33kV fault: Transient, Grid CB operation, (only Drimore customers affected due to lack of 33kV changeover)	454
2017	33kV fault: Deterioration, broken OHL insulator, (customer affected includes wider Uist customers)	1555
2017	33kV fault: Deterioration, broken OHL insulator, (only Drimore customers affected due to lack of 33kV changeover)	450
2017	33kV fault: Transient, Grid CB operation, (only Drimore customers affected due to lack of 33kV changeover)	419
2017	33kV fault: Transient, Grid CB operation, (customer affected includes wider Uist customers)	2169
2017	33kV fault: Deterioration, broken OHL insulator caused burning pole, (only Drimore customers due to lack of 33kV changeover)	457
2017	33kV fault: Deterioration, broken OHL insulator, (only Drimore customers due to lack of 33kV changeover)	453
2017	33kV fault: Faulty Manufacture, Faulty Spark Gap, (customer affected includes wider Uist customers)	1003
2017	33kV fault: Transient, Grid CB operation, (only Drimore customers affected due to lack of 33kV changeover)	457
2017	33kV fault: Transient, Grid CB operation, (only Drimore customers affected due to lack of 33kV changeover)	456
2017	33kV fault: Deterioration, broken OHL insulator caused burning pole, (only Drimore customers due to lack of 33kV changeover)	452
2018	33kV fault: Transient, Grid CB operation, (customer affected includes wider Uist customers)	1980
2018	33kV fault: Lightning, Faulted Surge Arrestors, (customer affected includes wider Uist customers)	1975

