Scottish & Southern Electricity Networks

RIIO ED2 Engineering Justification Paper (EJP)

Arisaig Primary Substations

Worst Served Customer Proposal

Investment Reference No: 341_SHEPD_REGIONAL_WSC_ARISAIG

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

1 Executive Summary

This Engineering Justification Paper (EJP) covers the strategic investment required to address the high volume of interruptions at Arisaig in Lochaber, Inverness-shire. This site has consistently featured in the top rank of the Worst Served Customer (WSC) sites in the ED1 years based on the ED2 WSC definition. The proposed scheme of an investment of £1.22m during RIIO-ED2.

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

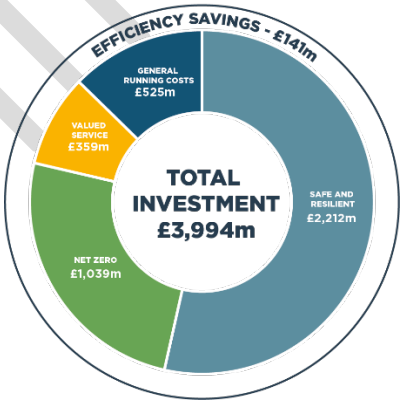
Delivering a safe, resilient and responsive network

- Installation of 1.5km of 33kV overhead line between P172 on Craigmore-Lochailort line and Arisaig;
- Installation of a 3 panel 33kV indoor switchgear and its associated building at Arisaig;
- Fully automating the disconnectors at Lochailort switching station by replacing the existing ones;
- Installation of enhanced lightning protection on the 11kV network;

The anticipated cost to deliver the proposed solution is £1.22m. The scheme is expected to deliver following outputs and benefits:

- Improved network performance for the 354 WSCs at Arisaig by providing the second teed 33kV connection from Craigmore – Lochailort line;
- Improved CI/CML performance as a result of the works expected volume reductions of 2,734 CI and 100,547 CMLs in the SHEPD area per year;
- Improved network operation and reliability by fully automating the disconnectors at Lochailort switching station.

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



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	Arisaig Substations WSC Proposal					
Primary Investment Driver	North of Scotland Resilience					
Scheme reference/mechanism or category	*341/SHEPD/REGIONAL/WSC/ARISAIG*					
Output reference/type	As above					
Cost	*£1.22m.*					
Delivery year	2027/28					
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	0	1.22	**1.22**

3 Introduction

This Engineering Justification Paper (EJP) covers the non-load related investment required to improve the performance of the network at Arisaig (NRN-740) supplied from Fort William Grid (NRN - 715) feeder 302, specifically relating to the Worst Served Customers (WSC).

The Primary Investment Driver described within this EJP is to remove this site from the WSC category. All 354 customers at Arisaig were worst served in the latest reporting year and also two other reporting years in ED1. These customers experiencd up to 16 number of interruptions in the 3-year period. This clearly is not acceptable to both our customers and SSEN.

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 justification set out for those options which are deemed unviable solutions, and therefore not taken forward to the Option Analysis in section 7.

The proposed investment will establish a second EHV connection to Arisaig from Fort William Grid feeder 305 by installing a section of approximately 1.5km long 33kV overhead line and a new 33kV switchboard at Arisaig. This is also expected to make improvement on the network performance to Mallaig, connected at the same 33kV circuit downstream. The scheme is proposed for delivery in 2027/28 in ED2 with design phase to commence in early years in ED2.

