Cost pass through application – April 2015 storms
(PUBLIC VERSION)

August 2015

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21 August 2015

Contents

1 Executive Summary

This is an application by Ausgrid, pursuant to clause 6.6.1(a) of the National Electricity Rules (NER) to seek approval from the Australian Energy Regulator (AER) to pass through the additional costs incurred in the 2014-2015 regulatory year (also known as the transitional regulatory year and transitional regulatory control period) from providing distribution services to remedy the damage done to Ausgrid's distribution network from the severe weather conditions caused by the East Coast Low in April 2015.

The severity of the storms generated by the April East Coast Low on 20 April 2015 is the relevant event upon which this pass through application is based. It caused widespread damage throughout parts of New South Wales (NSW) and heavily impacted upon Ausgrid's network.

Over a period of several days, Ausgrid's network area was hit with intense storms characterised by heavy rainfall and gale force winds, with gusts reaching the equivalent of category 2 cyclone strength at their peak. These conditions resulted in flooding, fallen trees and poles, and significant damage to overhead power lines causing widespread power outages throughout Ausgrid's network. At its peak, the storms resulted in approximately 240,000 customers (or 14% of Ausgrid's total customer base) being without power, with an estimated total of 369,000 customers (or 22% of Ausgrid's total customer base) experiencing supply interruptions from 20 to 25 April 2015.

The damage sustained from the storm was unprecedented and resulted in a total of 22 local government areas being declared natural disaster areas, 16 of which are within Ausgrid's network area. Restoring customer supply as safely and as quickly as possible following the storm required an exceptional response effort, made even more challenging by the continued adverse weather which persisted for several days after the storms initial impact on 20 April 2015.

A fundamental consideration underpinning Ausgrid's effort to restore customers' supply was to ensure the safety of the public and its employees. The restoration effort undertaken by Ausgrid in response to the storms has had a material impact on its costs of providing direct control services. Ausgrid has incurred $39.8 million in additional costs as a result of the April storms, which are not accounted for in its 2014-15 transitional distribution determination or in the current 2015-19 distribution determination. Given the nature of the event and magnitude of the cost impacts Ausgrid considers it appropriate for these additional costs to be recovered via the cost pass through provisions set out in section 6.6.1 of the NER.

We note the merit review matters currently before the Australian Competition Tribunal, the outcomes of which are not yet known. To enable the proper consideration of future potential price changes resulting from the merits review as well as from the outcome of this application, Ausgrid seeks to consult with the AER on the final price path for the remaining years of the current period before a final determination is made in relation to this application.

Ausgrid considers that the AER should approve its proposed positive pass through amount as:

- the storm meets the relevant requirements to qualify as a 'general nominated pass through event;'
- the costs incurred as a result of the storm amounts to 1.6% of Ausgrid's annual revenue requirement for the 2014-15 regulatory year, thus satisfying the materiality requirement in the NER for the pass through event to be a positive change event; and
- the application addresses the requirements outlined in clause 6.6.1(c) and has been submitted within the requisite 90 business days timeframe for making a pass through application.

The application also addresses the matters listed in clause 6.6.1 (j) that the AER must take into account in determining the approved pass through amounts. We consider that this would enable the AER to determine that the amounts proposed by Ausgrid should be approved for pass through to customers.

As an indication and in order to comply with the provisions of the NER, Ausgrid is proposing that the majority of this positive pass through amount be recovered in the regulatory year 2016-17 of the current regulatory period. This amounts to an increase of about $10 to the average residential customer's bill for this year. Alternatively, should the AER decide it to be more appropriate that the positive pass through amount be recovered evenly over the regulatory years 2016-17 to 2018-19 to alleviate price impacts on customers, the pricing impact would be approximately a $3 increase in the average residential customer's bill for each of these 3 years.

Ausgrid considers that approving this pass through application is consistent with the revenue and pricing principles in the National Electricity Law; as such approval provides Ausgrid with a reasonable opportunity of recovering at least the efficient costs of providing direct control services.[1]

[1] National Electricity Law, s7(A)(2)(a) and (b).

2 Cost pass through framework

The pass through provisions, contained in Chapter 6 of the NER, allows DNSPs to seek approval from the AER to recover (or pass through) the increase in costs of providing direct control services if those increases meet the relevant requirements in clause 6.6.1.

2.1 Ausgrid's written statement

To seek approval from the AER to pass through the increase incosts, the NER require a DNSP to submit a written statement to the AER within 90 business days of the relevant positive change event occurring. This statement must address the matters outlined in clause 6.6.1(c), namely:

- The details of the positive change event.
- The date on which the positive change event occurred.
- The eligible pass through amount in respect of the positive change event.
- The positive pass through amount Ausgrid is proposing in relation to the positive change event.
- The amount of the positive pass through amount that Ausgrid proposes should be passed through to Distribution Network Users in the regulatory year in which, and each regulatory year after that in which, the positive change event occurred.
- Evidence: [2]
    i. of the actual and likely increase in costs referred to in clause 6.6.1(c)(3) of the Rules;
    ii. that such costs occur solely as a consequence of the positive change event.
- Such other information as may be required under any relevant regulatory information instrument.

2.2 Framework for AER assessment

If the AER determines that a positive change event has occurred, it must then make a determination on:

- the approved pass through amount; and
- the amount of that approved pass through amount that should be passed through to distribution network users in the regulatory year in which, and each regulatory year after that in which the positive change event occurred,

In making this decision, the AER must take into account a number of relevant factors which are listed in clause 6.6.1(j) of the NER.

In addition, the National Electricity Law also requires the AER, in exercising its economic regulatory function and powers, to exercise its powers in a manner that will or is likely to contribute to the achievement of the National Electricity Objective (NEO).

The NER also specifies the revenue and pricing principles. Of relevance to this application is the principle that a regulated network service provider should be provided with a reasonable opportunity to recover at least the efficient costs the operator incurs in providing direct control services and complying with a regulatory obligation or requirement or making a regulatory payment.

[2] We have not recited clause 6.6.1(c)(6)(iii) as it relates to a retailer insolvency event and is not applicable.

3 Outline of Ausgrid's written statement

This application and accompanying appendices and attachments constitute a written statement pursuant to clause 6.6.1(c) of the NER, seeking the AER's approval to recover a positive pass through amounts totalling $37.9 million. This written statement[3] complies with the requirements under clause 6.6.1(c) of the NER as it provides the relevant details to enable the AER to determine that a positive change event has occurred as well as details of the eligible pass through amounts, positive pass through amounts and evidence of increase in costs. This statement also focuses on addressing the matters that the AER must take into account in deciding the approved pass through amounts, being the matters listed in clause 6.6.1(j) of the NER.

We note clause 6.6.1(c)(7) of the NER requires Ausgrid to provide such other information as may be required under any relevant regulatory information instrument. No such instrument has been issued by the AER at the time of submitting this statement. However, clause 6.6.1(e1) provides scope for the AER to request from Ausgrid such additional information as the AER requires for the purpose of making a determination on this application and Ausgrid must comply with such request within the time specified by the AER. Accordingly, we would welcome any further necessary information request and consultation from the AER in the course of its consideration of this application.

We note that the date on which this positive change occurred (or commenced its occurrence) is 20 April 2015.[4] Consequently, this written statement is required to be submitted to the AER by 24 August 2015, being 90 business days from 20 April 2015 (inclusive). The requirement of 6.6.1(c) in relation to the time for submitting the written statement has therefore been satisfied.

Ausgrid's written statement is comprised of this document, appendices and accompanying attachments. This document addresses the requisite matters through the following sections:

- ***Section 4: Positive change event*** –demonstrates why the April storms satisfy the definition of a positive change event and is supported by evidence provided in Appendix A, B, and C.
- ***Section 5: Cost incurred –*** outlines the costs Ausgrid had incurred as the result of the storm. These costs resulted from the activities we undertook to respond to the impact of the storm and to restore our network. Further evidence to support the costs that were incurred as a result of the storms is provided in Appendix D, E and F.
- ***Section 6: Pass through amount –*** specifies the eligible pass through amounts and positive pass through amounts in relation to the April storm.
- ***Section 7: The AER's assessment –*** outlines Ausgrid's consideration of each of the factors that the AER takes into account in determining the amounts to be approved for pass through to customers.

We also have provided at Attachment 1 a compliance checklist that outlines sections of Ausgrid's written statement that address the various NER requirements for a pass through application. We have also provided confidential and non-confidential versions of the written statement and a confidentiality template in accordance with the AER's confidentiality guidelines.

[3] At times referred to in this document as 'statement' or 'application'. These terms should be read interchangeably and inclusive of all appendices and supporting attachments accompanying this application.
[4] NER, cl 6.6.1(c)(2).

4 Positive change event

In order to make a pass through application, Ausgrid must establish that a positive change event has occurred. A positive change event is defined in the NER as[5]:

> *"a pass through event which entails the Distribution Network Service Provider incurring materially higher costs in providing direct control services than it would have incurred but for the event, but does not include a contingent project or an associated trigger event."*

The positive change event that is the subject of this application is the storms that were generated by the East Coast Low which commenced on 20 April 2015, being the date on which a positive change event occurred. This section demonstrates how the storm meets the requirements of a positive change, namely that:

1) it was a pass through event;

2) the event resulted in materially higher costs;

3) that the costs were incurred in providing direct control services; and

4) the event is not a contingent project or an associated trigger event.

A 'pass through event' means for a distribution determination the events specified in clause 6.6.1 (a1).[6] Clause 6.6.1(a1) specifies that any of the following to be a pass through event:

1) a regulatory change event;

2) a service standard event;

3) a tax change event;

4) a retailer insolvency event; and

5) any other event specified in a distribution determination as a pass through event for the determination.

The relevant distribution determination for the 2014-15 regulatory year is Ausgrid's transitional distribution determination made by the AER. The NER sets out the content of the AER's transitional distribution determination and mandated that the AER's transitional distribution determination must specify a number of matters as set out in the NER.[7] One of these matters is the additional pass through events. The NER requires the AER to specify:

a) the same additional pass through events that were decided in the distribution determination for the current regulatory period of the affected DNSP.[8]

b) The 'terrorism event' as defined by the NER prior to the relevant Rule amendment in 2012 comes into effect.[9]

The AER's distribution determination for the transitional regulatory year 2014-15 gave effect to this NER requirement. The AER determined, in its distribution determination for Ausgrid for the transitional regulatory control period that the pass through events for the transitional regulatory control period will be:[10]

- *The same additional pass through events that were decided in the distribution determination for the current regulatory control period for Ausgrid; and*

- *The 'terrorism event' as defined in the Rules immediately prior to the date the National Electricity Amendment (Cost pass through arrangements for Network Service Providers) Rule 2012 came into force.*

Consequently, the following events are additional pass through events for the 2014-15 regulatory year:

- Retail project event
- Smart meter event

[5] NER, Chapter 10 (definition of '*positive change event*').
[6] NER, cl 6.6.1(a1) and Chapter 10 (definition of *'pass through event´).*
[7] NER, cl 11.56.3
[8] NER, cl11.56.3(a)(8)(i)- (ii).
[9] National Electricity Amendment (Cost pass through arrangements for Network Service Providers) Rule 2012.
[10] AER, Placeholder determination for the transitional regulatory control period 2014-15, Ausgrid, April 2014, p4.

- Emission trading event
- General nominated pass through event.

These additional pass through events are defined in the AER's distribution determination for EnergyAustralia (as Ausgrid then was) for 2009-14. The definition of a 'general nominated pass through event' in the AER's 2009-14 determination was amended by a decision of the Australian Competition Tribunal.

Ausgrid contends that the April storm event is a pass through event as it meets the definition of a general nominated pass through event.

This section demonstrates Ausgrid's eligibility to pass through the costs associated with the April storm event to distribution network users by establishing that the occurrence of the April storms is a positive change event. Specifically, this section demonstrates that the April storm event meets the NER requirements to constitute a positive change event as:

- it is a general nominated pass through event, for the reasons outlined in section 4.2;
- the event resulted in Ausgrid incurring materially higher costs in providing direct control services for the reasons discussed in section 4.3; and
- the event is not a contingent project or trigger event, for the reasons discussed in section 4.4.

4.1 Details of the event

On 20 April 2015 an East Coast Low developed off the Hunter Coast, causing severe weather conditions across Sydney, the Central Coast and Hunter regions. This event is referred to throughout Ausgrid's pass through application as "the April storm event", "April storms" or "the event."

The storm cell generated by the East Coast Low lashed Sydney, the Hunter, Newcastle, and Central Coast with wild weather for up to 72 hours before decaying into the Tasman Sea on the evening of Wednesday 23 April. The weather conditions triggered by the East Coast Low resulted in:

- wide spread flash flooding causing transport interruptions and road closures;
- riverine flooding (minor, moderate and major) isolating communities and causing three fatalities;
- damaging and destructive winds, with several locations reporting wind gusts of up to 135km/h, the equivalent of wind forces associated with a category 2 cyclone[11]; and
- dangerous surf conditions and large swells.

These conditions had catastrophic impacts upon affected areas, resulting in 22 Local Government Areas being declared natural disaster areas by the NSW and Commonwealth Government, including Cessnock, Dungog, Gosford, Gloucester, Great Lakes, Hawkesbury, Ku-ring-gai, Lake Macquarie, Lithgow, Maitland, Mosman, Muswellbrook, Newcastle, Pittwater, Port Stephens, Randwick, Singleton, The Hills, Warringah, Waverley, Wollondilly and Wyong.[12] Sixteen (16) of the declared natural disaster areas lie within Ausgrid's network boundaries, (as shown by Figure 1 by the red shading), which highlights the magnitude of the April storms impact the upon Ausgrid's network.

[11] Bureau of Meteorology <http://www.bom.gov.au/cyclone/faq/>.

[12] Disaster Assist < http://www.disasterassist.gov.au/Currentdisasters/Pages/NSW/NSW-EastCoastStormsandFloods(20April2015).aspx>

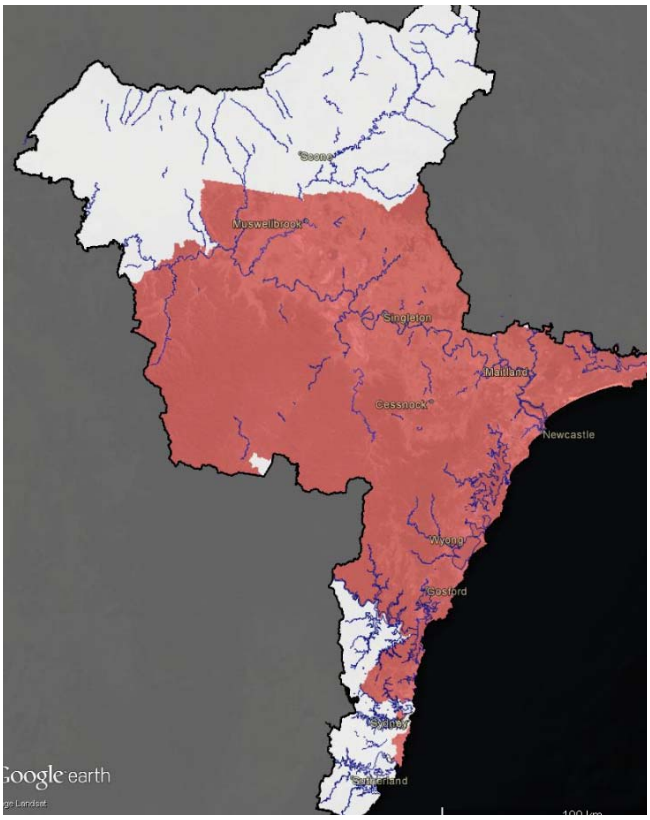


Figure 1 – Areas within Ausgrid's area declared natural disaster areas

SES declared the storm "NSW SES biggest response operation in the history of the Service" after recording more than 20,000 jobs and reporting 169 flood rescues in response to the storm.[13] The unprecedented number of jobs required significant resources, requiring the SES to seek assistance from more than 600 out of area personnel to help in its recovery efforts.[14] In addition, the Bureau of Meteorology (the "Bureau") stated that:[15]

This was the most severe East Coast Low to affect the New South Wales coast since at least 2007.

The severe weather conditions generated by the storm caused widespread damage to homes and other major infrastructure including roads and bridges, water and telecommunications services and privately-owned infrastructure. The damage wrought by the storm resulted in:

- 10 evacuation centres being opened;
- 13 communities losing telecommunications, with two areas isolated for more than 24 hours;
- 338 schools closing during the event;
- almost $60 million of agricultural damage; and
- more than $1.551 billion in insurance claims.[16]

A more detailed account of the weather conditions that occurred during the storm as well as background information on East Coast Lows and the storms' development is contained in Appendix A. This information demonstrates that the April storm event satisfies the requirements that a general nominated pass through event be unpredictable and unforeseeable, the effect of which prudent operational risk management could not have prevented or mitigated. A detailed account of the storms' impact upon Ausgrid's network and customers is provided in Appendix D, to provide the AER with evidence of the damage that was sustained to Ausgrid's network from the April storm event, which subsequently resulted in Ausgrid incurring $39.8 million (nominal) increases in costs.

[13] NSW SES media updates 27 April 2015, 6.26pm.
[14] NSW SES media updates 28 April 2015, 9.15am.
[15] Bureau of Meteorology, Monthly Weather Review Australia, April 2015, pages 3, 5. This report is provided as Attachment 2.
[16] Insurance Council of Australia, Media Release, Tuesday June 2, 2015.

4.2 General nominated pass through event

The general nominated pass through event specified in Ausgrid's 2009-14 distribution determination and subsequently in its 2014-2015 transitional determination, as modified by order of the Australian Competition Tribunal is defined as follows[17]:

A general nominated pass through event occurs in the following circumstances:

1. *An uncontrollable and unforeseeable event the effect of which prudent operational risk management could not have prevented or mitigated that occurs during the next regulatory control period;*

2. *The change in costs of providing distribution services as a result of the event is material.*

3. *The event does not fall within any of the following definitions: 'regulatory change event' in the NER; 'service standard event' in the NER, 'tax change event' in the NER; 'terrorism event' in the NER, 'retail project event', in this final decision, 'smart meter event' in this final decision, 'emission trading scheme event' in this final decision (read as if paragraph (a) of the definition were not part of the definition); and 'aviation hazard event' in this final decision'.*

For the purpose of this definition:

- *An event will be considered unforeseeable if, at the time the DNSP lodged its regulatory proposal, despite the occurrence of the event being a possibility there was no reason to consider that the event was more likely than not to occur during the next regulatory control period;*

- *'material' means the costs associated with the event would exceed 1 per cent of the smoothed forecast revenue specified in this final decision in the years of the regulatory control period that the costs are incurred.*

As evident in the above definition, an event must satisfy various conditions before it can be classified as a 'general nominated pass through event'. Those conditions and their application in the current circumstances are discussed below.

4.2.1 Uncontrollable and unforeseeable event

The East Coast Low of 20-22 April 2015, which generated severe weather conditions throughout NSW, was an uncontrollable and unforeseeable event.

The term 'uncontrollable' is not defined in the National Electricity Law (NEL), the NER, or in the 2009-2014 distribution determination. Accordingly, it should be given its ordinary meanings having regard to:

- the context in which they are used;
- the purpose of clause 6.6.1 of the Rules; and
- the NEO and the revenue and pricing principles contained in the NEL.

The Macquarie Dictionary defines 'uncontrollable' to mean 'not governable', ' not abiding by any rules or responding to any discipline'. In this case, the term 'uncontrollable' event simply means an event which is beyond the control of the DNSP. Whether an event is uncontrollable is therefore a question of fact and will be determined by reference to the nature of the event and circumstances.

Appendix A provides a detailed account of the circumstances relating to the April storms, particularly the characteristics of East Coast Lows, the storms' development and its severity to highlight how this event was an extreme weather event (subsequently labelled a natural disaster in NSW), and therefore outside of Ausgrid's control.

The AER has previously accepted that climatic conditions are uncontrollable and satisfy the requirements of the general nominated pass through definition. SA Power Networks applied to the AER to pass through a material increase in its vegetation management costs resulting from an uncontrollable and unexpected increase in vegetation growth rates due to above average rainfall. SA Power Network relied on the 'general nominated pass through event' as the pass through event to access the AER's approval process. The definition of the general nominated pass through event' that applied to

[17] AER, Statement of updates for NSW DNSPs distribution determination, 25 November 2009, p 14.

SA Power Networks is the same as that applicable to Ausgrid in this application except that the meaning of 'unforeseeable' was not defined in the SA Power Networks distribution determination.[18]

The AER found that the event (i.e. increase in vegetation growth rate) satisfied the requirements of the general nominated pass through event. The AER stated that: [19]

> *"In particular, the AER is satisfied that a general nominated pass through event has occurred and that all necessary requirements have been met. These requirements include that the event described in SA Power Networks' cost pass through application is uncontrollable and unexpected and that the effect of the event could not have been prevented or further mitigated by SA Power Networks."*

The AER also found that:

> *"The AER considers that a well-informed DNSP in the circumstances of SA Power Networks, acting reasonably, could not have considered that the increase in vegetation growth rates experienced in 2013 and forecast for 2014, at the time it submitted its regulatory proposal in April 2009."*

Ausgrid also considers that the April storms were 'unforeseeable' as defined in the 2009-14 distribution determination. We have provided further evidence of how the April storm event meets this requirement in Appendix A. However, in short, our view is that the inherent nature of East Coast Lows makes them difficult to forecast, as they have a high inter-annual variability (with some years experiencing several East Coast Lows while during other years only a few will develop)[20], and also can vary significantly in strength and impact from meso scale (approximately 10km to 100km) to synoptic scale (approximately 100km to 1,000km), and often develop overnight and intensify rapidly.[21]

As noted in Appendix A, it was not until 17 April 2015, (3 days before the commencement of the April storms) that the Bureau issued warnings about the potential of a severe storm, and it was not until 19 April 2015 (less than 24 hours before the commencement of the storms that the likely severity of the storms became apparent. The short timeframe within which Ausgrid became aware of the occurrence of the storms demonstrates that there was no reason for Ausgrid to consider that the event was more likely to occur than not, at the time it lodged its transitional regulatory proposal.

The unforeseeable nature of the event is also supported by the fact that despite having comprehensive records of East Coast Lows, the Bureau has noted that there is no evidence of a long term trend in frequency of East Coast Lows, particularly major East Coast Lows. [22] The last known storm that had a major impact on Ausgrid's network was the Queens' Birthday storm in 2007. The unpredictability (or lack of foreseeability) of East Coast Lows can be discerned from examining the history of the occurrence of these East Coast Lows from Bureau records, which is reproduced below.

Table 1 – Summary of major East Coast Lows[23]

Year East Coast Low (ECL) occurred	Description of East Coast Low (ECL)	Time elapsed between major ECL
2015	The April 2015 ECL caused substantial damage to NSW, particularly in the Hunter and Newcastle area.	8 years
2007	Five ECLs occurred, the greatest impacts caused by the 'Queen's Birthday Storm' on 8-9 June.	2 years
2005	An ECL occurred between 1-2 Feb 2005 causing widespread severe damage to southeast Australia. Damages in NSW, Victoria and Tasmania totaled $216.7 million	7 years
1998	An ECL on 23 June caused more than $12 million of damage to Hunter Region and the Northern Tablelands. A peak wind gust of 152 km/h was recorded at Nobby's Signal in Newcastle.	2 years
1996	An ECL between 30-31 August caused almost $20 million in damages and cost two lives.	10 years

[18] AER, Final Decision, SA Power Networks cost pass through application for Vegetation management costs arising from an unexpected increase in vegetation growth rates, 30 July 2013, pp 10 -11
[19] AER Decision, SA Power Networks' vegetation clearance cost pass through, 2013, p7.
[20] Verdon-Kidd, D, Kiem, AS, Willgoose, G & Haines, P 2010, *East Coast Lows and the Newcastle/Central Coast Pasha Baulker storm,* National Climate Change Adaption Research Facility, Gold Coast, 61, p 9.
[21] Guy Carpenter, *'Australian East Coast Storm 2007:Impact of East Coast Lows',* October 2007, p 11.
[22] Verdon-Kidd, D, Kiem, AS, Willgoose, G & Haines, P 2010, *East Coast Lows and the Newcastle/Central Coast Pasha Baulker storm,* National Climate Change Adaption Research Facility, Gold Coast, 61, p 14.
[23] This Table is based on information from the Bureau of Meteorology's history of stormy weather in Attachment 3.

Year East Coast Low (ECL) occurred	Description of East Coast Low (ECL)	Time elapsed between major ECL
1986	An ECL passed Sydney on 6 Aug causing flash flooding and traffic chaos with final damage bill exceeding $35 million.	12 years.
1974	An ECL caused widespread damage between Seal Rocks and Wollongong, grounding the *Sygna* ship.	12 years.
1966	An intense ECL occurred off NSW south coast, causing the loss of 13 lives on the ship *WD Atlas.*	16 years.
1950	A series of ECLs developed on the NSW coast causing flooding and the loss of 5 lives as well as the loss of the Navy motorship *Fairwind* with 17 crew.	15 years.
1945	A deep ECL occurred between 10-13 June causing flooding. The steamer *Coweambah* was lost with one death.	8 years.
1937	A severe ECL, the worst since 1927, occurred; causing severe delays to shipping.	2 years.
1935	An ECL damaged all areas of central and southern coast including Sydney and Newcastle. Five people drowned	8 years.
1927	An ECL developed off Port Macquarie between 18-19 April.	4 years.
1923	An ECL developed off Mid-North Coast. The SS Sumatra was lost with 46 lives. Passengers were injured when the Manly ferry *Burraba* nearly sank.	2 years.
1921	Two ECLs occurred, the first between 25-26 June causing the loss of 26 lives when the steamers *Fitzroy* and *Our Jack* foundered near Forster. The second occurred on 22-24 July damaging Manly ferries and delay shipping.	4 years
1917	A severe ECL on 18-20 September causing the Nerong to founder with the loss of three lives. Significant damage was reported in Sydney and Newcastle	5 years.
1912	An ECL on 14 July halted shipping and ferry traffic.	N/A. This is the first ECL reported.

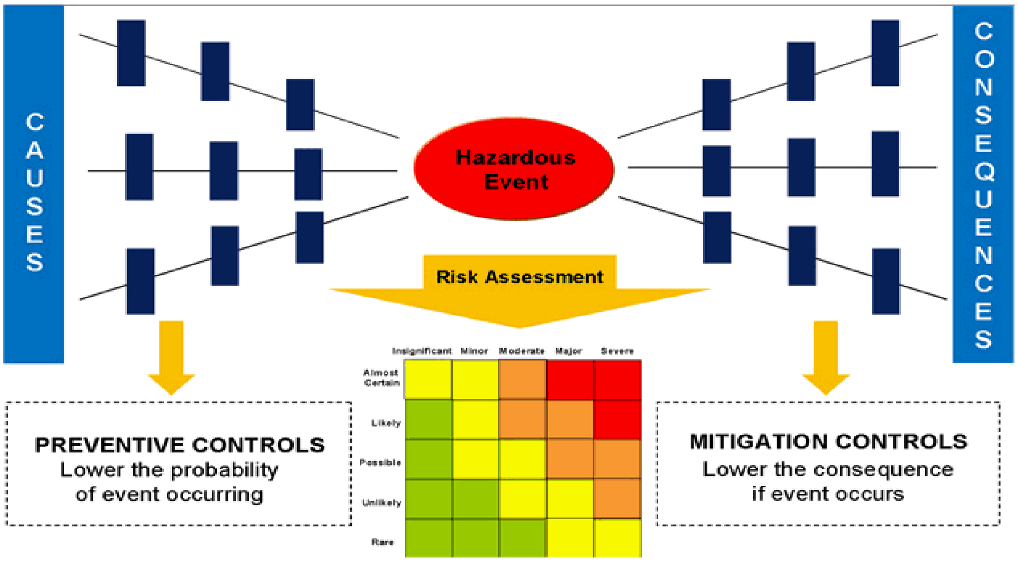
4.2.2 Effect could not have been prevented or mitigated the event

Not only are East Coast Lows unforeseeable and uncontrollable events, but their impact cannot be prevented. The effects of East Coast Lows are often natural disasters. No prudent operational risk management could have prevented or mitigated an event of this nature from occurring, nor could it prevent the effect or the impact of the event on its distribution network.

Ausgrid has a Risk Management Framework to prudently and efficiently manage its exposure to risks that it faces as an owner and operator of a distribution network. The Risk Management Framework sets out the foundation documents and organisational arrangements for designing, implementing, monitoring, reviewing and continually improving risk management throughout the business.[24] Ausgrid's Risk Management Framework uses the bow-tie risk methodology to assess its key risks. The bow-tie methodology considers plausible worst case hazardous events and identifies both the preventative controls to reduce the likelihood of the risk occurring and mitigation controls to reduce the consequence of the event, as illustrated by Figure 2.

[24] Ausgrid's Risk Management Framework outlines a: Risk Management Policy, Risk Management Strategy, Risk Matrix, Risk Assessment Methodology, Corporate Risk Management Plan Development, Risk Management Reporting Requirements. For further details see Ausgrid's attachment 4.13 to Ausgrid's regulatory proposal 2015-19, May 2014.

Figure 2 – Bow-tie risk methodology



The occurrence of storms on Ausgrid's network is a hazardous event that is beyond Ausgrid's ability to control or prevent. Consequently, in line with its bow tie methodology for assessing risks, Ausgrid has in place a number of preventative and mitigation controls aimed at reducing the consequences of storm events.

Ausgrid adopts a number of preventative controls aimed at lowering the probability of a storm having adverse impacts upon its network. It does this primary through its approach towards asset and vegetation management. Ausgrid's asset management approach seeks to achieve an optimal balance between risk, cost and performance. Ausgrid utilises Failure Mode Effects and Criticality Analysis (FMECA) and Reliability Centred Maintenance (RCM) techniques to manage the failure modes and risks of assets on its network. Ausgrid undertakes condition based maintenance of its poles and lines to identify key failures modes, and assesses asset conditions against acceptable criteria to address risks prior to failure. In doing so, Ausgrid manages the risks on its network during normal operating conditions (expected weather). Ausgrid also adopts a prudent approach towards vegetation management to keep vegetation, particularly tree branches, clear of powerlines and associated infrastructure to ensure the safety of its network and prevent property damage. Ausgrid has a comprehensive tree trimming program in place across its entire network area. The program is delivered to the requirements of Industry Safety Steering Committee (ISSC) - Guideline for managing vegetation near powerlines.[25] This guideline sets the minimum vegetation clearance profiles for specific voltage and span length combinations, as well as the requirement to identify trees or branches of a hazardous nature that may impact the electricity network. The ISSC guideline provides an acceptable clearance space in which Ausgrid's vegetation should be maintained. It does not provide for the potential of "blow ins" i.e. branches from outside the clearance space falling onto the lines. To attempt to do so would not be considered prudent investment, as it would not provide an appropriate level of effectiveness for the investment required.

The key mitigation controls Ausgrid has in place for managing the impacts from storms is through its Incident Management System (IMS and Storm Response Plan, which are developed in accordance with the *State Emergency and Rescue Management Act 1989 (NSW)*(SERM) and the NSW Emergency Plan as indicated by Figure 3.[26] In addition, Ausgrid has in place a number of systems for monitoring weather conditions such as live weather feeds in its Control Room, and notifications from the Bureau so that it can pro-actively manage weather related incidents in accordance with the afore mentioned processes and procedures.