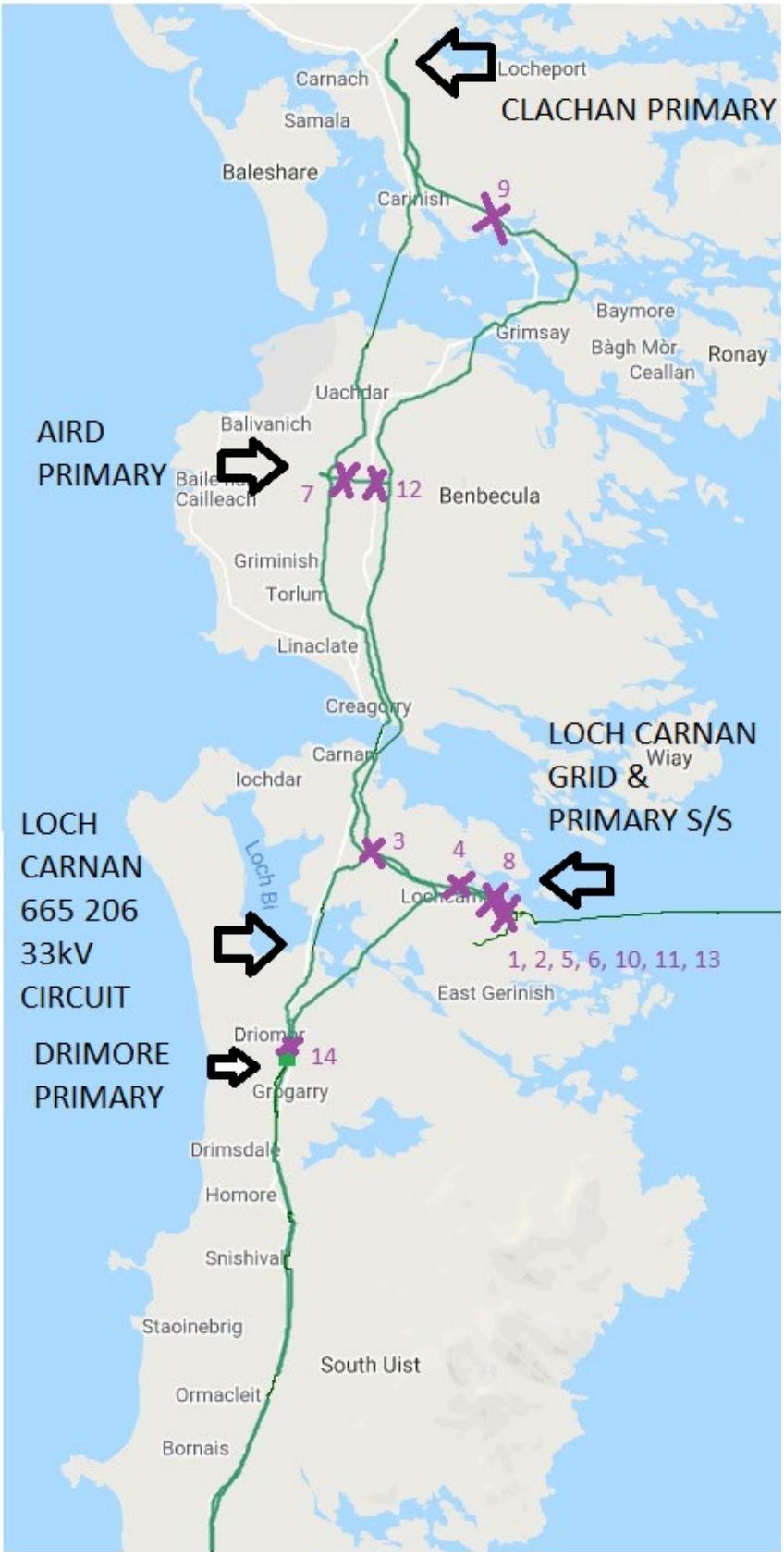


Figure 2: Location of 33kV faults affecting Drimore customers

Due to the radial nature of the 33V network supplying Drimore, there have been 14 no. 33kV faults causing customer interruptions due to faults occurring on the Loch Carnan 665-206 33kV circuit over the last 3-year period. Solely based on the performance of the 33kV network and its impact on the Drimore customers, these customers are already in WSC classification irrespective of additional 11kV faults.

On the 11kV feeders, there were 7 incidents where more than 100 customers were affected over the 3-year period. However, as the proposed works and costs to rectify the 33kV network performance is significantly lower compared to the required investment to rectify 11kV network performance and this will resolve the WSC classification, the 11kV solution has not been further developed.

5 Optioneering

This section of the report sets out the investment options that are considered when resolving the WSC issues. As described below a holistic approach is taken to ensure investment options which are both least regrets and represents best value for money for network customers are identified.

5.1 Summary of Options

Table below provides a high-level summary of the 5 investment options under consideration along with the advantages and disadvantages associated with each. A more detailed description of each option is then provided within the proceeding sub-sections.

Table 6: Summary of WSC Investment Options

Option	Description	Advantages	Disadvantages	Result
1. Do Nothing (Baseline)	No upfront action taken to improve the network performance. Maintenance and Inspection activities continue as normal.	No additional cost	WSCs will continue experiencing high number of interruptions.	Rejected
2. Enhanced Maintenance and/or Inspection (Refurbishment)	Enhanced inspection and maintenance to improve asset condition or slow the rate of ageing.	Cost effective over short time period No large upfront CAPEX	Additional maintenance resource required Significant proportion of customers remain as WSCs Increase in OPEX	Taken forward to further assessment.
3. Re-build existing lines (Replacement)	Rebuilding the existing network where the WSCs are to reduce the probability of failure on components.	Improve the network performance over short term No further maintenance or inspection required	Increase in CAPEX Lower utilisation of existing assets WSCs will fall back in this category over short period of time. No new fault resilience added	Taken forward to further assessment.

4. Reinforcing existing network (Reinforcement)	Installation of additional assets to mitigate the risk of interruptions due to single circuit supply arrangement	WSCs unlikely to return to this category as new fault resilience added Long term investment Wider benefits to network users including Net Zero targets	Often costly when compared with other options Longer delivery time due to the likely requirement of additional consent	Taken forward to further assessment/preferred option.
5. Flexible solutions	Use battery storage or other alternative mean to support the network and mitigate interruptions	Reduced requirement of reinforcing the network Competitive cost comparing to the reinforcement option	Technology and mechanism is yet to be proven Limited sites that can utilise such arrangement to improve WSC performance	Option rejected.

