Ensuring reliability requirements in the Flemington load area

DRAFT PROJECT ASSESSMENT REPORT

11 MAY 2018

Ausgrid

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Flemington zone substation load area reliability

Draft project assessment report – May 2018

Contents

Executive Summary

This report investigates the most economic option for continuing efficient supply to the Flemington zone substation load area

This Draft Project Assessment Report (DPAR) has been prepared by Ausgrid and represents the first step in the application of the Regulatory Investment Test for Distribution (RIT-D) to options for ensuring reliable electricity supply for the Flemington zone substation load area, located in the western end of Sydney's Inner West.

In particular, the main issue for the Flemington zone substation relate to asset condition and safety concerns stemming from obsolete compound filled switchgear. If left unaddressed, these assets are likely to become less reliable, which could expose customers in the Flemington load area to a supply risk that exceeds allowable levels under the applicable reliability standards.

Ausgrid considers that reliability correction action is required for the Flemington zone substation to comply with its electricity distribution license reliability and performance standards.

Ausgrid has prepared this report in response to recent Rules changes requiring the RIT-D to be applied to replacement expenditure

Rule changes to the National Electricity Rules (NER) in July 2017 has meant that replacement capital expenditure, projects such as the one proposed in this DPAR, are now subject to the Regulatory Investment Test for Distribution (RIT-D). Accordingly, Ausgrid has initiated this RIT-D for the Flemington zone substations project in order to identify a preferred option that would ensure Ausgrid is able to satisfy its reliability and performance standards in supplying the Flemington zone substation load area.

One credible network option has been assessed to address reliability concerns

One network option, Option 1, has been identified as credible. It involves transferring all load served by compound insulated switchgear at Flemington zone substation to adjacent Olympic Park and Auburn zone substations. A series of new ducts will be constructed to facilitate the transfer.

Ausgrid will also take an opportunity to address other secondary asset condition issues as part of Option 1, including relocating and replacing transformers, which are showing signs of deterioration.

Other options were considered in this assessment including refurbish and replacement options. However, these other options, while technically feasible, cost significantly more than Option 1 and therefore were not considered economically feasible.

Non-network options are not considered viable for this RIT-D

Ausgrid has also considered the ability of any non-network solutions to assist in meeting the identified need. A demand management assessment into addressing the issues at Flemington zone substation showed that non-network alternatives cannot cost-effectively address the identified need, compared to the network option outlined above. This result is driven primarily by the significant amount of unserved energy that the network option allows to be avoided, compared to the base case, and is detailed further in the separate notice released in accordance with clause 5.17.4(d) of the NER.

If during the course of this RIT-D process, a cost-effective non-network solution emerges, then it will be assessed alongside the credible network option identified.

Three different 'scenarios' have been modelled to deal with uncertainity

Ausgrid has elected to assess three alternative future scenarios – namely:

- Low benefit scenario – Ausgrid has adopted several assumptions that give rise to a lower bound NPV estimate for each credible option, in order to represent a conservative future state of the world with respect to potential market benefits that could be realised under each credible option;
- Baseline scenario – the baseline scenario consists of assumptions that reflect Ausgrid's central set of variable estimates, which, in Ausgrid's opinion, provides the most likely scenario; and

- High benefit scenario – this scenario reflects an optimistic set of assumptions, which have been selected to investigate an upper bound on reasonably expected potential market benefits.

A summary of each scenario and the sets of variable values adopted is presented in Table E.0.1 below.

Table E.0.1 – Summary of the three scenarios investigated

Variable	Baseline scenario	Low benefits scenario	High benefits scenario
Capital cost	100 per cent of capital cost estimate	125 per cent of capital cost estimate	75 per cent of capital cost estimate
Unplanned corrective maintenance cost	100 per cent of baseline corrective maintenance cost estimates	70 per cent of baseline corrective maintenance cost estimates	130 per cent of baseline corrective maintenance cost estimates
Demand	POE50	POE90	POE10
VCR	$40/kWh	$23/kWh	$90/kWh
Discount rate	6.13 per cent	8.07 per cent	4.19 per cent

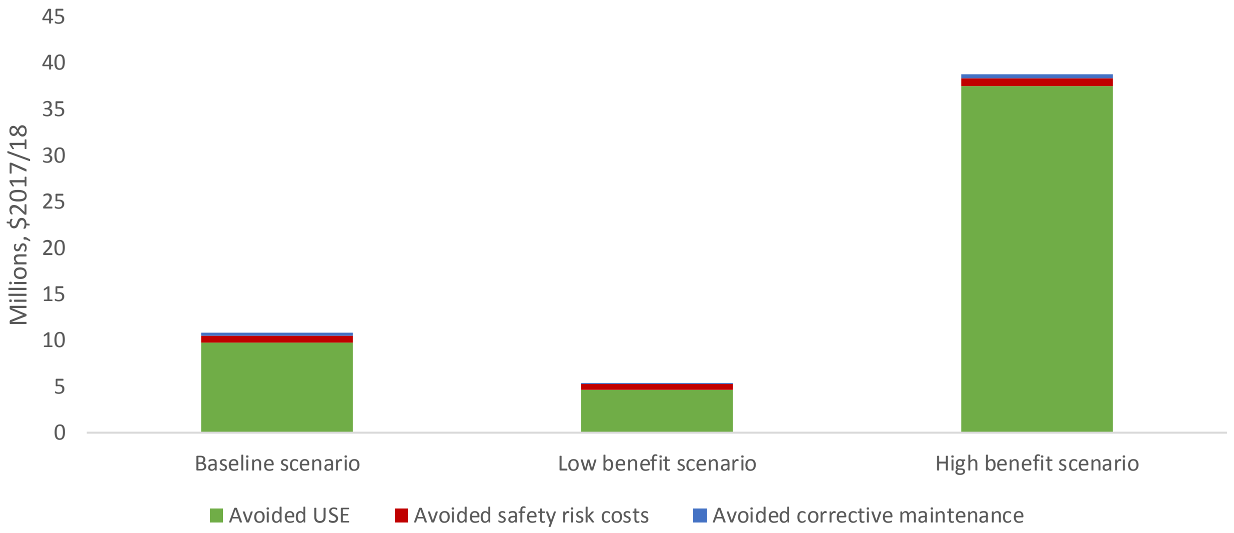
The results of Ausgrid's analysis shows that undertaking this project will provide positive net benefits under the baseline and high benefit scenarios, arising from the reduction of involuntary load shedding. These results are presented in more detail below.

Option 1 is the preferred option at this draft stage

Ausgrid proposes Option 1 to be the preferred option as it is the only credible option identified and satisfies RIT-D requirements. Ausgrid is the proponent for Option 1.

Option 1 provides positive gross benefits across all scenarios largely from avoiding the involuntary load shedding that would otherwise be incurred under the base case, as illustrated in Figure E.1. While there are other benefits from avoiding safety and corrective maintenance costs, these benefits are relatively small.

Figure E.1 – Breakdown of gross benefits of Option 1 relative to the base case, PV



Gross benefits are larger than gross costs under Option 1, except under the low benefit scenario. Gross costs consist only of discounted capital costs set out in the table below.

Table E.2 – Present value of costs of Option 1 relative to the base case, $m 2017/18

Option	Baseline scenario	Low benefit scenario	High benefit scenario	Weighted costs
Weighting	*50 per cent*	*25 per cent*	*25 per cent*	–
Option 1	-6.2	-8.1	-4.4	-6.2

On a weighted basis, costs are expected to be $6.2 million in present value terms, which is estimated to be significantly lower than the total of avoided costs and avoided involuntary load shedding. Table E.3 below provides a summary of the net market benefit for Option 1, on a scenario weighted basis. Overall, Option 1 exhibits positive NPV of $9.4 million on a weighted basis.

Table E.3 – Present value of expected net benefits relative to the base case, $m 2017/18

Option	Capital costs	Avoided costs	Avoided Involuntary load shedding	Weighted NPV
Option 1	-6.2	1.0	15.4	10.2

Option 1 involves transfer works for load served by Group 1 switchgears and transformer relocation works. In particular, the scope of works Option 1 consists of:

- installation of two sets of six conduit banks from Olympic Park zone substation through Sarah Durack Ave and Edwin Flack Ave to the corner of Shane Gould Ave to allow for the laying of ten new 11kV feeders;
- installation of a new 11kV feeder from Olympic Park zone substation to Figtree Drive through Australia Ave utilising a proposed conduit;
- transfer of Flemington zone substation 11kV switchgear Group 1 (approximately 42MVA) to Olympic Park zone substation and Auburn zone substation via the works above;
- decommissioning of existing Group 2 switchgears at Flemington zone substation;
- decommissioning Transformer 1 at Flemington zone substation;
- decommissioning Transformer 2 at Flemington zone substation and replacing it with Transformer 3 by physically relocating Transformer 3 to transformer bay number 2, and connecting Transformer 3 to 11kV switchgear Group 2; and
- replacing Transformer 4 at Flemington zone substation with ex-Clovelly zone substation Transformer 1 and connect it to 11kV switchgear Group 2.[1]

Construction of Option 1 is scheduled to occur during 2018/19, with commissioning in 2019/20 at which point benefits from unserved energy and lower operating costs will start to accrue. Ausgrid estimates undiscounted capital costs are $8.0 million. Incremental operating costs (i.e. maintenance cost) for Option 1 is assumed to be minimal given that it is expected new duct banks will incur immaterial levels of maintenance over the 20-year analysis period.