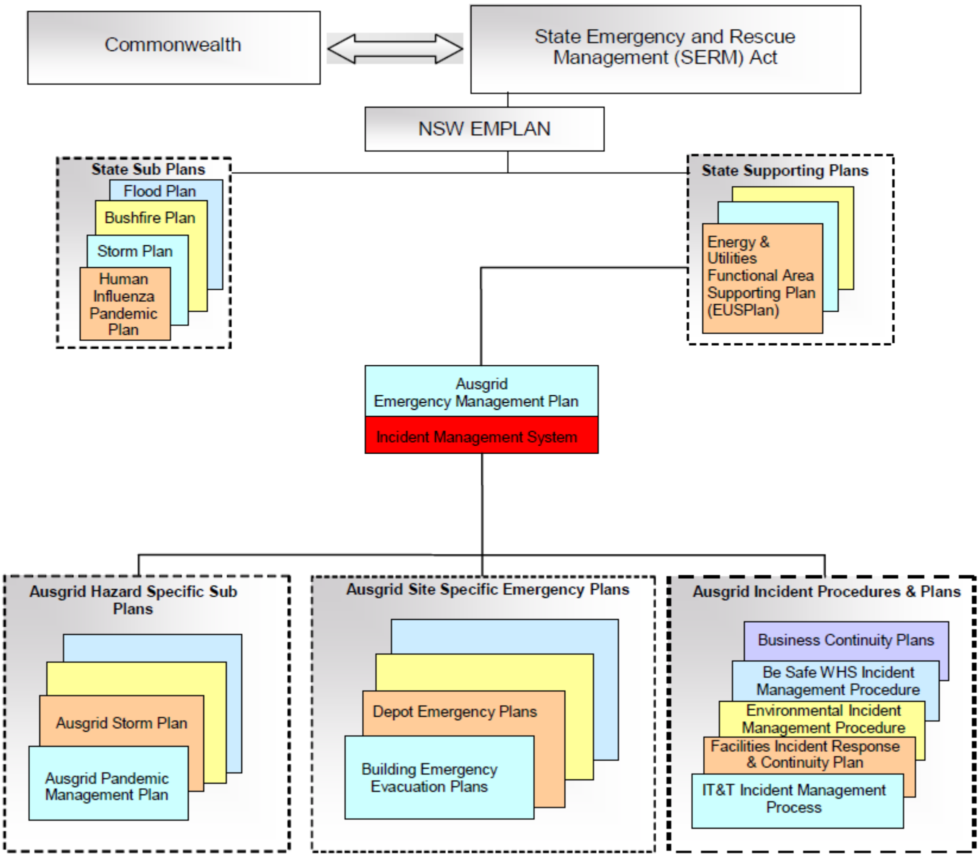
Further details regarding Ausgrid's Incident Management System and Storm Response Plan, are discussed in further detail in Appendix B. Together they formed the overarching framework for how Ausgrid coordinated and prioritised activities across its network to restore customer supply in response to the April storm event. These documents are provided as Attachments 5 and 6 respectively.[27]

[25] Refer to Attachment 4 - Industry Safety Steering Committee (ISSC) – December 2005 "Guideline For Managing Vegetation Near Power Lines", published by the Department of Energy, Utilities and Sustainability.

[26] Refer to Attachment 5 – Incident Management System (Red Folder) [Confidential]; and Attachment 6 – Ausgrid storm response plan [Confidential].

[27] Note that both of these Attachments have been provided confidentially to the AER.

Figure 3 – Structure of emergency management documentation



Whilst Ausgrid utilises insurance as a mitigation control for managing its exposure to property damage (i.e. damage to substations and buildings) it does not insure against damage to its poles and wires, which were the components of Ausgrid's network that sustained the majority of damage caused by the April storms.[28] Ausgrid does not have insurance for damage to its poles and wires as external insurance is unavailable on commercial terms, and Ausgrid has insufficient capacity to pool enough risk to cover the severity of the likely impact from a natural disaster event occurring. Rather, Ausgrid's approach to managing its exposure to natural disaster events is via a nominated pass through event as this represents the most cost effective and appropriate means for managing this type of risk.[29] The AER accepted this approach in its recent approval of a 'natural disaster nominated pass through event' for the 2015-19 regulatory control period, given that natural disasters are risks that:

- are uncontrollable, in the sense that they cannot reasonably or practicably be mitigated or prevented;
- have a low probability of occurrence and are unpredictable;
- cannot be effectively insured, in the sense that external insurance is unavailable on commercial terms or Ausgrid would not have sufficient capacity to pool enough risk to cover the severity of the likely impact should the event occur;
- are not already accounted for in Ausgrid's regulatory proposal;
- are likely to have a significant cost impact; and
- falls outside of the defined pass through events in the NER.

[28] For a more detailed account of the damage sustained to Ausgrid's network and its subsequent impact upon customers refer to Appendix D.
[29] Note that in its 2009-14 regulatory proposal, Ausgrid sought to manage its exposure to natural disaster events via a force majeure nominated pass through event, which the AER rejected but instead approved a general nominated pass through event for addressing natural disaster risks.

4.2.3 Material change in the costs of providing direct control services

To qualify as a general nominated pass thorough event, the change in costs of providing standard control distribution services as a result of the event must be material. In this section, we discuss:

- the definition of 'distribution services/direct control services' and how the April storm event satisfies this criteria;
- the term 'costs', in particular how the term is defined and calculated; and
- the definition of the term 'material' and how this criteria has been met.

There are common or inter-related elements in the definitions of general nominated pass through event and positive change event, namely the definitions of 'distribution services' and direct control services and the meaning of 'costs'. For brevity, we address these common / inter-related elements in this section and our consideration of these matters in this section is equally and separately applicable to the definitions of general nominated pass through events and positive change event in other areas of this application.

For the avoidance of doubt we have demonstrated how the April storm event meets the definition of 'material' and 'materially' separately to highlight that the April storm event satisfies both definitions. We have addressed these definitions in separate sections, as whilst these definitions are similar they establish different thresholds; with the definition of a general nominated pass through event requiring that costs exceed 1 per cent of the DNSP's *smoothed forecast revenue* specified in the final decision in the years of the regulatory control period that the costs are incurred, while the definition of a positive change event requires that costs exceed 1 per cent of the DNSP's *annual revenue requirement* as defined in the NER.

Distribution services / direct control services

The April storms caused significant damage to Ausgrid's distribution network and as a consequence resulted in Ausgrid incurring substantial costs in providing direct control services relating to the repair of the network to return electricity supply to over 369,000 customers who experienced supply interruptions during the April storm event.

The NER states that the AER may classify a distribution service to be provided by a Distribution Network Service Provider as:

- A direct control service
- A negotiated distribution service[30]

A direct control service is defined in the NER as a 'distribution service that is a direct control network service within the meaning of section 2B of the Law'[31]

A 'direct control service's defined as a distribution service; meaning a service provided by means of, or in connection with a distribution system.[32]

Section 2B of the NEL defines a direct control network service to be an electricity network service:

> *The Rules specify as a service the price for which, or the revenue to be earned from which, must be regulated under a distribution determination or transmission determination; or*
>
> *If the Rules do not do so, the AER specifies, in a distribution determination or transmission determination, as a service the price for which, or the revenue to be earned from which, must be regulated under the distribution determination or transmission determination.*

We note the classification of distribution services for the transitional year is a continuation of the AER's decision on classification of services for the 2009-14 Ausgrid distribution determination (except as supplemented and/or modified by the AER's Framework and Approach).[33] The AER's decision on the classification of services for 2009-14, in turn, was amended by the transitional rules (as applicable to the 2009-14 decision) which carried over the classification from the final Independent Pricing and Regulatory Tribunal (IPART) decision for 2009-14. In this respect, those services that were classified as prescribed distribution services by IPART for 2004-2009 were deemed by clause 6.2.3B of the NER to be classified as direct control services. Prescribed distribution services were defined by exception; that is, all distribution

[30] NER, cl 6.2.1(a).
[31] Chapter 10 of the NER.
[32] Ibid.
[33] The AER's Framework and Approach amended the classification applicable to the 2009-14 in a way that is not relevant to this application (i.e. changed the classification of type 5-6 metering services and ancillary network services to alternative control services and not to classify emergency and recoverable works).

services are prescribed distribution services except for customer funded connections, customer specific services, Type 1-4 metering services and the construction and maintenance of public lighting infrastructure.

Further, without limiting the generality of this definition of prescribed distribution service by exception, the final IPART determination for 2004-09 also provides that the prescribed distribution services include:

- Distribution use of system services;
- Private power line inspection and customer installation inspections;
- Monopoly services;
- Miscellaneous services; and
- Emergency recoverable works.

In addition, the AER's final decision for the 2015-19 regulatory period for Ausgrid classified the service group 'maintaining the network' as a direct control service and further as a standard control service. The AER's final determination specifies the activities included in this service group as: [34]

> ***"Asset maintenance*** *and network/asset performance management including:*
>
> - *Performance and condition monitoring.*
> - *Asset optimisation.*
> - *Asset maintenance/replacement/refurbishment program management.*
> - *Asset performance reporting.*
> - *Network systems maintenance.*
> - *Asset retirement.*
> - *Vegetation management, inspection and testing.*
> - *Works to fix damage to the network (other than emergency recoverable works)* (emphasis added)*"*

It is therefore clear that the costs Ausgrid incurred as a result of the storm are distribution services and direct control services; more specifically distribution use of system services (being a service the cost of which is recovered via general distribution use of system charges).

Cost

The term 'cost' is not defined by the NER and therefore has been a subject of much debate between the AER and the various DNSPs which has resulted in different views on how the material/materially threshold of 1 per cent should be satisfied.

This issue was canvassed extensively in Ausgrid's (then EnergyAustralia's) pass through application for the solar bonus scheme. It was revisited in Powercor's pass through application for the costs arising from the power line bushfire safety program[35]. Whilst Powercor's view of the meaning of 'costs' is the same as that of Ausgrid in our pass through application for the solar bonus scheme, the AER took a different view of the meaning of this term in its decision for our application and maintained this view in its decision for Powercor. Whilst Ausgrid and Powercor view the natural meaning of the term cost to mean the capital and operating expenditure (capex & opex) resulting from the occurrence of the event, the AER has maintained that the term costs should be taken to mean the building block revenue components resulting from the application of the capex and opex in the Post Tax Revenue Model (PTRM).

We have therefore addressed the requirements of material/materially using the approach the AER has taken with respect to the definition and calculation of costs.

The costs resulting from the occurrence of the April storm is $39.8 million (nominal). The majority of these costs were incurred and recognised in the regulatory year 2014-15 whilst an amount of $0.5 million (nominal) was recognised in the

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[34] Work to repair damage to the distribution network caused by a third party. See AER, Final Decision, Ausgrid distribution determination 2015-16 to 2018-19, Attachment 13 – classification of services, pages 13-21 and 13-31.

[35] Powecor Australia Limited, Pass Through Application: Costs arising from the powerline bushfire safety program, 25 July 2015, public version, p33.

regulatory year 2015-16. These are actual 'one-off' costs as it is not expected that we are likely to incur further costs in relation to this event.

To calculate the building block revenue that result from this $39.8 million costs, consistent with the approach adopted by the AER to date, we have applied the capex and opex components of the $39.8 million total expenditure to the final PTRM (distribution) used by the AER in its decision for Ausgrid for the transitional regulatory control period 2014-15. This building block revenue and their proportion as a per cent of the smoothed revenue and annual revenue requirement for each regulatory year are shown in Table 2 below.

Table 2 – Building block revenue

$ Million (nominal)	2014-15	2015-16	2016-17	2017-18	2018-19
Return on capital	-	0.44	0.44	0.45	0.45
Return of capital	-	-0.03	-0.03	-0.02	-0.02
Operating expenditure	33.9	0.53	-	-	-
Corporate income tax	-	0.01	0.01	0.01	0.01
Total building block revenue resulting from April storm (BBR)	**33.9**	**0.96**	**0.43**	**0.44**	**0.44**

Numbers may not add due to rounding

Material costs

To qualify as a general nominated pass through event, the change in costs of providing distribution services as the result of the April storm must be 'material', whereby the costs associated with the event are considered to be 'material' if they exceed 1 per cent of the smoothed forecast revenue specified by the AER in its final decision for the years of the regulatory control period that the costs are incurred.[36]

The April storm occurred in April 2015 which falls within the 2014-15 regulatory year. This regulatory year is also itself a regulatory control period and the applicable determination is the AER's transitional distribution determination. Consequently, we have used the smoothed revenue from the AER's transitional distribution determination to demonstrate that the 1 per cent material threshold specified in the definition of a general nominated pass through event has been satisfied. These revenue amounts as well as the proportion of these amounts that the April storm costs constitute are shown in Table 3 below.

[36] Refer to the Australian Competition Tribunal's amended definition of 'general nominated pass through event' as set in the AER, Statement of updates for NSW DNSPs distribution determination, 25 November 2009, p 14.

Table 3 – Demonstrating material change in costs

$ Million (nominal)	2014-15	2015-16	2016-17	2017-18	2018-19
Building block revenue resulting from April storm (BBR)	33.9	0.96	0.43	0.44	0.44
Smoothed revenue from AER's transitional decision	2,208[37]	2,183	2,227	2,271	2,319
BBR as % of smoothed revenue	**1.53%**	0.04%	0.02%	0.02%	0.02%

The cost impact of the April storm is 1.53% and therefore exceeds the 1 per cent of the smoothed revenue for the regulatory year 2014-15, the year in which the event occurred. The costs associated with the storm (i.e. the change in costs as the result of the event) are therefore material within the meaning given to the term by the AER's distribution determination.

4.2.4 The event does not fall into the other defined pass through events

The definition of the general nominated pass through event requires that the event does not to fall within any other pass through events defined by the NER or pass through events specified in Ausgrid's 2014-15 distribution determination. The April storm event does not fall within the definition of a regulatory change event, service standard event, tax change event, retailer insolvency event, retail project event, smart meter event, or emissions trading event; and therefore meets the definition requirements of a general nominated pass through event.

We outline these 'excluded' pass through events, their definitions and the reasons why we consider the April storm does not fall within the purview of any of these events, in Appendix C.

4.3 Materially higher costs

Having demonstrated that the April storm is a pass through event, the materiality requirement must also be addressed in order for this pass through event to be classified as a 'positive change event'. To qualify as a positive change event, the pass through event (i.e. the general nominated pass through event) must result in Ausgrid incurring materially higher costs. Materially is defined by the NER as exceeding 1 per cent of the annual revenue requirement as determined by the AER for the relevant regulatory year.[38]

Table 4 – Demonstrating 'materially higher costs

$ Million (nominal)	2014-15	2015-16	2016-17	2017-18	2018-19
Building block revenue resulting from April storm (BBR)	33.9	0.96	0.43	0.44	0.44
Annual revenue requirement from AER's transitional decision	2,117[39]	2,244	2,365	2,439	2,378
BBR as % of annual revenue requirement	**1.60%**	0.04%	0.02%	0.02%	0.02%

[37] AER, Transitional distribution decision 2014-15, Ausgrid, April 2014, tables 4.4 and 4.5 (Distribution = $1,956m and Transmission = $252m for smoothed revenue).
[38] For exact wording of this definition, see Chapter 10 of the NER which is also extracted above in section 2.1.1.
[39] AER, Transitional distribution decision 2014-15, Ausgrid, April 2014, tables 4.4 and 4.5 (Distribution = $1,956m and Transmission = $252m for smoothed revenue).

In respect of this assessment of materiality, we note the AER's previous decision in which the AER considered that the materiality threshold only needs to be satisfied in any one year affected by the relevant event. This means that the 1 per cent threshold would only need to be satisfied for one year out of all the years that the event triggered the change in costs (meaning that all other years could possibly not need to meet the materiality threshold). The AER has stated[40]:

> *The NER definition of 'materially' requires that the test be passed…..in any regulatory year of a regulatory control period… We interpret this to mean that if the change in costs is material in any year affected by the relevant trigger event, then all costs incurred in relation to that event must be considered for the purpose of determining the eligible pass through amount (emphasis added).*

Consistent with the AER's application of the test of materiality, we consider that the April storm event is a general nominated pass through event which resulted in Ausgrid incurring materially higher costs of providing direct control services and hence is a positive change event. This is because the change in costs as the result of the April storm constitutes 1.53% of Ausgrid's smoothed revenue (and therefore satisfies the materiality requirement of a general nominated pass through event) and 1.6% of its annual revenue requirement, hence satisfying the definition of a positive change event.

We note that the smoothed revenue and annual revenue requirement for 2014-15 we have used in demonstrating that the materiality threshold has been met are those amounts as determined in the AER's placeholder decision for Ausgrid. These amounts were estimates and the actual and substantive revenue for the regulatory year 2014-15 that Ausgrid is entitled to recover is substantially less, as a result of the AER adjusting (via a true up mechanism) Ausgrid's 2014-15 revenue as part of the 2015-19 distribution determination. The fact that the revenue for 2014-15 was effectively less and the difference was 'trued up' in the subsequent years is a relevant factor that we consider the AER should take into account in assessing this pass through application.

4.4 Exclusion of contingent projects and trigger events

Lastly, we note the definition of positive change event in the NER excludes a contingent project or an associated trigger event. Contingent project and trigger event is defined in the NER as:

> *In relation to a distribution determination, a proposed contingent project that is determined by the AER, in accordance with clause 6.6A1(b), to be a contingent project for the purposes of that determination.*
>
> *For a distribution network service provider, in relation to a proposed contingent project or a contingent project, a specific condition or event described in clause 6.6A.1(c), the occurrence of which, during the relevant regulatory control period, may result in the amendment of a distribution determination under clause 6.6A.2*

Ausgrid did not propose any contingent project and associated trigger event in its regulatory proposals and hence the AER determined that there is no contingent project and associated trigger event.[41] By virtue of clause 11.56.4(e) of the NER, this decision applies to the transitional regulatory control period as well.

Consequently, the April storm event is neither a contingent project nor an associated trigger event for the purpose of the definition of a positive change event in the NER.

[40] AER, Determination 2014-15 Powerline Replacement Program cost pass through for Powercor, September 2014, p 23.
[41] AER, Final Decision, Ausgrid distribution determination, 2015-16 to 2018-19, Appendix A of the Overview.

5 Costs incurred

The storms largely caused damage to Ausgrid's overhead network, specifically assets on its 132kV, 66kV, 33kV, 11KV and low voltage network. The damage sustained to the network triggered numerous faults resulting in over 369,000 customer experiencing supply interruptions. The types of faults which occurred on Ausgrid's network as a result of the storm included:

- vegetation or other material sitting on mains causing a fault;
- broken mains on the ground causing a fault, commonly as a result of vegetation contact;
- broken tie wires resulting in mains on the ground causing a fault;
- vegetation or other material landing on and damaging pole top transformer substations[42];
- leaning or broken poles or cross arms, resulting in multiple spans of mains on the ground causing a fault; and
- service wires pulling away from customers' points of attachment.

Appendix D of our application sets out in detail the damage to Ausgrid's network from the storms, and also provides background information on the design and characteristics of Ausgrid's network to provide context for Ausgrid's response. A detailed account of our response to the storms' impact is provided in Appendix E. The information provided in Appendix D and E provides important context on the circumstances and underlying drivers of the costs that were incurred as a result of the April storm event.

In this section, we outline the costs incurred as a result of the actions Ausgrid took in responding to damage sustained to its network from the storms and managing the associated impacts this had on customers. Specifically, this section provides an overview of the costs incurred as a result of the storm, as well as a more detailed breakdown of the activities that generated these costs in order to demonstrate that the costs were incurred as a sole consequence of the April storm event. In addition, we have also sought to highlight throughout this section the measure Ausgrid implemented to minimise the costs that were incurred from this event. Costs pertaining to the April storm event have been captured in accordance with Ausgrid's business as usual costing methodology and processes. These methodology and processes are described in Ausgrid's cost allocation method approved by the AER.[43] The process of capturing the April storms costs is outlined in Attachment 11.

This information has been provided to satisfy clause 6.6.1(c)(6) of the NER, which requires Ausgrid to provide evidence of the actual and likely increase in costs from the positive change event and to demonstrate that the costs were incurred as a sole consequence of that event. The positive pass through amount and eligible pass through amount that Ausgrid is seeking to recover from customers is discussed in section 6.

5.1 Overview of costs incurred

The restoration effort undertaken by Ausgrid in response to the April storm event has had a material impact on its costs of providing direct control services. Ausgrid incurred $39.8 million (nominal) increase incosts (amounting to approximately 1.6% of Ausgrid's ARR for the 2014-15 year) as a result of the April storms, which were not included as part of Ausgrid's operating and capital expenditure in either its 2014-15 transitional distribution determination or in the current 2015-19 distribution determination.

The $39.8 million increase in costs was incurred as a result of the substantial damage sustained to Ausgrid's network from the storm, which required an unprecedented amount of repair work to restore supply to the 369,000 customers throughout Ausgrid's distribution network who experienced supply interruptions as a result of the storms. This expenditure has been directly incurred as a result of the storm; or alternatively, Ausgrid would not have to bear expenditure of $39.8 million had the April storm not occurred.

Of the $39.8 million in expenditure that was incurred, $5.3 million related to capital expenditure (capex) and $34.4 million in operating expenditure (opex). In comparison to opex costs, capex expenditure was fairly minor, amounting to approximately 13% of the total costs incurred as a result of the storm. The 5.3 million in capital expenditure that was incurred relates to expenditure on replacing network assets damaged by the storm including, the need for poles to be replaced on Ausgrid's sub-transmission, high voltage and low voltage networks; the replacement of pole top transformers and kiosks; conductors; and hundreds of spans of aerial bundled cable (ABC) service wires. The number of poles and

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[42] Note that there were isolated cases of vegetation landing on and damaging kiosks at Newcastle and Chatswood.

[43] A copy of Ausgrid's approved cost allocation method can be found on: Ausgrid's website (http://www.ausgrid.com.au/~/media/Files/Network/Planning%20for%20the%20future/Regulatory%20Reports/Ausgrids%20Cost%20Allocation%20MethodNovember%202013FINAL.pdf) , the AER's website (http://www.aer.gov.au/sites/default/files/Ausgrid%20-%20Cost%20allocation%20method%20-%20November%202013.pdf) and has been replicated in the Ernst & Young Report provided in Attachment 11.

substation pole top transformers and kiosks that needed to be replaced as a result of the storm's impact is outlined below in Table 5.

Table 5 - Number of poles and substations replaced

Problem	South	Central	North	Total
Poles replaced (Sub-transmission, HV and LV)	24	60	50	124
Substations replaced (PT's & Kiosks)	0	7	8	15

The categorisation of capex is shown in the Post Tax Revenue Model (PTRM) – Distribution which has been used to calculate the eligible pass through amounts.[44] Table 6 shows the categorisation of the $5.3 million by asset classes.

Table 6 – Breakdown of capex costs

Capex by asset class	Cost ($ million, nominal)
Sub-transmission lines and cables	0.6
Distribution lines and cables	0.3
Low voltage lines and cables	4.5
Total capex	**5.3**

* Note numbers may not add due to rounding.

Tables 7 below shows the break-down of the storm response and restoration costs. A more detailed discussion on the activities underpinning the opex cost categories are discussed below.

Table 7 – Breakdown of costs

Cost categories	Opex ($ million, nominal)	Capex ($ million, nominal)	Total ($ million, nominal)	Activities undertaken
Call centre & corporate communication	0.5	-	**0.5**	Cost of responding to calls to emergency numbers, customers enquiries on facebook and twitter as well as communication to various stakeholders (e.g. Government)
Field operations				Costs of repairing the distribution network to ensure supply is restored as safe and as quick as possible. This costs include 'cut and make safe' of hazards caused by the storm. The costs also include minor contracted services costs not included below such as traffic control and pole removals.
- North region	10.7	1.1	**11.8**	
- Central region	10.2	1.1	**11.4**	
- South region	2.5	0.1	**2.6**	
Contracted services (major third parties assistance)				Costs payable to other DNSPs (Endeavour, Essential and Energex) and some contracted services providers (UGL and Zinfra) who assisted Ausgrid in the storm recovery effort. As further explained below, the amounts attributable to Endeavour Energy and Essential Energy are cost recovery only; there were no 'margins' charged.
- Endeavour Energy	2.7	1.5	**4.2**	
- Essential Energy	3.5	1.1	**4.6**	
- Energex	0.5	0.3	**0.9**	
Other Contractors	0.3	0.1	**0.4**	

[44] Refer to Attachment 7 – PTRM model. For further details on the eligible pass through amount refer to section 9 of Ausgrid's application.

Cost categories	Opex ($ million, nominal)	Capex ($ million, nominal)	Total ($ million, nominal)	Activities undertaken
Vegetation management	1.8	-	**1.8**	Cost incurred in clearing trees / branches fallen due to the storms.
Other costs	1.6	-	1.6	Other costs incurred in supporting the storm recovery effort such as system control operation and support costs from Network Services and Safety, HR and Environment divisions.
Total costs	**34.4**	**5.3**	**39.8**	

* Note numbers may not add due to rounding.

5.2 Breakdown of opex costs by key activities

Ausgrid has provided a more detailed discussion of the activities underpinning the operating expenditure it has incurred given that this represents a significant proportion of the total costs incurred as a result of the April storm event (approximately 87%). Consequently, Ausgrid has provided further information on the activities that were undertaken in responding to the April storm event to substantiate the appropriateness of the costs outlined in Table 7 and to demonstrate that they were incurred as a sole consequence of the April storm event. In addition, for each of the cost categories that are discussed in detail in this section, we have sought to highlight measures Ausgrid took to mitigate the magnitude of cost impacts from this event.

5.3 Contact Centre and Corporate Affairs

As highlighted by Appendix D, the storm had a significant impact on customers, resulting in 369,000 customer outages throughout Ausgrid's distribution area. Ausgrid was forced to ramp up its customer service operations considerably to handle the increased volume of calls of enquiries via the phone, email and social media channels reporting hazards, outages and requests for updates on restoration times. The cost of undertaking these activities resulted in Ausgrid incurring $0.5million in additional opex costs which are not accounted for in Ausgrid's transitional determination, or its 2015-19 regulatory determination. A large proportion of these costs were incurred as a result of Contact Centre overflow arrangements being triggered, and the need to utilise additional resources to manage the increased volume of enquiries from customers, media, emergency services, Councils, Local Members of Parliament (MPs) and NSW Government for corporate communications pertaining to outage updates, restoration timeframes and conveying safety messages.

An overview of the actions that were taken by Ausgrid to manage its response to customers and other stakeholders during the storms is provided in Appendix E. In this section, we focus on discussing the activities that underpinned the actions described in Appendix E, which subsequently resulted in costs being incurred.

Contact Centre

Of the $0.5million communications costs that were incurred as a result of the storm, $ 490,180 was attributable to the Contact Centre. The additional $ 490,180 in costs that were incurred as a result of the storm arose due the significant spike of customer enquiries that required the activation of established Ausgrid overflow resources external to the Contact Centre. As noted in Appendix E, Contact Centre overflow arrangements were activated on 20 April.[45] The Contact Centre commenced 24 hours operations from 20 to 28 April, with a 24 hour rotating roster set to manage fatigue and minimise stand down time. These resources were not sufficient to manage the volume of work. Subsequently, planning commenced to supplement the core Contact Centre and establish an overflow resource pool with additional resources. Assistance was sought from Endeavour Energy and an expression of interest was issued across Ausgrid for volunteers to receive training and assist the Contact Centre in answering customer calls. The increase in resourcing requirements triggered the need to establish an additional Contact Centre in Silverwater to provide sufficient seating capacity.

By 11pm on 21 April, the Silverwater Contact Centre site became operational following the completion of IT and system testing. By 10am on 22 April, 15 Endeavour Energy Contact Centre staff and 27 Ausgrid employees commenced training and started taking calls from the Silverwater Contact Centre site. An additional 66 Ausgrid employees who responded to the expression of interest were trained and commenced assisting with calls on 29 April across Wallsend and Silverwater Contact Centre sites. Additional ex Contact Centre administrative resources were also used during overflow arrangements to undertake support services such as rostering, payroll arrangements and appropriate cost capturing of activities during the April storms.[46]

[45] Ausgrid activated its established overflow capability of 42 people to assist in responding to customer calls.
[46] Ex-Contact Centre staff are staff who previously worked as part of the Retail Contact Centre, which have been subsequently redeployed to other roles within Ausgrid since the sale of its Retail business.

The need for additional staff resources to respond to the level of customer enquiries is evidenced by Table 9 below which highlights the volume of calls received by the Contact Centre, contrasted against the number of calls the Contact Centre was able to answer. On the day the incident was first declared a total of 4115 calls were offered to the Contact Centre, of which 2585 (63%) were able to be answered. Even with the activation of overflow staff, Contact Centre resourcing was insufficient to deal with the volume of calls (32,687) offered to the Contact Centre during the peak of the storms on 21 April, of which 7196 (22%) were able to be answered.

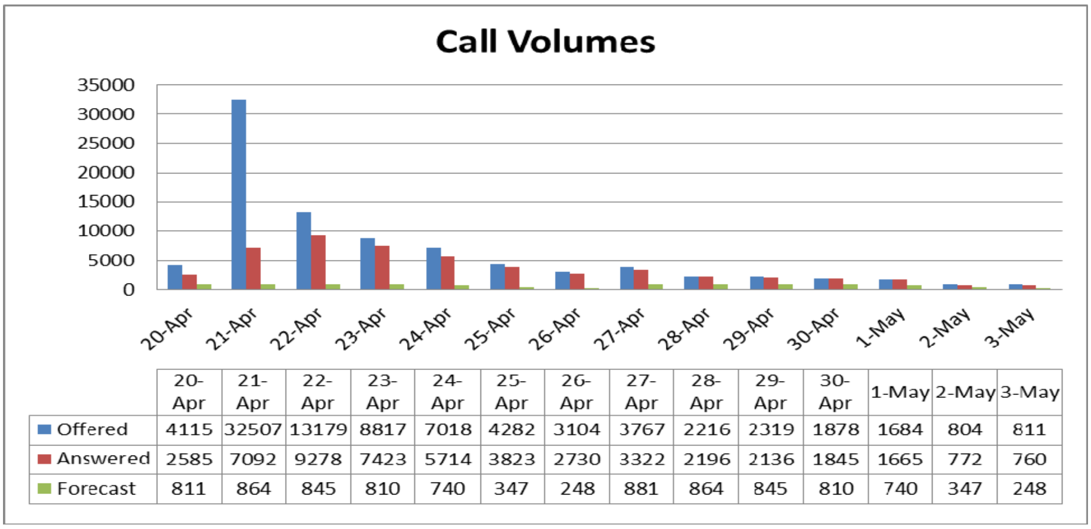
Table 8 – Contact Centre call volumes

Date	Number of calls offered	Calls answered
20 April 2015	4,115	2585
21 April 2015	32,507	7196
22 April 2015	13,179	9278
23 April 2015	8,817	7423
24 April 2015	7,018	5718
25 April 2015	4,282	3823
26 April 2015	3,104	2730
27 April 2015	3,767	3322
28 April 2015	2,216	2196
29 April 2015	2,319	2136
30 April 2015	1,878	1845
1 May 2015	1,684	1665
Total	**84,886**	**49,197**

* Note numbers may not add due to rounding.

To provide further context on the magnitude of calls being made to Ausgrid's Contact Centre we have provided a chart showing the number of calls offered, compared to the number of calls answered, and the forecasted number of calls that were anticipated for that period as part of Ausgrid's business as usual operations. In business as usual operations, Ausgrid's Contact Centre receives approximately 800 calls which are handled by 35 customer service representatives.

Figure 4- Comparison of Contact Centre call volumes

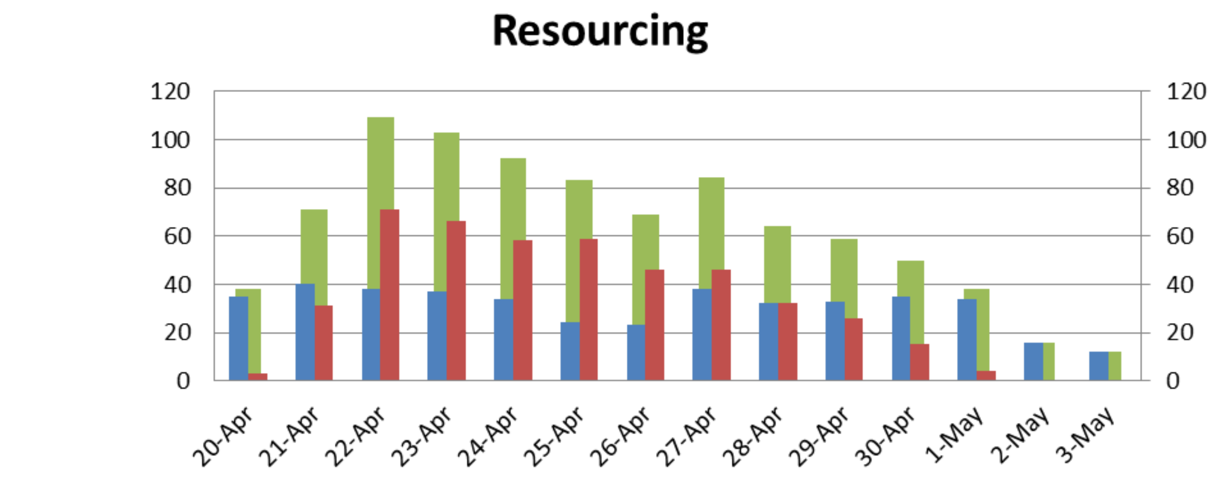


It is evident from Figure 4 that the storms caused a significant spike in call volumes necessitating the need for additional resources to answer these calls. Ausgrid considers that the use of additional resources was necessary to enable the community to report potentially life threatening hazards including wires down and within reach during the incident period. The reporting of hazards is critical to enabling restoration work to be prioritised and hazards to be addressed as quickly as possible.