6 Analysis and Cost

6.1 Option 1: Do Nothing

Estimated Cost: £0k

Drimore is supplied through a single radial 33kV circuit from Loch Carnan. Without any intervention, the WSCs will experience similar level of 33kV and 11kV interruptions into ED2 and beyond. Therefore, this option is not considered viable.

6.2 Option 2: Enhanced Maintenance and/or Inspection (Refurbishment)

Estimated Cost: £178k

This option is to carry out enhanced maintenance on the Drimore 644-012 11kV circuit and the upstream 33kV network. This will target the assets with poor health condition and the worst performing sections with targeted measures such as pole replacement and refurbishment. This is likely to improve the network performance for a small portion of the WSCs. However, given that are a number of faults are due to external factors, such as wind and gale, lightning and transient events, then this option will not resolve these potential faults. It is likely that significant number of customers would remain as WSCs as no fault resilience is added to the circuit in the form of circuit interconnection or changeover schemes and so the Drimore customers would remain exposed to faults arising from external factors.

Due to the lack of significant network improvement, the Drimore customers could experience WSC equivalent performance during the full ED2 period. Taking account of the anticipated post works deterioration in network performance, the likely outcome is that the Option 2 refurbishment in ED2 would have to be followed by the Option 4 reinforcement in ED3.

6.3 Option 3: Re-build existing lines (Replacement)

Estimated Cost: £2.02m

Under this option, it is considered that 15km of 33kV overhead line of the Loch Carnan 665-206 33kV circuit would be rebuilt and 20km of the worst performing sections of the Drimore 11kV OHL circuits would be re-built.

As a result of the proposed works, it is expected that the network performance will result in reasonable improvements however the network performance would deteriorate over time. It is likely that significant number of customers would remain as WSCs as no fault resilience is added to the circuit in the form of circuit interconnection or splitting the circuit and so Drimore primary would remain exposed to 33kV faults arising from external factors.

During the proposed Option 3 works, it is likely that the proposals would be built as an 'online' build which requires circuit outages that would impact the respective WSC and potentially wider area customers. Also, it would lead to an increase in diesel usage and CO_2 emissions due to usage of mobile generation to ensure customers were not off supply for excessive periods of time during the works.

It is assumed that 20 years post carrying out the Option 3 works, due to deteriorating performance of the circuit, that the Option 4 reinforcement proposal would have to be implemented at that point in the future.

6.4 Option 4: Reinforcing existing network (Reinforcement)

Estimated Cost: £695k

The proposed option is to establish a second 33kV connection into Drimore by teeing off the Loch Carnan 665-206 33kV circuit adjacent to the primary substation. This would involve the installation of approximately 50m of 33kV underground cable crossing A865 and overhead line cable termination to a new pole near to pole 87. It is also proposed to install a new 3 panel 33kV switchgear to enable the 33kV auto-changeover that will mitigate the 33kV faults which occur on the existing circuit. This would require an extension to the building to accommodate the new 33kV switchgear. The 33kV OHL interconnector can be removed.

The proposed option will eliminate the majority of 33kV faults which will cause actual interruptions to the customers as the changeover scheme will ensure continuous supply in the event of a single 33kV circuit fault. This will significantly reduce the overall volume of interruptions which are experienced per year by the customers.

During the proposed Option 4 works, as the proposal is to build new infrastructure, the majority of new equipment can be constructed as 'offline' build. This would minimise the requirement for circuit outages that would impact the respective WSC and potentially wider area customers. As there would be less requirement for outages, this would result in lower amounts of diesel usage and CO_2 emissions due to usage of mobile generation as compared to Option 3.

Therefore, taking account of these factors, this is the preferred option.