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[1] The replacement and relocation of these two transformers serves a different need from the project presented in this DPAR. However, Ausgrid considers undertaking the proposed project and address transformer asset conditions concurrently is the most efficient use of project planning and delivery resources.

How to make a submission and next steps

Ausgrid welcomes written submissions on this DPAR. Submissions are due on or before 22 June 2018. Submissions and queries should be addressed to:

Matthew Webb
Head of Asset Investment
Ausgrid
GPO Box 4009
Sydney 2001

Or

email to: assetinvestment@ausgrid.com.au

The next stage of this RIT-D involves publication of a Final Project Assessment Report (FPAR). The FPAR will update the quantitative assessment of the net benefit associated with different investment options, in light of any submissions received on this DPAR. Ausgrid intends to publish the FPAR as soon as practicable after submissions are received on this DPAR.

1 Introduction

The suburb of Lidcombe is located at the western end of the Inner West area of Sydney. The suburb and surrounding area is served by the Flemington 132/11kV zone substation, which was first commissioned in 1973. A critical component in the Flemington zone substation is the 11kV switchgear, of which there are two types: compound insulated and air insulated. The compound insulated switchgear has exhibited failures ranging from single equipment failures to multiple equipment failures impacting the operation of the entire substation. Although a range of measures have been implemented to mitigate these consequences, the 11kV switchgear is considered to be beyond its design life, which increases the risk that Ausgrid will exceed allowable levels of reliability set out in its license conditions. Consequently, Ausgrid has prioritized the retirement and replacement of compound insulated switchgears across the network.

Rule changes to the National Electricity Rules (NER) in July 2017 have meant that capital expenditure for replacement projects are now subject to the Regulatory Investment Test for Distribution (RIT-D). Accordingly, Ausgrid has initiated this RIT-D to replace the 11kV switchgear at the Flemington zone substation in order to identify a preferred option to address an identified need to undertake reliability corrective action that would ensure Ausgrid is able to satisfy its reliability and performance standards.

No exemptions listed in the NER clause 5.17.3(a) apply and therefore Ausgrid is required to apply the RIT-D to this project.

1.1 Role of this draft report

Ausgrid has prepared this Draft Project Assessment Report (DPAR) in accordance with the requirements of the National Electricity Rules (NER) under clause 5.17.4. It is the first stage of the formal consultation process set out in the NER in relation to the application of the RIT-D for this proposed project. In particular, this DPAR:

- describes the identified need which Ausgrid is seeking to address, together with the assumptions used in identifying this need;
- provides a description of each credible option assessed;
- quantifies costs and market benefits for each credible option;
- provides detailed description of the methodologies used in quantifying each class of cost and market benefit;
- explains why Ausgrid has determined that classes of market benefits or costs do not apply to a credible option;
- presents the results of a net present value analysis of each credible option and accompanying explanation of the results; and
- identifies and details information for the proposed preferred option.

A non-network options report has not been prepared as it is highly unlikely that there will be credible non-network options given the size of the load served by the Flemington zone substation. However, non-network options were considered in formulating the plan to address issues at the Flemington zone substation and are described in Section 3.2.

1.2 Making a submission and next steps

Ausgrid welcomes written submissions on this DPAR. Submissions are due on or before 22 June 2018.

Submissions and queries should be addressed to:

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2 Description of the identifed need

This section provides a description of the network area and the ‘identified need’ for this RIT-D, before presenting a number of key assumptions underlying the identified need.

2.1 Overview of the Inner West network area and the Flemington zone substation

The Flemington zone 132/11kV substation is located in the west end of the Inner West area of Sydney. The Inner West extends from Homebush Bay in the north south east to Rozelle and Leichhardt. The network in this area is currently supplied from TransGrid’s transmission system at Sydney North Bulk Supply Point (BSP) and via Mason Park sub-transmission switching station (STSS) from Beaconsfield West BSP and Sydney South BSP.

The Inner West area is divided by parts of the harbour and the Parramatta River. Parramatta Road runs through the southern part of the area. The catchment area for the Flemington zone substation borders Olympic Park, Auburn, Lidcombe, Concord and Burwood Zone Substation catchment areas. Notable landmarks in the Flemington zone substation load area include Flemington Markets and Sydney Olympic Park.

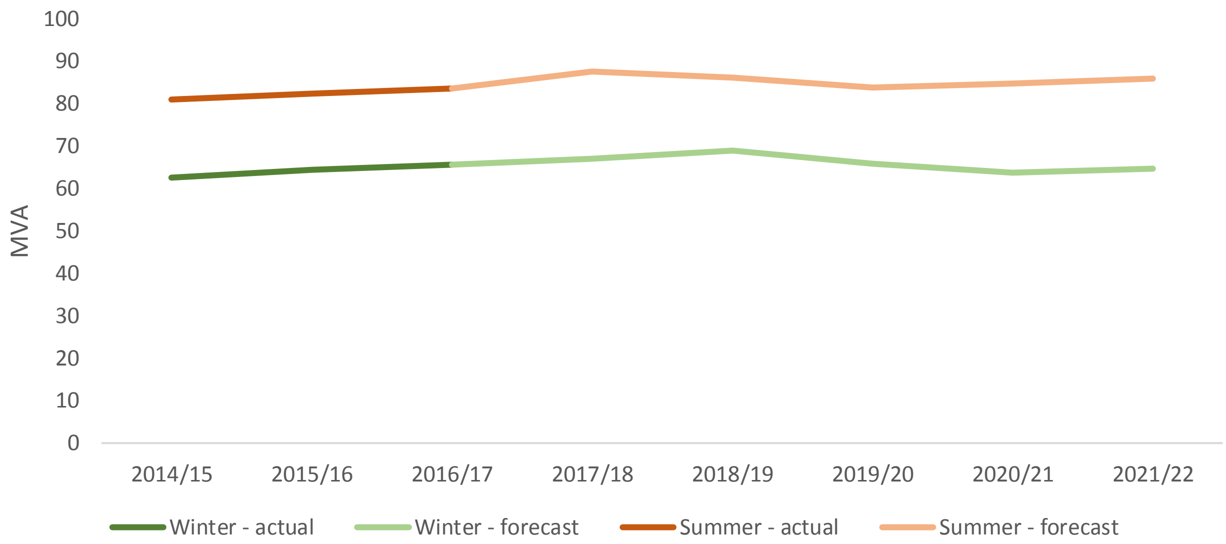
The Flemington zone substation sits within the Inner West distribution network and has a load catchment area that supplies homes and business to the south of Sydney Olympic Park along the M4 motorway and Parramatta Road. It also supplies Flemington Markets, the Tooheys Brewery and Olympic Park Rail Station.

The Flemington zone substation was commissioned in 1973 and is supplied from the Sydney North BSP via Mason Park STSS. It has three 36MVA and one 37.5MVA transformers and two double bus sections of 11kV switchgear, with a firm capacity of 98.7MVA in summer and 106.6MVA in winter.

Figure 2.1 – Location and catchment area of the Flemington zone substation

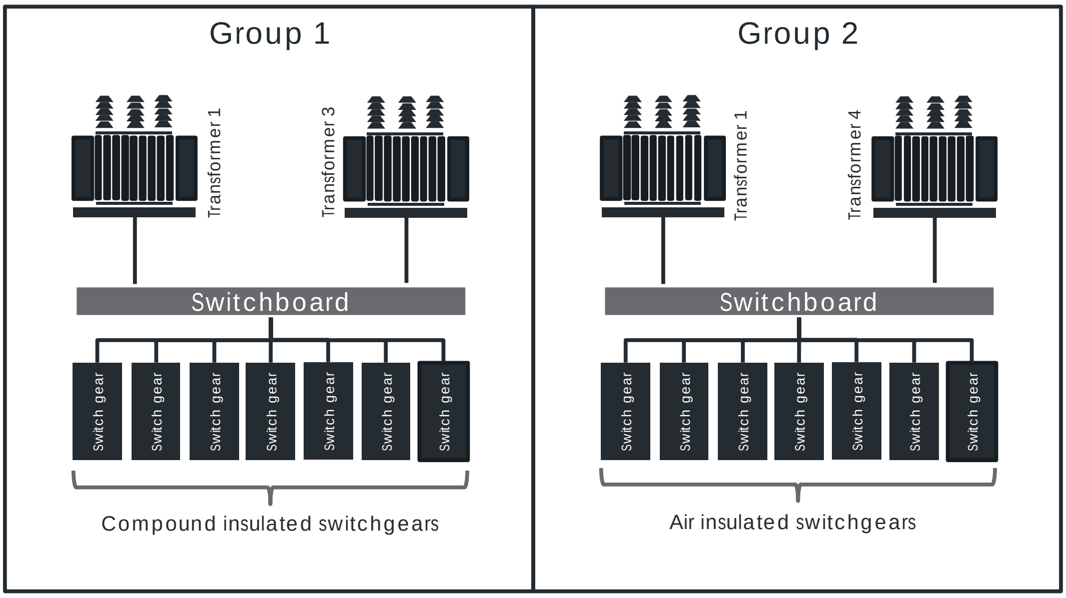
There is an enduring need to serve load in the area around the Flemington zone substation. The Flemington zone substation itself serves load that fluctuates between 62.4MVA to 83.5MVA depending on the season. Over the next four years, load at Flemington zone substation is expected to be between 63.6MVA to 87.5MVA, as shown in Figure 2.2, and is expected to grow further to 92.4MVA by 2026 as commercial and residential developments are realised.