The additional resources provided ability to answer the majority of calls once the storms deteriorated on 23 April providing customers with the capability to report general outages and get updates on restoration efforts. Customer call taking during the storms was a crucial element of Ausgrid's response as not only did this alleviate customer anxiety and concern but also helped Ausgrid ensure the safety of its network. Hazard call taking by the Contact Centre also helped to better pin point the location of hazards on Ausgrid's network; thus enabling restoration work to be more targeted and hazards to be addressed as quickly as possible.

Ausgrid took a strategic approach to managing resourcing during the April storms. Overflow arrangements allowed Ausgrid to quickly divert resources from business as usual activities to provide support during the April storms, reducing Ausgrid's reliance on external assistance.[47] Despite, having a pool of 42 Contact Centre overflow resources the magnitude of the storm's impact was so severe that additional resources were required. Ausgrid accepted assistance from Endeavour Energy to supplement internal resources. The NSW DNSPs (Endeavour Energy, Essential Energy and Ausgrid) has in place transfer pricing arrangements for resources lent to each other in the event of a natural disaster. This agreement mandates that no profit margin is to be charged for services provided. Consequently, engaging Endeavour Energy for assistance with the storms response resulted in lower costs being incurred than if assistance was provided from another external provider with similar call centre skills and experience.[48] Ausgrid also sought to reduce costs associated with deploying extra resources to manage call volumes by issuing an expression of interest internally to staff to receive training to take Contact Centre calls over the weekend (when fatigue management policy requirements meant that Contact Centre staff would need to have rostered time off) rather than seeking assistance externally.

Figure 5 – Contact Centre resourcing



	20-Apr	21-Apr	22-Apr	23-Apr	24-Apr	25-Apr	26-Apr	27-Apr	28-Apr	29-Apr	30-Apr	1-May	2-May	3-May
Total Resources	38	71	109	103	92	83	69	84	64	59	50	38	16	12
Rostered Staff	35	40	38	37	34	24	23	38	32	33	35	34	16	12
Additional staff	3	31	71	66	58	59	46	46	32	26	15	4	0	0

Figure 5 above shows how Ausgrid utilised resources throughout the storm event, showing a breakdown between Contact Centre employees and use of additional resources. Figure 5 shows that resources were used appropriately, with the use of additional resources higher during the storms and the initial days following the storm's impact, and then ramping down from 27 April onwards in line with the volume of calls that were being offered to the Contact Centre. By 27 April 2015 Endeavour Energy staff were also being returned to their business, as call volumes dropped to a level that Ausgrid was able to handle internally with the assistance of additional resources from other areas of its business.

In addition to answering customer calls, resources were also utilised to make outbound calls to contact the 4,602 life support customers that suffered power outages as a result of the April storms and to liaise with State Disaster Recovery Centre.

47 Refer to Attachment 8 – Contact Centre overflow protocol.
48 Refer to Attachment 9 – Networks NSW Memorandum, Common Company Policy – Transfer Pricing.

Corporate Affairs

A total of $52,185 in additional Corporate Affairs costs were incurred as a result of the storm, and primarily relate to the provision of safety alerts, outage updates and other key messages distributed via traditional media and paid advertising channels as well as social media platforms. Ausgrid sought to leverage broadcast and social media updates as much as possible during the storms to convey safety messages and outage information, as these are extremely effective, efficient and low-cost channels which can be quickly geared up to cater for increased demand. Outlined below, is a description of the activities undertaken by Ausgrid which resulted in $52,185 in additional expenditure being incurred.

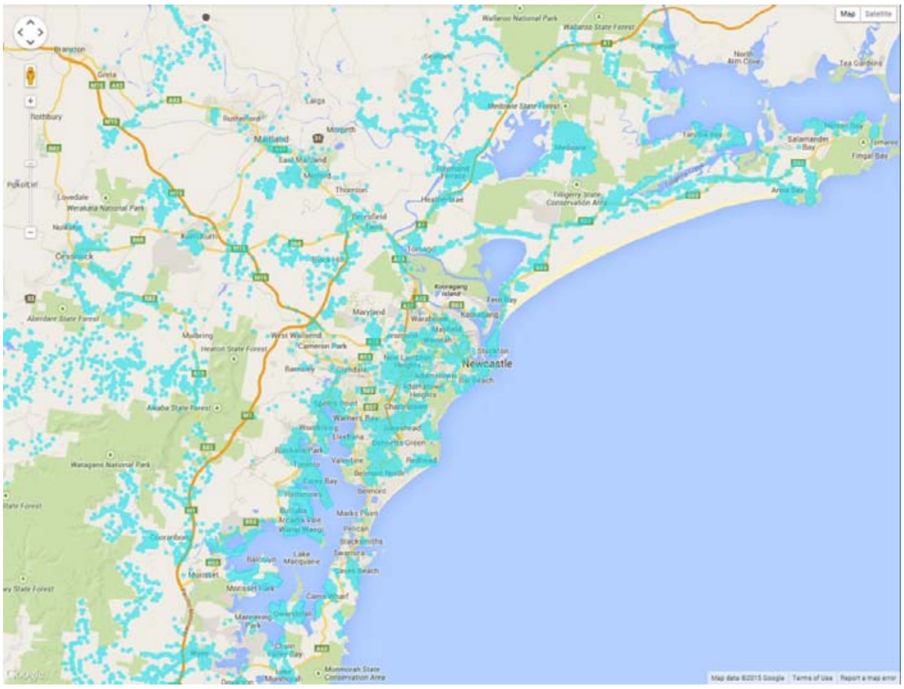
As discussed in Appendix E, Ausgrid's initial communication strategy for managing customer calls during the storms was to prioritise hazard call taking and later no supply calls, with all other calls being directed to refer to Ausgrid's website or social media (Facebook and Twitter) for updates on outages and restoration timeframes. Subsequently, Ausgrid's communications activities needed to ramp up significantly to manage the increased demand from customers for information. Sixteen (16) additional resources from the Contact Centre and other parts of the business were brought into the communications area, working in rotating around the clock shifts to manage customer inquiries on social media. As a result, Ausgrid was able to respond to about 75% of customers posting directly to the Ausgrid Facebook page – above the Australian average of 67%. Ausgrid also posted 130 standalone social media updates which were seen by about 2 million people on Facebook and 4.2 million on Twitter.

Communications staff also created new content to help increase engagement and reach as many people as possible through the website and low cost social media channels. For example, the Facebook post with the highest reach throughout the storm period had more than 512,000 impressions and was shared by almost 1,000 people. Outlined below is an example of a Facebook post made by Ausgrid during the April storm event to convey safety information to customers.

Example of Ausgrid's use of social media (Facebook) to convey safety alerts to customers

As the impact of the storms emerged, Ausgrid generated outage maps and progress reports to help deliver information to the community, which helped to alleviate customer anxiety and frustrations over the sustained nature of power outages caused by the storms.

Example of outage maps used to provide updates to customers



Several infographics were also customised for the April storms, including key safety messages and advice to customers without power. Included below is an example of the infographics that were provided during the April storm event.

Example of media infographic generated to convey safety messages during the April storm event

Traditional media remained a key channel for Ausgrid throughout the incident. About 30 media updates were provided to all media and more than 500 media interviews were given to newspapers, radio stations and TV stations throughout the storms and subsequent clean-up.

Ausgrid also used paid advertising to convey safety messages and information to customers, incurring a total of $33,000 in external costs. Radio ads were put in place almost immediately, with 330 Australian Traffic Network (ATN) ads targeting customers in storm affected areas with 10 second live reads. Newspaper ads were also placed in the Newcastle Herald and the Central Coast Advocate.

Ausgrid's use of a combination of different media channels to convey safety messages and outage updates was appropriate in light of the severity of the incident. We also consider that the use of additional staff to manage website and social media content was a low-cost means of effectively communicating with customers during the April storm event.

These costs were incurred as a result of the activities discussed above and hence would not have been incurred but for the occurrence of the April storms.

If Ausgrid had not undertaken the communication measures outlined above, it is likely that customers and members of the public would have been exposed to significant risk of injury as a result of the hazardous conditions caused by the storms. To date, Ausgrid is not aware of any electrical related injury caused to members of the public or customers from its assets being damaged, which we consider can be attributed to Ausgrid's strong focus on safety during the storm event.

We consider the communication costs that were incurred were appropriate under the circumstances given the significant impact the storm had upon customers on Ausgrid's network. Given the adverse effect power outages have on customers, it would have been inappropriate to not increase communications to keep customers informed and respond to requests for information as quickly as possible. Further evidence of the effectiveness of our approach towards communicating with customers and other key stakeholders during the April storm event is provided in Appendix E.

5.4 Restoration work

This section provides further details on the core activities that comprised Ausgrid's restoration work to demonstrate that these activities resulted in $30.5 million in additional costs being incurred, and further that these costs would not have been incurred but for the storm's occurrence. Specifically in this section we:

- discuss how resources levels were determined and work dispatched during the storm,
- outline and discuss the activities that were required to repair the damage to the network as a result of the storm; and
- highlight the measures Ausgrid took to try and mitigate the amount of cost that were incurred as a result of having to undertake restoration work to return customer supply.

For details on Ausgrid's operational response to the storms' impact and the strategies underpinning how Ausgrid carried out restoration work refer to Appendix E.

The $30.5 million in restoration costs incurred as a result of the April storms are largely reflective of the labour costs associated with undertaking restoration work. The reason labour costs account for such a large percentage of total costs associated with the storm is due to the extensiveness of the damage that was sustained to the network, the nature of the damage that was incurred, and the assets types that were damaged. As damage was primarily incurred to Ausgrid's overhead network as a result of fallen vegetation or downed wires and poles, the restoration work required to repair this damage was highly labour intensive and time consuming. Further, the nature of the damage also meant that external resources needed to be engaged to assist Ausgrid in completing repair work, as some repairs could only be undertaken by staff who had the appropriate skill set, qualifications or training to undertake the work in accordance with the Electrical Safety Rules. Given that this event was classified as an emergency network incident, which subsequently resulted in 16 local government areas in Ausgrid's distribution area being declared natural disaster areas, it would have been inappropriate for Ausgrid to not to seek external assistance. This is because the timeframes to restore customer supply would have been significantly longer (it is likely restoration would have taken up to 19 days as opposed to 11 days) if work was only undertaken by Ausgrid staff due to the availability of appropriately skilled internal staff, the need to manage staff fatigue and the sheer volume of faults on the network that needed to be addressed. Consequently, we consider that our use of external resources to assist Ausgrid in restoring power supply to the 369,000 customers who experienced supply interruptions as a result of the storms was an appropriate and prudent measure taken by Ausgrid to manage the impacts from this incident. We further note, that similar measures were also taken by SES, who called in 600 additional resources to assist in responding to over 21,000 jobs.[49]

Resourcing

Once an emergency network incident was declared, the following day (21 April) Ausgrid's Chief Operating Officer (COO) and General Manager of Network Operations (who was also the Incident Controller for the incident), conducted a series of site visits to heavily impacted areas of the network to assess the magnitude of restoration work required, and to determine the level of external assistance required. As is common in the event of major/emergency network incidents, particularly natural disaster events, offers of assistance were made by neighbouring and interstate DNSPs. Following a ground level assessment and discussions with Regional Managers and the NSW Premier regarding the extent of the damage and estimated repair timeframes, as well as the Bureau's forecast for conditions to worsen significantly over a 48 hour period - Ausgrid's COO determined that a significant number of external staff would be required to assist in returning supply to customers as quickly as possible to minimise adverse impacts to customers from having no electricity supply at their premise.

[49] NSW SES media updates 28 April 2015, 9.15am.

A total of 885 external staff were engaged from Endeavour Energy, Essential Energy, Energex and other service providers to assist Ausgrid in restoring supply to customers.[50] The resulting cost of accepting assistance from other DNSPs was $10.1 million, which would not have been incurred but for the storm's occurrence and the damage it caused to Ausgrid's network. A breakdown of these costs and the number of staff engaged is provided below in Table 9.

Table 9– Breakdown of the costs associated with external staff

Provider	Number of staff engaged	Total paid by Ausgrid ($ million, nominal)
Endeavour Energy	401	4.3[51]
Essential Energy	395	4.6
Energex	61	0.9
Other contracted services	28	0.4
Total	**885**	**10.1**

* Note numbers may not add due to rounding.

As shown by Table 9, Ausgrid sought to predominately accept assistance from Endeavour Energy and Essential Energy, as not only could these crews be more rapidly mobilised and deployed to impacted areas but also as a means of keeping cost impacts from calling upon external assistance down as Ausgrid has in place transfer pricing arrangements with these DNSPs in the event of natural disaster incidents.[52]

Outlined below in Table 10 are Ausgrid's field operation costs by operating region, which include the use of minor contracted services, where Ausgrid already had in place contractual arrangements with the provider or in the case of (Accredited Service Providers) ASPs were obtained through acceptance of an expression of interest (EOI) issued by Ausgrid and with work undertaken on a fix rate basis. We have provided a breakdown of Ausgrid's field operating costs by operating region to highlight the correlation between costs and the damage sustained to Ausgrid's network as a result of the storm. As noted previously in Appendix A and D, the areas which were hardest hit by the severe weather conditions were the Central Coast, Upper and Lower Hunter and Newcastle. While Sydney sustained some damage, particularly in northern areas of Sydney, the damage was not as extensive as the North and Central operating regions, which is reflected in the lower field operation costs that were incurred by the South Region.

Table 10 – Breakdown of Ausgrid's field operation costs as a result of the storm

Operating Region	Amount in $ million (nominal)
North	10.7
Central	10.2
South	2.5
Total	**23.4**

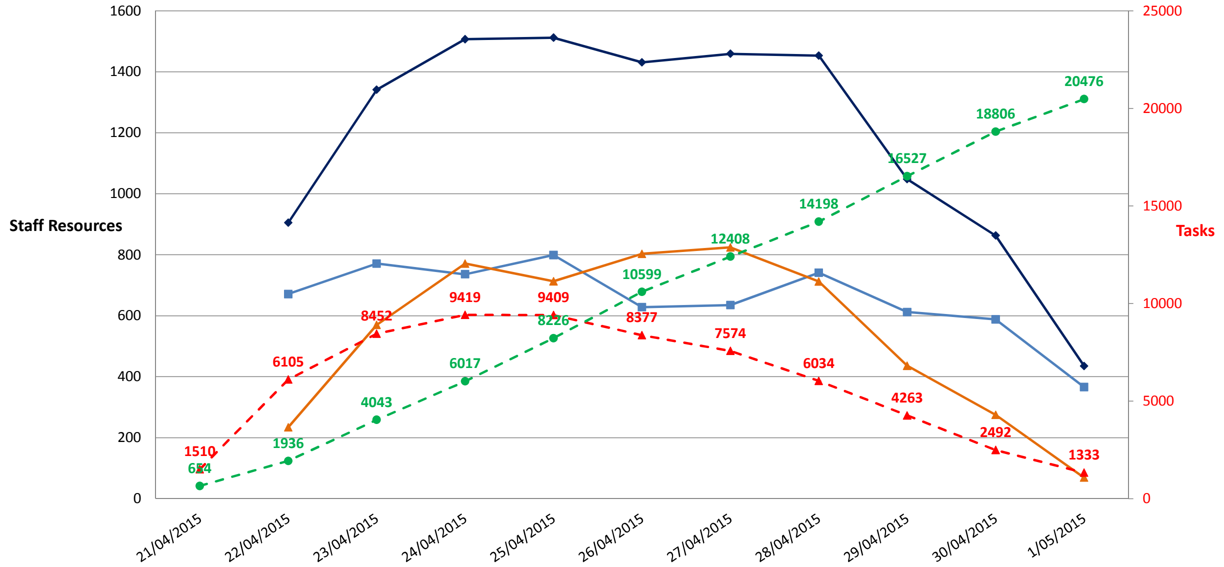
* Note numbers may not add due to rounding.

Ausgrid adopted a planned approach to resourcing during the storm. External resources were deployed centrally by Ausgrid, using a dedicated staff as the point of contact between external organisations' management and Ausgrid's distribution areas to determine where and how many external resources were required for each day during Ausgrid's response to the April storm event. External staff were deployed based on feedback provided by Ausgrid's field operations with respect to the quantity of outstanding work, the type of work, the skills required, and the Region's ability to effectively plan and dispatch work. These considerations were balanced against the length of time specific external resources had been involved in Ausgrid's response efforts and whether resources had to travel long distances, in order to manage staff

[50] Note, external staff were deployed on a rotating basis and not all at once. The level of external resources utilised on any given day depended on the gaps reported to Ausgrid's Incident Management Team on the number of available Ausgrid crews and the number of OMS jobs ready for issuing by Depots, as well as fatigue considerations. For further details refer to Figure 6.
[51] The $4.3 million costs for Endeavour Energy includes $0.1 million in costs for services rendered to Ausgrid's Contact Centre during the storm event.
[52] Refer to Attachment 9– Networks NSW Memorandum, Common Company Policy – Transfer Pricing.

fatigue. Consequently, external resources were only engaged to provide assistance where there was meaningful work available in responding to OMS outstanding jobs to minimise the inconvenience to affected customers by restoring supply as quickly as possible. As illustrated by the graph below, allocation, deployment and determining resource numbers required was managed daily based on the demand communicated by Distribution Areas.

Figure 6 – Resource levels during the storm

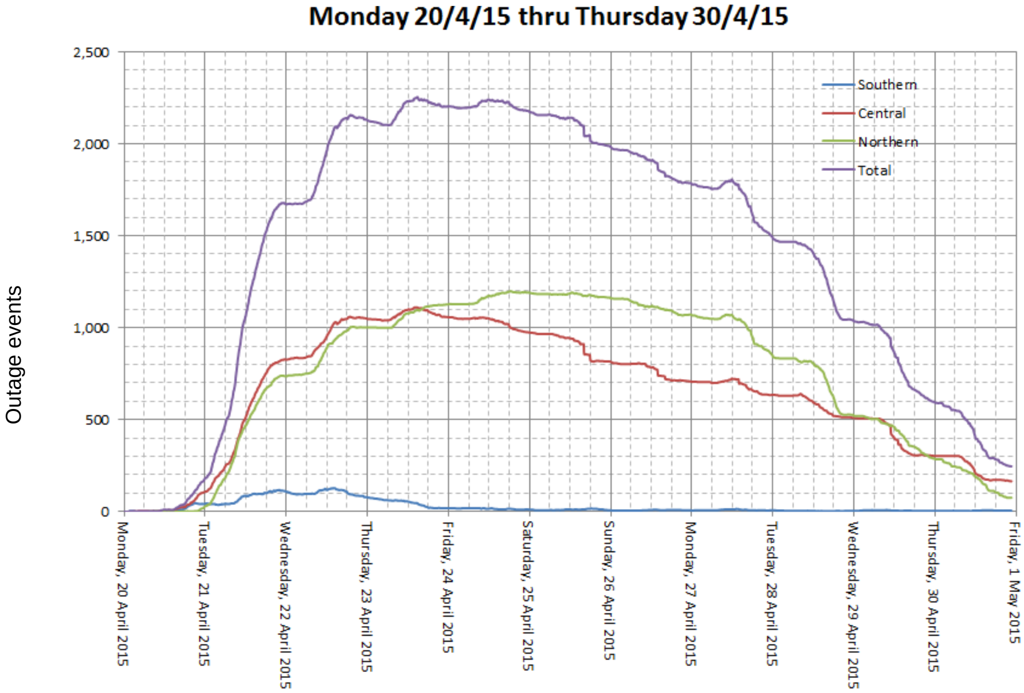


	21/04/2015	22/04/2015	23/04/2015	24/04/2015	25/04/2015	26/04/2015	27/04/2015	28/04/2015	29/04/2015	30/04/2015	1/05/2015	2/05/2015	3/05/2015	4/05/2015	5/05/2015	6/05/2015	7/05/2015
Internal + External Staff		905	1341	1507	1512	1431	1459	1453	1048	863	435						
Total Internal (Ausgrid)		671	771	736	799	628	635	741	612	588	366						
Total External		234	570	771	713	803	824	712	436	275	69						
OMS Outstanding Tasks	1510	6105	8452	9419	9409	8377	7574	6034	4263	2492	1333						
OMS Completed Tasks	654	1936	4043	6017	8226	10599	12408	14198	16527	18806	20476						

As shown by the above graph external resources were ramped up and decreased broadly in line with the trend of outstanding OMS tasks recorded. The vast majority of external resources were not able to be deployed until after 23 April due to unsafe weather conditions and travel time to sites. Ausgrid utilised this forced stand down time to plan how best to deploy resources, as well as to do safety inductions so that staff could be mobilised once weather conditions improved. The use of external resources ramped down slightly around 24 April as crews from the South Region were able to move up north to the Ausgrid's Central Region to assist in restoration work. However, external resources ramped up again over 25 to 27 April as a result of further damage to the network from the second storm and the need to rotate internal staff out for fatigue management reasons.

Ausgrid considers that its use of resourcing during the storm (both internal and external) was appropriate in order to complete OMS jobs as quickly as possible. Figure 7 below, depicts the number of active outage events that were active each day of the storm event, by operating region and subsequently provides a view of the events which resulted in the customer outages noted in Figure E3 in Appendix E. The combination of Figures 7 and E3 show that while Ausgrid made significant progress restoring large groups of customers affected by the storms, there remained a significant number of events affecting smaller numbers of customers. Consequently, even with the assistance from external providers it still took nearly 11 days for Ausgrid to complete the majority of OMS jobs and return power to the bulk of customers. As noted previously, some customers were left without power for longer. This generally occurred due to access issues or reaching communities that were isolated by major flooding. Had additional resources not been used, restoration timeframes would have been significantly longer given the unprecedented volume of OMS calls (32,731) recorded during the storm that needed to be attended to restore customer supply.

Figure 7 – Active outage events by operating region



The restoration strategies and priorities were set at the organisational level by the Incident Controller and the coordination of work was undertaken at a depot level based on Distribution Areas, as per Ausgrid's Storm Response Plan, with oversight of Regional Managers. Regional Managers and Distributional Managers discussed the options for restoration with each determining their staffing level requirements based on their assessment of the localised damage, with staffing levels being re-assessed daily. The assessment of resources numbers and job packaging was completed in the evenings and overnight to ensure that restoration work completed during daylight hours was maximised. Job packs were put together based on known rectification jobs or tasks (i.e. OMS jobs) as well as reports from spotters and the Control Room on the repair work required, as well as the equipment available and/or required. This planned approach to undertaking restoration work, enabled Ausgrid to utilise resources effectively to complete OMS jobs as quickly as possible to minimise customer inconvenience.

Restoration Activities

This section provides a description of the core activities that comprised Ausgrid's restoration work and which caused $30.5 million in additional costs to be incurred ($23.4 million in internal field operation costs, and $7.1 million in external assistance costs).

In Table 11 below, we have summarised the common fault scenarios that occurred as a result of the storms, which correspond to the 15,561 hazard jobs entered into OMS and coded as a specific hazard type as shown in Table D8 in Appendix D. The number of crews requires and skill requirements required to address these faults is outlined in Table 12.

Table 11 – Faults caused by the storm

<table>
<tr><th>Network Hierarchy</th><th>Elements</th><th>Nature of damage</th></tr>
<tr><td>Subtransmission (33/66/132kV)</td><td rowspan="3">Overhead conductors
Overhead fixings
Poles
Pole-mounted substations
Kiosk substations
Underground LV pillars</td><td rowspan="3">Vegetation blow-ins and wind loading caused:
• Broken conductors
• Clashing conductors
• Broken fixings (insulators, tie pins, crossarms)
• Damaged poles
• Damaged/destroyed pole-mounted transformers
• Damaged/destroyed kiosk substations
Significant flooding and flash flooding caused:
• Erosion of pole footings (leading to fallen poles)
• Flood damaged kiosk substations
• Damaged underground LV pillars
Additionally, vegetation and structures which did not damage assets but were found in contact with mains presented a safety risk to the public (and in many cases caused supply interruptions).</td></tr>
<tr><td>High Voltage Distribution (11/2233kV)</td></tr>
<tr><td>Low Voltage Distribution (415V)</td></tr>
<tr><td>Service Connections</td><td>Service wires
Barge board connections
Lead-in poles</td><td>Vegetation blow-ins and wind loading caused:
• Broken service wires
• Broken fixings (insulators, tie pins, cross arms, barge board connections)
• Damaged lead-in poles
Additionally, a significant number of individual customer installations were affected by flooding and required rectification by private electricians.</td></tr>
<tr><td>Street Lighting</td><td>Street lighting conductors
Overhead fixings
Street Lights</td><td>Vegetation blow-ins and wind loading caused:
• Broken conductors
• Clashing conductors
• Broken fixings (insulators, tie pins, crossarms)
• Damaged street lights</td></tr>
</table>

Table 12– General resource requirements for repairing network faults caused by the storm

Type of damage sustained to the network	Crew types involved in response	Order of response activities
Broken conductors, clashing conductors and broken fixings on the HV, LV or street lighting network	District Operator / Restricted Operator Tree trimmers (if required) Overhead crew	1. District Operator / Restricted Operator isolates the damaged section of network, proves the mains and apparatus de-energised, applies earthing & short circuiting equipment (or observes a lineworker applying this equipment), and issues an access permit or clearance to work. 2. Tree trimmers or overhead crew clear vegetation (if required). 3. Overhead crews repair the conductors, or restring new conductors if necessary. 4. District Operator / Restricted Operator cancels the access permit, removes the earthing & short circuiting equipment (or observes the removal by a lineworker), checks network phasing if required, and returns the mains to service. NOTE: The District Operator / Restricted Operator is not required if the LV work can be isolated by the overhead crews or safely performed live.
Damaged, broken or fallen poles on the HV, LV or street lighting network	District Operator / Restricted Operator Tree trimmers (if required) Overhead/pole crew	1. District Operator / Restricted Operator isolates the damaged section of network, proves the mains and apparatus de-energised, applies earthing & short circuiting equipment (or observes a lineworker applying this equipment), and issues an access permit. 2. Tree trimmers or overhead/pole crew clear vegetation (if required). 3. Overhead/pole crews replace the pole and transfer mains to the new pole. 4. District Operator / Restricted Operator cancels the access permit, removes the earthing & short circuiting equipment (or observes the removal by a lineworker), checks network phasing if required, and returns the mains to service. NOTE: The District Operator / Restricted Operator is not required if the LV or street lighting pole changeover can be isolated by the overhead/pole crews or safely performed live.
Damage to the overhead subtransmission network	District Operator Tree trimmers (if required) Transmission Overhead crew	1. District Operator isolates the damaged section of network, proves the mains and apparatus de-energised, applies earthing & short circuiting equipment (or observes a transmission lineworker applying this equipment), and issues an access permit. 2. Tree trimmers or Transmission Overhead crew clear vegetation (if required). 3. Transmission Overhead crews replace poles, repair the conductors, or restring new conductors if necessary. 4. District Operator cancels the access permit, removes the earthing & short circuiting equipment (or observes the removal by a transmission lineworker), checks network phasing if required, and returns the mains to service.

Type of damage sustained to the network	Crew types involved in response	Order of response activities
Damaged or destroyed Pole-mounted transformers	District Operator / Restricted Operator Tree trimmers (if required) Overhead/pole crew Substations crew	1. District Operator / Restricted Operator isolates the damaged section of network, proves the mains and apparatus de-energised, applies earthing & short circuiting equipment (or observes a lineworker/technician applying this equipment), and issues an access permit. 2. Tree trimmers or overhead/pole crew or substation crew clear vegetation (if required) 3. Substations crew work with overhead/pole crew to replace pole (if required), lift and install new transformer, lift and reconnect conductors, and complete pre-commissioning checks. 4. District Operator / Restricted Operator cancels the access permit, removes the earthing & short circuiting equipment (or observes the removal by a Lineworker/technician), checks network phasing, and returns the mains and apparatus to service.
Flood damaged kiosk substations	District Operator / Restricted Operator Substations crew Underground crew	1. District Operator / Restricted Operator isolates the damaged section of the substation, proves the mains and apparatus de-energised, applies earthing & short circuiting equipment, and issues an access permit. 2. Substations crew inspects the substation and repairs damage where possible, in conjunction with the underground crew. Further works required are identified and provided to planning groups. 3. District Operator / Restricted Operator cancels the access permit, removes the earthing & short circuiting equipment, checks network phasing if required, and returns the mains and apparatus to service.
Damaged or destroyed underground LV pillars	Underground crew	1. Underground crew isolates the damaged section of the underground LV network, inspects the damage and completes repairs. NOTE: A District Operator / Restricted Operator is required if the isolation requires the removal of fuses at a substation.
Damage to service connection wires	Overhead service crew, or Customer connection crew, or ASP	1. Crew repairs or replaces the customer service. Normally performed live to identify the correct phase connections. This work needs to follow reenergisation of low voltage lines.
Damage to customer installations	Customer electrician	1. Ausgrid crew attends property, makes safe and informs customer that they need to arrange repairs with a qualified contractor. 2. Customer arranges repairs. 3. If customer's electrician is an ASP they can perform the final reconnection, otherwise Ausgrid crew returns to site to re-connect customer to network.

A brief explanation of roles/work that was performed by field resources is described below, as well as supporting activities/costs that facilitated this work being undertaken.

Spotters – whilst not listed as part of the actual repair work, spotters were used extensively during restoration work, particularly during 20 to 23 April when weather conditions were unsafe to undertake repair. Spotters were used to patrol feeders and overhead lines to investigate faults and assess and report the repair work required to depots and the Control Room so that repair work could be planned and packaged, and prioritised appropriately. Further during this period spotters were used to stand by (or make safe if capable) network hazards until line crew or District Operators attended to rectify the hazard. Spotters were also utilised, particularly towards the end of repair work, to check that all work had been completed and no outstanding work was required once the full restoration of a circuit was made, as a final check. Spotter crews typically consisted of two man crews. Under normal BAU arrangements patrolling feeders is performed by District Operators or transmission crews on the sub-transmission network, however given the extensive damage sustained to Ausgrid's network and volume of OMS jobs, Ausgrid sought to utilise as many appropriately qualified internal resources as possible to perform this role. Consequently, spotter crews could consist of a combination of the following staff (substation technicians, cable jointers, engineering officers, engineers, Emergency Service Officers (EMSOs), metering technicians, telecontrol technicians, line workers, compliance officers, installation inspectors, project officers, protection technicians and customer connection technicians). Throughout the April storm event approximately 100 spotter crews were deployed.

ASP2 Providers – were utilised by Ausgrid to respond to single premise no supply jobs such as fallen service lines or replace service fuses. Whilst Ausgrid had the necessary skills to perform this work internally, Ausgrid engaged Accredited Service Providers (ASPs) to undertaken this work so other internal resources could be prioritised to carry out repair work on the high voltage, 11kV and low voltage network to restore supply quickly to large numbers of customers. ASP2 providers were engaged through a framework for ASP emergency works, whereby Ausgrid issued an expression of interest with quoted set rates and charges and vetted participants appropriately based on skills and capability.[53] ASPs were utilised effectively by Ausgrid to undertake repair work with ASPs being issued job packs ranging from 5-15 jobs depending on location works and travel time.

Overhead (OH) Line Crews – typically consists of crews either 2 persons or 3-4 persons to remove any fallen wires (cut away and make safe), as well as install, attach or tighten overhead lines. During the storm high voltage overhead lines were repaired as a priority as this enabled Ausgrid to restore power to large numbers of customers quickly. Where damage could not be addressed immediately or if additional resources were required this was communicated back to depot storm rooms so that they could be rectified quickly. All incomplete work at the conclusion of shifts was identified and sent to depot storm rooms so that they could be packaged up into jobs and issued in following days.

District Operators– are authorised to operate switches on Ausgrid's network within a nominated geographic area and issue access permits to authorised person (but not themselves). During restoration work District Operators were required to perform switching, earth and isolate relevant parts of the network to ensure that lines were de-energised before any repair work was carried out. Once this was completed District Operators issued accessed permits for repair work to be undertaken and once work was complete, removed earths, cancelled permits and returned mains to service. Endeavour Energy District Operators were provided with temporary authorisation which permitted them to perform switching and issue access permits to other Endeavour Energy staff.

Pole crew - consist of 4-5 staff and a borer-erector (a truck to bore holes and install poles). The overhead/pole crew removes damaged poles from the ground, bores new holes, transports new poles to site, lifts the new pole into place and backfills to secure the pole in the ground. Before hole boring can commence underground utility checks need to be completed (i.e. Dial Before You Dig checks).