4 Background Information and Analysis

4.1 Existing Network

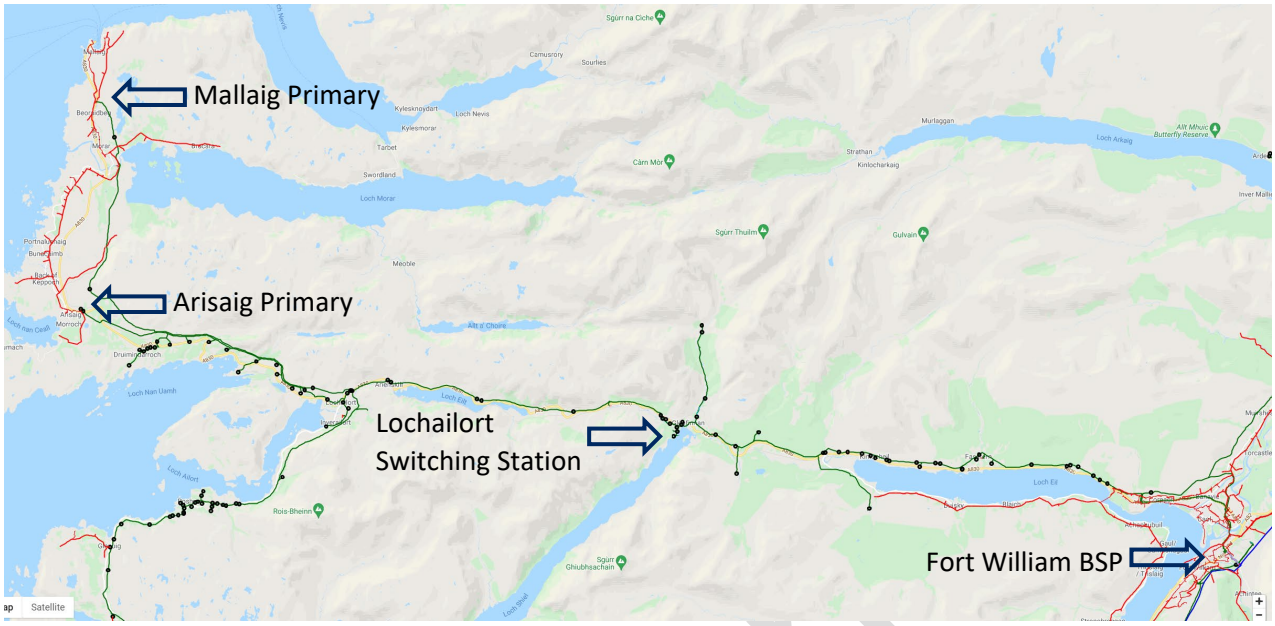


Figure 1: Location of Arisaig and Mallaig Primary Substations

Both Arisaig and Mallaig are supplied from Fort William Grid (715-302) via 56.4km overhead line network. These two sites are located in Lochaber, Inverness-shire on the west coast of the Highlands. Arisaig has only one HV feeder supplying all their customers and it is interconnected with Mallaig HV feeder 013.

Both Arisaig and Mallaig are normally supplied from 715-302 feeder with changeover arrangement at Lochailort Switching Station to switch the supply to 715-305 in the event of 33kV faults upstream. From Lochailort Switching Station, there are two separate 33kV line running in proximity for approximately 14km.

The total number of customers at each site and their Priority Service Register (PSR) customer numbers are shown in the table below.

Table 2: Arisaig HV Feeder

	HV Feeder	Number of connected customers	Number of PSR customers	Length of OHL (km)	Length of UG cable (km)
Arisaig	**740-011**	354	67	18.88	1.91

4.2 WSC Network Performance

All 354 number customers at Arisaig are in the WSC category in 2019. The average interruption length over the 3-year period was 139 minutes for HV interruptions and 33 minutes for EHV interruptions. The interruption number ranged between 12 and 16 over the 3-year period.

The table below shows the WSC network performance on Arisaig WSC HV feeder. It shows the WSC number and the range of interruption numbers over the 3-year period from the reporting year 2019/20 against each feeder.

Table 3: WSC Network Performance

	HV Feeder	WSC No.	Range of interruption No. over 3-year	Average interruption length (mins)	Network Investment Priority score (high score = more vulnerable)
Arisaig	**740-011**	354	12-16	139	3.5

4.3 Demand Forecast

Under the Consumer Transformation scenario, the demand forecast for Arisaig is shown in the table below between 2021 and 2033. The average annual growth rates for Arisaig is 3.65%.