Figure 2.2 – Flemington zone substation load



Critical components at the Flemington zone substation are showing signs of deterioration, especially on switchgears that are used to control, protect and isolate electrical equipment. There are two types of 11kV switchgear used at the Flemington zone substation: compound insulated and air insulated. The switchgear is organised into two groups, Group 1 and Group 2, where each group of switchgear is connected to two pairs of transformers, as depicted in Figure 2.3.

Figure 2.3 – Simplified Flemington zone substation diagram[2]



Group 1 of the switchgear supplied by transformers Transformer 1 and Transformer 3 is the Westinghouse HQ type compound switchboard. It includes vacuum circuit breakers and bituminous compound insulation busbars (switchboard), which heightens the risk of fire and health and safety issues in the event of equipment failure. Advances in circuit breaker technology since the 1970s have rendered compound insulated switchboards obsolete and continued their use at the Flemington zone substation exposes Ausgrid and the general public to unnecessary operational and safety risks, given the alternatives technologies that are now available.

Switchboards at Flemington zone substation are also due for replacement as they are in poor condition and exhibited poor insulation resistance during their last test in March 2015. These switchboard rank 13 out of 30 in Ausgrid's

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[2] The diagram is only indicative of the zone substation layout and is not intended to be a technically accurate depiction of the Flemington zone substation.

compound insulated switchboard priority list, noting that switchboards with higher priority have projects already approved and are in construction to address the identified risks.

Quantitative risk analysis undertaken by Ausgrid indicates that the level of unserved energy incurred would cause a breach of reliability and performance standards as set out in its distribution licence conditions if action were not taken to address the condition of switchgears, switchboards, transformers and tap chargers. The quantitative risk analysis also indicates that benefits of reducing of unserved energy due to the risk of switchboard failure exceeded the annualised cost of removing this asset from 2017 onwards.

It follows that there is an identified need to undertake reliability corrective action to address asset conditions at the Flemington zone substation.

2.2 Overview of Ausgrid’s relevant statutory and regulatory obligations

All New South Wales electricity distribution businesses, including Ausgrid, are obliged to comply with reliability and performance standards as part of their distributor’s license.[3] These standards are determined by the New South Wales Government.

At a high-level, the reliability and performance standards are specified in terms of both:

- the average frequency of interruptions a customer may face each year; and
- the average time those outages may last.

Specifically, under the current Ausgrid license, reliability and performance standards are expressed in two measures – namely:

- the System Average Interruption Frequency Index – ‘SAIFI’ – which measures the number of times on average that customers have their electricity interrupted over the year;[4] and
- the System Average Interruption Duration Index – ‘SAIDI’ – which measures the total length of time (in minutes) that, on average, a customer would have their electricity supply interrupted over a given period.[5]

These two reliability measures capture two key sources of inconvenience to electricity customers from supply disruptions, i.e. how long their electricity supply is off for as well as how often their electricity supply is off. Customers experience less inconvenience (i.e. a better level of supply reliability), the lower these measures are. Reliability standards applied to distribution networks typically set minimum requirements in relation to each of these two measures.

The current reliability standards applying to the Inner West network area (classified as an ‘urban’ feeder type) are shown in the table below.

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[3] Granted by the Minster for Industry, Resources and Energy under the *Electricity Supply Act 1995 (NSW)*.

[4] SAIFI is calculated as the total number of interruptions that have occurred during the relevant period, divided by the number of customers. Momentary interruptions (which in NSW are currently defined as interruptions less than one minute) are typically not included.

[5] SAIDI is calculated as the sum of the duration of all customer interruptions over the period divided by the number of customers. Momentary interruptions (i.e. those of less than one minute) are typically not included.

Table 2.1 – Current distribution reliability standards applying to Ausgrid[6]

Feeder type	Network Overall Reliability Standards		Individual Feeder Reliability Standard	
	SAIDI (Minutes per customer)	SAIFI (Number per customer)	SAIDI (Minutes per customer)	SAIFI (Number per customer)
Urban	80	1.2	350	4

2.3 Key assumptions underpinning the identified need

The need to undertake action is predicated on the deteriorating condition of assets at the Flemington zone substation, and the characteristics of any resultant outages, as well as the fact that maintaining technologies present heightened maintenance and asset failure risks.

This section summarises the key assumption underpinning the identified need for this RIT-D. Appendix C provides additional detail on assumptions used, and methodologies applied, to estimate the costs and market benefits as part of this RIT-D.

2.3.1 Ageing assets at the Flemington zone substation have an increasing likelihood of failure that leads to unserved energy

The key assumption underpinning this RIT-D project is that the condition of the 11kV switchgear at Flemington zone substation is such that there is a significant risk of Ausgrid not being able to maintain its required levels of reliability.

There are two types of switchgear installed in the Flemington zone substation: compound insulated and air insulated switchgears. While air insulated switchgear appear to be in good condition, compound insulated switchgear has bituminous compound insulation busbars (switchboard) and oil-filled circuit breakers, which may result in significant consequential damage in the event of failure. A range of measures have been implemented to mitigate risks presented by compound insulated switchgear, however the switchgear itself is considered to be beyond its design life.

In the past, there have been a considerable amount of 11kV switchgear failures, which have resulted in a range of adverse consequences ranging from single equipment failures to multiple equipment failures impacting the operation of the entire substation. Consequently, Ausgrid has assumed that aging assets (i.e. compound insulated switchgear) at the Flemington zone substation have an increasing likelihood of failure and involuntary load shedding.

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[6] The Hon. Anthony Roberts MP Minister for Industry, Resources & Energy, Reliability and Performance Licence Conditions for Electricity Distributors, 1 December 2016, pp. 18-19 - available at:

https://www.ipart.nsw.gov.au/files/sharedassets/website/shared-files/licensing-administrative-electricity-network-operations-proposed-new-licence-conditions/ausgrid-ministerial-licence-conditions-1-december-2016.pdf

3 One credible option can address the identified need

This section provides details a credible option that Ausgrid has identified as part of its network planning activities to date. Other options could technically address the identified need, but are likely to cost significantly more than the credible option identified without any corresponding increase in benefits. Ausgrid has therefore identified only one credible option as other options are deemed non-credible on the basis they are not economically feasible. More details of other options are set out in section 3.2.

Ausgrid has also considered whether there are non-network options that could address the identified need. However, non-network options are unlikely to address the identified need given the size of the load at Flemington zone substation and the level involuntary load shedding that would be incurred in the event of an equipment failure. Ausgrid has therefore published a non-network screening notice setting out that a non-network options are unlikely to exist. However, Ausgrid would welcome submissions from non-network solution providers if credible non-network solutions exist.

The identified credible option identified by Ausgrid involves retiring compound filled 11kV switchgear at Flemington zone substation and the replacement of Transformer 4,[7] which is expected to improve reliability, reduce unserved energy levels and reduce operating expenditure over time. Table 3.1 provides a summary of this option. All costs in this section are in $2017/18, unless otherwise stated.

Table 3.1 – Summary of the credible option considered and the base case

Option details	Option 1
Option description	Transfer all Group 1 load at Flemington zone substation to Olympic Park zone substation and Auburn zone substation.
Capital costs	$8.0 million
Construction period	2018/19
Commissioning date	2019/20

3.1 Option 1 – Transfer of Group 1 load to Olympic Park and Auburn zone substations

Option 1 involves the transfer all load served by Group 1 switchgear (i.e. compound insulated switchgear) at Flemington zone substation (approximately 42MVA) to adjacent Olympic Park and Auburn zone substations. A number of ducts will be constructed to facilitate the transfer. The Switchgear in Group 2 (i.e. air insulated switchgear) is in reasonably good condition and will remain in operation.

Ausgrid will also take an opportunity to address other secondary asset condition issues as part of Option 1, including relocating Transformer 3 to the transformer bay currently occupied by Transformer 2, while Transformer 4 will be replaced by a transformer made surplus by the reconfiguration of Clovelly zone substation.[7]

These works are expected to provide avoided cost benefits from lower operating and safety costs, and reduce levels of unserved energy.

Option 1 is expected to cost $8.0 million with a one year construction period in 2018/19. Commissioning of Option 1 is scheduled to take place one year later in 2019/20.

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[7] The replacement and relocation of these two transformers serves a different need from the project presented in this DPAR. However, Ausgrid considers undertaking the proposed project and address transformer asset conditions concurrently is the most efficient use of project planning and delivery resources.