Jointers – were utilised to accept permits for external resources and standby. They were also used to check OMS job packs and provide feedback to Depot storm rooms on work required. Jointers were also used for restoration of repaired low voltage if they had a limited operator qualification..

Technicians – were initially utilised as spotters and to make areas safe during the initial days of the storm's impact. Around 24 April and with the introduction of external resources technicians would either use restricted operating authority to issue access permits, accept permits for tree trimmers and external resources and standby, form service connection crews to complete service replacement/repair work; worked off OMS job bundles to carry out repairs and restore faults as required; provided feedback to Depot storm rooms on equipment or line worker skill set requirements, assessed transformer and circuit breaker equipment damage and carried out repairs as required. If they had a limited operator qualification this was also utilized for restoration of repaired low voltage.

Traffic controllers – contracted crews of Road and Maritime Services (RMS) authorised traffic controllers who redirected traffic around worksites to ensure safety for staff, road users and pedestrians during repair works. For work at low risk sites during BAU the traffic control function is often performed by Ausgrid staff, however contracted staff were used extensively during the storm to ensure that Ausgrid staff were efficiently utilised repairing the network.

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[53] Attachment 10- Emergency procurement of ASP2s services for the restoration of services damaged during the April storm event.

Safety inductions – Ausgrid carried out a total of 921 safety inductions for external resources, to familiarise them with Ausgrid's safety systems so that they could complete their repair works safely.

Accommodation costs – accommodation was provided for external staff who had to travel significant distances (in some cases interstate) to provide assistance. Ausgrid also provided accommodation for field staff from the South operating region who travelled to provide assistance in the Central Coast once repair work in the South had been completed.

5.5 Vegetation management and other costs

Vegetation management

Ausgrid incurred an additional $1.8 million in costs from having to engage tree trimmers to remove fallen vegetation from electricity assets and infrastructure. As highlighted in Appendix A and D, the destructive wind forces that occurred during the storm caused hundreds of trees to fall. Damage to Ausgrid's overhead assets primarily occurred as a result of fallen tree limbs and trunks. The majority of tree failures consisted of full failure of the entire tree including root area and surrounding soil damage, full tree canopy failure where the force snapped the tree at a pivot point on the trunk, and individual limb loss where tree movement in the wind conditions caused the limb to fracture from the trunk. These failures cannot be predicted in a routine vegetation management program, and are directly attributable to the extreme weather conditions. Vegetation clearance to accommodate extreme weather conditions of this nature would incur excessive and unacceptable expenditure and environmental damage to the areas surrounding any overhead network.

Ausgrid needed to engage tree trimmers to remove vegetation in order to commence the repair or replacement of damaged network assets. This formed an important part of Ausgrid's initial restoration strategy of "cut away and make safe." Tree trimming of this nature is specialised work that requires specific skill sets to undertake safely. Tree trimmers were engaged based on existing contractual arrangements that set out fixed prices for emergency works.[54]

Other

Ausgrid incurred $1.6 million in other additional costs as part of undertaking restoration work. These costs were largely comprised of various support activities which underpinned Ausgrid's recovery efforts including:

- **Logistic and fleet costs** – Ausgrid incurred additional costs as a result of having to dedicate resources to identify and make available materials and equipment for crews to undertake repair work. Key activities undertaken by logistics staff included replenishing vans and emergency service crews at depots; transferring products between depots; identifying critical items for re-supply by suppliers and overseeing the ordering and delivery of those items within 48hours; communicating with other utility providers for key material support (i.e. service wires, poles, cross arms, fuses, overhead conductors and key insulators and connectors); and undertaking emergency forecasting based on real time reports. The effective undertaking of these activities allowed Ausgrid to coordinate the delivery of materials and equipment so that t when work crews arrived they had the necessary equipment to complete the jobs they were assigned.

- **System Control –** additional costs were incurred due to the need to roster extra shifts in the Control Rooms, Field Operating (District Operators) and Emergency Services (EMSO's) to respond to the significant increase in work volumes as a result of the April storm event and to support the Incident Management team in planning and coordinating Ausgrid's restoration work. These shifts were in addition to normal staffing levels. In addition, this cost reflects the cost associated with other System Control staff outside of the Control Rooms having to suspend its business as usual activities during the storm event so that resources could be diverted to assist in Ausgrid's restoration and recovery work.

- **Support costs –** additional costs incurred in supporting field operation staff as well as costs pertaining to staff in Health, Safety and Environment area dedicated to the storm recovery effort.

5.6 Efficiency of Ausgrid's decisions and actions

Whilst the efficiency of Ausgrid's actions and decisions in response to the April storm event have been discussed throughout our application we have sought to summarise evidence of the prudency and appropriateness of our actions as well as the measures Ausgrid took to mitigate costs impacts from the storm.

As noted previously, the occurrence of natural disaster events are beyond Ausgrid's control, however Ausgrid has in place a number of processes and procedures to mitigate the impact and consequences of events of this nature. Ausgrid's IMS and Storm Response Plan establish a framework to enable Ausgrid to respond quickly and appropriately to network incidents triggered by storms. These plans formed the basis for Ausgrid's approach to responding to the storm (refer to Appendix B and E) and guided Ausgrid's development of restoration strategies and prioritisation of repair work. These processes have been improved overtime as a result of key lessons from incident debriefings. Without having these procedures and processes in place, restoration timeframes would have been significantly longer because it is unlikely

[54] Refer to confidential attachment 6.03 to Ausgrid's May 2014 regulatory proposal for further details of the tendering process for vegetation management contractors.

that damage could be assessed and resources mobilised, coordinated and deployed as effectively. The establishment of clear priorities for restoration work also helped safeguard customer and public safety and allowed for the return of large numbers of customers as quickly as possible.

Ausgrid considers that its use of external providers and contracted services during the April storm event was appropriate in light of the magnitude of the damage to the network and need to return customer supply as quickly and as safely as possible. The timeframes for completing restoration work would have been significantly longer if Ausgrid had undertaken the work using only internal resources. Repair work would have likely taken 19 days instead of 11 days. We consider that this would have been inappropriate and would have caused significant adverse impacts for customers. Even with significant assistance from external staff, it took just over 11 days for Ausgrid to return supply to the majority of customers who experienced supply interruptions as a result of the storm.

5.6.1 Evidence of the efficiency of Ausgrid's actions and decisions

Outlined below is a brief summary of some of the actions that highlight the efficiency of Ausgrid's actions and decisions and the measures that we took to mitigate the cost impact from the event:

- Ausgrid mobilised resources from regions least affected to those heavily impacted by the storm to reduce restoration timeframes. For example field crews from the South operating region were sent to work in the Central operating region once damages to affected areas in the South were repaired.
- To reduce Ausgrid's reliance on external assistance, appropriately skilled resources were diverted from other areas of the business to provide assistance in supervising, spotting/patrolling the network for faults, and perform repair work.
- Ausgrid dedicated resources to plan and package jobs so that work was allocated effectively and according to the skill sets of available resources. Further, staff reviewed OMS data and sought to group jobs where it appeared that they may be duplicate OMS entries. Resourcing was also planned on a daily basis, based on outstanding/active jobs in OMS, meaning that external resources could be deployed as required and rotated out as they reached fatigue limits, which also allowed Ausgrid to manage staff fatigue.
- External crews, particularly Endeavour and Essential Energy staff, were deployed to nearest affected geographical regions. This minimised travel time, and ultimately stand down time, meaning that these external resources could be mobilised more quickly to assist in repair work. In addition, for crews who had travelled long distances, Ausgrid did not replenish these crews once they have reached fatigue management limits.
- From a communications perspective, Ausgrid diverted additional resources to the Contact Centre and Corporate Affairs team to take hazard calls, contact life support customers and provide outage updates and respond to customers. The additional staff assigned to Corporate Affairs allowed Ausgrid to handle the significant increase in traffic to the website and social media, to leverage these communication channels to keep customers informed. This approach subsequently meant that Ausgrid relied less on paid advertisements and radio announcements to communicate messages to customers and members of the public.
- Ausgrid's overflow arrangements enabled Ausgrid to quickly ramp up its Contact Centre capabilities internally, and meant that it relied less on external assistance, thus reducing the cost impacts that could have been incurred if these arrangements were not in place. Further, Ausgrid closed down its general enquiry line and re-directed customers not calling to report emergencies, hazards or no supply to Ausgrid's social media channels and website, in order to prioritise the use of customer service representatives.
- Ausgrid sought to utilise Essential Energy and Endeavour Energy resources/crews as much as possible in undertaking restoration work as Ausgrid has in place transfer pricing arrangements with these DNSPs in the case that assistance is required in the event of a natural disaster. This significantly reduced the cost impacts from restoration work as Endeavor and Essential Energy resources are charged to Ausgrid at cost.
- During the initial days of the storm's impact where adverse weather conditions made it unsafe to undertake substantive repair work, Ausgrid focused on deploying spotters to patrol the network and assess the repair work required to rectify faults so that the Incident Controller could develop appropriate restoration strategies and prioritise work, and allowed Depot Storm rooms to plan work so that resources could be deployed to achieve maximum outcomes.
- ASPs were engaged so that Ausgrid could prioritise the use of its internal resources to undertake repairs to the high voltage and low voltage network. ASPs were able to be mobilised quickly and according to pre-determined fixed rates set under the ASP emergency framework, which helped to minimise the costs impacts from their engagement.
- Tree trimmers were engaged based on existing contract terms which contain commercially negotiated rates for emergency work, which was established based on a competitive tender process.[55]

[55] Refer to confidential attachment 6.03 to Ausgrid's May 2014 regulatory proposal for further details of the tendering process for vegetation management contractors.

6 Pass through amount

The NER requires Ausgrid to specify the eligible pass through amounts and the positive pass through amounts that Ausgrid proposes in relation to the positive change event and the regulatory years in which these positive pass through amounts should be passed through to distribution network users. We address these requirements in this section.

6.1 Eligible pass through amounts

Clause 6.6.1(c)(4) of the NER requires the specification of the eligible pass through amount in respect to that positive change event. The relevant definition of eligible pass through amount in the NER as applicable to Ausgrid is reproduced below:

> *In respect of a positive change event for a Distribution Network Service Provider, the increase in costs in the provision of direct control services that, as a result of that positive change event, the Distribution Network Service Provider has incurred and is likely to incur (as opposed to the revenue impact of that event) until:*
>
> *(a) unless paragraph(b) applies – the end of the regulatory control period in which the positive change event occurred; or*
>
> *(b) if the distribution determination for the regulatory control period following that in which the positive change event occurred does not make any allowance for the recovery of that increase in costs (whether or not in the forecast operating expenditure or forecast capital expenditure accepted or substituted by the AER for that regulatory control period) – the end of the regulatory control period following that in which the positive change event occurred.*

The definition of eligible pass through amounts refers to 'increase in costs'. As discussed above, the term 'cost' is not defined in the NER and consequently has been subject to divergent views as to its precise meaning in the context of the pass through framework. Ausgrid maintains that the term 'cost' in its most natural meaning means the expenditure we have incurred as the result of the occurrence of the event. This interpretation of costs accords with clause (b) of the definition of eligible pass through amounts in Chapter 10 of the NER as quoted above. This clause (b) refers to the need for the distribution determination to have not made any allowance for the recovery of that increase in costs (whether or not in the forecast operating expenditure or forecast capital expenditure accepted or substituted by the AER).

The AER's final distribution determination for Ausgrid for the 2015-19 regulatory control period does not make allowance for the increase in costs resulting from the April storm. The increase in costs to Ausgrid in the provision of direct control services as the result of the positive change event i.e. the April storm, is $39.8 million (nominal). These are 'one-off' amounts incurred in responding to and restoring our network from the impacts caused by the storm and these amounts have been recognised in the 2014-15 and 2015-16 regulatory years. We will not incur any further costs beyond the amount of $39.8 million ($39.2 million in 2014-15 and $0.5 million in 2015-16).

Table 13 below shows the eligible pass through amounts in respect of this positive change event. This amount represents the costs of the various activities that Ausgrid needed to undertake in order to restore our network which was heavily impacted by the April storms. The costs resulting from these activities were quarantined in Ausgrid's financial system (using specific project codes) to ensure that only costs resulting from the storm are captured and captured separately. Ausgrid has also engaged Ernst and Young to review the validity of these costs and ensure that only costs resulting solely as a consequence of the storm are captured and claimed. Ernst & Young's report is provided at Attachment 11.

Table 13– Ausgrid's approach regarding eligible pass through amounts ($ million, nominal)

Eligible pass through amounts	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Capex	5.3	-	-	-	-	5.3
Opex	33.9	0.5	-	-	-	34.4
Total	**39.2**	**0.5**	**-**	**-**	**-**	**39.8**

* Note numbers may not add due to rounding.

Whilst we have set out above the eligible pass through amounts in respect of the April storm and consider that the requirements of clause 6.6.1(c)(3) of the NER is complied with, we have also set out below the eligible pass through amounts that 'accords' with the AER's position to date on the meaning of 'costs'. As noted above, the AER has adopted the building block components that result from the application of these expenditures to the PTRM as 'costs'. These eligible pass through amounts are shown in Table 14 below.

Table 14– AER's approach regarding eligible pass through amounts ($ million, nominal)

Eligible pass through amounts	Transitional regulatory period	Subsequent regulatory period				Total
	2014-15	2015-16	2016-17	2017-18	2018-19	
Return on capital	-	0.44	0.44	0.45	0.45	**1.78**
Return of capital	-	-0.03	-0.03	-0.02	-0.02	**-0.1**
Operating expenditure	33.9	0.53	-	-	-	**34.44**
Corporate income tax	-	0.01	0.01	0.01	0.01	**0.04**
Total eligible pass through amounts	**33.9**	**0.96**	**0.43**	**0.44**	**0.44**	**36.16**

Numbers may not add due to rounding

We note that the eligible pass through amounts stated in Table 14 above span over all the years of the subsequent regulatory period 2015-19 simply as a result of the application of the PTRM (or building block) approach to calculating costs. That is, in addition to the opex of $0.53 million for the 2015-16 year, the costs incurred in each year of the 2015-19 period of approximately $0.4 million p.a. also includes the return on and of (and the resulting tax estimates) capital Ausgrid has incurred as a result of the April storms.

Also as mentioned above, the AER in its decision for Powercor confirmed that the materiality requirement only needs to be satisfied in any one year affected by the relevant event. Once the materiality threshold has been satisfied, then 'all the costs in relation to that event must be considered for the purpose of determining the eligible pass through amounts'.[56]. In accordance with this AER's decision, we have included the amounts for the years 2015-16 to 2018-19 as eligible pass through amounts as shown in Table 15 above.

6.2 Positive pass through amount

Clauses 6.6.1(c)(4) of the NER requires Ausgrid to specify the positive pass through amount that Ausgrid proposes in relation to the April storm positive change event and the amount of the positive pass through amount that Ausgrid proposes should be passed through to network users in the regulatory year in which, and each regulatory year after that in which, the April storm positive change event occurred.

The NER defined positive pass through amounts as:

> *For a Distribution Network Service Provider, an amount (not exceeding the eligible pass through amount) proposed by the provider under 6.6.1(c)*

Ausgrid proposes that a positive pass through amount of $37.9 million (nominal) be passed through to network users. Table 16 below shows the regulatory years and the relevant amounts for each regulatory year in which we propose should be passed through to network users. In fact, these proposed positive pass through amounts are those that the AER considered to be eligible pass through amounts; that is, the resulting building block revenues from the application of the PTRM to the capex and opex incurred by Ausgrid as the consequence of the April storm.

[56] AER, Determination, 2014-15 Powerline Replacement Program cost pass through for Powercor, September 2014, p 23.

Table 15 – Positive pass through amount

Proposed pass through amounts	2016-17	2017-18	2018-19	Total
Proposed positive pass through amount	37.0	0.44	0.44	37.9
Total	**37.0**	**0.44**	**0.44**	**37.9**

Numbers may not add due to rounding

These amounts are those Ausgrid propose to be recovered from network users via the distribution use of system charges of each relevant year. The April storm occurred on 20 April 2015, falling within the 2014-15 regulatory year. At the time of submitting this application, this regulatory year has ended. Similarly, Ausgrid has also not proposed the recovery of any amount in the 2015-16 regulatory year as the distribution use of system charges for this year have been approved by the AER. In addition, we also note that the AER has 40 business days from the date of Ausgrid's submission to make a determination on this application (otherwise the application is deemed to have been determined as proposed), unless the AER decides to extend this deadline or there is a suspension in the calculation of the 40 days period available to the AER.[57] Consequently, the regulatory year 2016-17 is the earliest regulatory year in which Ausgrid can propose the recovery of the proposed positive pass through amount; or alternatively, it is the earliest regulatory year that Ausgrid can implement the AER's decision in relation to this pass through application.

For the avoidance of doubt and any possible technical non-compliance, Ausgrid proposes nil amounts to be recovered from network users in the regulatory years 2014-15 and 2015-16. Further, we note that the time of submitting this application, the AER's distribution determination for Ausgrid for 2015-19 is before the Australian Competition Tribunal and the Federal Court of Australia. The outcomes of these reviews are not yet known and could potentially result in a different price path to the price path that was set by the AER in its distribution determination for the 2015-19 period. Cognisant of this, Ausgrid proposes that Ausgrid and the AER consult to consider an appropriate amended price path that takes into account the outcome of this pass through application as well as the outcome of the appeals such that the impact on customers is minimised to the greatest extent possible; not only during the remaining years of the current regulatory period but also between the current regulatory period and the next regulatory period.

We note the definition of positive pass through amount in the NER requires the amount to not exceed the eligible pass through amount. This is the case if the proposed positive pass through amount of $37.9 million (nominal) is compared to the $39.8 million (nominal), the amount that Ausgrid considers to be the eligible pass through amount

However, compared to the AER's view of costs, the proposed positive pass through amount of $37.9 million exceeds the $36.2 million eligible pass through amount that accords with the AER's view. The difference is simply the conversion of the eligible pass through amounts of $33.9 million in 2014-15 and $0.96 million in 2015-16 and 2016-17 dollars by applying consumer price index (CPI) escalation of 2.5% p.a. This conversion is necessary to maintain the real values of the eligible pass through amounts for 2014-15 and 2015-16 as they are recovered in the 2016-17 regulatory year. This calculation is shown in Attachment 7 – PTRM and also as set out in the table below.

[57] AER, Determination, 2014-15 Powerline Replacement Program cost pass through for Powercor, September 2014, p 23.

Table 16- Relationship between eligible pass through amounts and proposed positive pass through amounts

Steps in converting the Eligible Pass Through Amount to the Positive Pass Through Amount		**Regulatory Control Year**					**Total**
		2014-15	**2015-16**	**2016-17**	**2017-18**	**2018-19**	
(a)	*Eligible pass through amounts (EPTA)*			**0.43**	**0.44**	**0.44**	
Add (b)							
(b)	*EPTA for 2014-15*	*33.90*					
	EPTA for 2014-15 in 2015-16 dollars terms		*34.75 (33.9*1.025)*				
	EPTA for 2014-15 in 2016-17 dollars terms			**35.61** *(34.75*1.025)*	-	-	
Add (c)							
(c)	*EPTA for 2014-15*		*0.96*				
	EPTA for 2015-16 in 2016-17 dollars terms			**0.98** *(0.96*1.025)*	-	-	
Total proposed positive pass through amount (a + b + c)				**37.02**	**0.44**	**0.44**	**37.9**

7 The AER's assessment under clause 6.6.1(j)

Clause 6.6.1(j) lists ten factors that the AER is to take into account in determining the approved pass through amounts. Some of these factors overlap with the matters that Ausgrid must address in its written statement for the positive change event. For brevity and clarity, we set out in the table below these relevant factors and indicate in which part of Ausgrid's written statement that the relevant factor has been considered by Ausgrid.

Table 17– Summary of how Ausgrid's application addresses clause 6.6.1(j) of the NER

Clause reference	Description of relevant factors	Sections of written statement where factor has been considered
6.6.1(j)(1)	The AER must take into account the matters and proposals set out in any statement given to the AER by Ausgrid.	Ausgrid has set out in this application and accompanying appendixes and attachments all the necessary details to enable the AER to make its decisions under clauses 6.6.1(d). This includes our consideration of the other relevant factors the AER must take into account in making a decision on the approved pass through amounts.
6.6.1(j)(2)	In the case of a positive change event, the increase in costs in the provision of direct control services that, as a result of the positive change event, the Distribution Network Service Provider has incurred and is likely to incur until: (i) unless subparagraph(ii) applies – the end of the regulatory control period in which the positive change event occurred; or (ii) if the distribution determination for the regulatory control period following that in which the positive change event occurred does not make any allowance for the recovery of that increase in costs – the end of the regulatory control period following that in which the positive change event occurred;	We note that this factor is similar in nature of the requirements of clause 6.6.1(c)(3) which relates to the eligible pass through amounts and of clause 6.6.1(c)(6) which relates to the evidence of increase in costs. The definition of eligible pass through amounts in Chapter 10 of the NER is substantially the same as this relevant factor in clause 6.6.1(j)(2). We have considered the requirements with respect to eligible pass through amounts in section 6 and evidence of increase in costs in section 5 and Appendix D, E, and F. Our consideration in these sections are equally applicable to this relevant factor under clause 6.6.1(j)(2).
6.6.1(j)(2A)	In the case of a *negative change event*, the costs in the provision of *direct control services* that, as a result of the *negative change event*, the *Distribution Network Service Provider* has saved and is likely to save until: (i) unless subparagraph(ii) applies – the end of the *regulatory control period* in which the *negative change event* occurred; or (ii) if the distribution determination for the *regulatory control period* following that in which the *negative change event* occurred does not make any allowance for the pass through of those cost savings to *Distribution Network Users* – the end of the *regulatory control period* following that in which the *negative change event* occurred;	Not applicable as the April storm is a positive change event, not a negative change event.
6.6.1(j)(3)	In the case of a positive change event, the efficiency of the DNSP's decisions and actions in relation to the risk of the positive change event, including whether the DNSP has failed to take any action that could reasonably be taken to reduce the magnitude of the eligible pass through amount in respect of that positive change event and whether the DNSP has taken or omitted to take any action where such action or omission has increased the magnitude of the amount in respect of that positive change event.	Our consideration of this relevant factor is set out in section 5.3 and Appendix E.
6.6.1(j)(4)	The time cost of money based on the *allowed rate of return* for the *Distribution Network Service Provider* for the *regulatory control period* in which the *pass through*	Clause 6.6.1(j)(4) requires the AER to consider the time cost of money in making a decision on the amount to be approved for pass through. This clause states that the time cost of money is to be based on the allowed rate of

Clause reference	Description of relevant factors	Sections of written statement where factor has been considered
	event occurred;	return for the DNSP for the regulatory control period in which the pass through event occurred. As such we have adopted the rate of return of 8.1% determined by the AER in the transitional determination for Ausgrid as the time cost of money.
6.6.1(j)(5)	The need to ensure that the *Distribution Network Service Provider* only recovers any actual or likely increment in costs under this paragraph (j) to the extent that such increment is solely as a consequence of a *pass through event*.	We note that this factor is similar in nature of the requirements of clause 6.6.1(c)(6) which relates to the evidence of increase in costs. We have considered the requirements of clause 6.6.1(c)(6) above in section 5 above. Our consideration in section 7 is equally applicable to this relevant factor under clause 6.6.1(j)(2).
6.6.1(j)(6)	In the case of a *tax change event*, any change in the way another *tax* is calculated, or the removal or imposition of another *tax*, which, in the *AER's* opinion, is complementary to the *tax change event* concerned.	Not applicable as the April storm is not a tax change event.
6.6.1(j)(7)	Whether the costs of the *pass through event* have already been factored into the calculation of the *Distribution Network Service Provider's annual revenue requirement* for the *regulatory control period* in which the *pass through event* occurred or will be factored into the calculation of the *Distribution Network Service Provider's annual revenue requirement* for a subsequent *regulatory control period*.	The costs of the April storm have not been factored into Ausgrid's calculation of the annual revenue requirement for the 2014-15 regulatory control period, the period that the event occurred. These costs have also not factored into the revenue requirement for the subsequent regulatory control period 2015-19. For the 2014-15, Ausgrid provided an indicative estimate of forecast opex and capex and these estimates did not include any forecast relating to the cost impact of any potential storm. Ausgrid adopted the base year approach to deriving this estimate forecast and adopted the actual opex outcomes of 2012-13 as the base. This base actual amount did not include any one off costs relating to a storm that is analogous to the April storm event, the subject of this application. The AER did not make any decision on the indicative estimate forecast opex and capex (nor was it required to). Rather, the AER adopted Ausgrid's indicative forecast opex and capex to determine its substituted annual revenue requirement and smoothed revenue for 2014-15.[58] Similarly, Ausgrid's proposed forecast expenditure for the 2015-19 period, including the proposed expenditure for the transitional year 2014-15 as required by the NER to be included in the regulatory proposal for 2015-19, did not include any forecast expenditure for the impact of any potential storms. The AER's decision for the 2015-19 period (including the transitional year) did not contain any expenditure allowance for such event. Rather, the AER recognised that the cost impact of event such as the April storm event is more appropriately cater for by the pass through framework and consequently the AER accepted 'natural disaster event' as a pass through event in its distribution determination for the 2015-19 period.
6.6.1(j)(7A)	the extent to which the costs that the *Distribution Network Service Provider* has incurred and is likely to incur are the subject of a previous determination made by the *AER* under this clause 6.6.1.	This factor is not applicable as there is no previous determination made by the AER under the pass through provisions of clause 6.6.1 with respect to the April storm. The event, i.e. the storms, occurred on 20 April 2015 and therefore could not have been the subject of a previous pass through determination by the AER.

[58] AER, Ausgrid, Endeavour Energy, Essential Energy, ActewAGL Transitional distribution decision, April 2014, page 43.

Clause reference	Description of relevant factors	Sections of written statement where factor has been considered
6.6.1(j)(8)	Any other factors that the AER considers relevant.	We consider a relevant factor that the AER should take into account is its distribution determination for Ausgrid for the subsequent regulatory control period 2015-19. The NER requires this determination to include a substantive decision on the revenue that Ausgrid is allowed to recover for the 2014-15 year, including a detailed assessment of the proposed expenditure for this year. Any difference in revenue between the transitional decision and the substantive decision for 2014-15 are to be trued up. The AER's substantive decision for the 2014-15 proposed expenditure did not include amounts for the costs associated with the occurrence of the April storms. This is a factor that is relevant for the AER's assessment of this pass through application. In addition, we would appreciate the opportunity to be informed of any other relevant factors that AER consider relevant before the AER makes its determination so that we can provide the AER with further information and/or provide the AER with our views on those additional relevant factors.

Abbreviations

ABC	Aerial Bundled Cable
AEMC	Australian Energy Market Commission
AER	Australian Energy Regulator
ARR	Annual Revenue Requirement
ASPs	Accredited Service Providers
ATN	Australia Traffic Network
BAU	Business as Usual
BRR	Building Block Revenue
CAM	Cost Allocation Method
CASS	Computer Aided Service System
COO	Chief Operating Officer
CPI	Consumer Price Index
DNSP	Distribution Network Service Provider
DNMS	Distribution Network Management System
ECC	Emergency Coordination Centre
ECL	East Coast Low
EDM	Emergency Duty Manager
EMSO	Emergency Service Officers
EWP	Elevated Work Platform
FMECA	Failure Mode Effects and Criticality Analysis
GIS	Geographic Information System
HV	High Voltage
IMS	Incident Management System
IPART	Independent Pricing and Regulatory Tribunal
ISSC	Industry Safety Steering Committee
IVR	Interactive Voice Response
MPs	Members of Parliament
NEL	National Electricity Law
NER	National Electricity Rules

NEO	National Electricity Objective
NPV	Net Present Value
NSW	New South Wales
LV	Low Voltage
OH	Overhead
OMS	Outage Management System
PFA	Police Fire and Ambulance
PTRM	Post Tax Revenue Model
RAB	Regulated Asset Base
RCM	Reliability Centred Maintenance
SCADA	Supervision Control and Data Acquisition
SERM	State Emergency and Rescue Management Act
SES	State Emergency Service
WBS	Work Breakdown Structure

Attachments List

Attachment 1 – Compliance checklist (to be provided as part of Minters Legal Review).

Attachment 2 – Bureau of Meteorology, Monthly Weather Review Australia, April 2015.

Attachment 3 – Bureau of Meteorology – A history of stormy weather

Attachment 4 - Industry Safety Steering Committee (ISSC) – December 2005 "Guideline For Managing Vegetation Near Power Lines", published by the Department of Energy, Utilities and Sustainability.

Attachment 5 - Incident Management System (Red Folder) [CONFIDENTIAL].

Attachment 6 – Ausgrid storm response plan [CONFIDENTIAL].

Attachment 7 – Post Tax Revenue Model (PTRM) model

Attachment 8 - Contact Centre overflow protocol [CONFIDENTIAL]

Attachment 9- Networks NSW Memorandum: Common Company Policy – Transfer Pricing

Attachment 10 - Emergency procurement of ASP2s services for the restoration of services damaged during the April storm event

Attachment 11 – Ernst & Young review of Ausgrid costs

Attachment 12- Summary of severe weather warnings issued by the Bureau of Meteorology.

Attachment 13 – Contact Centre hazard codes

Attachment 14 – Time lapse video of customer outages from the April storm event.

Attachment 15 – Samples of customers sentiment towards Ausgrid's April storm response

Attachment 16 – Ausgrid's Be Safe Hazard Guideline 16: Managing Fatigue.

Appendix A – Further details of the event

This section provides the AER with further context on the circumstances of this event and how it occurred. Specifically it is aimed at highlighting the uncontrollable and unforeseeable nature of the storm, and the severity of its impact to satisfy the AER that the event is a 'general nominated pass through event.' In this section, we discuss the characteristics of East Coast Lows, how the storm developed and intensified, and the severity of the storm.

A1 Meteorological summary of East Coast Lows

East Coast Lows are intense low-pressure systems which occur on average several times each year off the eastern coast of Australia, in particular southern Queensland, NSW and eastern Victoria. They are defined by the NSW Regional Office of the Bureau of Meteorology as a system with a closed cyclonic circulation at the surface, forming and/or intensifying in a maritime environment within the vicinity of the east coast.[59]

East Coast Lows, also known as east coast cyclones, are a complex phenomenon that can form from a variety of weather situations. However, it is most common that they will form offshore within a pre-existing low pressure trough in the upper atmosphere over eastern Australia.[60] This type of weather system:[61]

- can occur anywhere between 20°S and 40°S;
- can occur at any time of the year but are most common in autumn and winter;
- can sometimes be associated with a slow-moving high, often referred to as a blocking high which can result in gale conditions that can last from hours to several days;
- can vary in size from meso-scale (approximately 10km to 100km) to synoptic scale (approximately 100km to 1,000km);
- often moves parallel to the coast;
- often exhibits rapid falls in pressure (e.g. 24hPa in 24 hours) these systems are often referred to as 'bombs' or 'explosive cyclones';
- often develops overnight and intensifies rapidly.

Further, East Coast Lows have a high inter-annual variability, with some years experiencing several East Coast Lows while during other years only a few will develop.[62] The strength and impact of an East Coast Low is dependent on the location of the low's central pressure over the Tasman Sea.[63] Therefore, the challenge for forecasters in predicting the likely impact of an East Coast Low is accurately calculating the location and movement of the centre of the low.[64]

Generally, East Coast Lows are considered one of the more dangerous weather systems to affect the NSW coast given their propensity to rapidly intensify overnight. [65] The large scale storms caused by East Coast Lows can result in gale force winds along the coast and adjacent waters, heavy rainfall leading to widespread flooding, and rough seas and prolonged heavy swells causing damage to the coast line.[66] These conditions can trigger falling trees and flash flooding on land, and cause small crafts to be lost off the coast and larger vessels to run aground.