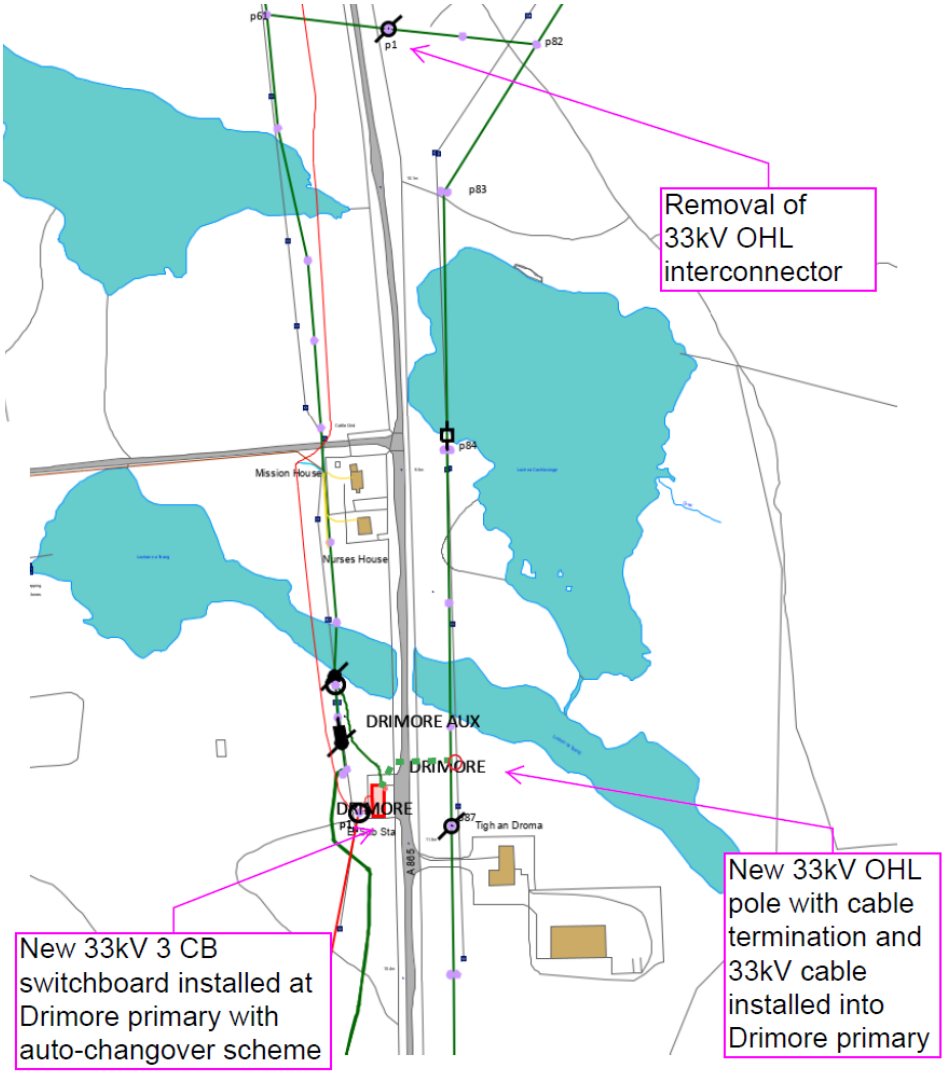


Figure 3: Proposed Option 4 works at Drimore Primary

6.5 Option 5: Flexible Solution

Estimated Cost: £268k

Flexibility services could be used to support Drimore substation in the EHV fault scenario. The flexible solution needs to be made available throughout the year and be able to support the network over the period to allow the restoration. This period can be up to 2 hours based on the fault history.

The estimated cost is based on the energy storage service to support 1MW load with maximum utilisation of 30 days per annum starting from year 2 in ED2. The technology is still unproven for a solution that can support the network of this size for this duration. Therefore, this option is not considered viable.

7 Option Analysis

This section of the report provides an overview of the CI/CML results and analysis for each option. It provides an overall comparative review and analysis of the options, confirmation of the EJP preferred option and the associated justifications. The figures presented below represent the expected percentage improvement of the Ofgem CI & CML methodology ratio figures for SHEPD area per year and the expected actual volume reductions of CI and CMLs in the SHEPD area per year.