3.2 Options considered but not progressed

Ausgrid also considered several other options that have not been progressed. In general, these options have not progressed because they were found to be economically infeasible, or they are materially similar to options considered above. The table below summarises Ausgrid's consideration and position on each of these potential options.

Table 3.2 – Options considered but not progressed

Option not progressed	Description	Reason why option was not progressed
Refurbishing of Flemington zone substation	Refurbishing Flemington zone substation, utilising the existing switchroom building. Loads would need to be transferred to other zone substations to allow the refurbishment work to take place. This option is estimated to cost $23.6 million	Refurbishing of Flemington zone substation is deemed not to be economically feasible as it costs three times more than Option 1 but does not provide a corresponding increase in benefits. This is largely due to the need to undertake additional refurbishing works in addition to transfer works that are incurred in Option 1.
Replacement of compound-filled 11kV switchgear and Transformers 2 and 4	This option involves replacement of compound filled 11kV switchgear and transformers 2 and 4, using a new switchroom. Loads will need to be transferred to other zone substations to enable these replacements. This option is estimated to cost $17.5 million.	Replacement of compound-filled 11kV switchgear and transformers is also not deemed to be economically feasible as it costs more than twice that of Option 1 but does not provide a corresponding increase in benefits. This is largely due to the need to undertake additional replacement works in addition to transfer works that is incurred in Option 1.
Deferment of Option 1	This option recreates Option 1 but at a later date. The option would have the same estimated cost of $8.0 million.	Ausgrid has performed analysis to identify the optimal commissioning year for Option 1 and found that the highest NPV was achieved in 2019/20, being the earliest year that Option 1 can be commissioned. All later commissioning years generated NPVs lower than in 2019/20 (see section 5.4.1). For this reason, Ausgrid has considered but not progressed a deferred option.

4 How the option has been assessed

This section outlines the methodology that Ausgrid has applied in assessing market benefits and costs associated with the credible option considered in this RIT-D. Appendix C presents additional detail on the assumptions and methodologies employed to assess the option.

4.1 General overview of the assessment framework

All costs and benefits for each credible option have been measured against a 'business as usual' base case. Under this base case, Ausgrid is assumed to undertake escalating regular and reactive maintenance activities as the probability of failure and outages increases over time in the absence of an asset replacement program.

The RIT-D analysis has been undertaken over a 20 year period, from 2018/19 to 2037/38. Ausgrid considers that a 20 year period takes into account the size, complexity and expected life of the relevant credible option to provide a reasonable indication of the market benefits and costs of the option. While the capital components of the credible option have asset lives greater than 20 years, Ausgrid has taken a terminal value approach to incorporating capital costs in the assessment, which ensures that the capital cost of long-lived options is appropriately captured in the 20 year assessment period.

Ausgrid has adopted a central real, pre-tax discount rate of 6.13 per cent as the central assumption for the NPV analysis presented in this report. Ausgrid considers that this is a reasonable contemporary approximation of a 'commercial' discount rate (a different concept to a regulatory WACC), consistent with the RIT-D.[8]

Ausgrid has also tested the sensitivity of the results to changes in this discount rate assumption, and specifically to the adoption of a lower bound real, pre-tax discount rate of 4.19 per cent (equal to the latest AER Final Decision for a DNSP's regulatory proposal at the time of preparing this DPAR[9]), and an upper bound discount rate of 8.07 per cent (i.e., a symmetrical upwards adjustment).

4.2 Ausgrid's approach to estimating project costs

Ausgrid has estimated capital costs by considering the scope of works necessary under Option 1 together with costing experience from previous projects of a similar nature. Where possible, Ausgrid has also estimated capital costs for Option 1 using supplier quotes or other pricing information.

Operating and maintenance costs have been determined for Option 1 by comparing the operating and maintenance costs with the option in place to the operating and maintenance costs without the option in place. These costs are included for each year in the planning period. If operating and maintenance costs are reduced with an option in place, the cost savings are effectively treated as a benefit in the assessment.

Operating costs have been estimated for Option 1 and the base case by considering:

- the probability and expected level of network asset faults, which translates to the level of corrective maintenance costs; and
- the level of regular maintenance required to maintain network assets in good working order, including planned refurbishment costs.

All options reduce the incidence of asset failures earlier than the base case, and hence the expected unplanned corrective maintenance costs associated with restoring supply.

Ausgrid has also included the financial costs associated with safety outcomes that are assumed to be avoided under Option 1, relative to the base case. These costs have been estimated using internal Ausgrid estimates, and are found to be immaterial in the analysis.

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[8] Ausgrid notes that it has been sourced from the discount rate recently independently estimated as part of the Powering Sydney's Future RIT-T. See: TransGrid and Ausgrid, *Project Assessment Conclusions Report*, Powering Sydney's Future, November 2017, p. 62 – available at: https://www.transgrid.com.au/news-views/lets-connect/consultations/current-consultations/Documents/Powering%20Sydney%27s%20Future%20-%20PACR.pdf

[9] See TasNetworks' PTRM for the 2017-19 period, available at: https://www.aer.gov.au/networks-pipelines/determinations-access-arrangements/tasnetworks-determination-2017-2019/final-decision

4.3 Benefits are expected from both reduced involuntary load shedding and reduced operating costs

Ausgrid considers that the only relevant category of market benefits prescribed under the NER for this RIT-D relate to changes in involuntary load shedding. Appendix D outlines the categories of market benefit that Ausgrid considers are not material for this particular RIT-D.

Involuntary load shedding is where a customer's load is interrupted from the network without their agreement or prior warning. Ausgrid has forecast load over the assessment period and has quantified the expected unserved energy by comparing forecast load to network capabilities under system normal and network outage conditions. A reduction in involuntary load shedding expected from an option, relative to the base case, results in a positive contribution to market benefits of the credible option being assessed.

Involuntary load shedding of a credible option is derived by the quantity in MWh of involuntary load shedding required assuming the credible option is completed multiplied by the Value of Customer Reliability (VCR). The VCR is measured in dollars per MWh and is used as proxy to evaluate the economic impact of unserved energy on customers under the RIT-D.

Ausgrid has applied a central VCR estimate of $40/kWh, which has been derived from the 2014 AEMO VCR estimates.[10] In particular, Ausgrid has escalated the AEMO estimate to dollars of the day and weighted the AEMO estimates according to the make-up of the specific load considered.

We have also investigated the effect of assuming both a lower and higher underlying VCR estimate. The lower sensitivity has derived by reducing the AEMO-derived estimate by 30 per cent, consistent with the AEMO-stated level of confidence in its estimates, and results in an estimate of $28/kWh.[11] The higher sensitivity involves applying a VCR of $90/kWh, consistent with the recent Independent Pricing and Regulatory Tribunal (IPART) review of the transmission reliability standards for Inner Sydney (a region that includes Flemington), as well as the recently finalised Powering Sydney's Future RIT-T.[12]

In addition, while load forecasts are not a determinant of the identified need (since the reliability standards expected to be breached relate to the *duration* and *frequency* of supply interruptions – neither of which are affected by underlying load), Ausgrid has investigated how assuming different load forecasts going forward changes the expected net market benefits under the options. In particular, we have investigated three future load forecasts for the area in question – namely a central forecast using our 50 per cent probability of exceedance ('POE50') forecasts, as well as a low forecast using the POE90 forecasts and a high forecast using the POE10 forecasts.

The figure below shows the assumed levels of unserved energy, under each of the three underlying demand forecasts investigated over the next ten years. For clarity, this figure illustrates the MWh of unserved energy assumed under each load forecast if none no credible option is commissioned, i.e. it reflects both the underlying demand forecasts and the assumed failure rates associated with keeping assets in service.

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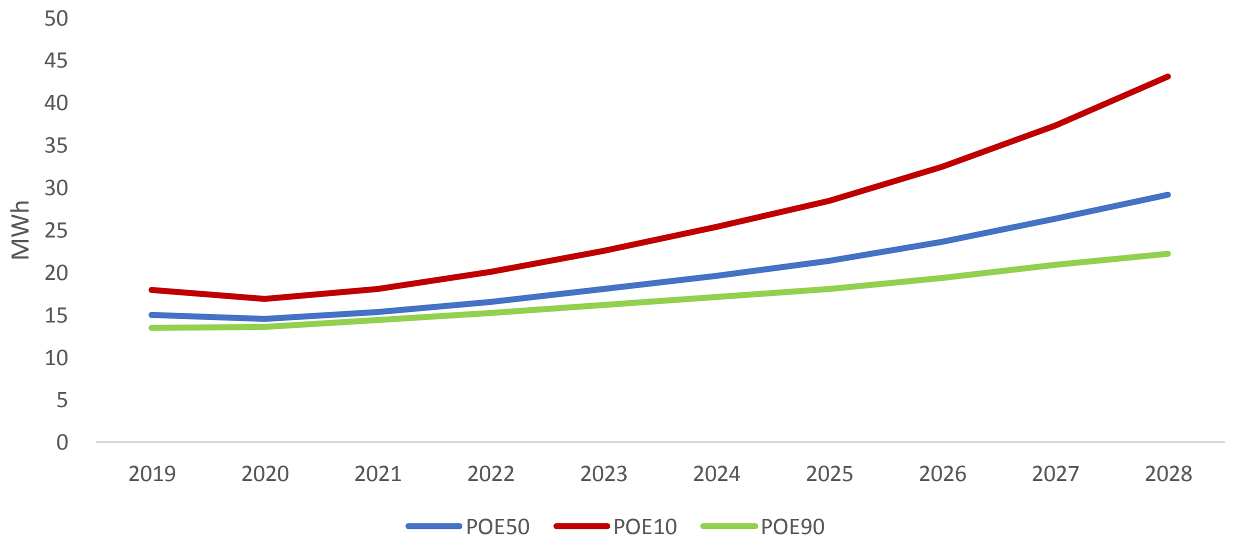
[10] AEMO, *Value of Customer Reliability Review*, September 2014, Final Report.