Table 4: Demand Forecast for Arisaig

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Arisaig (MW)	0.62	0.62	0.63	0.63	0.64	0.64	0.67	0.69	0.76	0.83	0.90	0.92	0.95

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.

Table 5: Fault Data Analysis

Date	Fault Description	No. Customers Impacted
2018	33kV fault: Birds, Transformer faulted	1326
2018	33kV fault: Extension of fault zone, Annat 3L5 tripped	1327
2018	33kV fault: Domestic Animal, Mallaig T1 caused trip	667
2018	33kV fault: Birds, Broken conductor	425
2018	33kV fault: Lightning, Annat 2L5 tripped	2650
2018	33kV fault: Birds, broken OHL conductors	1322
2019	33kV fault: Incorrect Protection Settings, Annat 2L5 tripped	2632
2019	33kV fault: Transient, Fort William 1L5 tripped	2647
2019	33kV fault: Lightning, Broken Dishes	1327
2019	33kV fault: Deterioration, Faulty Transformer	420
2017	11kV fault: Lightning, Transformer faulted	360
2017	11kV fault: Lightning, Damaged pole box	356
2018	11kV fault: Lightning, Damaged pole	356
2019	11kV fault: Domestic Animal, Broken stay cased by cattle	116
2019	11kV fault: Lightning, HV fuses blown	16
2019	11kV fault: Wind and gale, Broken HV jumper	12
2019	11kV fault: Safety restriction, Deliberate disconnection	243

2019	11kV fault: Transient, No damage	354

There have been ten number of EHV faults affecting the supply to Arisaig in the last 3-year period. These faults are caused by factors such as bird strikes, lightning strikes, and weather events distributed through the various section of the line.

On the HV network, there were six HV interruptions that resulted loss of supply for more than 100 customers. The fault data indicates that there are very high-level lightning risk in the area that has affected the network performance, 4 occasions at Arisaig that affected over 300 customers.