7.1 CI/CML Analysis of refurbishing the existing line (Option 2)

It is expected that following Customer Interruption (CI) and Customer Minutes Lost (CML) improvements will be achieved under this option. These figures are too low to improve the number of WSC and will make no discernible impact on the quality of supply and network performance. The assumption is that these benefits will diminish over a period of five years, by when the reinforcement option would be necessary to address the WSC issue.

	CI Improvement % (Actual Volume)	CML Improvement % (Actual volume)
Drimore 011 & 012	0.005 (42)	0.002 (1988)
Loch Carnan 665-206	0.006 (51)	0.005 (2906)
Total	0.011 (93)	0.008 (4894)

7.2 CI/CML Analysis of re-building of the existing line (Option 3)

It is expected that the CI & CML improvements for the re-build option would be higher than the refurbishment option but are remain low CI & CML values due to the same network arrangement being retained. The assumption is that these benefits will diminish over a period of twenty years and at this future point the reinforcement option would be necessary to address the WSC issue.

	CI Improvement % (Actual Volume)	CML Improvement % (Actual volume)
Drimore 011 & 012	0.013 (105)	0.005 (3976)
Loch Carnan 665-206	0.015 (128)	0.007 (5812)
Total	0.028 (233)	0.012 (9788)

7.3 CI/CML Analysis of reinforcement of the network (Option 4)

The expected CI and CML improvements based on this option is as shown in the table below. The table shows a significant improvement for CI/CML and network performance relative to the customer numbers involved and this will remove all Unst customers from WSC classification.

	CI Improvement % (Actual Volume)	CML Improvement % (Actual volume)
Loch Carnan 665-206	0.2782 (2228)	0.0321 (25685)

From the above tables, it is evident that the CI/CML improvement from the reinforcement option is significantly higher than the other proposed options. This confirms the case that Option 4 is the most preferable option as it delivers the required level of improvement to the network and will permanently remove those customers from WSC classification.

7.4 Summary of Cost

Table 7: Summary of Cost

Options	Unit	2023/24	2024/25	2025/26	2026/27	2027/28	Total
Option 1 – Do Nothing	£m	0	0	0	0	0	0
Option 2 – Enhanced Maintenance and Inspection	£m	0	0	0.18	0	0	0.18
Option 3 – Asset Replacement	£m	0	0	2.02	0	0	2.02
Option 4 – Reinforcement	£m	0	0	0.70	0	0	0.70
Option 5 – Flexible Solution	£m	0	0	0.09	0.09	0.09	0.27

Our RIIO ED2 Business Plan costs are derived from our outturn RIIO ED1 expenditure. We have modified costs per activity, capturing and reporting those adjustments in our cost-book. By tying our costs back to reported, outturn, real life data this approach provides multiple data points on which both the Regulator and we can benchmark cost efficiency.

It provides a high level of cost confidence in our Business Plan cost forecast for RIIO ED2. Through our benchmarking analysis, we recognised that not all Non-Load related RIIO-ED1 actual unit costs sit within the upper quartile efficiency band. Where this is the case, we have applied a catch-up efficiency to those cost categories.

Further detail on our unit cost approach, cost efficiency and cost confidence for RIIO-ED2 can be found within our ***Cost Efficiency (Annex 15.1)***. Following our draft Business Plan, we have continued to develop project volumes and costs, utilising valuable stakeholder feedback. We have included developments of our Commercial Strategy within the updated project scope and delivery strategy.

7.5 Cost Benefit Analysis comparisons

The tables above demonstrate that the reinforcement option is the preferred option as the other options are either rejected as non-viable, have poorer CI/CML performance or higher investment cost. As Options 2 and 3 do not introduce any new fault resilience to Drimore Primary and associated customers; they only deliver marginal improvement in CI/CML and network performance; which will deteriorate in future years and therefore they cannot be chosen as the preferred option.

The preferred option allows the customers to benefit from investment in ED2 and improved CI/CML and network performance. Both Option 2 and Option 3 are envisaged to incorporate the works in Option 4 with reinforcement in the future years to achieve the improved performance delivered by Option 4.