Table A1 – Meteorological impact of East Coast Lows and explanations

Impact	Reasons
Heavy rainfall	The deep low-pressure system and the coastal terrain cause moist maritime air to rise, condense and subsequently to precipitate
Strong winds	The tight pressure gradient around the deep low-pressure system causes strong winds to blow in a cyclonic (clockwise in the southern hemisphere) direction around the centre of the low
Large waves	Surface stress from the continuous strong winds

Source: Bureau of Meteorology

[59] Guy Carpenter, *'Australian East Coast Storm 2007: Impact of East Coast Lows',* October 2001, p11.
[60] Verdon-Kidd, D, Kiem, AS, Willgoose, G & Haines, P 2010, *East Coast Lows and the Newcastle/Central Coast Pasha Bulker storm,* National Climate Change Adaption Research Facility, Gold Coast, 61 p 9.
[61] Guy Carpenter, *'Australian East Coast Storm 2007: Impact of East Coast Lows',* October 2001, p11.
[62] Verdon-Kidd, D, Kiem, AS, Willgoose, G & Haines, P 2010, *East Coast Lows and the Newcastle/Central Coast Pasha Bulker storm,* National Climate Change Adaption Research Facility, Gold Coast, 61 p 9..
[63] Guy Carpenter, *'Australian East Coast Storm 2007: Impact of East Coast Lows',* October 2001, p10.
[64] Australian Government, Bureau of Meteorology website (http://www.bom.gov.au/nsw/sevwx/facts/ecl.shtml).
[65] Australian Government, Bureau of Meteorology website (http://www.bom.gov.au/nsw/sevwx/facts/ecl.shtml).
[66] Verdon-Kidd, D, Kiem, AS, Willgoose, G & Haines, P 2010, *East Coast Lows and the Newcastle/Central Coast Pasha Bulker storm,* National Climate Change Adaption Research Facility, Gold Coast, 61 p 9.

A2 Development of the April storm

The Bureau of Meteorology (the Bureau) closely monitored the development of the East Coast Low which impacted large parts of NSW between 20 and 22 April, before decaying on 23 April 2015.

Ausgrid first became aware of the potential for a major storm to develop on 17 April 2015, when the Bureau issued an alert to emergency services and subscribers of the potential for an East Coast Low to develop off the Hunter coast. Ausgrid closely monitored the development of the storm through a combination of live weather feeds in its Control Room, and notifications from the Bureau leading up to the storm's impact on 20 April 2015.[67]

It was not until Sunday 19 April, that the likely severity of the storm became apparent, with the Bureau issuing warnings for the following impacts:

- destructive and damaging winds;
- heavy rainfall, likely to cause flooding; and
- dangerous surf conditions.

Whilst the initial impacts from the storm on the morning of Monday 20 April were fairly moderate, the storm began to intensify rapidly as the day progressed and overnight, as evidenced by the increase in weather warnings issued by the Bureau.[68] By the afternoon, the Bureau had issued a media release to 179 media outlets alerting them to a severe weather warning which stated that:

> *"'The Bureau of Meteorology has issued a severe weather warning for damaging winds, heavy rainfall and dangerous surf conditions in the Sydney metropolitan, Illawarra, Hunter, Central Coast and Mid North Coast districts."*
>
> *"The Bureau has issued a flood watch for the NSW coast from the Manning Valley to the Central Coast. Moderate to major flooding for the Paterson and Williams Rivers (lower Hunter Valley) is likely as early as tomorrow (Tuesday) morning."*

The expected forecast for Tuesday 21 April was damaging winds averaging 50-70km with average gusts of 90km/h for the Hunter and south parts of the Mid North Coast forecast districts.[69]Rainfall of 50-100mm was expected to be widespread throughout regions affected by the storm with localised falls predicted to reach up to 200mm for the Hunter and southern parts of the Mid North Coast.[70]

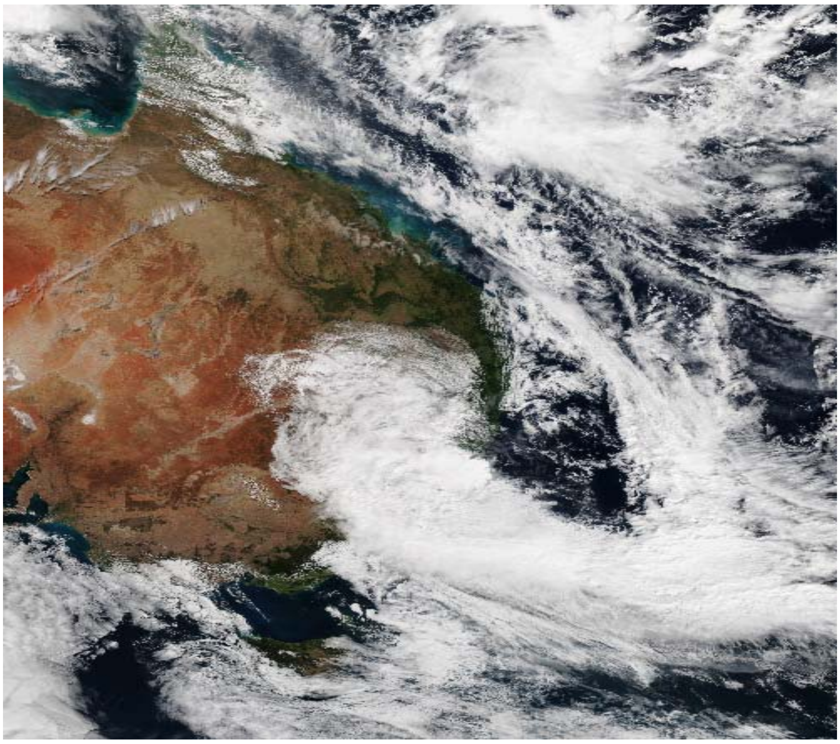

Image 1 - Suomi NPP satellite image of east coast low 21 April 2015.[71]

[67] The Sydney Control Room also has an active feed of temperature and wind speed from an Ausgrid weather station at Bass Hill zone substation that is displayed on Wallboards. In addition, the control room has a display of the Bureau radar on Wallboards and runs a Weather Zone Application.

[68] Refer to Attachment 12 – Summary of severe weather warnings issued by the Bureau of Meteorology.

[69] Refer to NSW State Emergency Services (SES) media update 20 April, 2.54pm.

[70] Ibid.

[71] NOAA View http://www.nnvl.noaa.gov/view

However, the storm cell intensified more rapidly than anticipated and by Tuesday afternoon, the Bureau had escalated its severe weather warning to include a detailed severe thunderstorm warning for people in Greater Newcastle and Maitland/Cessnock areas, as well as a severe thunderstorm warning for damaging and locally destructive winds, damaging winds, heavy rainfall and damaging surf in Sydney Metropolitan, Hunter and Illawarra districts.[72] A further flood warning was issued by the NSW State Emergency Service (SES) for residents in Newcastle and surrounding areas to expect flash flooding and rapid rise and high flow velocities in local watercourses.[73]

The storm maintained its intensity for a 48 hour period, during which parts of Sydney, the Central Coast, Newcastle and the Hunter were inundated by heavy rains which caused widespread flash flooding and riverine flooding, and were battered by cyclonic force winds

A severe weather warning remained in place on 22 April 2015, however was subsequently cancelled in the evening as the storm started to show signs of easing. The storm eventually deteriorated into a broad trough over the Tasman Sea on the evening of 23 April 2015 resulting in improved weather conditions until a second storm cell hit Sydney on 25 April causing heavy rain and hail before travelling north to the Central Coast and Hunter resulting in thunderstorms.[74]

For a more detailed account on the weather conditions forecasted for this period and how they rapidly intensified please refer to Attachments 12 and Table A5.

A2.1 Heavy rainfall

The storm caused widespread heavy rainfall throughout parts of Sydney, and Hunter regions, with two day totals as high as 436mm at Tocal and Maitland, and hourly totals as high as 112mm in Tocal on the morning of 21 April.[75] The heavy rainfall resulted in flooding throughout Ausgrid's network area which created access issues that delayed Ausgrid's ability to investigate and restore faults on its network. An infographic used on Facebook and Twitter to communicate to customers difficult access areas in Ausgrid's network as a result of the storm has been provided below.

Figure A1 – Areas with significant access issues

Major flooding in the Hunter and Sydney Western region resulted in five communities being isolated for several days, four of which are in Ausgrid's network area (as indicated in the table below in yellow shading).

[72] NSW SES media update 21 April 2015, 1.11pm.
[73] NSW SES media update 21 April 2015, 4.01pm.
[74] NSW SES media updates 22 April 2015, 5.35pm and 23 April 2015, 2.26am.
[75] Australian Government, Bureau of Meteorology, "*Monthly Weather Review: Australia, April 2015",* p 3.

Table A2 - Communities isolated by the storm

Location	Area	Estimated Population
Hinton	Port Stephens	313
Bulga	Cessnock	358
Gillieston Heights	Maitland	1,500
Wollombi/Laguna	Cessnock	280
MacDonald Valley	Hawkesbury	200
Total	**5**	**3001**

* Data sourced from NSW SES website. Yellow shaded Locations are within Ausgrid's network area.

Major flooding was observed in the Williams and Patersons Rivers, with flash flooding reported throughout the Sydney, and Hunter regions. Several fatalities were reported during the event, as a result of flooded roads and a severe flash flood in Dungog on the morning of April 21 2015.[76] Flooding in the Georges river also caused residents to be evacuated from Milperra and Chipping Norton in Southwest Sydney.[77]

To assist in understanding the impact of this flooding on the community and Ausgrid's network we have provided definitions of the various types of floods that occurred as a result of the storm in Table A3 below, and have also included photos to demonstrate the associated impacts of these types of floods.

Table A3 – Definition of flood types according to the Australian Water Dictionary

Flood Type	Impact
Flash flood	Flash floods occur when soil absorption, runoff or drainage cannot adequately disperse intense rainfall. The most frequent cause of flash flooding is slow-moving thunderstorms. These systems can deposit extraordinary amounts of water over a small area in a very short time with waters reaching up to 1.5m high.
Minor flooding	Causes inconvenience. Low-lying areas next to watercourses are inundated which may require the removal of stock and equipment. Minor roads may be closed and low-level bridges submerged.
Moderate flooding	In addition to the criteria for minor flooding, the evacuation of some houses may be required. Main traffic routes may be covered. The area of inundation is substantial in rural areas requiring the removal of stock.
Major flooding	In addition to the criteria for moderate flooding, extensive rural areas and/or urban areas are inundated. Properties and towns are likely to be isolated and major traffic routes likely to be closed. Evacuation of people from flood affected areas may be required.

* Data sourced from the Bureau of Meteorology

[76] Ibid.
[77] Ibid.

Image 2– shows flooding on Illawarra Rd, Marrickville during heavy rain, 22 April 2015.[78]

Image 3 – shows floods in Milperra south of Sydney closed parts of Newbridge Road for most of Wednesday 22nd April 2015.[79]

Image 4 – shows SES volunteers moving stranded residents and vital supplies by boat.[80]

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[78] Source Sydney Morning Herald (http://www.smh.com.au/nsw/sydney-weather-flood-waters-rise-across-sydney-south-west-homes-evacuated-20150422-1mr18e.html)

[79] Photo: Steven Siewert

[80] http://www.dailytelegraph.com.au/news/nsw/sydney-storms-flooding-to-continue-on-day-four-as-storms-ease/story-fnl2dlu7-1227316376580 - 23 April 2015

Image 5- Flooding at Lower Hunter – Woodville and Largs

In addition to flooding, the heavy rainfall also resulted in 26 areas recording their highest daily rainfall on record. Outlined in Table A4 below are the areas within Ausgrid's network which recorded new daily highs during the storm.

Table A4 – Record highest April daily rainfall within Ausgrid's network area

Location	New record (mm)		Old record	Years record was held
Branxton (Dalwood Vineyard)	199.4mm	22/04/2015	116.8mm on 16/04/1927	88
Elderslie	175.0mm	21/04/2015	132.6mm on 23/04/1931	84
Williamtown RAAF	155.6mm	21/04/2015	129.0mm on 21/04/1974	41
Carrowbrook	108.8mm	21/04/2015	84.6mm on 8/04/1962	53
Marrickville Golf Club	123.0mm	21/04/2014	116.3mm on 27/04/1966	49
Gosford North (Glennie St)	140.0mm	21/04/2015	106.2mm on 25/04/2007	8
Mandalong (Mandalong Rd)	140.0mm	22/04/2015	97.0mm on 17/04/2011	4
Cessnock Airport AWS	126.6mm	22/04/2015	72.0mm on 2/04/2009	6
Chatswood Bowling Club	131.0mm	21/04/2015	78.0mm on 28/04/2003	12
Hampton (Bindo)	68.0mm	21/04/2015	67.0mm on 20/04/1984	31
Canterbury Racecourse AWS	123.0mm	21/04/2015	100.0mm on 11/04/1998	17

* Data sourced from the Bureau of Meteorology – NSW in April 2015: Wettest April in 25 years.

A2.3 Damaging and destructive winds

The storm caused prolonged and severe winds, with mean winds exceeding 50km/h for 44 consecutive hours at Sydney Airport and wind gusts as high as 135km/h at several locations, which is the equivalent of a category 2 tropical cyclone.[81]

For several days, areas within Ausgrid's network were battered with galeforce winds ranging from damaging to destructive in strength and impact. Numerous warnings were issued by the Bureau starting on Sunday 19 April and continuing throughout 20 to 22 April, the period during which that the storms were at their peak. Table A5 provides a summary of these warnings as well as details of recorded wind gusts and rainfall during this period.

[81] Australian Government, Bureau of Meteorology, "*Monthly Weather Review: Australia, April 2015",* p 3.

Table A5 – Summary of warnings issued by the Bureau of Meteorology and details of the storm's impacts

Date of Bureau warning issued	Number of warnings issued & time	Overview of warnings issued	Recorded rain fall and wind gusts
Sun 19 April 2015	2 warnings issued at 4.04 PM and 10.42 PM	• DAMAGING WINDs around 50 km/h with peak gusts of 90 km/h for Monday afternoon. • Low pressure system to intensify, strong to gale-force wind.	None given
Mon 20 April 2015	5 warnings issued at 4.31 AM, 11.39 AM, 4.38 PM, 9.51 PM and 10.07 PM.	• DESTRUCTIVE WINDS around 90 km/h with peak gusts of 125 km/h forecast for Hunter, including Central Coast overnight and Tuesday • DAMAGING WINDS averaging 55 to 70 km/h with gust to 100 km/h for Metropolitan and Illawarra, • HEAVY RAIN for late Monday and continue to Tuesday. Conditions expected to be worst in Newcastle, Nelson Bay area, leading to potential FLASH FLOODING.	None given
Tue 21 April 2015	10 warnings issued at 3.36 AM, 5.05 AM, 8.22 AM, 8.54 AM, 11.23 AM, 2.01 PM, 3.09 PM, 5.19 PM, 8.09 PM, 11.04 PM	• DESTRUCTIVE WINDS around 90 km/h with peak gusts of 125 km/h are forecast for parts of the Hunter forecast district, including the Central Coast today. • DAMAGING WINDS averaging 60 to 70 km/h with gusts to about 100 km/h are forecast to continue for Metropolitan, Mid North Coast and Illawarra forecast districts today. • HEAVY RAINFALL widespread today, local flooding possible. The heaviest rain likely the Hunter District. • *A line of THUNDERSTORM causing intense rain fall*; location affected included Hunter Valley, Nelson Bay to Branxton, Williamtown, Tocal, Raymond Terrace and Newcastle.	Wind gusts to date include: • 135 km/h at Norah Head, • 120 km/h at Nobby's Head, • 110 km/h at Williamtown, • 107 km/h at Molineaux Point and Sydney Airport. Rainfall totals from 9am Monday to 9am Tuesday include: • 312 mm at Dungog, • 259 mm at Crawford (near Bulahdelah), • 186 mm at Wallsend, • 172 mm at Wahroonga (Sydney). Rainfall totals from 9am to 8pm today include: • Maitland 292 mm, • Seaham 152 mm and • Tocal 158 mm (all in the Hunter Valley).
Wed 22 April 2015	5 Warnings issued at 4.16 AM, 9.58 AM, 2.44 PM, 4.47 PM,10.22 PM	• An intense low pressure system was centred just off the Hunter coast near Newcastle. This low is expected to remain slow-moving, maintaining vigorous winds, large seas, and periods of heavy rain and thunderstorms. Conditions are expected to slowly ease during Wednesday as the low weakens. • DAMAGING WINDS averaging 60 to 70 km/h with peak gusts of 100 km/h are forecast for the coastal fringe. • HEAVY RAIN and THUNDERSTORMS, which may lead to FLASH FLOODING, are forecast for parts of the Metropolitan, Hunter and Illawarra forecast districts. • Note that due to high recent rainfall there may still be areas of local flooding occurring, and several Flood Warnings remain in place.	Rainfall totals in the 24 hours from 9am Tuesday to 9am today include: • Maitland 308 mm and Seaham 198 mm (both in the Hunter Valley), • Reverces 176mm (Illawarra), • Wallsend 131mm, • Hornsby 135mm. In the 7 hours from 9am to 4pm further rainfall totals include: • Cronulla 79mm, • Sans Souci 66mm, • Peakhurst 63mm and • Bankstown 56mm (all in Sydney).

Tables A6 and A7 below are extracts from the Bureau on the definition of different wind terms and the associated impact that these winds have, as well as a categorisation of different tropical cyclones based on wind speed. We have included these definitions and categorisations to provide further context, clarification and appreciation of the warnings issued by the Bureau as summarised in Table A5 above.

Table A6 – Definition of terms "*damaging winds", "destructive winds" and "very destructive winds"*

Category	Sustained winds (km/h)	Strongest gust (km/h)	Typical effects
1 Tropical Cyclone	63 - 88	Below 125	Damaging winds
2 Tropical Cyclone	89 - 117	125 - 164	Destructive winds
3 Severe Tropical Cyclone	118 - 159	165 - 224	Very destructive winds
4 Severe Tropical Cyclone	160 - 199	225 - 279	
5 Severe Tropical Cyclone	Over 200	Over 280	

* Data sourced from the Bureau of Meteorology

Table A7 – Severity of tropical cyclones

Category	Maximum Mean Wind (km/h)	Typical Strongest Gust (km/h)	Central Pressure (hPa)	Typical Effects
1	63 - 88	< 125	> 985	Negligible house damage. Damage to some crops, trees and caravans. Craft may drag moorings
2	89 - 117	125 - 164	985 - 970	Minor house damage. Significant damage to signs, trees and caravans. Heavy damage to some crops. Risk of power failure. Small craft may break moorings.
3	118 - 159	165 - 224	970 - 955	Some roof and structural damage. Some caravans destroyed. Power failures likely. (e.g. *Winifred*)
4	160 - 199	225 - 279	955 - 930	Significant roofing loss and structural damage. Many caravans destroyed and blown away. Dangerous airborne debris. Widespread power failures. (e.g. *Tracy*, *Olivia*)
5	> 200	> 279	< 930	Extremely dangerous with widespread destruction. (e.g.*Vance*)

* The severity of a tropical cyclone is described in terms of categories ranging from 1 (weakest) to 5 (strongest) related to the maximum mean wind speed as shown in this table. Data sourced from the Bureau of Meteorology website (http://www.bom.gov.au/cyclone/faq/)

Tables A5, read in conjunction with Tables A6 and A7, highlights the severity of the weather conditions experienced over a 72 hour period. The recorded impacts show that during the storm parts of Ausgrid's network were lashed by sustained cyclonic wind gusts lasting for several days and heavy rainfall causing flooding (flash, minor, moderate and major flooding). Further, it is also evident from the number and nature of warnings issued by the Bureau during 20-21 April that the storm intensified rapidly, with the recorded impact in some cases being more severe than initially forecasted. These conditions posed a significant challenge in coordinating Ausgrid's restoration work and resulted in some customers experiencing no power supply for several days.

Appendix B – Mitigation controls

This section outlines key aspects of Ausgrid's Incident Management System (IMS) and Storm Response Plan, as together these processes and procedures formed the overarching framework for how Ausgrid coordinated and prioritised activities across its network to restore customer supply. These documents are provided as Attachments 5 and 6 respectively.[82]

B1 Ausgrid's Incident Management System (IMS)

Ausgrid's IMS outlines the processes and procedures for the preparation for and response to incidents at an organizational level. In particular, the IMS sets out:

- the framework for incident declaration, escalation, de-escalation and classification;
- incident response procedure and priorities;
- incident management team structure, contacts and responsibilities;
- Emergency Coordination Centre activation and use;
- communication (SMS, teleconference and GRN) procedures;
- pre-incident and debrief procedures; and
- record keeping procedures.

Figure B1 below, outlines the process that is followed under the IMS when an incident occurs. As show by Figure B1, once it is apparent that an incident has occurred it is assessed and escalated, whereby an Emergency Duty Manager (EDM) is notified and declares the incident using the Incident Severity Matrix outlined in Figure B2. Once an incident is declared, an Incident Controller is appointed to manage and coordinate Ausgrid's response and is responsible for activating the Incident Management Team. An Incident Executive Officer responsible for providing administrative support to the Incident Controller and activating Ausgrid's Emergency Coordination Centre (ECC) is also appointed.

The Incident Controller manages Ausgrid's response to an incident at an organisational level using the Incident Management Team and Standard Incident Meeting Agenda. An incident is de-escalated by an Emergency Duty Manager when: 1) the level of service in the network is secured; 2) the network is able to maintain this level of service; and 3) the incident conditions no longer pose a threat or are reduced to a level which can be managed locally. Once an incident has been de-escalated an incident debrief is coordinated by the Incident Controller to ensure the continual improvement of incident management at Ausgrid.

The IMS represents an organisational framework that enables Ausgrid to quickly and effectively respond to incidents. It does this primarily through: 1) its classification of incidents which enables appropriate escalation of incidents according to their severity; 2) the pre-establishment of Incident Management Team structures, contacts and responsibilities; 3) set meeting agendas; and 4) the establishment of strategic priorities for responding to incidents. This framework allows Ausgrid to quickly mobilise staff to respond to incidents efficiently and in a coordinated manner.

[82] Note that both of these Attachments have been provided confidentially to the AER.

Figure B1– Ausgrid's Incident Management System

[redacted]

B1.1 Classification and escalation of incidents

The severity of an incident is determined by Ausgrid's Incident Severity Matrix (see Figures B2 and B4 below), which provides the EDM with a framework for assessing and classifying incidents. Incidents are assessed according to incident criteria which reflect the broad nature of risks faced by Ausgrid as an owner and operator of a distribution and transmission network and is used to determine the Incident Type. A scale of severity is given for each incident criteria, which allows for an Incident Severity to be determined. The combination of Incident Type and Severity will determine who is appointed the Incident Controller for the incident.

Figure B2 – Incident Severity Matrix

[redacted]

Figure B3 – Incident Severity Matrix definitions: Network Events[83]

[redacted]

The different coloured shading used in Figures B2 to B4 indicates the severity classification of an incident. Yellow shading represents incidents which are deemed to have a medium impact; orange shading for when an incident is deemed to be a major incident; and red shading to indicate that an incident represents an emergency incident. For network incidents where the severity is based on customers interrupted the severity of incidents, as demonstrated by Figure B4, is determined based on customers affected by the event and the estimated time to rectify the network interruption.

[83] Sensitive customers referred to in Figure 14 are defined as customers where a sustained interruption to its electrical supply would cause widespread issues for the public. These customers may include major hospitals, railways, utilities, airports and road tunnels.

Figure B4– Incident Severity Matrix: Network Events

[redacted]

B1.2 Incident Management Team

The classification and subsequent declaration of an incident will determine the level of response activated to manage a particular incident. Specifically, it will trigger the establishment of an Incident Management Team, the structure of which will vary according to the type of incident.[84] Certain Incident Management Team structures exist for particular incident types to reflect the different areas of the business that will need to be involved in the coordination of Ausgrid's response.[85].The IMS defines the duties and responsibilities for each role under the Incident Team Management structure and also contains a list of primary and secondary contacts for each of the role. Ausgrid's pre-defined Incident Management Team structures have evolved over time as part of Ausgrid's de-brief and continual improvement process. It has been established to facilitate a process whereby staff can be quickly mobilised to respond to an incident in a coordinated and efficient manner.

B1.3 Incident meeting agenda

The frequency with which the Incident Management Team meets is determined by the Incident Controller having regard to the severity of the incident. To assist in planning Ausgrid's response to an incident, meetings are held using a prescribed meeting agenda. The incident meeting agenda consists of discussion items aimed at facilitating a holistic view of the incident and its impact to enable appropriate response strategies to be developed.

[84] Incident types under the Incident Management System include: network, work health and safety (WHS), IT and telecommunications, facility, pandemic, environment, and security.

[85] Specific Incident Management Team structures exist for the following incident types: network, WHS, IT and telecommunications, facility, and other (which applies to environment, pandemic and security incident types).

B1.4 Network restoration priorities

Over time Ausgrid has developed a set of strategic priorities for responding to incidents which are embedded in its IMS. Outlined below, in order of importance, are the priorities underpinning Ausgrid's strategy for responding to incidents safely and as quickly as possible:[86]

- Safety of persons and property – this is Ausgrid's first and foremost priority when responding to an incident. Restoration work and response efforts are focused on communicating safety messages and removing/addressing network related hazards that may pose a risk to the safety of customers, members of the public or property.

- Environment- restoration efforts are prioritised to address any potential environment impact that may occur as a result of damage sustained to the network. For example, oil cables leaking into waterways or the risk of network assets triggering bushfires.

- Transmission – when an incident results in damage to the sub-transmission network restoration efforts are focused on repairing this part of the network once safety and environmental hazards have been addressed as this re-establishes network redundancy which improves network security and helps prevent reoccurring faults. Further, as this part of the network services larger customer numbers restoring supply to this part of the network enables more customers to be returned to supply than addressing faults at the low voltage level.

- High voltage network – restoration work to the high voltage network is prioritised over the distribution and low voltage network in the event of no hazards, as it would be inefficient to repair lower parts of the network if the upstream network is not energised. Further, as this part of the network services larger customer numbers restoring supply to this area of the network enables more customers to be returned to supply than addressing faults at the low voltage level.

- Key customers – Ausgrid prioritises restoration to these customers in recognition of their influence or ability to affect large sections of the community. Key customer can include: high voltage customers, customers with a direct connection to a distribution centre, health institutions, critical infrastructure (water, sewerage and telecommunications companies), life support customers, customers with high security requirements and large religious buildings.

- Low voltage and customer services – restoration work to the low voltage network is generally coordinated after the above priorities have been addressed, as this work is often labour and time intensive and results in only small numbers of customers being returned per fault addressed.

- Street lighting – restoration work to street lighting is a low priority in response to an incident in light of the lower risk that it poses to the public.

B2 Ausgrid's Storm Response Plan

Ausgrid's Storm Response Plan forms a subset of Ausgrid's IMS. It is specifically aimed at providing an incident recovery strategy for effectively managing the impacts to Ausgrid's network and customers as a result of storms. In particular, this plan sets out the specific business processes that need to be followed at a depot level in respect to safety, storm categorisation, the repair process and shift management.

B2.1 Safety

Storms and subsequent repairs can pose a significant number of safety hazards for staff. The Storm Response Plan sets out the safety requirements that must be adhered to when responding to storms in order to ensure the safety of staff and compliance with the Ausgrid Electrical Safety Rules. In undertaking any restoration work staff must follow the Hazard Assessment procedure from the Electrical Safety Rules at each job site to identify and control hazards.

Specific hazards that may be more likely and pose higher risks during storms are listed below.

- ➢ Lightning – Line workers must avoid working aloft when lightning is present in the area. All staff must take care as dangerous voltages can also be present on neutral or earthing conductors, and on underground cable sheaths, when there is lightning activity in the area.

- Wind – Climbing poles and operating elevated work platform (EWP) in high wind conditions carries additional risk and needs to be suitably controlled.

- Hail, Wet and Inclement Weather – Working and driving in wet weather and during hail storms can be hazardous. Staff need to drive carefully due to conditions including slippery roads, flooding, blacked-out traffic

[86] Note priorities are listed in order of importance.

signals, and fallen trees, poles and lines. The risk of slips, trips and falls when working increases due to wet and slippery surfaces.

- Fatigue – Staff are likely to be working longer than normal hours, shift work and night work during storm response. Staff must be managed in accordance with Ausgrid's "Be Safe Hazard Guideline 16: Managing Fatigue", in particular, "no individual should work beyond a 14 hour extension of their start time without a 10 hour break."

- Wires Down – It is likely that staff will encounter situations with fallen conductors.

  - All fallen conductors must be regarded as alive until they have been identified, isolated and proved de-energised. Precautions for low voltage and high voltage conductors must be followed in accordance with the Electrical Safety Rules.

  - In these hazardous situations only authorised persons, as defined in the Electrical Safety Rules, may work on the mains in accordance with Electrical Safety Rules clauses 6.4.2 "Electrical Hazards or Emergencies with Public Risk" and 6.8 "Handling Fallen Conductors".

  - Other staff must respond in accordance with Electrical Safety Rules clause 6.2 "Reporting Dangerous or Emergency Conditions or Damage".

  - Spotters can only cut away and make safe covered 100amp service wires in accordance with their training. Spotters cannot cut away bare wires or low voltage distributor cables.

  - Note that some fallen wires jobs encountered during storms are telecommunications cables, including copper phone lines, fibre optic cables and co-axial drop cables. These cables are to be treated as alive and handled in accordance with DG01 Broadband Communications Cables and the procedures documented in the Spotters Training Notes.

- Embedded and Mobile Generators – Staff must be aware that customers may be using generators at their own installations during blackouts that pose a risk of back-feed into the network, and that ESR clause 7.1 "De-energised Low Voltage Mains and Apparatus" must be followed in regards to this.

For the above hazards and any other hazards identified by staff, the Storm Response Plan requires that work is carried out in accordance with Ausgrid's Safe Work Method Statements, procedures and control methods.[87]

B2.2 Storm categorisation

Storms are a specific and frequently encountered category of incident for Ausgrid. Whilst the IMS classifies incidents into three levels of severity, Ausgrid has found it useful, in the case of responding to storms, to further classify the incident as either Category 1, 2, or 3. Categorisation of storm damage assists with storm management at a depot level in the following ways:

- It provides a quickly and easily comprehendible "big picture" of the extent of a storm's damage, and importantly has the same meaning at all levels of the organisation. This means that management and field staff at all levels are aligned as to what is expected from a change in category.

- It determines and reflects the management structure and resourcing that is operating at the depot.

- By escalating the categorisation a depot can pro-actively indicate that additional field and support resources are required.

- By de-escalating the categorisation a depot can proactively indicate that the restoration is being brought under control, potentially releasing resources to other, more affected parts of the business.

Ausgrid has three categories of storm at the depot level. The following table correlates the storm category level to the incident severity level.

[87] SWMS OH601 Emergency Situations / Extreme Conditions & Routine/Emergency Recovery and Replacement of CCA Crossarms (Includes: Wires Down, Car Hit Pole, Failed Pole, Tree in Mains, Fire, Flood, High Winds etc) is available as an appropriate SWMS for staff to use during Spotting work.

Table B1 – Storm categories and severity of incident

AUSTGRID STORM RESPONSE PLAN	TYPICAL NUMBER OF OMS JOBS PER DEPOT	INCIDENT MANAGEMENT SYSTEM (IMS)
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

As noted in Table B1, a Category 1 storm represents the most severe of the storm categories resulting in significant damage to the network, across multiple depots or regions, and will require significant numbers of staff from other Regions and organisations to assist in restoration. If a Category 1 storm occurs, Ausgrid's procedure is for other operating Regions to supply support staff and spotters. [redacted]

When a Category 1 storm occurs, a dedicated Storm Manager, who is an experienced Manager, is appointed to manage the overall depot storm response for storms of this magnitude and severity.[88] In addition, Ausgrid's protocol is to locate appropriate managers to depots so that they are close to the action and can provide for direct communications flow between the depots and the Control Room/Incident Controller; and to use local people where possible as they know the local processes and geography.

In the case of the occurrence of a Category 1 storm, external staff (i.e. from Endeavour Energy or other utilities) are often required in order to help complete restoration work as quickly as possible. Where external staff are needed, the Storm Response Plan requires that:

- Ausgrid take direct "hands-on" management in the field (e.g. a dedicated Field Co-ordinator), and may also require a Field Co-ordinator to act as a dedicated Supervisor when there are significant numbers of external staff to be managed.

- A dedicated Safety Advisor carry out inductions and record keeping for the external staff.

- An autonomous work team concept is utilised wherever possible, whereby a full set of crews is dispatched with supervision and given their own set of work to manage.[89] The advantage of this approach is that external staff have familiarity with each other's working methods, inherent co-ordination, and a team spirit.[90]

- Where it is not possible for autonomous crews to be dispatched, adequate supervision must be provided to manage the additional staff, with the general rule of thumb being that supervision is required per 15 staff.

Further, the classification of a storm as a Category 1 will also trigger the establishment of a specific depot structure designed to facilitate the smooth coordination of roles and responsibilities for responding to an incident of this nature. This is reflected below in Figure B5.