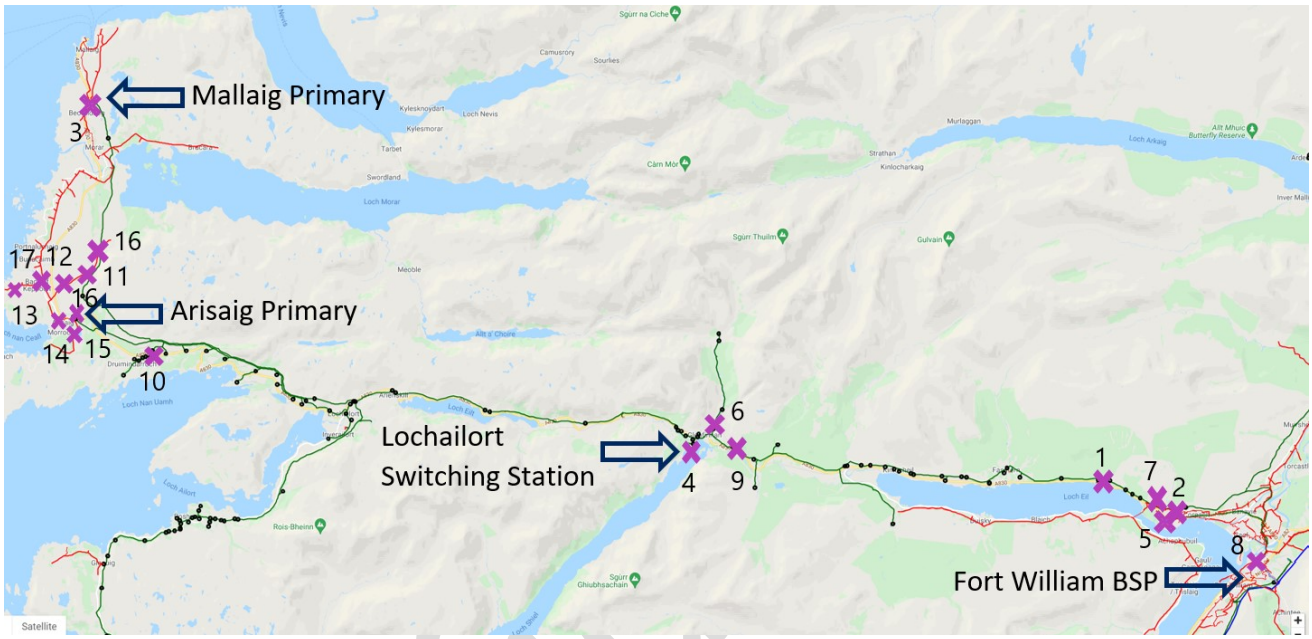


Figure 2: Fault Data Analysis

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 Minimum (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.	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 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	Rejected

6 Analysis and Cost

6.1 Option 1: Do-Minimum

Estimated Cost: £0k

Due to the remoteness of the Arisaig site, it is supplied through a long radial feed circuit from Fort William Grid and has no interconnection at 33kV. Without any intervention, the WSCs will experience similar level of interruptions into ED2 and beyond. Therefore, this option is not considered viable.

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

Estimated Cost: £661k

This option is to carry out enhanced maintenance on the Fort William EHV feeder and Arisaig HV feeder. This will target the asset with poor health condition and the worst performing sections with measures such as pole replacement and refurbishment. This is likely to improve the network performance and reduce the probability of failure over the short term. However, due to the long radial network, this measure alone will not warrant the improved performance for WSCs at Arisaig over ED2 and beyond.

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

Estimated Cost: £1,734k

Under this option, it is considered that the worst performing sections of the overhead line elements are being re-built:

- 12.2km of the 11kV overhead line network at Arisaig S/S;
- 7.3km of the 33kV overhead line network at various sections between Fort William and Arisaig;

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 Arisaig would remain exposed to 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 CO2 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. Whilst it is expected that the network performance will be significantly improved under this option, this option does not represent the best utilisation of the current asset and no material impact on the interruption performance in the long term.

6.4 Option 4: Reinforcing existing network (Reinforcement)

Estimated Cost: £1,220k

Under this option, it is proposed to install a section of 33kV overhead line from the existing line to Mallaig to Arisaig substation. A 3 panel 33kV switchboard will be required at Arisaig to accommodate this connection with auto-changeover arrangement. This second EHV connection to Arisaig will improve the network performance for any interruptions on the Lochailort No.2 section. The discussion with our local staff indicated that the 1.5km route shown on the map below is feasible. It is worth noting that this option involves a railway crossing.

Figure 3: The proposed connection to Arisaig

For any faults on the network upstream, the Lochailort Switching Station currently requires engineers visit to manually operate the disconnectors to switch the supply for both Mallaig and Arisaig from Fort William 715-302 to 715-305. This has resulted multiple interruptions to Arisaig in the past.

As part of this scheme, it is proposed that the disconnectors at Lochailort Switching Station to be fully automated to further improve the network performance for both Arisaig and Mallaig.