As such, it is understood that delaying the investment does not provide the best value for money solution, reinforcing the case for Option 4.

7.6 Volume on Preferred Option

Table 8: Volume of Preferred Option

Asset Category	Unit	2023/24	2024/25	2025/26	2026/27	2027/28	Total
33kV UG Cable (Non Pressurised)	km	0	0	0.5	0	0	0.5
33kV CB (Gas Insulated Busbars)(ID)(GM)	#	0	0	3	0	0	3
33kV OHL (Pole Line) Conductor	Km	0	0	1	0	0	1
33kV Pole	#	0	0	15	0	0	15
33kV Switch (PM)	#	0	0	1	0	0	1
11kV Pole Refurbishment	#	0	0	23	0	0	23

8 Validate investment plans and benefits with Stakeholders

This section of the EJP describes the stakeholder engagement strategy that has been implemented to inform SSEN's RIIO-ED2 submissions. This includes the engagement activities that have been undertaken, the stakeholder groups that have been approached, and the feedback that has been gathered from this stakeholder engagement.

The intention of this exercise was to identify the appetite from our stakeholders for SSEN in carry out the investment described within this document during RIIO-ED2 to improve the condition of SSEN's network assets and the quality of supply for customers in during ED2 and beyond.

We conducted audience research with stakeholders via online workshops/open forums to co-create our strategies and priorities in RIIO-ED2 for improving the network for WSCs. Following insights were derived:

- Stakeholders suggested that, based on the remote location of some Scottish islands, investment for the WSCs there should be a priority, as it will potentially take far longer to restore power there compared to mainland areas.
- There was no consensus on whether investment in worst-served circuits should be prioritized according to: number of WSCs; number of interruptions; level of customer vulnerability; or potential of low carbon technology (LCT) take-up.
- Stakeholders, however, expressed concern about the impact of power cuts on customers in vulnerable situations, and on this basis focusing investment efforts on reducing the number of worst-served vulnerable customers was supported.
- The interruption duration which is currently not considered in Ofgem's WSC definition is recognized as an important factor by our stakeholders.
- Stakeholders suggested that an annual WSC report would be welcome and raise the profile of the issue but might give the incorrect impression that these are the areas where there will be investment.
- Some stakeholders were concerned about the impact of worst-served circuits on generation as well as supply customers.

The lack of consensus on stakeholders on how to prioritise worst-served areas for improvement clearly suggests that being worst-served is a substantial detriment to all such customers, albeit playing out in different ways and therefore remedying these is extremely important. Therefore, we are committing to remove at least 75% of customers from this list in ED2; this ambitious proportion represents all circuits where cost benefit analysis warrants investment; the remaining 25% of WSCs are distributed over so many circuits that the benefit derived from each circuit investment would be limited to very few customers.

We will also ensure that we communicate effectively during power outages, particularly for remote communities where electricity is heavily relied upon, promote the PSR and the 105 power outage number, and produce an annual WSC report to be shared with wider stakeholders to embed resilience partnerships.

Based on the stakeholder feedback, the average Customer Minutes Lost (CML), Priority Service Register (PSR) and the vulnerability score from the Customer Mapping Tool are also factored in the scheme consideration.

9 Deliverability and Risk

Between our draft and final Business Plans we have carried out a more detailed deliverability assessment of our overall plan as a package and its component investments. Using our draft Business Plan investment and phasing as a baseline we have followed our deliverability assessment methodology. We have assessed any potential delivery constraints to our plan based on:

- In-house workforce capacity and skills constraints based on our planned recruitment and training profile and planned sourcing mix as well as the efficiencies we have built into our Business Plan (detailed in our ***Ensuring Deliverability and a Resilient Workforce (Chapter 16)*** and ***Cost Efficiency (Chapter 15***)
- Assessment of the specific lead and delivery timelines for the asset classes in our planned schemes
- We have evaluated our sourcing mix where there were known delivery constraints to assess opportunities to alleviate any constraints through outsourcing
- We have engaged our supply chain (detailed in our ***Supply Chain (Annex 16.2)***) to explore how the supply chain could support us to efficiently deliver greater volumes of work and how we could implement a range of alternative contracting strategies to deliver this
- We have also engaged with the supply chain on the delivery of work volumes that sit within Uncertainty Mechanisms to ensure we have plans in place to deliver this work if and when the need arises
- We have assessed the synergies between our planned load, non-load and environmental investments to most efficiently plan the scheduling of work and minimise disruption to consumers
- Based on our assessment of delivery constraints and potential solutions to resolve them, we have revised our investment phasing accordingly to ensure our Business Plan is deliverable, meets our consumers' needs and is most cost efficient for our consumers