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[88] Local Managers or Field Services Managers/Area Managers in "passive" regions (i.e. regions not greatly affected by the storm) could take on roles of Storm Manager in active depots.
[89] This could be possibly an area, or series of large jobs
[90] Information from autonomous work crews is fed back to the overall depot storm response being managed by the Storm Manager.

Figure B5 – Depot structure for responding to a Category 1 storm[91]

[redacted]

Original depot staff

Region support staff to assist

Additional Ausgrid staff to assist

Additional staff from other distributors

B2.3 Business process for storm repair

The Storm Response Plan establishes the business processes for undertaking typical repair work following a storm. The processes described in the Storm Response Plan include the following jobs typically received through OMS:

- wires down;
- trees on mains;
- other hazards; and
- single customer outages.

Other OMS jobs such as high voltage feeder trips and multiple customer outages are managed through the Control Room, and where necessary transferred to local depots. System Control may also issue work to local depots via telephone, fax or email to the Storm Manager/Superintendent. For these other jobs, the same principles for managing and prioritising the work will apply.

A summary of Ausgrid's business process for storm repair is provided in Figure B6 below.

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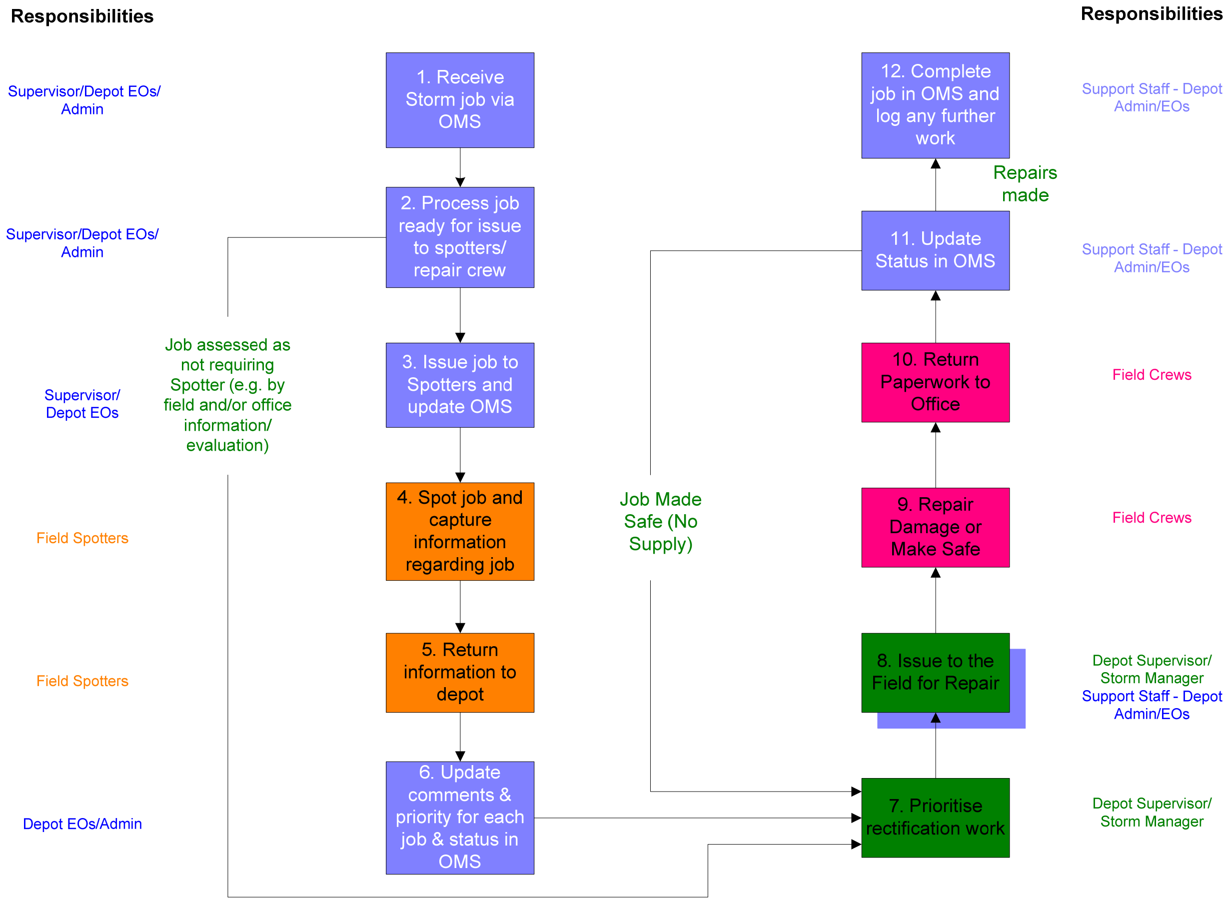
[91] Refer to Attachment 6 – Ausgrid's Storm Response Plan, pp 15-20 for a detailed explanation or roles and responsibilities under this structure. Note that some of the titles in the Figure B5 refers to Ausgrid's previous organisational structure.

FigureB6 – Ausgrid's business process for storm repair[92]



A more detailed explanation of this process can be found in Attachment 6 – Ausgrid's Storm Response Plan.

B2.4 Shift management

Shift management is an important aspect of storm response, and is particularly important when the duration of the storm incident is more than one day (as is the case with Category 1 and Category 2 storms and the April storm). Ausgrid's Storm Response Plan sets out the shift management process for planning the shifts for staff associated with all aspects of storm response to ensure:

- There is adequate coverage of all the skills required throughout the entire storm incident including management, supervision, support and administration, field staff (including spotters).
- Staff get appropriate breaks in accordance with Ausgrid's policies, and there is planned backup where necessary. All staff are managed in accordance with Ausgrid's Working Extended Hours Policy which allows for a maximum of 14 hours shift allowance with a 10 hour stand down period.
- Emergency staff are available around the clock.
- Time is used efficiently and effectively with regards to day versus night work.[93]
- Appropriate records are kept regarding shifts.

[92] Refer to Attachment 6 – Ausgrid's Storm Response Plan, pp 21-25.
[93] Field work becomes inefficient at nights and therefore should primarily be aligned to daylight hours, with stand down periods aligning with darkness where possible. Night work can be carried out effectively when used as preparation - such as sorting and prioritising work for the next day shift of repair work which allows for the greatest efficiency and effectiveness of field to be gained during daylight hours.

Appendix C – Excluded Pass Through Events

This appendix demonstrates that the April storm event does not fall within any of the following pass through events.

‘Excluded’ event	Definition	Reasons April storm does not fall within this event
Regulatory change event in the NER (read as if paragraph (a) of the definition were not part of the definition)	A change in a regulatory obligation or requirement that (a) falls within no other category of pass through event [not applicable in this instance]; (b) occurs during the course of a regulatory control period; and substantially affects the manner in which the TNSP or DNSP provides direct control services (as the case requires); and materially increase or materially decreases the cost of providing those services	The April storm event does not represent or constitute a change in regulatory obligation or requirement.
Service standard event in the NER	A legislative or administrative act or decision that: (a) has the effect of: (i) substantially varying, during the course of a regulatory control period, the manner in which a Transmission Network Service Provider is required to provide a prescribed transmission service, or a Distribution Network Service Provider is required to provide a direct control service; or (ii) imposing, removing or varying, during the course of a regulatory control period, minimum service standards applicable to prescribed transmission services or direct control services; or (iii) altering, during the course of a regulatory control period, the nature or scope of the prescribed transmission services or direct control services, provided by the service provider; and (b) materially increases or materially decreases the costs to the service provider of providing prescribed transmission services or direct control services.	The April storm event is not ‘a legislative or administrative act or decision’.
Tax change event in the NER	A tax change event occurs if: (a) any of the following occurs during the course of a regulatory control period for a Transmission Network Service Provider or a Distribution Network Service Provider: (i) a change in a relevant tax, in the application or official interpretation of a relevant tax, in the rate of a relevant tax, or in the way a relevant tax is calculated; (ii) the removal of a relevant tax; (iii) the imposition of a relevant tax; and (b) in consequence, the costs to the service provider of providing prescribed transmission services or direct control services are materially increased or decreased.	The April storm event is not a change in a relevant tax or the removal of a relevant tax or the imposition of a relevant tax.

'Excluded' event	Definition	Reasons April storm does not fall within this event
Terrorism event in the NER	An act (including, but not limited to, the use of force or violence or the threat of force or violence) of any person or group of persons (whether acting alone or on behalf of in connection with any organisation or government), which from its nature or context is done for, or in connection with, political, religious, ideological, ethnic or similar purposes or reasons (including the intention to influence or intimidate any government and/or put the public, or any section of the public, in fear) and which materially increases the costs to a Transmission Network Service Provider of providing prescribed transmission services or the costs to a Distribution Network Service Provider of providing direct control services. [94]	The April storm event is clearly not a terrorism event as it was not an act of any person or group of persons done for political, religious, ideological, ethnic or similar purposes or reasons.
Retail project event as defined in the final determination	Any legislative or administrative act of the NSW Government to separate the retail electricity business of a DNSP in whole or in part from the electricity distribution function of the DNSP (including by way of a sale of the DNSPs retail business) which materially changes the costs to the DNSP of providing direct control services in the next regulatory control period.	The April storm event does not involve any legislative or administrative act of the NSW Government.
Smart meter event	An event which results in an obligation being externally imposed on a DNSP to install smart meters for some or all of its customers, or to conduct large scale metering trials during the course of the next regulatory control period, regardless of whether that requirement takes the form of the imposition of a statutory obligation or not, and which: a) Falls within no other category of pass through event; and b) Increases the costs of a DNSP providing direct control service.	The April storm event does not relate to any externally imposed obligation to install smart meters.
Emission trading scheme event NER (read as if paragraph (a) of the definition were not part of the definition)[95]	An event which results in the imposition of legal obligations on a DNSP arising from the introduction or operation of a carbon emissions trading scheme imposed by the Commonwealth or NSW Government during the course of the next regulatory control period and which: a) Falls within no other category of pass through event; and b) Materially increases the costs of a DNSP providing direct control service.	The April storm event is not an emission trading scheme event.

[94] Chapter 10, version 50 of the NER.
[95] AER, EnergyAustralia distribution determination 2009-10 to 2013-14, 28 April 2009, pp294-295.

Appendix D – Impact of the April Storm Event

This section provides further evidence of the costs that were incurred as a result of the April storm event, which were discussed in section 5. Specifically this section provides the AER with an understanding of the magnitude of damage incurred to Ausgrid's network from the storm to provide context for Ausgrid's response, and the circumstances which triggered the material increase in Ausgrid's costs.

In this section we discuss:

- **Ausgrid's network** – we have provided background information on our network area to illustrate how many of the regions heavily impacted by the storm reside within our network area. Also included is a brief summary of the design and characteristics of our network to provide further context on the damage sustained to our network and the efficiency of our response efforts.

- **Impact to Ausgrid's network -** understanding the severity of the storm's impact on Ausgrid's network, and on different elements in the electricity supply chain, provides context on the scale of restoration work Ausgrid undertook to make the network safe and restore customer supply, which resulted in Ausgrid incurring a material increase in costs in providing direct control services that it would not have incurred without the storm event.

- **Impact to customers –** understanding the significant impact the April storms had upon customers provides important context on the communication costs that were incurred as a result of responding to this event, and was a key driver of Ausgrid's restoration costs due to need to restore supply to customers as quickly and safely as possible.

D1 Ausgrid's network

An understanding of Ausgrid's network area and its configuration is needed to be able to appreciate the severity of the storm and its impact on our network. This provides important context on the scale of restoration work that was required and the challenges faced by Ausgrid in performing this task.

D1.1 Ausgrid's network area

Ausgrid operates one of the largest electricity networks in Australia (ranked by size of asset base) servicing a broad customer base ranging from rural, to urban, and residential to commercial customers, including mining, manufacturing and agricultural industries. Our distribution network covers an area of 22,275 square kilometres and includes some of the most densely populated areas in NSW. We supply more than 1.65 million customers from the Upper Hunter Valley in the north, to Waterfall in the South, and from Auburn in Sydney west to Port Stephens in the east. A map highlighting Ausgrid's network area is provided below in Figure D1.

Figure D1 – Ausgrid's Distribution Area

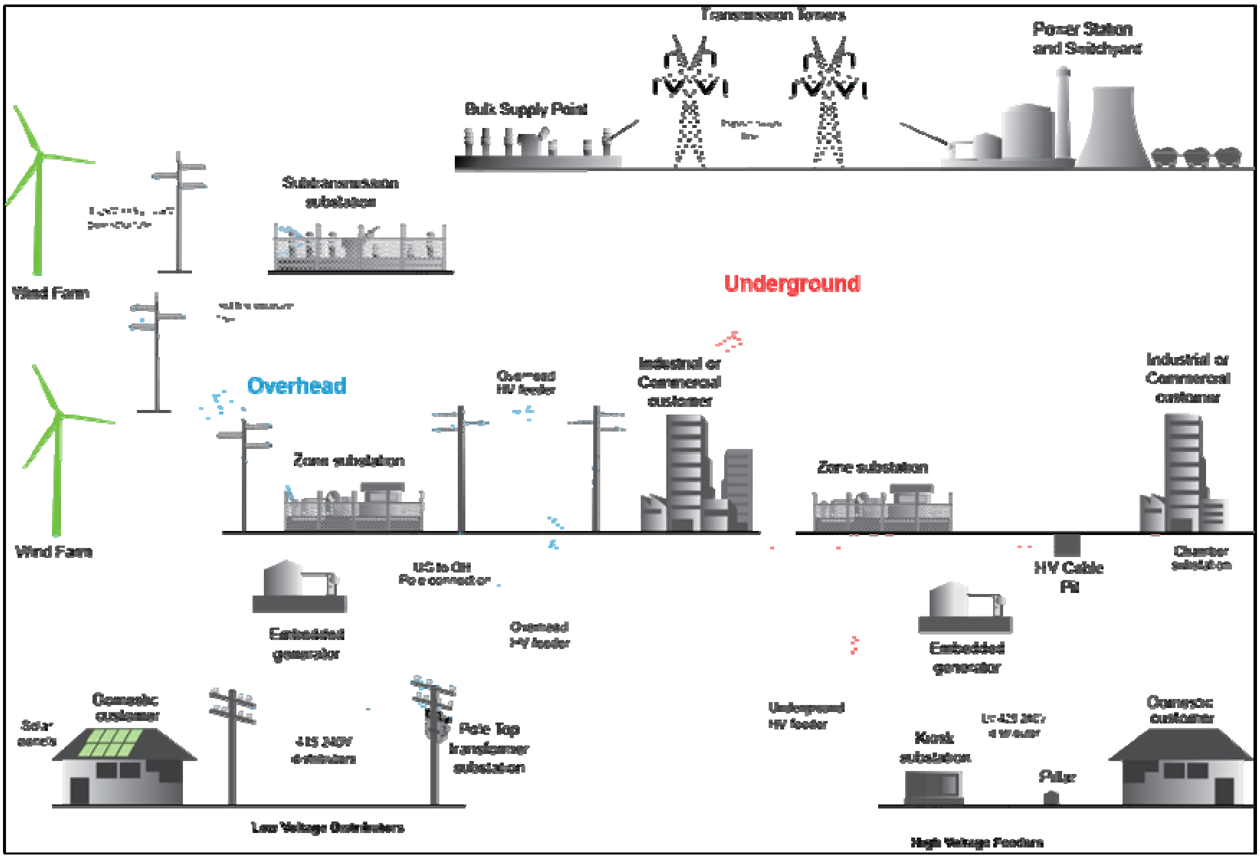
D1.2 How our network transports electricity

Ausgrid's network is comprised of a sub-transmission network and distribution network which consists of:

- dual function (transmission) system of 132kV assets;
- sub-transmission system of 33kV, 66kV and 132kV assets;
- high voltage distribution system of 11kV (and some 5kV), 22kV, and 33kV assets; and
- low voltage distribution system of 240V and 415V assets.

Power is generally supplied through TransGrid's state wide transmission system, distributed via bulk supply points into Ausgrid's sub-transmission network and transported to end users via our distribution network. Other electricity distributors' networks and some power stations are also connected into our distribution network. Our typical network arrangement is represented below in Figure D2.

Figure D2 – Typical components of the electricity network



As demonstrated in Figure D2, Ausgrid takes electricity from TransGrid's transmission network at bulk supply points to sub-transmission substations. Electricity is then transported via Ausgrid's sub-transmission system which consists of both overhead and underground networks operating at 33kV, 66kV and 132kV. The electricity supply is transformed to a high voltage distribution system (predominantly 11kV) at Zone Substations which take their supply from the sub-transmission network. Ausgrid has approximately 190 zone substations which generally supply entire precincts or multiple suburbs. Most zone substations have a "meshed" supply from the sub-transmission network with two or more sources of supply. This means a single sub-transmission fault will not, in most cases, directly result in a sustained outage to a zone substation.

The high voltage distribution system consists of both overhead and underground networks supplied by zone substations. The electricity supply is transformed to the low-voltage distribution system from the high voltage distribution system at distribution substations (shown at Pole Top Transformers or kiosk substations in Figure D2). The low voltage distribution system comprises both overhead and underground networks.

Some customers such as mines and large industrial sites receive electricity directly from our sub-transmission network. Some of our large commercial and industrial customers are supplied directly off our 11 kV network; however, the majority of customers are served by the low voltage distribution system.

The implication of this electricity supply chain is that a fault on the low voltage network, or upstream on the high voltage distribution network, zone substation, or sub-transmission network will all impact (or have the potential to impact) customers supplied by the low voltage network. In scenarios where there are multiple faults on the electricity supply chain all these problems need to be resolved in order to restore supply to the customer.

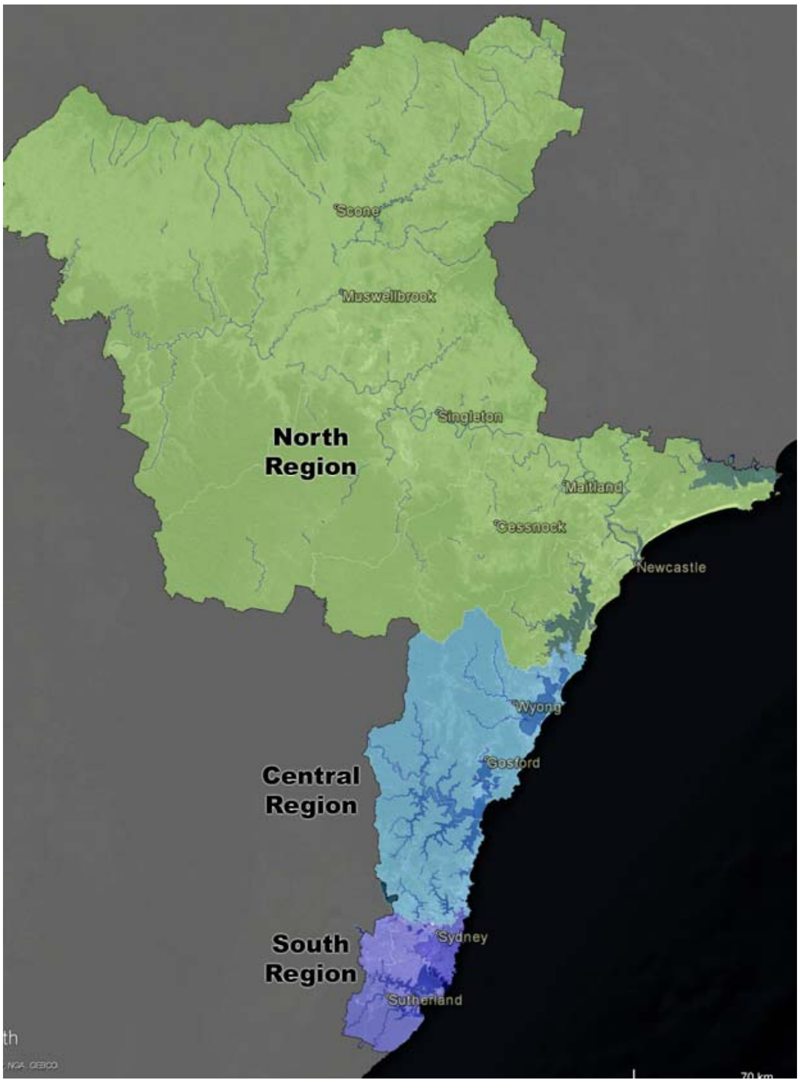
D1.3 How our network is operated and faults resolved

Ausgrid operates and maintains a highly complex array of assets including powerlines, substations, protection equipment and ancillary equipment. We have 230 sub-transmission and zone substations, over 31,000 distribution substations, 48,000 kilometres (km) of powerlines and 500,000 power poles.

The field operation and maintenance of Ausgrid's network is divided into three regions:

- South Region –includes the Sutherland local government area as far south as Waterfall, east of and including Bankstown and Auburn local government areas, up to Sydney Harbour;
- Central Region - includes the Central Coast and North Sydney areas, east of and including Hornsby, and Ryde local government areas;
- North Region - includes the northern part of Ausgrid's network area, including the Upper Hunter, Singleton, Muswellbrook, Port Stephens, Cessnock, Maitland Newcastle, and Lake Macquarie local government areas.

Figure D3 – Ausgrid's network split by operating region



Ausgrid's network is monitored, managed and operated via two Control Rooms, one in Sydney and the other in Newcastle. These two Control Rooms operate independently of one another and cover different network areas. The Sydney Control Room manages the Sydney CBD and Sydney East, Sydney South, Sydney North, and the Central Coast network areas (or the South and Central Regions depicted in Figure D3). The Newcastle Control Room manages the network for the Newcastle, Lower Hunter and Upper Hunter network areas (or the North Region depicted in Figure D3). Each Control Room has the ability to monitor the network areas monitored by the other Control Room if required in emergency situations such as a local site evacuation.

Ausgrid monitors the operation of its network through a number of different tools and systems such as:

- Supervisory Control and Data Acquisition (SCADA) –a system used by Ausgrid's Control Rooms to remotely monitor and control the electrical network. The historical data gathered by the SCADA system is used by staff for electrical network investigations and reporting.

- Distribution Network Management System (DNMS) –is an advanced SCADA system used by Ausgrid's Control Rooms to monitor and control the electrical network. The DNMS interfaces with SCADA. From a Control Room perspective these two systems (SCADA and DNMS) are essentially considered the same.

- Outage Management System (OMS) –a computing application that predicts network fault locations based on a combination of customer outage calls and network device operations. This system is used across Ausgrid at the time of an outage to process customer outage calls, provide feedback to customers for known outages, and to assist with managing outage identification and restoration.[96] Ausgrid uses this system to manage its response to trouble calls received from customers. When calls from customers are received by Ausgrid's Contact Centre the calls are entered into OMS which triggers a response process

- Computer Aided Service System (CASS) –a despatching and mobile computing application that enables the electronic issuance of customer premise jobs to the field, such as reconnect orders and single premise outage jobs. The jobs are updated and completed in a CASS mobile solution in the field and updates on the progress of these jobs are available in CASS and the Outage Management System (OMS) via an interface. It is used primarily by System Control's Despatch sections and Emergency Service Officers (EMSOs).

Ausgrid has a network only Contact Centre, located in Sydney and Wallsend which allows customers and the public to quickly contact Ausgrid regarding network related matters. Ausgrid's Contact Centre also has in place "overflow" arrangements, whereby staff trained at other locations as overflow can be put on phones at short notice, if and when required. Ausgrid also has the capability to establish an additional Contact Centre site at Silverwater in the event that additional overflow arrangements need to be utilised.

Ausgrid uses a combination of the above systems and tools to manage faults on its network as not all of its assets can be monitored directly via the Control Room. SCADA/ DNMS is typically only used to manage alarms, and monitor and control the network from the sub-transmission network, and zone substations down to the start of the 11kV network, with some devices on 11kV feeders such as re-closers also captured.

Outlined in Table D1 below are the assets on Ausgrid's network which have SCADA/DNMS visibility.

[96] Primary users of OMS and OMS data include the Contact Centre, Control Room, Despatch, Field Services, Network Security, Network Reliability and Network Claims.

Table D1 – Assets monitored by Ausgrid's SCADA system[97]

Asset Type	Number 2013/2014	SCADA monitored
Dual Function (Transmission) System – 132kV (km)	784	Yes
Substations – sub-transmission	45	Yes
Sub-transmission System – 33kV, 66kV and 132kV (km)	3,508	Yes
Substations – Zone	189	Yes
Feeder Numbers CBD	55	Yes
Feeder Numbers – Urban, Short & Long Rural	2,089	Yes[98]
High Voltage Overhead – 11kV and 22kV (km)	10,092	Yes[98]
High Voltage Underground – 11kV and 22kV (km)	8,024	Yes[98]
Substation – Distribution	31,064	No
Low Voltage Overhead – 400V (km)	19,645	No
Low Voltage Underground – 400V(km)	7,099	No
Pole (number)	509,277	No[99]
Streetlights (number)	254,637	No

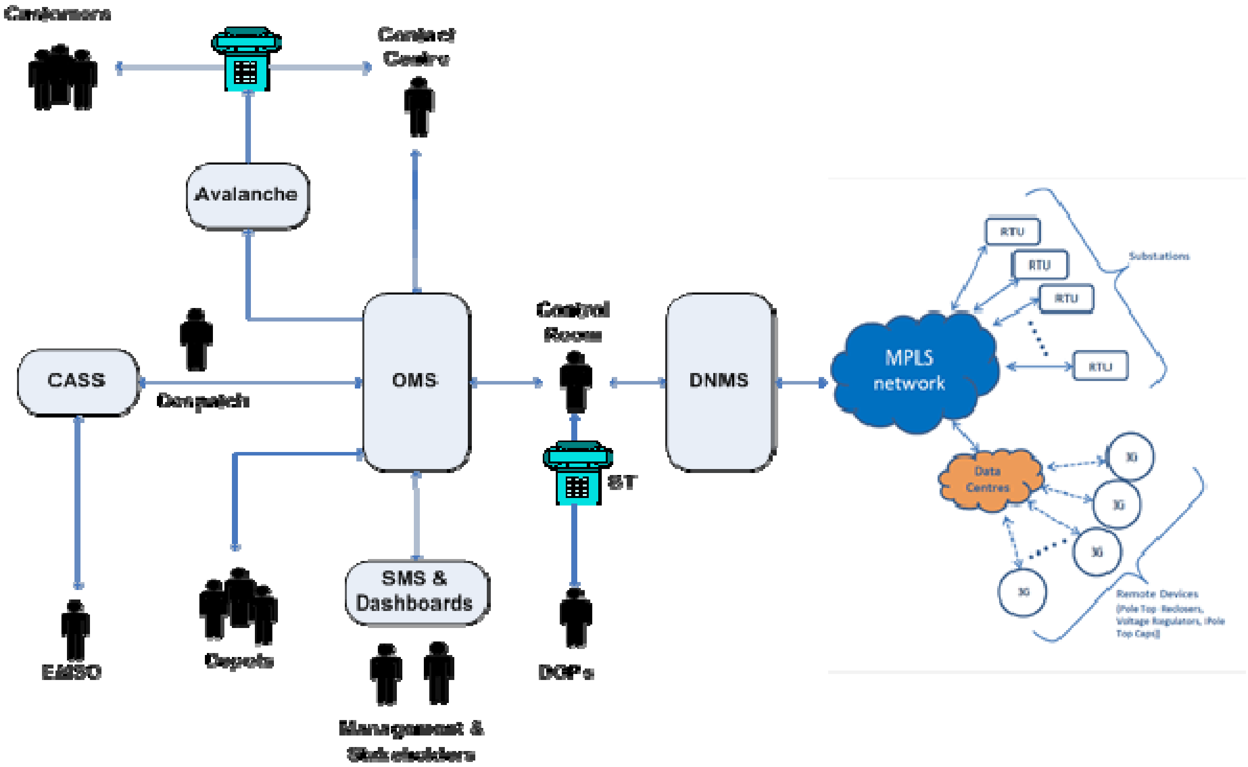
As demonstrated by the table above, a significant part of Ausgrid's network is not monitored or controllable by SCADA/DNMS. When a fault occurs on parts of the network not monitored by automated systems (predominantly Ausgrid's 11kV distribution network beyond the feeder circuit breaker on the high voltage and low voltage distribution network[100]), Ausgrid relies on customers and the public to notify it of problems on the network through calls to its Contact Centre entered into OMS. Calls entered into OMS then trigger a response process.

In addition, whilst Ausgrid's Control Room might be aware of a fault which has caused an 11kV or sub-transmission feeder to trip based on alarms from SCADA/DNMS, it will not know the exact cause of the fault prior to field patrols. In these cases using information received by the Contact Centre entered into OMS can assist in responding to these events by providing an indication as to the potential fault locations and causes.

The processes and responses which are triggered by a fault differ depending on the type of fault, as depicted in Figure D4 below. Understanding how Ausgrid monitors and responds to faults on its network provides important context for Ausgrid's response efforts and the challenges it faced in coordinating restoration work.

[97] Note, that Ausgrid assets monitored by SCADA/DNMS is across industry both in Australia and worldwide.
[98] SCADA control and monitoring is present at the start of feeders and at points where SCADA monitored devices such as reclosers are installed. SCADA monitoring and control is not present at all points along a feeder.
[99] Indirect monitoring for some poles if the failure of a pole causes a fault on a feeder that is SCADA monitored – i.e. an high voltage or sub-transmission feeder.
[100] Ausgrid has monitoring for the feeder circuit breaker (at the zone substation), so is aware if the whole feeder trips.

Figure D4 – Ausgrid's process for responding to faults



The above figure illustrates how the Control Room monitors the network using a combination of alerts provided by SCADA/DNMS, which are supplemented with information provided by OMS through customers calls received via the Contact Centre.

The nature of the fault and its location on the network will determine how the fault is responded to and addressed. For example, where the fault relates to a single premise only, the jobs will be issued from OMS via Despatch or via Depots, whereas network related faults are generally managed by the Control Room and responded to via District Operators. Outlined below is a brief summary of the business as usual responses triggered by different faults on the network.

- Network fault is identified by SCADA/DNMS - an alarm is received into SCADA/DNMS notifying the Control Room of a fault. This information may be supplemented by a customer call entered into OMS which could provide the Control Room with an indication of the potential cause or location of the fault. The Control Room will notify District Operators who will patrol the network to try and establish the cause of the fault before isolating, switching and issuing access permits for appropriate skilled staff to undertake repair work.

- Network Fault identified by calls in OMS or direct call to Control Room - a significant portion of the network is not monitored by SCADA/DNMS. For faults on individual distribution substations or low voltage distributors Ausgrid relies on loss of supply calls being taken and entered in OMS. When multiple loss of supply calls are received in an area OMS will try to predict if a part of the network is likely to have an outage causing the loss of supply. The Control Room has visibility of these predicted outages and will notify District Operators who will patrol the network to try and establish the cause of the fault before isolating, switching and issuing access permits for appropriate skilled staff to undertake repair work.

- Single Premise Fault identified by calls in OMS that can be handled by an Emergency Service Officer (EMSO) - these jobs are issued electronically by a system called CASS that interfaces to OMS. This is done by the Despatch team in System Control as opposed to being coordinated by the Control Room.

- Single Premise "Depot Job" requiring line crews - business as usual (BAU) jobs that require a line crew that are unrelated to a network outage are sent in OMS to the depots to manage the response.

Where a network outage results in more than 500 customers without supply, SMS message alerts are sent to relevant Ausgrid management. These messages often trigger the provision of media updates via email and social media by Ausgrid's Corporate Affairs team. These updates provide general information on outage and restoration updates for customers and stakeholders. Ausgrid also has an internal dashboard that provides visibility of the jobs currently active in OMS. These processes are consistent with other DNSPS in Australia and overseas.

D2 Impact to Ausgrid's Network

Ausgrid's network suffered extensive damage from the storms. The heavy rain caused significant soil erosion, which in combination with prolonged strong winds caused ground conditions to weaken and trees to be uprooted and power poles to lean or fall. In some cases the wind force was so great that power poles were snapped in two (refer to image 5).

Whilst heavy rain was a contributing factor, the majority of damage sustained to Ausgrid's network was predominantly caused by the strong winds generated by the storms, which either directly impacted on the network or caused indirect impacts due to the surrounding environment (mainly vegetation) making contact with assets on Ausgrid's network. The gale force winds resulted in thousands of trees and branches falling, bringing down power lines and poles, damaging kiosk substations and pole top transformer substations, and causing customer service lines to pull away from their point of attachment. We have sought to highlight this damage by providing photos of some of the damage to Ausgrid's network.