[11] AEMO, *Value of Customer Reliability Review*, September 2014, Final Report, p. 31.

[12] TransGrid and Ausgrid, *Project Assessment Conclusions Report*, Powering Sydney's Future, November 2017 – available at: https://www.transgrid.com.au/news-views/lets-connect/consultations/current-consultations/Documents/Powering%20Sydney%27s%20Future%20-%20PACR.pdf

Figure 4.1 – Estimated level of Unserved Energy under each of the three demand forecasts



Ausgrid has capped the level of Unserved Energy under each of these assumed demand forecasts at the value in the tenth year for all remaining years in the assessment period. Since the base case reflects a 'do nothing' approach, in which the reliability standard is breached (and which is therefore unrealistic), Ausgrid considers it appropriate to cap the level of Unserved Energy at the level reached after ten years, since it is considered particularly uncertain after this. This also avoids a situation where an exponential increase in USE in later years[13] dwarfs other market benefits and skews the results,[14] and does not affect identification of the preferred option at all.

4.4 Three different 'scenarios' have been modelled to address uncertainity

RIT-D assessments are required to be based on cost-benefit analysis that includes an assessment of 'reasonable scenarios', which are designed to test alternate sets of key assumptions and whether they affect identification of the preferred option.

Ausgrid has elected to assess three alternative future scenarios – namely:

- Baseline scenario – the baseline scenario consists of assumptions that reflect Ausgrid's central set of variable estimates, which, in Ausgrid's opinion, provides the most likely scenario;
- Low benefit scenario – Ausgrid has adopted a number of assumptions that give rise to a lower bound NPV estimate for each credible option, in order to represent a conservative future state of the world with respect to potential market benefits that could be realised under each credible option; and
- High benefit scenario – this scenario reflects an optimistic set of assumptions, which have been selected to investigate an upper bound on reasonably expected potential market benefits.

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[13] An exponential increase in USE results from assumptions that failure rates increase exponentially with asset age. 'Capping' the USE level recognises that in reality action would be taken before this occurred.

[14] Ausgrid notes that this approach was commented on and supported by Dr Darryl Biggar in his recent review of the modelling undertaken for the Powering Sydney's Future RIT-T. See: Biggar, D., *An Assessment of the Modelling Conduced by TransGrid and Ausgrid for the "Powering Sydney's Future" Program*, May 2017, available at: https://www.aer.gov.au/system/files/Biggar%2C%20Darryl%20-%20An%20assessment%20of%20the%20modelling%20conducted%20by%20TransGrid%20and%20Ausgrid%20for%20the%20%20Powering%20Sydney%20s%20Future%20%20program%20-%20May%202017.pdf

Table 4.1 – Summary of the three scenarios investigated

Variable	Baseline scenario	Low benefits scenario	High benefits scenario
Capital cost	100 per cent of capital cost estimate	125 per cent of capital cost estimate	75 per cent of capital cost estimate
Unplanned corrective maintenance cost	100 per cent of baseline corrective maintenance cost estimates	70 per cent of baseline corrective maintenance cost estimates	130 per cent of baseline corrective maintenance cost estimates
Demand	POE50	POE90	POE10
VCR	$40/kWh	$23/kWh	$90/kWh
Discount rate	6.13 per cent	8.07 per cent	4.19 per cent

Ausgrid considers that the baseline scenario is the most likely, since it based primarily on a set of expected/central assumptions. Ausgrid has therefore assigned this scenario a weighting of 50 per cent, with the other two scenarios being weighted equally with 25 per cent each. However, Ausgrid notes that the identification of the preferred option is the same across all three scenarios, i.e. the result is insensitive to the assumed scenario weights.

5 Assessment of the credible option

This section provides a description of the credible network option Ausgrid has identified as part of its network planning activities to date. The option is compared against a base case 'do nothing' option.

5.1 Gross market benefits for each credible option

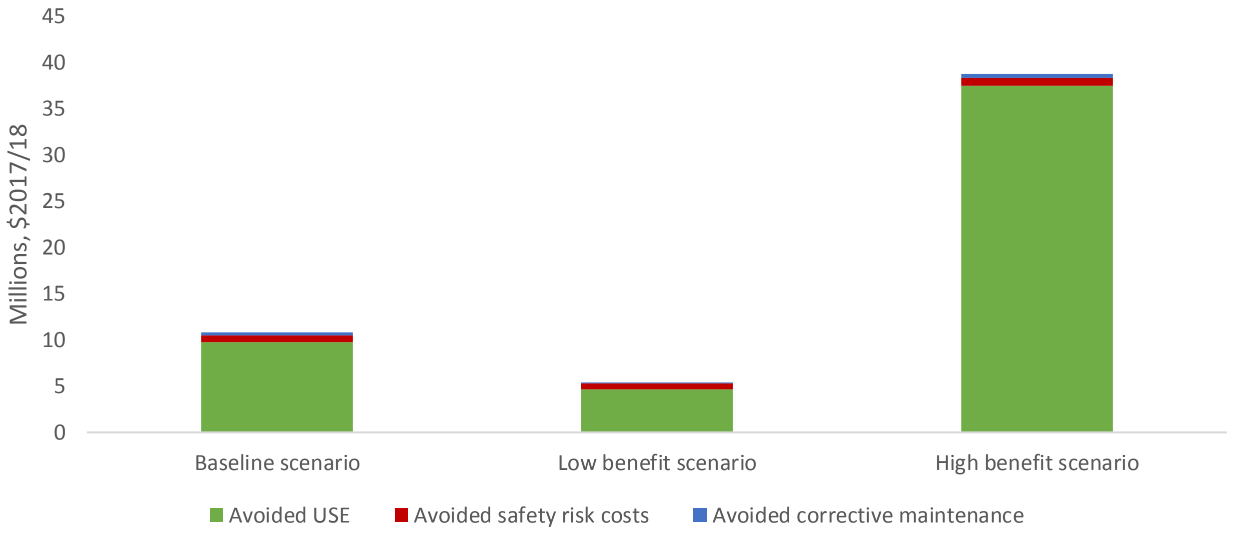
The table below summarises the gross benefit Option 1 relative to the 'do nothing' base case in present value terms. The gross market benefit for each option has been calculated for each of the three reasonable scenarios outlined in the section above.

Table 5.1 – Present value of gross benefits of Option 1 relative to the base case, $m 2017/18

Option	Baseline scenario	Low benefit scenario	High benefit scenario	Weighted benefits
Weighting	*50 per cent*	*25 per cent*	*25 per cent*	–
Option 1	10.7	5.4	38.7	16.4

Figure 5.1 provides a breakdown of benefits relating to each credible option, showing almost all of the benefits from Option 1 are derived from avoided involuntary load shedding, while avoided corrective maintenance avoided safety and benefits contributing relatively small amounts to gross benefits. This is driven by the age and condition of the assets in question and the fact that they are expected to failure, resulting in customer outages, more going forward if left in service (i.e. under the base case).

Figure 5.1 – Breakdown of present value gross economic benefits of Option 1 relative to the base case



Gross benefits under the high benefit scenario is significantly higher than under the baseline and low benefit scenarios, reflecting a higher levels of avoided USE (i.e. involuntary load shedding) and a VCR of $90/kWh. Benefits from avoiding unserved energy dominate gross benefits under all scenarios, while avoided safety risk costs and corrective maintenance only contribute minimally to overall gross benefits.

5.2 Estimated costs for each credible option

The table below summarises the gross costs Option 1 relative to the base case in present value terms. The gross costs entirely consist of capital costs as it is the only class of cost are incurred under Option 1 relative to the base case.[15] The gross cost of each option has been calculated for each of the three reasonable scenarios, in accordance with the approaches set out in Section 4.

Table 5.2 – Present value of gross costs of Option 1 relative to the base case, $m 2017/18

Option	Baseline scenario	Low benefit scenario	High benefit scenario	Weighted costs
Weighting	*50 per cent*	*25 per cent*	*25 per cent*	–
Option 1	-6.2	-8.1	-4.4	-6.2

5.3 Net present value assessment outcomes

Table 5.3 summaries the net market benefit in NPV terms for each credible option on a weighted basis across the three scenarios. The net market benefit is the gross market benefit (as set out in Table 5.1) minus the cost of each option (as outlined in Table 5.2), all in present value terms.