10 Conclusion

The purpose of this Engineering Justification Paper (EJP) has been to describe the overarching investment strategy that SSEN intends to take during RIIO ED2 for the NoSR related investment in Drimore substation.

Five investment options have been described which could be carried out to address the WSC issue at these sites. As detailed within Section 7, a holistic approach is taken when selecting the most viable option for each investment, where the primary and secondary investment drivers are assessed together within the Option Analysis. This includes careful consideration of the financial, safety, and environmental implications of each investment option.

- Option 1: Do Minimum
- Option 2: Enhanced Maintenance and Inspections
- Option 3: Asset Replacement
- Option 4: Asset Reinforcement
- Option 5: Flexible Solution

A thorough stakeholder engagement exercise was undertaken to gather feedback on each of these strategies to determine which approach should be proposed within SSEN's RIIO ED2 business plans.

As a result, the following costs are proposed for delivery during RIIO ED2. The preferred investment for Drimore substation in RIIO ED2 is Option 4: Reinforcement.

Table 9: CV Table Summary

CV Table	Unit	2023	2024	2025	2026	2027	Total
CV15 North of Scotland Resilience RIIO ED2 Spend	£m	0	0	0.70	0	0	0.70

11 Appendix 1 List of Indicators of Vulnerable Characteristics and Weighting System

These indicators are applied when producing combined indexes of vulnerability.

Indicator of vulnerable characteristic	Network investment priority: score (high score = more vulnerable)
Under 5 years	0.5
Under 16 years	0
Over 65 years	0.1
Over 75 years	0.4
Over 85 years	0.6
Fuel poverty levels (Scotland; 1=low, 4=v.high)	0
Fuel poor households (England)	0
Dwellings without a mains gas connection	0
Dwellings without central heating system	0
Dwellings rated in EPC bands EFG	0
Households with no car	0
Combined distances to services (Score; high=most remote)	0
Children in low income households	1
People with low qualifications	0
People in low income employment	1
Long-term unemployment	1
Disability benefits	1
Child disability benefits	1
Mental health benefits	1
Universal credit claimants	0
People in bad or very bad health	0.5
People whose health condition limits activities a lot	0.5
Access to health services (Score; 0=best access, 100=worst access)	0
People providing over 20hrs/week of care	0.5
Number of residential care homes	0
Number of care home beds	0
Households in privated rented dwellings	1
Lone parents	1
Ethnic minorities	1
Unable to speak English well or at all	0
Lone pensioners	1

12 Appendix 2: Relevant Policy, Standards, and Operational Restrictions

TG-NET-NPL-012.pdf

Scottish & Southern Electricity Networks

13 Appendix 3: Assumptions for the Flexible Solution

Contract Year	Availability Price – CMZ Secure (£/MW/Day)	Capacity offered (MW)	Potential Days Required	Maximum Total Availability price paid	Utilisation Price – CMZ Secure (£/MWh)	Maximum Potential Energy Required (MWh)for 30 days per annum	Total Utilisation Cost (£) per annum	Yearly total	
Year 1	[redacted]	1	365		[redacted]	720			
Year 2	[redacted]	1	365		[redacted]	720			
Year 3	[redacted]	1	365	[redacted]	[redacted]	720	[redacted]	[redacted]	
Year 4	[redacted]	1	365	[redacted]	[redacted]	720	[redacted]	[redacted]	[redacted]
Year 4	[redacted]	1	365	[redacted]	[redacted]	720	[redacted]	[redacted]	