Image 1 - Tree on Wires at Berkeley Vale

Image 2- Substation destroyed at Gateshead

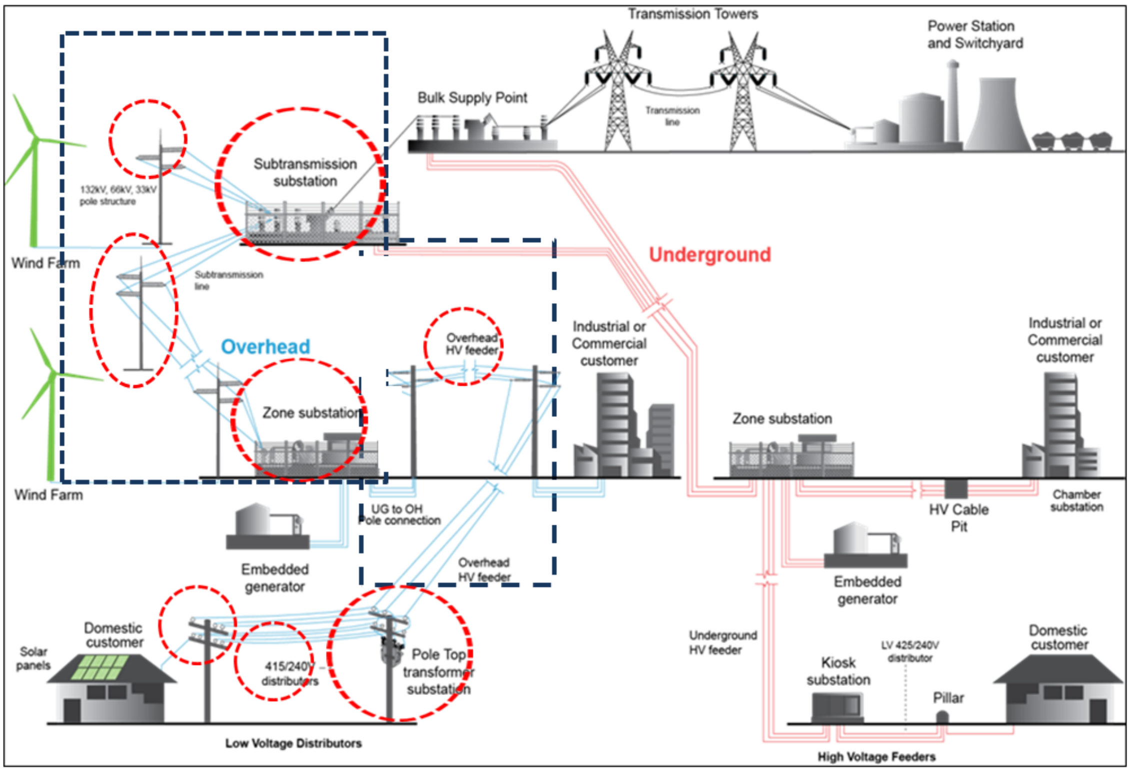
Image 3- Uprooted tree at Bigola Plateau blocking access and downing overhead wires

Image 4 - Fallen vegetation causing downed wires at Glen Road, Ourimbah

Image 5 (left image) Broken power pole at Rookwood

The storms largely caused damage to Ausgrid's overhead network, specifically assets on its 132kV, 66kV, 33kV, 11KV and low voltage network. The damage sustained to the network triggered numerous faults resulting in widespread customer outages. We have highlighted the parts of the network primarily impacted by the storms in Figure D5 below, using dotted red circles. As indicated by Figure D5, the majority of damage sustained from the storms was to Ausgrid's overhead network distribution network.[101] Also highlighted in the diagram (by the dashed blue box) are the assets impacted by the storm which are monitored by SCADA/DNMS. We have highlighted this section of the network to demonstrate what parts of the network the Control Room has direct visibility of when a fault occurs.[102] For the remainder of assets outside of the dashed blue box and situated from the start of the high voltage feeders, the level visibility of faults is not readily available and Ausgrid must instead rely on customers and the public to notify it of faults via the Contact Centre which is in turn managed through OMS.[103]

Figure D5 – Areas of Ausgrid's network impacted by the storm



Consequently, to appreciate the magnitude of the storm's impact on Ausgrid's network it is necessary to take into account the impact reported on Ausgrid's sub-transmission and high voltage networks via SCADA and trouble calls entered into OMS. To view either in isolation would provide an incomplete picture of the damage sustained to the network. While a fault may occur on the sub-transmission level, or high voltage feeder level, potentially impacting on large numbers of customers,[104] in this storm event there was also a significant volume of damage downstream of the level of SCADA monitoring. These faults would not necessarily correlate to known problems on upstream feeders, and each of the resulting OMS jobs required investigation to ensure the network was safe and that customer supply was restored. This activity needed to be coordinated with investigation of known problems on the network identified by SCADA.

To give the AER a more comprehensive view of the damage sustained by Ausgrid's network we have outlined in detail the number and nature of faults that occurred on our network as a direct result of the storms by examining the damage to Ausgrid's sub-transmission and high voltage networks, call volumes and OMS jobs.

[101] It should be noted that the damage sustained to Ausgrid's network was primarily to itsoverhead network. Sub-transmission and zone substations were not damaged per se but were impacted nonetheless as a result of the damage sustained to overhead mains and feeders which triggered the operation of protection equipment causing some zone substations and sub-transmission substations to experience sustained outages until faults on feeders could be rectified.
[102] SCADA /DNMS issue alerts and notifications to the control room when a fault is detected. However, whilst these systems alert the control room to a fault/outage on the network it does not alert the control room to the cause of the fault only that a fault has occurred.
[103] Note that the area of the network situated between the Bulk Supply Point to the zone substation on the underground network is also monitored by SCADA/DMNS. Minimal events were experienced on the underground network during the storm.
[104] As a fault at this level may impact both customers directly connected to the feeder as well as customers connected further downstream.

Understanding the severity of the storm's impact on Ausgrid's network, and on different elements in the electricity supply chain, provides context for the magnitude of restoration work required to make the network safe and restore customer supply, which subsequently resulted in Ausgrid incurring a material increase in costs in providing direct control services that it would not have incurred without the storm event.

D2.1 Impact of the storms on Ausgrid's sub-transmission network

To highlight the damage to Ausgrid's sub-transmission network we have included a table summarising the number and nature of faults incurred, as well as the number of customers who were affected. Specifically, the table below shows the number of:

- Trip and reclose events – some of Ausgrid's sub-transmission network has auto-reclose capability. When auto-reclose is used a feeder will trip (i.e. open) on detecting a fault and then automatically reclose (i.e close) to see if the fault was transient. In the case of a transient fault this means the feeder is only open for a short period of time (<1 minute) before it is available again. If the fault is not transient (i.e. it is a permanent fault) the feeder will open again resulting in a lockout event whereby the feeder is opened permanently.

- Lockout events– where a feeder has tripped and opened permanently (causing no supply) due to a fault. This can be because the feeder has auto-reclose capability but was unable to clear the fault or because a fault was detected and the feeder does not have auto-reclose capability. For the purposes of the table below, if a feeder tripped, reclosed, and locked out then this is counted as a lockout, rather than a trip and reclose event and as such these events are not reflected in the trip and reclose count.

- Events resulting in sustained outages to zone substations – these events occur due to a combination of the previous events on the sub-transmission network. Due to the way Ausgrid's network is configured if there had already been a number of events to other sub-transmission feeders in an area an additional event on the sub-transmission network may trigger a sustained outage to one or more Ausgrid zone substations. Events that resulted in momentary interruptions (<1 minute) or interruptions to directly connected sub-transmission customers are not reflected in the number of events resulting in sustained outages to zone substations.

- Zones & Customer Impact – the table outlines the zone substations affected and customer impact associated with a sustained outage.[105]

Table D2 – Damage to Ausgrid's sub-transmission network (132kV, 66kV, and 33kV)[106]

Sub-Transmission Region (Area)	Trip & Reclose	Lockouts	Events Resulting in sustained Outages to Zone Substations	Zone and customers impact	Total Number of Customers impacted
South Region	0	4	0	NA	0
Central (Sydney North)	0	10	3	Event 1: Manly ZS, Harbord ZS and North Head ZS – 14,743 Customers Event 2: Narabeen ZS – 1,821 Customers Event 3 – Brookvale ZS – 5,801 customers	22,365
Central (Central Coast)	1	12	3	Event 1: Peats Ridge ZS 1,776 customers Event 2: Wamberal ZS – 2,980 customers Event 3 – Somersby ZS 3,522 Customers	8,278
North (Newcastle Inner City)	12	13	1	Event 1 – Maryland ZS 2,448 customers	2448
North (East Lake Macquarie)	4	6	0	NA	0

[105] In many cases some customers fed from these zone substations may have already been impacted by an early event on the distribution network. The customer impact excludes the impact of any such prior faults.
[106] Table 9 reflects the damage sustained to Ausgrid's sub-transmission and high voltage network from 20 to 22 April 2015.

Sub-Transmission Region (Area)	Trip & Reclose	Lockouts	Events Resulting in sustained Outages to Zone Substations	Zone and customers impact	Total Number of Customers impacted
North (West Lake Macquarie)	9	7	1	Event 1 – Toronto ZS 4,368 customers	4,368
North (Maitland & Hunter)	11	17	2	Event 1 – Cessnock & Paxton ZS 5,548 customers Event 2 – Cessnock ZS 3,415 customers	8,963
North (Port Stephens)	9	13	4	Event 1 – Stockton ZS 3,091 customers Event 2 – Tomago ZS 458 customers Event 3 – Raymond Terrace ZS 3,837 customers Event 4 – Raymond Terrace ZS 276 customers	7,662
Total	**46**	**82**	**14**	**NA**	**54,354**[107]

As most of Ausgrid's sub-transmission network has redundancy (i.e. more than one sub-transmission feeder supplying a zone substation) a single sub-transmission event generally does not result in a sustained interruption to a zone substation.

In the case of the April storms - where there were many sub-transmission events, the impact of each sub-transmission event depended on the state of the network at the time. If redundancy still existed then in general a sub-transmission event would not directly result in a sustained outage to a zone substation.[108] However it would "weaken" the security of the network meaning a further event would be more likely to result in an outage to a zone. If there had already been events on other sub-transmission feeders in an area then a new sub-transmission event could then result in an outage to a zone or parts of a zone.

In the event of a sustained sub-transmission outage (i.e. lockout) the feeder had to be patrolled to determine the cause of the fault before it could be returned to service. Patrols of sub-transmission feeders are typically performed by District Operators and transmission overhead crews. Repairs would depend on the types of faults that were found. This process is the same whether or not a customer outage resulted from the sub-transmission event, though a sub-transmission outage resulting in a customer impact would have higher priority.

As indicated by Table D2, there were a total of 82 faults occurring on Ausgrid's sub-transmission network which required patrols to be sent out to investigate the cause of the fault and assess the repair work required to the sub-transmission feeder. While the number of faults on the sub-transmission network is relatively small compared to the number of faults incurred on the distribution network, the corresponding impact of each fault upon customers is much higher with 54,354 customers experiencing sustained outages as a result of the faults occurring on the sub-transmission network.

Restoring the sub-transmission network was a key focus of Ausgrid's response efforts after addressing hazards, because prioritising this part of the network meant that supply could be restored to larger numbers of customers than resolving faults on the distribution network as these assets supply significantly smaller numbers of customers. Additionally, re-establishing network redundancy was important in order to ensure the security of the network, which was a priority at the time, given the forecasts for further poor weather events.

[107] For clarity, this is the total number of customers experiencing a sustained interruption (interruption greater than one minute) due to sub-transmission network interruptions, and excludes both momentary interruptions (interruptions less than one minute) and interruptions due to faults on the 11kV and low voltage networks.

[108] A sustained outage refers to customer outages with a duration greater than one minute. Outages less than one minute (typically due to automatic reclosing or automatic change-over schemes) are referred to as momentary outages.

D2.2 High voltage network damage

As outlined previously Ausgrid has some visibility of events on the high voltage distribution network through DNMS/SCADA. If a whole distribution feeder trips, or if a SCADA monitored device along the feeder such as a line recloser trips Ausgrid's Control Rooms will receive an alarm into DNMS/SCADA indicating that a fault has occurred.

Similar to the sub-transmission network, some of Ausgrid's distribution network has auto-reclose capability. This means that for a transient fault in some parts of the network a "trip and reclose" event will result with the feeder, or feeder section, opening automatically for a short period of time before automatically closing again. In these cases customers on the affected part of the network will see a short duration (<1 minute) outage.

If auto-reclose is unsuccessful (i.e. the fault remains on the network when reclose is attempted), or the feeder does not have auto-reclose installed then a "lockout" event results. In the case of a lockout event affected customers will see a sustained outage. Feeders that have locked out need to be patrolled to identify the cause/s of the fault(s) before any restoration and repair activity can commence.

Table D3 shows the number of trip and reclose events, and lockout events seen on the 11kV network during the first 2 days of the storm event. While the typical individual customer impact (average customers per event) is less than that of the sub-transmission network, the volume of events on the high voltage 11kV network meant that this portion of the network accounted for the majority of the customer interruptions during the storm event.

Table D3 – Summary of damage to Ausgrid's high voltage network from the April storm

Sub-transmission Region (Area)	Trip and Reclose	Sustained zone interruptions		Total number of customers impacted due to sustained interruption
		Number of Zones with feeder outages	Number of Events	
South	7	13	16	24,820
Central (Sydney North)	9	21	45	47,204
Central (Central Coast)	33	15	107	92,830
North (Newcastle)	35	22	72	77,054
North (Maitland and Hunter)	20	22	74	39,560
North (Port Stephens)	5	3	13	16,904
Total	**109**	**96**	**327**	**298,372**

D2.3 Customer calls

Whilst faults sustained to Ausgrid's sub-transmission and 11kV networks caused wide-spread outages there were also significant numbers of smaller faults reported on Ausgrid's 11kV (below level of SCADA monitoring) and low voltage distribution networks, which impacted customer supply.

Through SCADA/DNMS Ausgrid receives alarms and visibility of faults that involve whole 11kV feeders and also faults where some SCADA monitored devices on the high voltage distribution network operate (e.g. line recloser).

As outlined previously, Ausgrid does not generally have visibility of faults occurring beyond the zone substation level but relies on customers and the public to report faults occurring on this section of the network through its Contact Centre which are then entered into OMS.[109] Consequently, as the impact of the storms became apparent, customers rushed to report emergency hazards and power interruptions that were not necessarily reflected in the alarms and notifications captured by SCADA/DNMS.

[109] Ausgrid does have some visibility below the zone substation. For example, Ausgrid will know that an 11kV has trips and lockouts, however, it will not know what know the cause of the fault or the exact location of the fault on the feeder. Ausgrid does not have visibility of its low voltage distribution network, which consists of a large number of assets (refer to Table D1) without customers calling in and reporting an outage.

Ausgrid's Avalanche Interactive Voice Response (IVR) system which provides customers who call Ausgrid's emergency line some information about known outages and major network events, is a useful indicator for understanding the magnitude of the storm's impact. Avalanche IVR is used by Ausgrid to manage call volumes by providing information about outages via automated voice messages.[110] The IVR also gives customers the option to report either a hazardous situation or a loss of supply. When customers select these options they are transferred to Ausgrid's Contact Centre to speak to a customer service representative.

Many customers who receive outage information from Avalanche (and are satisfied with the automated message) do not hold the line to speak to the Contact Centre, thus allowing priority to be given by the call centre to hazard calls or outage calls related to unknown problems.

Table D4 below shows the call volumes that were received by Ausgrid's Avalanche IVR during the April storm event, and consequently highlights the damage to Ausgrid's network as a result of the storm. Table D4 shows the total number of calls to Ausgrid's Avalanche IVR, as well as a breakdown of the number of calls that were transferred to the Contact Centre to report a hazard or loss of supply problem, as well as the number of calls which exited the Avalanche IVR for a different reason.[111]

During the period 20 April to 1 May 2015, Avalanche handled about 283,000 calls. The highest numbers of calls occurred on 20 and 21 April. Since the introduction of Avalanche in January 2012, there had only been four days where Ausgrid's call volumes exceeded 10,000 calls. During the storm event call volumes in excess of 10,000 were received on 5 consecutive days, and are therefore a useful indicator for understanding the magnitude of the storm's impact on Ausgrid's network.

Table D4 – Avalanche call volumes[112]

Date	Total calls	Transferred to site	Hazard	Report problem	Other Exit Reason
20 April 2015	9,540	3,825	785	2,668	372
21 April 2015	123,213	36,807	15,995	17,096	3,716
22 April 2015	56,454	13,272	3,628	8,082	1,562
23 April 2015	38,435	9,429	1,674	6,675	1,080
24 April 2015	23,863	7,297	1,150	5,378	769
25 April 2015	10,136	4,561	601	3,539	421
26 April 2015	6,194	3,297	412	2,585	300
27 April 2015	5,872	3,738	486	2,936	316
28 April 2015	3,067	1,979	279	1,514	186
29 April 2015	2,555	1,394	244	1,018	132
30 April 2015	2,113	1,192	186	892	114
1 May 2015	1,822	1,157	186	886	85
Total	**283,264**	**87,948**	**25,626**	**53,269**	**9,053**

[110] Customers are asked to input the postcodes of their address. Avalanche, using the known outages already logged in OMS, then provide customers with an automated response regarding known outages impacting that postcode.

[111] Of the calls received to Ausgrid's Avalanche IVR some customers would hang up while some would hold to speak to a customer service representative to report a hazard or an outage. Other Exit Reason in Table D4 refers to customers who came to the site because of another reason such as selecting invalid postcodes or not selecting an option.

[112] The call numbers represented in Table D4 are calls received through Ausgrid's Avalanche system (Ausgrid's main emergency line 131388) and do not include calls made directly to Ausgrid's hazard and Police, Fire and Ambulance (PFA) lines, direct hazard line, and major customers line.

D2.4 OMS jobs

Customer calls answered during the storm event were entered into OMS (creating or updating OMS jobs), triggering a response process. Consequently, the number of jobs created in OMS during the storm event (whilst potentially a lagging measure as customers may have been reporting problems that had existed for a period of time) is a useful indicator for understanding the damage sustained to Ausgrid's network, as it was used by the Control Room to supplement information on known faults on the sub-transmission and high voltage distribution networks and also to provide visibility of outages and damage sustained to the distribution network beyond the level of SCADA/DMNS monitoring. Therefore, analysis of OMS jobs raised during the storm event provides a holistic view of the damage sustained to Ausgrid's network and the subsequent customer impacts, and provides important context for the magnitude of restoration required to restore customer supply.

Outlined below in Tables D5 to D8, is information extracted from Ausgrid's OMS which highlights both the number and nature of faults which occurred on Ausgrid's network as a result of the storms. The data extracted from OMS in Tables D5 to D8, is for the period of 20 April 2015 to 1 May 2015, which coincides with the date the storm was first declared an emergency incident to when the incident was officially deescalated.

Jobs entered into OMS as no supply and hazard have the following meanings:[113]

- No Supply – refers to jobs notifying Ausgrid of no power at a premise;
- Hazard – refers to jobs regarding a broad range of hazard scenarios that pose a safety concern to the customer or members of the public including - trees leaning on distribution or service wires, damage to switchboards, poles leaning/split or fallen on the ground, wires on the ground/hanging low/pulling away, point of attachment pulling away, service wires taut or twisted, and wires arcing.

It is important to note that the number of jobs created in OMS does not reconcile with the number of faults, as multiple jobs could be associated with the same fault or hazard. Further, multiple calls were sometimes received from the same customer seeking further information on when power could be expected to be returned to their premise. Ausgrid made significant efforts to avoid duplicative entries in OMS by dedicating resources to sort through the jobs entered in OMS to identify calls related to the same event prior to jobs being packaged and allocated to crews.

Table D5 below, provides a summary of the no supply and hazard calls entered into OMS as a consequence of the storms. The total number of jobs created in OMS during the storm event was 21,306. Whilst there might be multiple jobs corresponding to a fault, this data still provides a useful indicator regarding the magnitude of faults that occurred on Ausgrid's network which subsequently required investigation to determine repair work needed to return customer supply.

Throughout the storm event around 15,000 hazard jobs were created including urgent safety hazards such as fallen/leaning power poles and fallen wires. During the initial days of the storm event Ausgrid's priority was around hazard call taking and job entry so that Ausgrid's response efforts could be focused on making the network safe and ensuring the security of the network.

As evidenced by Table D5, the profile of OMS jobs (no supply versus hazard calls) changed through the duration of the event with hazard calls dropping significantly as the storms decayed and weather conditions improved, which had a corresponding impact on how work was prioritised. This change in OMS profile occurred as a result of Ausgrid's media communications and Avalanche messages during the initial period of the storms which encouraged customers to report hazards rather than no supply as Ausgrid was already aware of the significant volume of customer outages. A sample message playing to all customers calling Ausgrid's 13 13 88 number on the night of the 20 April and 21 April is provided below.

> *Please be aware that due to widespread storm damage, we are experiencing significant delays. Unless you are calling due to wires down or a life threatening situation, please call back again later.*

And during the day on 21 April:

> *We have wide spread storm damage across our network. To ensure community safety, we can only take wires down and life threatening hazard calls at this time. General information about affected areas and restoration times is available on Ausgrid's Facebook page, twitter account and web site. To report a wires down or life threatening call please hold on the line.*

[113] Refer to Attachment 13 – Contact Centre OMS Codes.

Table D5 - Number of jobs created in Ausgrid's Outage Management System (OMS)

Date	Types of jobs created in OMS		Total
	No supply	Hazard	
20 April 2015	383	771	1,154
21 April 2015	931	5,444	6,375
22 April 2015	1,194	3,237	4,431
23 April 2015	1,060	1,503	2,563
24 April 2015	826	948	1,774
25 April 2015	630	631	1,261
26 April 2015	425	435	860
27 April 2015	491	523	1,014
28 April 2015	294	308	602
29 April 2015	193	283	476
30 April 2015	216	215	431
1 May 2015	147	221	368
Total	**6,790**	**14,519**	**21,309**

Tables D6 and D7 below provide a more detailed view of the number of no supply and hazard jobs by region to highlight the correlation between the areas of the network where the majority of faults were reported and the locations within Ausgrid's distribution network area heavily impacted by the storms.

Table D6 – No supply jobs entered into Ausgrid's OMS

Date	Number of jobs by region			Total
	Central	North	South	
20 April 2015	195	58	130	383
21 April 2015	345	428	158	931
22 April 2015	546	231	417	1,194
23 April 2015	478	357	225	1,060
24 April 2015	418	305	103	826
25 April 2015	257	229	144	630
26 April 2015	185	156	84	425

Date	Number of jobs by region			Total
	Central	North	South	
27 April 2015	204	182	105	491
28 April 2015	109	133	52	294
29 April 2015	68	83	42	193
30 April 2015	78	65	73	216
1 May 2015	54	35	58	147
Total	**2,937**	**2,262**	**1,591**	**6,790**

Table D7 – Number of Hazard jobs entered into Ausgrid's OMS

Date	Number of jobs by region			Total
	Central	North	South	
20 April 2015	387	72	312	771
21 April 2015	2,603	2,156	685	5,444
22 April 2015	1,575	1,163	499	3,237
23 April 2015	690	650	163	1,503
24 April 2015	412	444	92	948
25 April 2015	228	276	127	631
26 April 2015	193	187	55	435
27 April 2015	222	207	94	523
28 April 2015	129	131	48	308
29 April 2015	115	113	55	283
30 April 2015	96	77	42	215
1 May 2015	97	74	50	221
Total	**6,747**	**5,550**	**2,222**	**14,519**

Table D8 provides a more detailed view of the hazard jobs created during the storms to provide further context on the nature of the faults (i.e. damage sustained to Ausgrid assets) addressed as part of Ausgrid's storm response. Jobs logged as hazards were attended as a priority as faults of this nature typically pose a significant safety risk to customers or members of the public.

It is important to note that the hazard type listed in Table D8 could reflect a number of different fault scenarios. For example, in the case of trees and/or branches blown down or falling into the overhead network causing downed wires, there could be a range of different repair scenarios required to restore supply depending on the size and number of trees.

The complexity and time involved in restoration would also depend on the number of trees/branches involved and (in order of increasing complexity) whether the wires brought down resulted in a combination of broken conductors, insulators and/or tie wires broken, cross arms broken, poles snapped or leaning at an unacceptable angle.

Consequently, whilst hazards have been broadly grouped according to a particular hazard type in Table D8, the restoration work required to address a particular hazard and return supply could vary significantly within each hazard type category depending on the specific nature of the fault (i.e. the cause of the fault and whether there were access issues) and the resources available to undertake the restoration work.

Table D8 - Breakdown of hazard jobs entered into OMS by Region

Hazard type	Central	North	South	Total
Other	971	901	426	2,298
Point Attach/Switch Board	110	117	137	364
Pole	265	207	152	624
Wire Down	2,385	2,022	568	4,975
Wire/Tree	3,016	2,303	939	6,258
Total	**6,747**	**5,550**	**2,222**	**14,519**

D3 Customer Impact

The damage sustained to Ausgrid's network during the storms caused significant customer outages throughout Ausgrid's network. During the April storm event, at its peak, about 240,000 customers were without power, with over 369,000 customers experiencing one or more sustained interruptions.[114]

A more detailed breakdown of customer outages by operating region is provided in Table D9 to highlight the magnitude of the impact on certain parts of Ausgrid's network. As can be seen, significant damage to Ausgrid's Central and North operating regions resulted in extensive customer outages. In the Central Region over a quarter of all customers serviced by this network area experienced supply interruptions while over half of customers in the Newcastle and Hunter (North Region) were left without power.

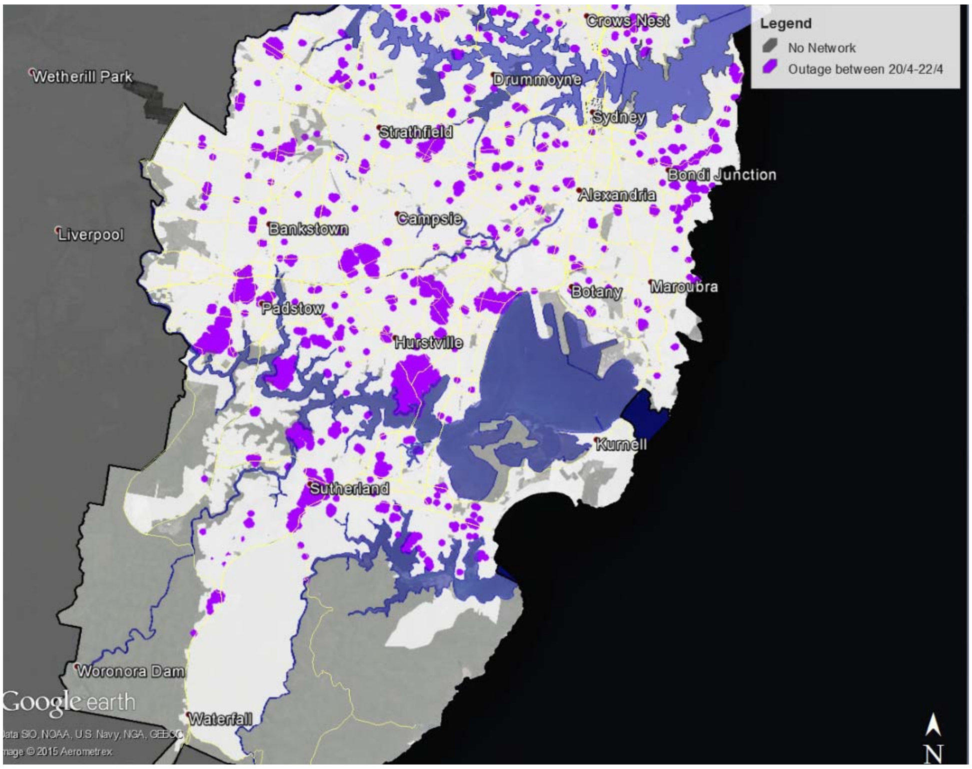
[114] Note that during the storm event, customer outage numbers were initially higher (at approximately 275,000 customers without supply) than the final numbers quoted in this application as Ausgrid's initial estimates of the impact was based on data available at the time.

Table D9 – Customer outages by region[115]

Region	Peak customers w/o supply	Total # of customers	Percentage of peak customers w/o supply	Total #of customer experiencing outages[116]	Percentage of total customers experiencing outages
South	**8,578**	**831,176**	**1%**	**36,197**	**4%**
Central	**113,186**	**554,975**	**20%**	**174,674**	**31%**
Sydney North	*35,854*	*395,573*	9%	*75,803*	19%
Central coast	*82,531*	*159,402*	52%	*98,871*	62%
North	**126,199**	**289,111**	**44%**	**157,971**	**55%**
Newcastle	*76,499*	*164,612*	*46%*	*92,192*	*56%*
Lower Hunter	*51,618*	*99,662*	*52%*	*64,007*	*64%*
Total	**239,577**	**1,675,543**	**14%**	**369,446**	**22%**

The customer outages that were triggered as a result of the storms were widespread throughout Ausgrid's distribution network area. Figures D6-D8 below shows maps of each of Ausgrid's operating regions extracted from GIS, showing outages marked in purple, highlight the dispersed geographical nature of outages that occurred on Ausgrid's network. These figures also show, in yellow, the areas that were difficult to access (due to flooding for example), restricting Ausgrid's ability to promptly respond to the situation.

Figure D6 –Outage map of South Region during 20 to 22 April



115 Total customer outages numbers in Table D9 are for the period 20 April to 25 April 2015.

116 Total number of customers experiencing outages refers to the total number of customers who experienced at least one interruption with a duration greater than one minute in the period 20 to 25 April 2015.