The table shows that Option 1 provides net economic benefits on a weighted scenario basis, with most of the benefits arising from avoided unserved energy.

Table 5.3 – Present value of weighted net benefits relative to the base case, $m 2017/18

Option	Capital costs	Avoided costs	USE benefits	Weighted NPV
Option 1	-6.2	1.0	15.4	10.2

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[15] While there may be some routine maintenance costs involved with implementing Option 1 over the 20 year analysis period, these costs are immaterial and have therefore not been included in the analysis.

5.4 Sensitivity analysis results

Ausgrid has undertaken a thorough sensitivity testing exercise to understand the robustness of the RIT-D assessment to underlying assumptions about key variables.

In particular, we have undertaken two tranches of sensitivity testing – namely:

- Step 1 – testing the sensitivity of the optimal timing of the project (‘trigger year’) to different assumptions in relation to key variables; and
- Step 2 – once a trigger year has been determined, testing the sensitivity of the total NPV benefit associated with the investment proceeding in that year, in the event that actual circumstances turn out to be different.

That is, Ausgrid has undertaken sensitivity analysis to first determine the optimal timing of the project, to conclude that a particular year represents the ‘most likely’ date at which the project will be needed.

Having assumed to have committed to the project by this date, Ausgrid has also looked at the consequences of ‘getting it wrong’ under Step 2 of the sensitivity testing. That is, if demand turns out to be lower than expected, for example, what would be the impact on the net market benefit associated with the project continuing to go ahead on that date.

We outline how each of these two steps has been applied to test the sensitivity of the key findings.

5.4.1 Step 1 – Sensitivity testing of the assumed optimal timing for the credible option

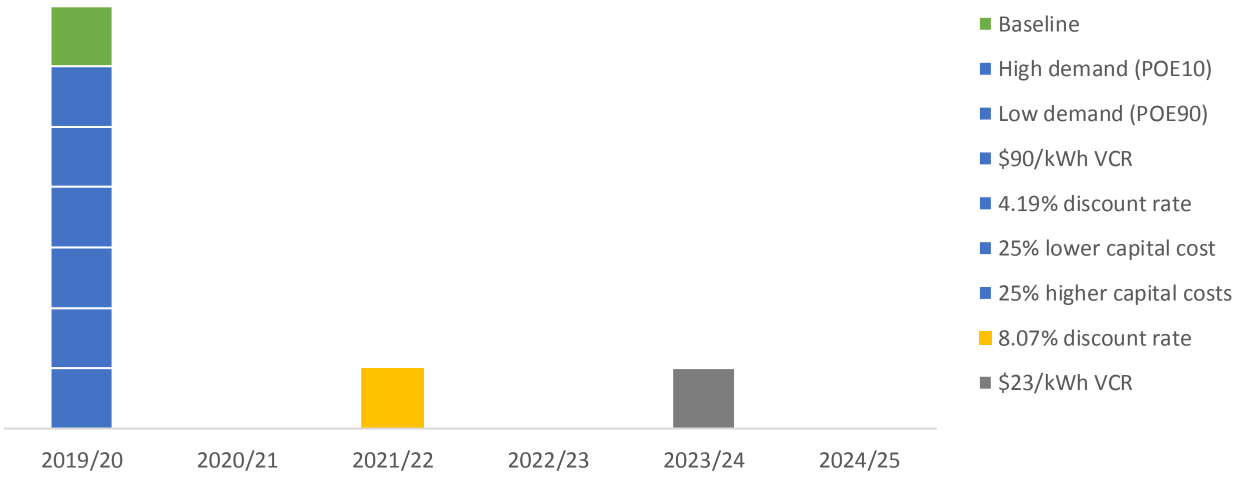
Ausgrid has estimated the optimal timing for Option 1 based on the year in which year the NPV of Option 1 is maximised. This process was undertaken for both the baseline set of assumptions and also a range of alternate assumptions for key variables.

This section outlines the sensitivity on the identification of the commissioning year to changes in the underlying assumptions. In particular, the optimal timing of the options is found to be largely invariant to assumptions of:

- a 25 per cent increase/decrease in the assumed network capital costs;
- alternate forecasts of maximum demand growth, based on POE10 (high) and POE90 (low);
- a lower VCR ($23/kWh) and a higher VCR ($90/kWh); and
- a lower discount rate of 4.19 per cent as well as a higher rate of 8.07 per cent.

The figures below outline the impact on the optimal commissioning year for Option 1, under a range of alternate assumptions. It illustrates that the optimal commissioning date for all but two sensitivities is found to be 2019/20.

Figure 5.2 – Distribution of optimal project commissioning years under each sensitivity investigated for Option 1



This indicates that the central commissioning year of 2019/20 is likely to offer the highest NPVs under most circumstances. Ausgrid is therefore satisfied that a commissioning year of 2019/20 has been robustly determined and tested.

5.4.2 Step 2 – Sensitivity testing of the overall net market benefit

Ausgrid has also conducted sensitivity analysis on the overall NPV of the net market benefit, based on the assumed option timing established in step 1.

Specifically, Ausgrid has investigated the same sensitivities under this second step as the first step, ie:

- a 25 per cent increase/decrease in the assumed network capital costs;
- alternate forecasts of maximum demand growth, based on POE10 (high) and POE90 (low);
- a lower VCR ($23/kWh) and a higher VCR ($90/kWh); and
- a lower discount rate of 4.19 per cent as well as a higher rate of 8.07 per cent.

All these sensitivities investigate the consequences of ‘getting it wrong’ having committed to a certain investment decision. Table 5.4 presents the results of these sensitivity tests and, for each sensitivity. The analysis reaffirms the robustness that Option 1 has a positive net market benefit for all sensitivities investigated.

Table 5.4 - Sensitivity testing results, $m 2017/18

Sensitivity	Option 1
Baseline	4.5
25 per cent higher capital cost	3.0
25 per cent lower capital cost	6.1
Unserved energy under POE10	8.3
Unserved energy under POE 90	2.7
VCR $90/kWh	16.7
VCR $23/kWh	1.6
4.19 per cent discount rate	7.3
8.07 per cent discount rate	2.4

6 Proposed preferred option

Ausgrid proposes Option 1 to be the preferred option, as the proposed preferred option satisfies the RIT-D. Ausgrid is the proponent for Option 1 and have presented this project to community stakeholders including the Parramatta City Council and the Sydney Olympic Park Authority. A community newsletter was published in April 2018 and is available on Ausgrid's website.[16]

The following sections provide detailed information about the proposed preferred option.

6.1 Technical characteristics

Option 1 involves transfer works for load served by Group 1 switchgears and transformer relocation works. In particular, the scope of works Option 1 consists of:

- installation of two sets of six conduit banks from Olympic Park zone substation through Sarah Durack Ave and Edwin Flack Ave to the corner of Shane Gould Ave to allow for the laying of ten new 11kV feeders;
- installation of a new 11kV feeder from Olympic Park zone substation to Figtree Drive through Australia Ave utilising a proposed conduit;
- transfer of Flemington zone substation 11kV switchgear Group 1 (approximately 42MVA) to Olympic Park zone substation and Auburn zone substation via the works above;
- decommissioning of existing Group 1 (panels 25 to 45) switchgear at Flemington zone substation;
- decommissioning Transformer 1 at Flemington zone substation;
- decommissioning Transformer 2 at Flemington zone substation and replacing it with Transformer 3 by physically relocating Transformer 3 to transformer bay number 2, and connecting Transformer 3 to 11kV switchgear Group 2; and
- replacing Transformer 4 at Flemington zone substation with Clovelly zone substation Transformer 1 and connect it to 11kV switchgear Group 2.[17]

6.2 Estimated construction timetable and commissioning date

Construction of Option 1 is estimated to occur during 2018/19, with commissioning in 2019/20 at which point benefits from unserved energy and lower operating costs will start to accrue.

6.3 Indicative capital and operating cost

Ausgrid expects to incur a total of $8.0 million in capital costs on a real basis in 2018/19.

Incremental operating costs for Option 1 are assumed to be minimal given that it is expected new duct banks will incur immaterial levels of maintenance over the 20 year analysis period.

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[16] See: https://www.ausgrid.com.au/-/media/Files/Network/Network-Projects/Sydney-South/LidOlyP/L2OP_newsletter-April-2018.pdf?la=en&hash=A22778FD47CD72F5C1279E0C6DF0DCC13E23F45C

[17] The replacement and relocation of these two transformers serves a different need from the project presented in this DPAR. However, Ausgrid considers undertaking the proposed project and address transformer asset conditions concurrently is the most efficient use of project planning and delivery resources.