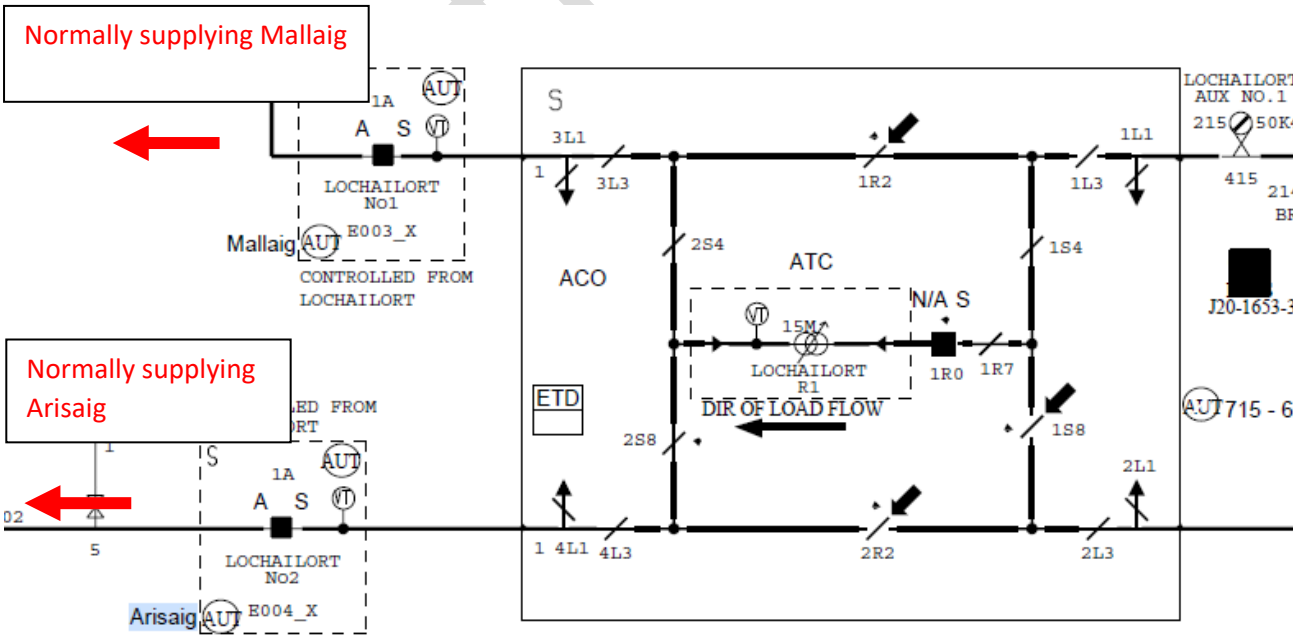


Figure 4: Schematic diagram for the proposed connection to Arisaig

The proposed arrangement at Arisaig switchboard is shown below.

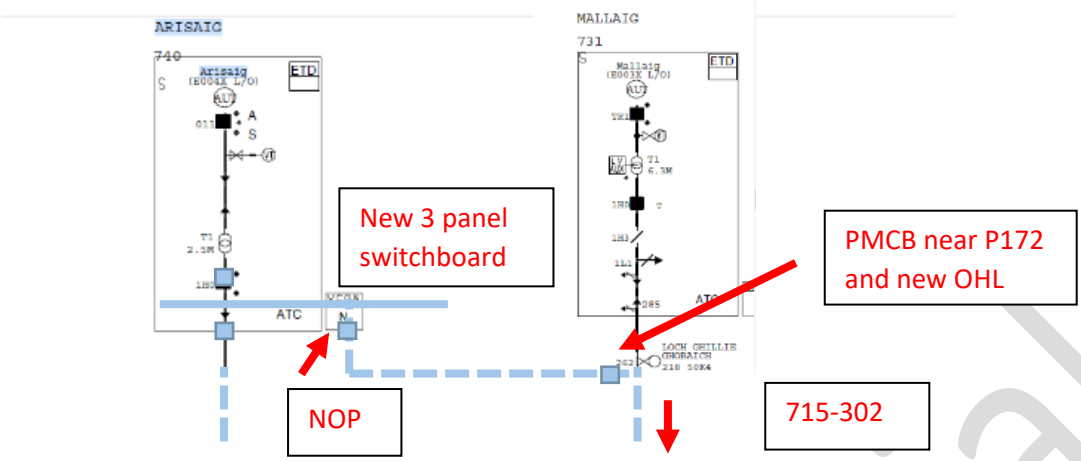


Figure 5: Proposed Arrangement at Arisaig

To mitigate the lightning risk, it is also proposed to install enhanced lightning protection at the 11kV feeders at Arisaig, assuming 10 no. poles to be modified.