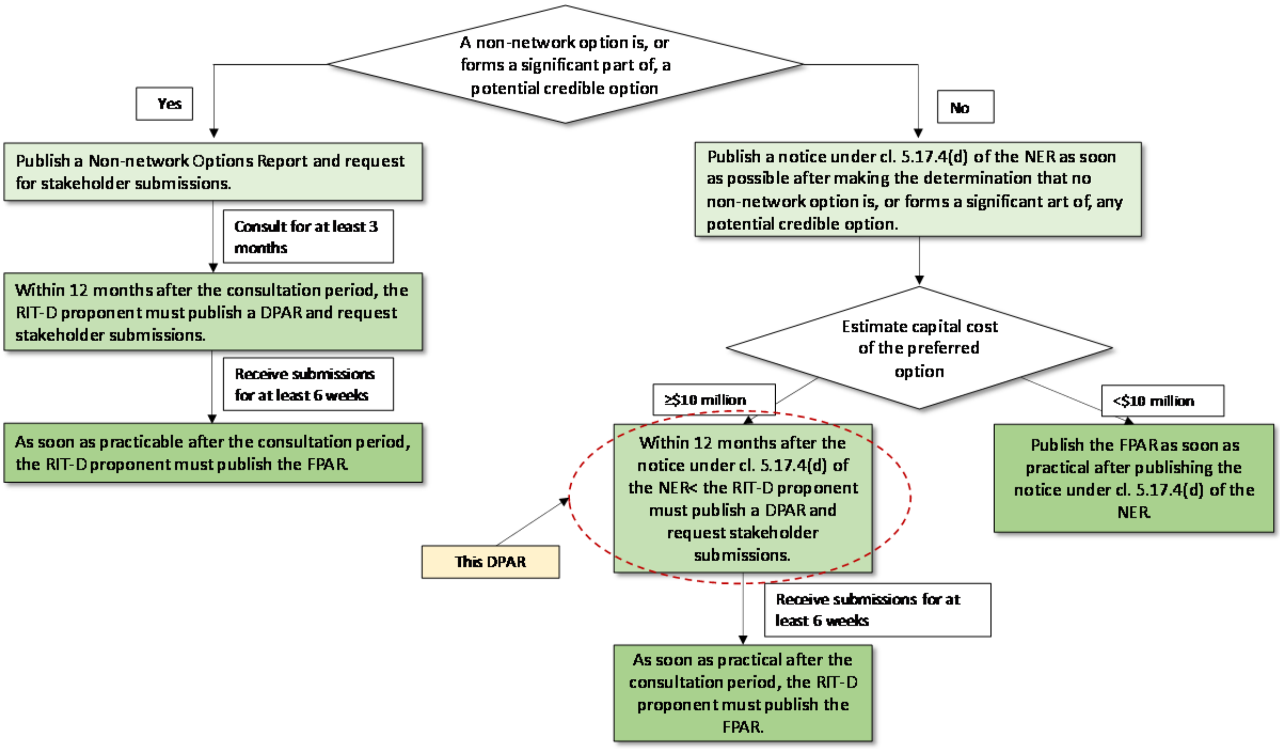
Appendix A – Checklist of compliance clauses

This section sets out a compliance checklist that demonstrates the compliance of this DPAR with the requirements of clause 5.17.4(j) of the National Electricity Rules version 107.

Rules clause	Summary of requirements	Relevant sections in the DPAR
5.17.4(j)	(1) a description of the identified need for the investment	2
	(2) the assumptions used in identifying the identified need	2.3, 4 & Appendix C
	(3) if applicable, a summary of, and commentary on, the submissions on the non-network options report	NA
	(4) a description of each credible option assessed	3
	(5) where a DNSP has quantified market benefits, a quantification of each applicable market benefit for each credible option;	5.1
	(6) a quantification of each applicable cost for each credible option, including a breakdown of operating and capital expenditure	3 & 5.2
	(7) a detailed description of the methodologies used in quantifying each class of cost and market benefit	2.3, 4 & Appendix C
	(8) where relevant, the reasons why the RIT-D proponent has determined that a class or classes of market benefits or costs do not apply to a credible option	Appendix D
	(9) The results of a net present value analysis of each of credible option and accompanying explanatory statements regarding the results	5
	(10) the identification of the proposed preferred option	6
	(11) for the proposed preferred option, the RIT-D proponent must provide: (i) details of technical characteristics; (ii) the estimated construction timetable and commissioning date (where relevant); (iii) the indicative capital and operating cost (where relevant); (iv) a statement and accompanying detailed analysis that the proposed preferred option satisfies the regulatory investment test for distribution; and (v) if the proposed preferred option is for reliability corrective action and that option has a proponent, the name of the proponent	6
	(12) Contact details for a suitably qualified staff member of the RIT-D proponent to whom queries on the draft report may be directed.	1.2

Appendix B – Process for implementing the RIT-D

For the purposes of applying the RIT-D, the NER establishes a three stage process: (1) the Non-Network Options Report (or notice circumventing this step); (2) the DPAR; and (3) the FPAR. This process is summarised in the figure below.



Appendix C – Additional detail on key assumptions

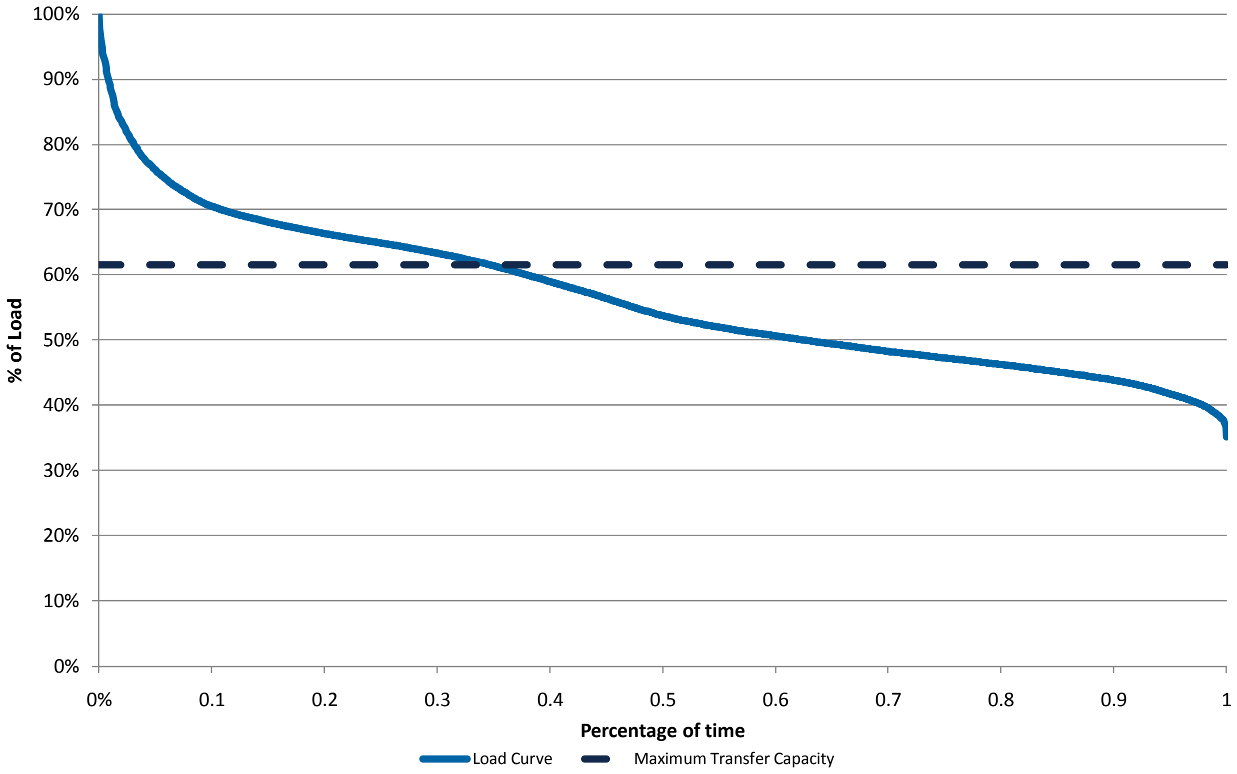
This appendix provides additional detail on key input assumptions that are used in the evaluation of the base case and the credible option.

C.1 Charactertistic load duration curves

Load duration curves for Flemington zone substation is presented in Figure C.1 below.

The load duration curves display similar characteristics because of the similar load types supplied by the substations. It is assumed that the load types supplied by these substations will not change substantially in to the future and therefore the load duration curves will maintain their characteristic shape regardless of the zone substation supplying the existing load at Flemington.

Figure C.1: Load duration curve for Flemington



C.2 Load transfer capacity and supply restoration

Flemington zone substation load area is classified as urban and has potential 11kV interconnection with Homebush Bay, Auburn, Lidcombe, Croydon and Burwood zone substations. In the event of a total loss of supply to Flemington zone substation, approximately 51.7MVA of peak load can be recovered within days via the load transfer capacity of the existing network.

In the event of an equipment outage, the network may be returned to a normal configuration by one of the following actions:

- repairing the failed equipment
- initiating a contingency plan
- replacing the failed equipment with spares.

The assumed supply restoration actions and the time taken to implement the action are detailed in the table below. These actions are the most likely actions for the contingencies considered in this planning study.