6.5 Option 5: Flexible Solution

Estimated Cost: £89k

Flexibility services could be used to support Arisaig substation in the EHV fault scenario. However due to nature of HV network, 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 in the last year of ED2. The technology is still unproven for a solution that can support the network of this size for this duration. This will also be unable to support the faults further on the HV feeders, hence has limited impact to the WSC performance improvement.

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.

Table 7: CI/CML Improvement for Option 2

	CI Improvement % (Actual Volume)	CML Improvement % (Actual volume)
Arisaig	0.01 (53)	0.04 (6482)

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 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.

Table 8: CI/CML Improvement for Option 3

	CI Improvement % (Actual Volume)	CML Improvement % (Actual volume)
Arisaig	0.068 (547)	0.025 (20109)

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 Arisaig customers from WSC classification.

Table 9: CI/CML Improvement for Option 4

	CI Improvement % (Actual Volume)	CML Improvement % (Actual volume)
Arisaig	0.341 (2734)	0.126 (100547)

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 10: Summary of Cost

Options	Unit	2023/24	2024/25	2025/26	2026/27	2027/28	Total
Option 1 – Do Minimum	£m	0	0	0	0	0	0
Option 2 – Enhanced Maintenance and Inspection	£m	0	0	0	0	0.66	0.66
Option 3 – Asset Replacement	£m	0	0	0	0	1.73	1.73
Option 4 – Add New Asset	£m	0	0	0	0	1.22	1.22
Option 5 – Flexible Solution	£m	0	0	0	0	0.09	0.09

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 Option Analysis comparisons

The analysis 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 Arisaig; 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 11: Volume of Preferred Option

Asset Category	Unit	2023/24	2024/25	2025/26	2026/27	2027/28	Total
11kV OHL (Covered Conductor)	km	0	0	0	0	0	2
11kV Poles	#	0	0	0	0	10	10
33kV UG Cable (Non Pressurised)	Km	0	0	0	0	0.3	0.3
33kV CB (Gas Insulated Busbars)(ID)(GM)	#	0	0	0	0	3	3
33kV OHL (Pole Line) Conductor	Km	0	0	0	0	1.5	1.5
33kV Pole	#	0	0	0	0	22	22
33kV CB (Air Insulated Busbars)(OD)(GM)	#	0	0	0	0	1	1
33kV Switch (PM)	#	0	0	0	0	1	1
33kV Switch (GM)	#	0	0	0	0	7	1

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 our ***Cost and 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 Strategy (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

Scottish National Heritage and Scottish Environment Protection Agency may object to OHL circuits or elements of them and request undergrounding of sections of the OHL proposed routes or impose various conditions related to archaeological or environmental or ecological requirements to carry out the works. There is also need of crossing railway along the new proposed overhead line route. This can impose further risk in delaying and incurring additional cost.

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 WSC related investment in Arisaig substation.

Five investment options have been described which could be carried out to address the WSC issue at this site. 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 and Assessment section. 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 and volumes are proposed for delivery during RIIO ED2. The preferred investment for Arisaig substation in RIIO ED2 is Option 4: Reinforcement.

Table 12: Summary of CV Table

CV Table	Unit	2023	2024	2025	2026	2027	Total
CV15 North of Scotland Resilience **RIIO ED2 Spend**	£m	0	0	0	0	1.22	1.22

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

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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		£0	
Year 3	[redacted]	1	365		[redacted]	720		£0	
Year 4	[redacted]	1	365		[redacted]	720		£0	[redacted]
Year 4	[redacted]	1	365	[redacted]	[redacted]	720	[redacted]	[redacted]	