Table C.1: Equipment outage assumptions

Equipment outage	Action	Outage duration (Days)
Transformer/Feeder Panel	Time between failure and access	1
	Time to undertake causal analysis	1
	Time to engineer solution (T&D Engineering)	1
	Time to manufacturer/repair engineered solution	6
	Time to implement engineered solution	6
	Ancillary Work - testing etc.	2
	Total - MAJOR FAILURE	**17**
	Total - MINOR FAILURE	**8.5**

C.3 Forecast availability of equipment

A range of models have been used to forecast the availability of equipment relevant to this RIT-D. These models utilise Ausgrid's historical outage records to determine the likelihood of failure. These models are combined with the estimates for repair or supply restoration time to determine the availability of equipment. The assumptions used to obtain the availability forecasts are provided in this section.

C.3.2 Availability of 11kV switchboards

For the purposes of this analysis, failures of 11kV switchboards are assumed to be non-repairable because typically the board is no longer functional following a failure (and hence is replaced or removed from service). Weibull analysis is used to derive a probability distribution function for the asset's age at time of failure. This function is denoted as f(t), where t is expressed in years. The parameters of the function are derived by considering the following information:

- the age of Ausgrid's in service 11kV switchboards;
- the age of functional failure for Ausgrid's failed switchboards; and
- the age of retirement for Ausgrid's switchboards that were retired before the point of functional failure.

The model has been created to distinguish between 11kV switchboards that are of differing condition. This assessment was performed using a group of Ausgrid subject matter experts based upon their specialist knowledge of the asset(s) and a review of the available conditional information (i.e. test results). This review assigned switchboards into three specific condition bands: 'Good', 'Average' and Poor'. The Flemington zone compound and Air 11kV switchboard are assigned condition band poor and average respectively.

The resultant Weibull parameters are given in the table below.

Table C.2: Switchboard parameters for the Weibull analysis

Equipment	Condition	Shape	Scale
Compound insulated 11kV switchboard	Poor	6.1	90.3
Air insulated 11kV switchboard	Average	3.6	203.5

The concept of conditional probability is used to evaluate the probability of failure (Pf) for each year in the planning period. The probability a switchboard failure occurring each year, given that the board has survived to the current age (T) is calculated by applying the Equation 1:

$$P_f = \frac{\int_t^{t+1} f(t)dt}{\int_T^{\infty} f(t)dt} \qquad (1)$$

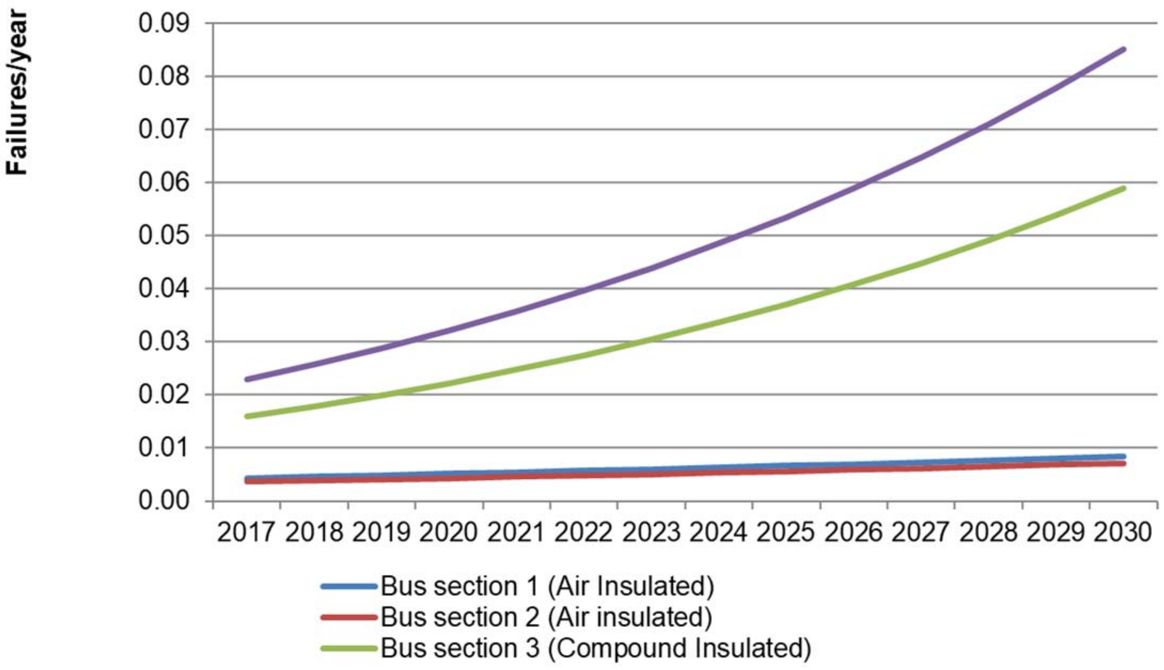
Unavailability is calculated by using a restore time, so the unavailability represents the percentage of time that a particular busbar is not available to supply load. The unavailability (U) of a switchboard is calculated for each year by applying Equation 2:

$$U = \frac{P_f\,.\,Outage\ Duration}{365} \tag{2}$$

This model is based on the assumption that the condition of a switchboard is dependent upon its age. In order to explore the possibility that each board is in better or worse condition than the population average, lower and upper bounds for U are calculated by either adding or subtracting ten years from the age of each board.

Figure C.2 shows cumulative probability of failure for the11kV switchboards at Flemington zone substation.

Figure C.2: Cumulative probability of failure – 11kV switchboards



C.4 Direct costs of equipment failures

For the purposes of evaluating safety impacts, it is assumed that equipment outages have direct costs as per the table below. All costs are in 2013/14 real dollars.

For switchboard failures, these costs are based on the estimated cost of implementing the contingency plans described above. This cost includes 11kV feeder connections, protection and earthing designs, delivery costs and labour rates.

Transformer replacement costs are based on planning estimates for capital replacements. 33kV reactor, 132kV circuit switch and 132kV gas-insulated switchgear replacement costs are based on high level estimates.

Table C.3: Direct costs of equipment outages

Equipment outage		Direct cost ($)
Transformer/Feeder Panel	Time between failure and access	2320
	Time to undertake causal analysis	8000
	Time to engineer solution (T&D Engineering)	8640
	Time to manufacturer/repair engineered solution	16800
	Time to implement engineered solution	71040
	Ancillary Work - testing etc.	70000
	Return to Service (RTS)	5120
	Total - MAJOR FAILURE	**181,920**
	Total - MINOR FAILURE	**90,960**

Appendix D – Market benefit classes considered not relevent

The market benefits that Ausgrid considers will not materially affect the outcome of this RIT-D assessment include:

- timing of unrelated network expenditure;
- changes in voluntary load curtailment;
- costs to other parties;
- load transfer capability and embedded generators;
- option value;
- electrical energy losses; and
- deferring the need for unrelated network expenditure.

The reasons why Ausgrid considers that each of these categories of market benefit is not expected to be material for this RIT-D are outlined in the table below.

Table D.1 – Market benefit categories under the RIT-D not expected to be material

Market benefits	Reason for excluding from this RIT-D
Timing of unrelated network expenditure	Ausgrid does not expect any changes in unrelated network expenditure in both size of expenditure or timing of expenditure as a consequence of implementing Option 1. Ausgrid has therefore excluded from timing of unrelated network expenditure benefits from this RIT-D.
Changes in voluntary load curtailment	Ausgrid notes that the level of voluntary load curtailment currently present in the NEM is limited. Where the implementation of a credible option affects pool price outcomes, and in particular results in pool prices reaching higher levels on some occasions than in the base case, this may have an impact on the extent of voluntary load curtailment. Ausgrid notes that the option is not expected to affect the pool price and so there is not expected to be any changes in voluntary load curtailment.
Costs to other parties	This category of market benefit typically relates to impacts on generation investment from the option. Ausgrid notes that the option will not affect the wholesale market and so we have not estimated this category of market benefit.
Changes in load transfer capacity and embedded generators	Load transfer capacity between substations is predominantly limited by the high voltage feeders that connect substations. The credible option under consideration does not affect high voltage feeders and therefore are unlikely to materially change load transfer capacity. Further, Option 1i is unlikely to enable embedded generators in Ausgrid's network to be able to take up load given the size and profile of the load serviced by network assets currently considered. Consequently, Ausgrid has not attempted to estimate any benefits from changes in load transfer capacity and embedded generators.
Option value	Option value arises where there is uncertainty regarding future outcomes, the information that is available in the future is likely to change, and the credible options considered are sufficiently flexible to respond to that change. Ausgrid notes that the credible option assessed provides the flexibility to install additional capacity at the Flemington zone substation in the event significant customer connections occur in the area in the future. However, Ausgrid has not estimated the option value associated with this flexibility on account of the complexities of doing so (both in terms of option value modelling generally as well as the uncertainty surrounding these connections specifically), as well as the fact that, doing so, will not affect identification of the preferred option (since there is only one credible option).

Changes in electrical energy losses	Ausgrid does not expect that the credible option considered would lead to significant changes in network losses and so have not estimated this category of market benefits.
Deferring the need for unrelated network expenditure	Option 1 does not affect the timing of any other network investment.

Ausgrid