Figure D7 – Outage map of Central Region during 20 to 22 April

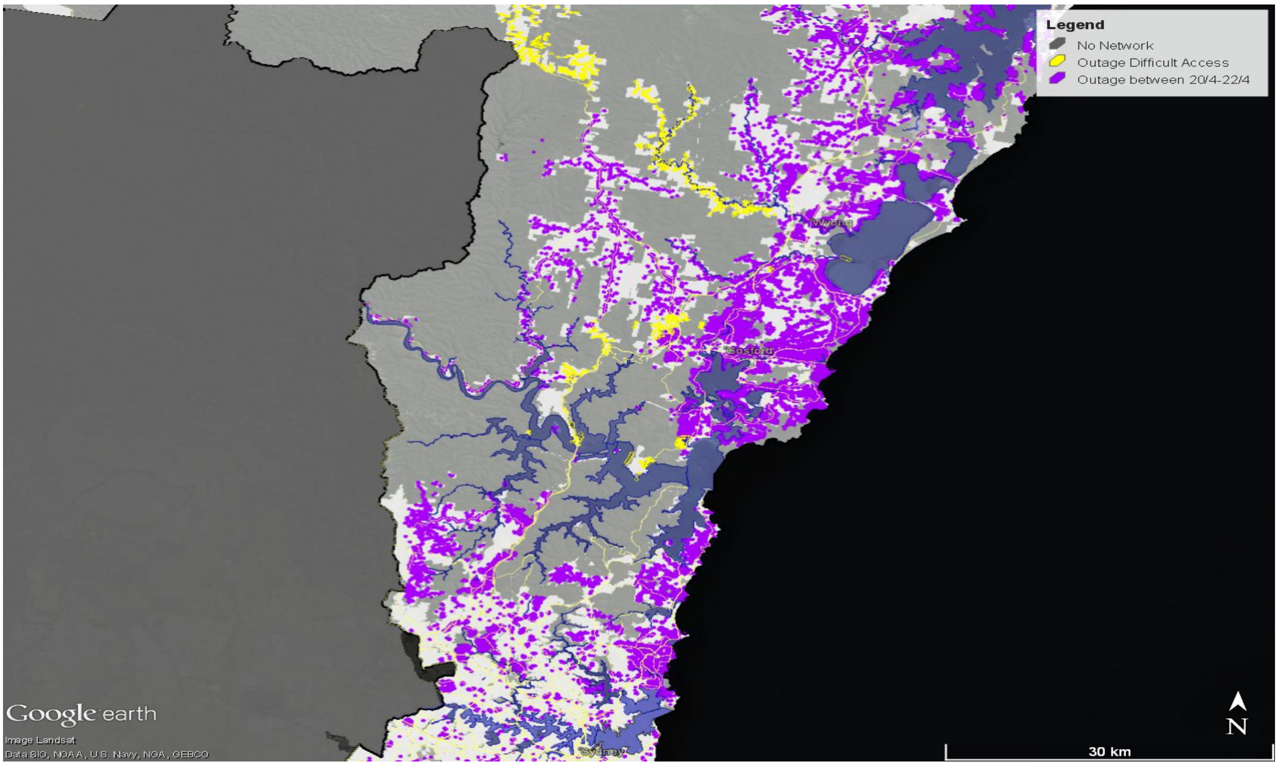
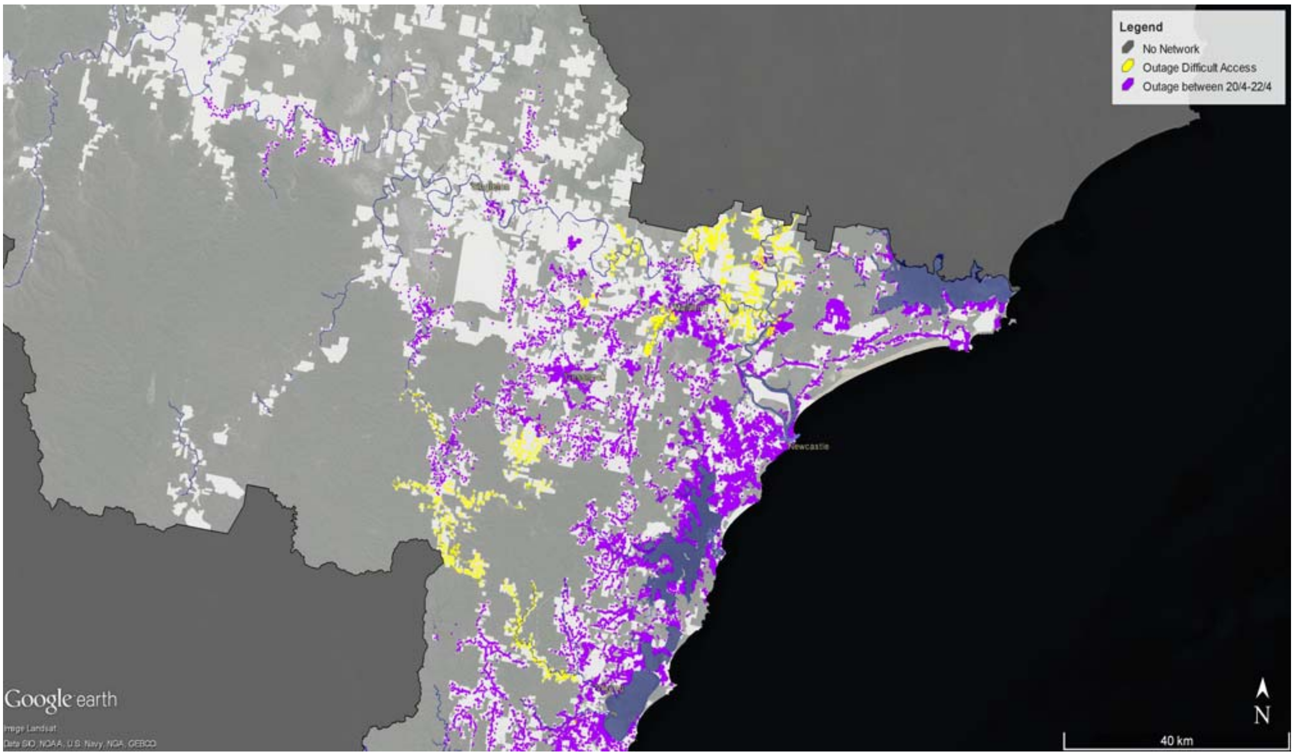


Figure D8– Outage map of North Region during 20 to 22 April



Appendix E – Ausgrid's Response to the April Storm Event

As noted in Appendix A and D, the weather conditions generated by the East Coast Low in April caused significant damage to Ausgrid's network, resulting in widespread outages throughout Ausgrid's network area. This section outlines how Ausgrid responded to these impacts. In particular, it focuses on the actions Ausgrid took to coordinate and plan the unprecedented level of restoration work required to return power as quickly and safely as possible to the 369,000 customers who experienced supply interruptions as a result of the storm. Specifically, this section discusses:

- the actions Ausgrid took to address damage sustained to its network from the storm to return customer supply as safely and as quickly as possible; and
- the challenges Ausgrid faced in coordinating and completing restoration work during the storm.

This information provides the AER with context for why the costs outlined in section 5 were incurred and an understanding of the underlying drivers for those costs.

E1 How Ausgrid's response was managed

Ausgrid's response to the April storm event was largely guided by the processes and procedures outlined in its IMS and Storm Response Plan discussed above in Appendix B. This section discusses how these mitigation controls facilitated a planned and coordinated response to the April storms, thus allowing Ausgrid to undertake restoration work as efficiently and effectively as possible in light of the circumstances and the safety risks posed to customers, the public and workers (both internal and external staff).

E1.1 Incident assessment and escalation

Ausgrid first became aware of the potential for a major storm to develop on 17 April 2015, when the Bureau issued an alert to emergency services and subscribers about the potential for an East Coast Low to develop off the Hunter coast. However, it was not until 19 April that the possible severity of the storm first became evident.[117] Ausgrid's Control Room closely monitored the development of the storm and its potential to adversely impact Ausgrid's network through a combination of live weather feeds in its Control Room, and notifications from the Bureau. As the ferocity of the storms started to intensify rapidly throughout the evening of 20 April, evidence of its destructive impact on Ausgrid's network began to manifest with customer outages starting to spike sharply.

Senior management was quickly alerted to the emerging network event and an assessment was made in accordance with Ausgrid's IMS. By 10:00pm 15 SMS alerts had been issued from OMS, approximately 630 hazard jobs had been logged and more than 20,000 customers were off supply. At approximately 11:00pm on Monday 20 April 2015, an incident was declared as a network type incident using the Incident Severity Matrixes described in Figures B2 to B4. A first Incident Team Meeting was scheduled for 8:00am Tuesday 21 April. By 8:00am 21 April 2015, the network incident was escalated to an emergency severity with approximately 200,000 customer outages. The storm was further classified as a Category 1 storm under the Storm Response Plan.

The classification of the April storm as a Category 1 storm network incident with an emergency severity allowed for the event to be escalated rapidly, by triggering the activation of an Incident Management Team Structure, as depicted in Figure E1 and activation of Storm Rooms in Depots. The activation of these arrangements allowed for Ausgrid to resource up quickly and undertake a coordinated response to the April storm event.

E1.2 Establishment of an Incident Management Team

As the April storms were a network related incident, it triggered the activation of a pre-defined Incident Management Team Structure, as represented in Figure E1 below. Ausgrid has in place a pre-defined Incident Management Team structure for events of this nature, as over time and learning from previous incidents we have realised that a number of key business units across the organisation need to be involved in assessing and planning our response to ensure that issues are considered holistically and restoration work and communications are carried out in the most effective manner under the circumstances.

[117] See Table 8 and Attachment 2 – Summary of severe weather warnings issued by the Bureau of Meteorology.

Figure E1 – Network Incident Management Team Structure

[redacted]

To give the AER an understanding of how this structure works we have provided a brief summary of the key roles in the Network Incident Management Team which were instrumental in coordinating Ausgrid's response. These are discussed below and are highlighted in red in Figure E1.

- Incident Controller – provided the overall coordination of Ausgrid's recovery effort for Ausgrid and formulation of recovery strategies. The Incident Controller amongst other things appointed additional staff to the Incident Management Team as required, determined the frequency of meetings, authorised various response strategies, and determined when the incident should be de-escalated.

- Incident Executive Officer– provided administrative support to the Incident Controller including activating the Emergency Coordination Centre, scheduling meetings and recording minutes.

- Emergency Management – liaised with Energy Utilities Services Functional Co-ordinator (EUSFAC) and with other customer groups such as Telstra, Sydney Water, Hunter Water, and Roads and Maritime Services.

- Regional Managers – provided updates on the status of restoration activities in their areas and regions, and worked with logistics teams to ensure that internal and external staff were appropriately allocated and inducted.

- System Control – provided updates with incident details (status of sub-transmission network, numbers of customers off supply, number of hazard jobs, etc), acted as a subject matter expert in electrical network management and identified areas of network risk related to the incident, and provided priorities for restoration activities.

- Corporate Affairs – monitored media coverage of the incident and provided updates to the Incident Management Team, issued media statements regarding the incident (both verbal and written), developed Ausgrid's media response strategy, informed key stakeholders such as Ministers of the status of the incident, and kept the public well informed of the current situation and Ausgrid's restoration efforts to restore customer supply.

- Contact Centre – provided updates on call volumes, resourcing and call taking strategies (for example the activation of the additional Contact Centre site at Silverwater), and was responsible for conveying accurate information to customers in conjunction with Corporate Affairs.

- Warehouse and Distribution – provided advice on matters related to equipment and material spares, and liaised with regions to proactively identify and meet material and equipment requirements for repair work.

- Logistics Co-ordinator – coordinated external staff requirements with regions, and provided updates to the Incident Management Team on external staff volumes, types of crews available and locations, and intended crew movements.

As the structure of the Network Incident Management Team is already pre-determined by Ausgrid's IMS and key roles already appointed by default, key staff were able to be mobilised quickly to coordinate Ausgrid's response to the April storm event, with the first meeting taking place at 8:00am on Tuesday 21 April 2015, 9 hours after the event was first declared.

E1.3 Planning and prioritisation of work

Ausgrid undertook a very planned and considered response to the April storm event. This approach was facilitated by Incident Management Team meetings which focused on:

1. **Situation Reporting** - both Control Rooms, each operating regions (South, Central, and North) and various distribution areas and transmission groups provided updates to the Incident Management Team on damage sustained to the network, customer outages, safety hazards, fault investigations, assessments on repair work required, and difficult access areas.

2. **Communications -** updates were provided from Contact Centre on call handling and queue status; Corporate Affairs provided updates on customer responses/feedback and advised on appropriate communication strategies for conveying updates to customers, media, Minister, and Emergency Management (Energy and Utility Services Functional Area Coordinator) on the status of the network, customer outages and safety messages. Regional Managers provided updates on communication to key stakeholders and customers (i.e. life support customers, hospitals, nursing homes and other critical infrastructure).

3. **Strategic Options -** discussed how to best prioritise restoration work in light of the circumstances and how to resource effectively to complete restoration work in light of weather conditions, resource skill sets and expertise and fatigue management. Different strategies and operational focuses were developed in order to give effect to the network restoration priorities based on the situation at the time and whether further impacts to the network was anticipated as a result of ongoing severe weather conditions generated by the storm.

4. **Logistics -** updates were provided on the number of OMS jobs in each operating region and the resource capabilities at a depot level. Updates were also provided on warehouse supplies and stock replenishment.

The consideration of these issues by the Incident Management Team allowed for appropriate recovery strategies to be formulated by the Incident Management Team, taking into account issues such as the state of the network, the number and duration of customer outages, anticipated weather conditions and safety considerations. As the status of these considerations changed throughout the April storm event, so too did Ausgrid's operational focus which is evident by Table E1.

Due to the severity of the event, the Incident Management Team met three times daily during the height of the incident (Tuesday 21 April to Friday 24 April), with meeting frequency later scaled back to twice a daily until the event was eventually de-escalated and the network stabilised.[118]

[118] The incident was de-escalated by Ausgrid on 1 May 2015, on the basis that the impact of the event had been reduced to a scale that restoration work was manageable at a local level.

Table E1 – Overview of Ausgrid's operational focus during the storm event

Date / number of meetings	Key operational focus
Mon 20 Apr	• Incident declared at approximately 10.40 pm • Meeting scheduled at 8.00 am Tuesday 21 April. • Network Incident was classified at Emergency Severity.
Tues 21 Apr [3 meetings at 8 am, 1 pm and 5 pm]	• Network Incident classified at Emergency Severity. • Leverage social media for communication and reporting of hazards by customers. • Activate established call centre overflow resources, prepare Silverwater site as a temporary call centre for additional seating capacity. • Focus on making safe due to continuing storm. o Attend to hazard jobs where possible. o Spotters sent to field. o Tree trimming contractors sent to assist. • Some Endeavour Energy crew available to assist. Essential Energy crews expected Wed 22 April.
Wed 22 Apr [3 meetings at 8 am, 1 pm and 5 pm]	• Focus continues to be on making safe and vegetation management. • Focus in restoring / partially restoring sub-transmission feeders, priority given to Mangrove/Mooney Dam water plants. • Action for the identification of GRN/Telecommunications sites affected. • Mobilising internal and external resources (Endeavour, Essential and Energex) • Identify number of life support customers without supply and commence work to make outbound contact to these customers. • Priority given to restore areas that may affect ANZAC processions and public holiday. • Emergency Operating Authorities to allow limited operation during storm considered feasible.
Thurs 23 Apr [3 meetings at 8 am, 1 pm and 5 pm]	• Focus continues on restoring sub-transmission feeders for Network Security. • Continue to mobilise and induct external crews and shifting District Operators team to the Central Coast. • Focus on getting supplies available and delivered. • Contact life support customers.
Fri 24 Apr [3 meetings at 8 am, 1 pm and 5 pm]	• Focus on Newcastle and Lower Hunter and on low voltage jobs as most sub-transmission jobs back in service. • Commence moving available crews from South Region to Central and North Regions. • Supplies received from suppliers and ship to Homebush.
Sat 25 Apr [2 meetings at 9 am and 5 pm]	• Focus on finishing high voltage jobs and move on to low voltage jobs, particularly in the Central and North regions. • Continue outbound calls to life support customers.
Sun 26 Apr [2 meetings at 9 am and 5 pm]	• Focus on finishing high voltage jobs and move on to low voltage jobs, particularly in the Central and North regions. • Continue outbound calls to life support customers. • Focus on assessing requirements for external crews as some Essential staffs are due to leave on Monday and Tuesday.
Mon 27 Apr [2 meetings at 9 am and 5 pm]	• Continue to focus on high voltage, pole transformers, low voltage and service jobs. Mobilise crews from South and Newcastle. • Expect all Newcastle customers supply to be restored by COB Wed 29 April and Lower Hunter Customers by COB Thurs 30 April. Forecast to move into mop up phase by Thursday. • ASP to focus on jobs in the Maitland area. Installation inspectors and EMSO to check flood affected premises prior to energisation.
Tues 28 Apr [2 meetings at 9 am and 5 pm]	• Weather forecast for Central Coast and Hunter not favourable, plan to secure sub-transmission network before adverse weather conditions arrive. • Focus on remaining high voltage jobs, and targeting to complete service jobs. Still expect Newcastle and Lower Hunter to be moving into mop up phase after Wed and Thurs. • Communication broadcast to ask customers without supply to call in if they had not done so already. • Focus on reducing external staff by Wed and Thurs.
Wed 29 Apr [2 meetings at 9 am and 5 pm]	• Majority of life support customers restored, only about 160 without supply. Call centre winding down from 24 hours operations. • Focusing on restoration work in Lower Hunter area. Moving resources from Newcastle to Maitland to support crews in Maitland. • Most external resources released after today.
Thurs 30 Apr [2 meetings at 9 am	• Focus on restoring supply to individual jobs, closing OMS jobs and mop up. • Deploy crews from South region, Newcastle area and Muswellbrook to Maitland to assist in the work

Date / number of meetings	Key operational focus
and 5 pm]	there. • Release Endeavour Energy staff by afternoon. • Emergency Operating Authorities issued during the incident to be immediately withdrawn once incident is de-escalated. • Customers still without supply asked to contact Ausgrid's Contact Centre.
Fri 1 May [1 meeting at 4 pm]	• Storm update webpage shut down – focus on message to customers about reporting street lighting problems. • Establish correspondence with NSW Regional Recovery Co-ordinator. • Expect business as usual by end of today. • Incident de-escalated by Incident Controller at 4:20 pm.

The planning undertaken by the Incident Management Team allowed for Ausgrid to appropriately prioritise recovery work to ensure that safety issues were addressed and work was undertaken in a manner which allowed for the maximum number of customers to be returned to supply as quickly as possible. Outlined below is an overview of how restoration work was prioritised during the storm event

1. **Addressing safety hazards** – Ausgrid's initial priority was to ensure customer and public safety. This was done by addressing OMS hazard jobs and employing an "attend to, cut away and make safe" approach by depots in each of Ausgrid's operating regions.

2. **Ensure the security of the sub-transmission network** – in parallel to the "attend to, cut away and make safe approach" there was a focus on conducting feeder patrols on the sub-transmission network to restore bulk customers supply by zone substations interrupted, and to re-establish network redundancy which was important in order to ensure the security of network supply.[119]

3. **Repair and restore high voltage feeders on the distribution network** – by prioritising high voltage feeders Ausgrid was able to restore large groups of customers as quickly as possible.

4. **Priority given to key customers** – these included hospitals, GRN, telecommunications (Optus, Telstra and Vodafone), nursing homes, drinking water and sewerage pumping stations, facilities for the 100th Anzac Day processions (i.e RSL clubs), schools, Ausgrid depots and facilities, and life support customers.

5. **Restoration of low voltage network and individual customer services** – Ausgrid focused on restoring low voltage distributors damaged by the storm and allocated single premise repair work such as fixing service lines and fuses to Accredited Service Providers (ASPs) as low voltage supply became available.

6. **Street lighting** – Street lighting repairs were undertaken in conjunction with other network repairs where possible, and outstanding damage was repaired once all customers were restored in a region.

In giving effect to these priorities, the Incident Management Team and depots had regard to staff availability, anticipated weather conditions, fatigue management, skill sets and required crew sizes, safety risks, external providers, logistics, availability of materials and supply, vegetation management and access to works.

E2 Overview of restoration work

As noted in Appendix A, during 20-23 April parts of Ausgrid's network area were battered with cyclonic wind gusts and heavy rain causing widespread customer outages. During the peak of the storms on 21 April, customer outages totalled approximately 240,000 or 14% of Ausgrid's total customer base.

Due to the severe weather conditions generated by the April storm, Ausgrid was limited in the restoration work that could be safely carried out in these conditions. For example, climbing ladders, poles and using EWP's would have been perilous given the strong wind gusts and heavy rainfall during 21-22 April and would have exposed staff to unacceptable risk. Similarly, Ausgrid's ability to undertake repair work was also limited during this period due to the occurrence of severe thunderstorms.[120] This was particularly the case in the Hunter, Newcastle and Central Coast regions which were hardest hit by the storms. However, despite adverse weather conditions, where major repair work was not required or the problem could be isolated, Ausgrid was able to undertake repair work and restore supply to significant numbers of customers as demonstrated by Table E3 below.

[119] Security refers to the ability of the network to withstand a single fault on any network element without causing an interruption to supply.
[120] This is because dangerous voltages can be present on neutral or earthing conductors, and on underground cable sheathes during lighting activity in the area.

Consequently, as only relatively minor repair work could be carried during the storms, Ausgrid's focus was on assessing and monitoring the damage sustained to its network and making the network safe by cutting and clearing any wires across roads or otherwise forming a hazard, isolating wires that were low and still energised, and investigating the cause of outages and requirements to repair. Spotters were deployed to patrol feeders with supply interruptions, or active OMS jobs outstanding and identify the problem and repair requirements. Spotters would cordon off public hazards such as wires down to keep the public safe and, if appropriately trained, would cut broken service wires away.

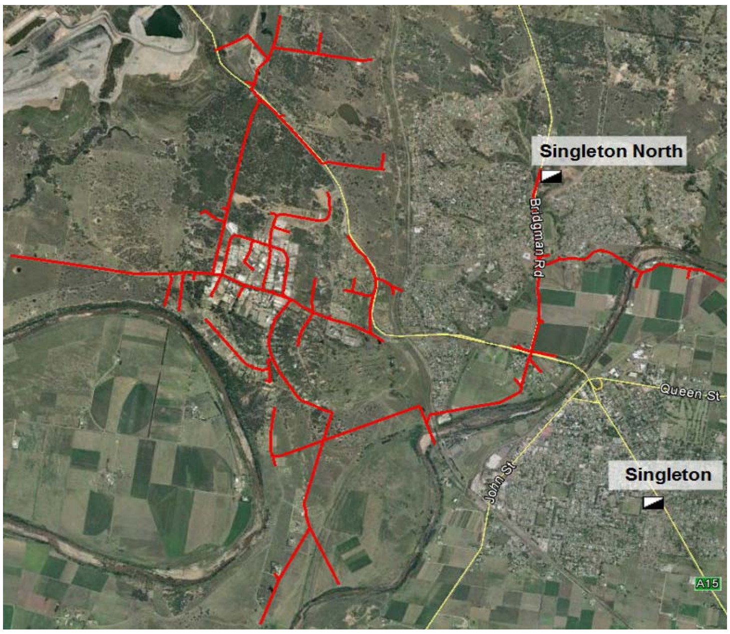
The investigation of faults was an essential aspect of Ausgrid's recovery works. Whilst Ausgrid has some visibility of faults occurring on its network this visibility does not extend to the cause of the fault or its exact location, particularly in the case of the 11kV network and below. Identifying the cause of the fault was important both from a repair perspective, to allow an accurate assessment of the repair work and skill sets required to address the fault, and also from a network safety and security perspective. This is because whilst it is possible to group network faults, the repair work required to address a particular fault will depend on the specific nature of the fault and can vary significantly. For example, the work required to address a hazard coded as a Wire/Tree will vary depending on whether there is one fallen tree, multiple trees, access issues and whether the tree has downed a span or multiple spans of wires. Therefore, from a repairs perspective an accurate assessment of the fault will ensure that resources are deployed as effectively as possible.

Patrolling the network was vital for both safety and security. The length of lines can vary significantly, as illustrated by Table E2. During the storm damage was typically sustained on longer lines in multiple locations. A GIS plot of one of the longer 11kV feeders is included (Figure E2) to illustrate the length and complexity of the 11kV network and the time required to patrol feeders. As a prudent network operator, Ausgrid could not energise these lines until it had ascertained that all faults had been identified and addressed.

Table E2– Minimum and maximum feeder lengths by voltage

Nominal voltage	Minimum feeder length (km)	Maximum feeder length (km)
11kV	0.1	328.7
33kV	0.1	61.0
66kV	0.2	54.4
132kV	0.3	46.2

Figure E2 – A typical 11kV rural feeder



During this initial period (20-22 April) when weather conditions were at their worst, Ausgrid utilised all available internal resources that were relevantly qualified and able to assist in patrolling the network including line workers, customer connection technicians, protection and telecontrol technicians who ordinarily work in zone substations, installation inspectors, metering technicians, and design staff with field experience. In parallel to this, external assistance (particularly Endeavour and Essential crews) were being called in and inducted so that they could be deployed as soon as weather conditions improved. In addition, by 23 April Ausgrid was able to shift resources from Sydney (where the impact to the network was not as severe) to the Central Coast to provide assistance.

Whilst the weather conditions from 20-22 April significantly constrained Ausgrid's ability to undertake restoration some restoration of supply was possible through the District Operators and limited operators isolating the damaged sections of 11kV feeders and rerouting power through an alternate route circuit, leaving a smaller section of the feeder (i.e. a smaller number of customers) without power. When resources were available to repair, these sections were then restored. Often the isolation involved cutting away sections of damaged low voltage circuits so that some power could be restored to the good section. The repair work was mostly completed by line workers and the switching to restore supply by operators.

Once the weather improved repair work was prioritised according to the priorities listed above in Appendix B (Refer to B1.4). Restoration generally worked in a hierarchical manner with restoration of lines supplying zone substations done first. During the storm there were a number of zone substations blacked out because the sub-transmission feeders supplying them were damaged. Once it was established which of the feeders could be repaired the fastest, they were then worked on and supply restored to the zone substation. This allowed work to begin on the 11kV feeders. In a similar manner, Ausgrid worked through a process of determining which jobs could be completed the fastest to restore the most customers.

In urban areas, repair efforts were initially focused on the trunk of the feeder as well as interconnections to other feeders – damaged radial spurs were isolated so that the bulk of the feeder could be restored more quickly. Repairs to the isolated spurs were completed once the trunk and interconnections had been restored.

In rural areas, repairs started at the zone substation and worked their way along the feeder, generally prioritising the trunk, but taking customer volume and customer type into consideration. Access issues also played a part in the prioritisation of rural feeder repairs – local flooding and fallen trees both hindered access to sections of some feeders.

As the restoration priority was driven by a desire to restore the largest number of customers in the shortest period of time, repairs to damage on the low voltage network in both urban and rural areas were left until the 11kV restorations were largely complete.

Once the 11kV sections were repaired there was a second wave to repair low voltage overhead lines. A similar process was undertaken to repair and re-energise the low voltage lines at each substation. Before returning supply, a full patrol of all the low voltage lines was completed. If there was damage to individual services these were cut away to isolate the fault, so that the surrounding customers without installation specific damage could be restored.

Once low voltage lines were restored, customer connection technicians could then work their way along the low voltage lines and replace/repair the individual service wire connections. In many cases this task was also performed by line workers once the bulk of the high voltage and low voltage repairs were done.

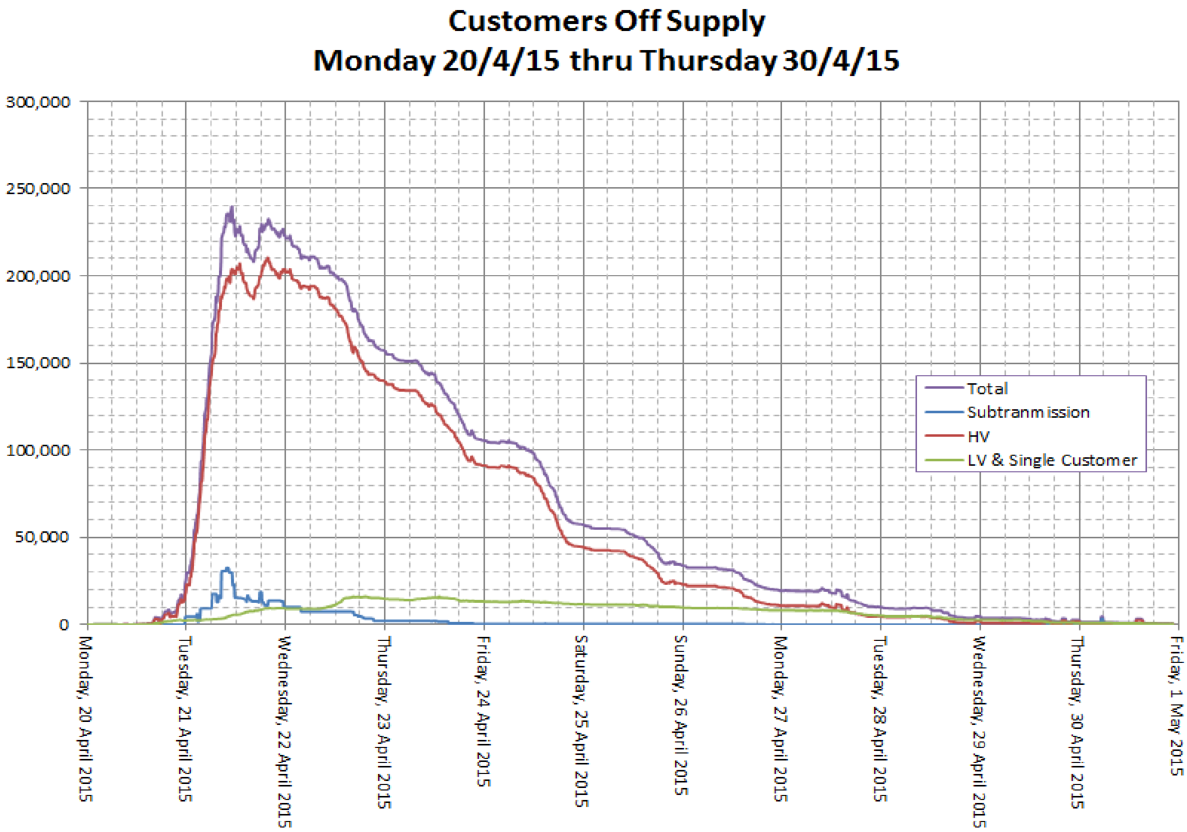
In areas such as the Lower Hunter and Central Coast where significant flooding occurred, Ausgrid's ability to access faults and undertake repair work was constrained until flood water levels receded and roads and bridges were reopened and cleared of debris and vegetation. At the peak of the storms there were around 500 road closures in the Port Stephens, Maitland and Cessnock local government areas. Due to the rural nature of the network, many of these lines traverse bush and farmland which was impassable until the water receded.

Consequently, in areas such as Hinton in Port Stephens where flooding prevented access some residents were without power for seven days. Once flood waters subsided and access was possible, crews worked for 12 hours to restore power to homes, replacing overhead mains, cross arms and other associated supporting attachments.

Another example where restoration work was difficult due to access issues was Scotland Island. More than 250 residents in this area experienced a sustained outage for up two days due to fallen trees blocking roads. In addition, the damage sustained by the network in this location was substantial with multiple spans of low voltage Aerial Bundled Cable (ABC) down, and high voltage ABC which had come away from poles in two separate locations. To restore customer supply to this part of the network Ausgrid had to replace the low voltage ABC and restring the high voltage ABC requiring a crew consisting of six overhead line workers, four substation technicians, and four customer connections staff.

Ausgrid has sought to highlight the effectiveness of its restoration approach in Figure E3 and Table E3 below. Figure E3 shows a clear correlation between the weather conditions generated by the April East Coast Low and customer outage numbers. Customer outage numbers can be seen to rise rapidly in the evening of 20 April, peaking on 21 April when weather conditions were at their worst, and continuing to stay high during 22 April. The number of customers without supply then declines sharply from 23 to 25 April as weather conditions improve and Ausgrid is able to start restoring supply to the sub-transmission and high voltage network, thus enabling it to return supply to large numbers of customers. As indicated by the graph customer outages on the low voltage network remained relatively constant after the East Coast Low had decayed and did not noticeably start to change profile until around 26 to 28 April when most supply had been returned to the high voltage network and restoration efforts focused on returning supply to low voltage network and single premises.

Figure E3– Customers without supply



Whilst Figure E3 shows the number of customer outages and is useful in terms of understanding the relationship between weather conditions and customer outages it does not show how many customers Ausgrid was able to restore supply to throughout the April storm event, particularly during 20 to 23 April. Consequently, for completeness we have included a table comparing the number of customers off supply, the number of customers that Ausgrid was able to restore supply and the number of customers remaining off supply to highlight the repair work that was being undertaken throughout April storm event. Table E3 shows that although customer outages are rising during 20 to 22 April (as depicted by Figure E3) Ausgrid was undertaking repair work that restored supply to large numbers of customers; however, at the same time further damage was sustained to the network from the adverse weather conditions generated by the storm which caused new outages, which is why the customer outage profile in Figure E3 is depicted as still rising despite the number of customers returned to supply.

Table E3 – Comparison of customers without supply and customers restored

Date	Customers off supply	Customers restored	Customers remaining off
20/04/2015	43,173	13,366	29,807
21/04/2015	344,094	152,477	221,424
22/04/2015	29,798	94,310	156,912
23/04/2015	15,542	66,857	105,597
24/04/2015	8,580	57,021	57,156
25/04/2015	7,078	30,469	33,765
26/04/2015	2,114	16,529	19,350

Date	Customers off supply	Customers restored	Customers remaining off
27/04/2015	9,055	18,433	9,972
28/04/2015	2,929	8,501	4,400
29/04/2015	5,153	7,007	2,546
30/04/2015	6,813	8,844	515
1/05/2015	8,784	8,475	824

We have also provided at Attachment 14 a time lapse video showing outages caused by the storms in our distribution area, which corresponds to Figure E3 above. This video highlights the outages at the start of the storms and the supply restored (or reduction in outages) as our response and restoration efforts accelerated.

The video provides further evidence of the magnitude of the storm's impact on Ausgrid's network, particularly during 21-22 April, and the geographically dispersed nature of the outages. The video highlights areas with difficult access which were not able to be resolved until several days after the East Coast Low deteriorated. The video also shows how outages continued to occur on the network, albeit not as sustained, after the East Coast Low decayed on 23 April due to lingering bad weather conditions and the second storm cell which hit Ausgrid's distribution area on 25 April.

E3 Responding to customers

The damage sustained to Ausgrid's network from the April storms impacted customers significantly, with nearly 240,000 customers experiencing supply outages during the peak of the storms on 21 April, and an estimated 369,000 customers experiencing a sustained supply outage over the course of the April storm event. The overwhelming impact of the storms on customers required Ausgrid to significantly increase resources, from an operational perspective to undertake repairs to the network, and also from a communications perspective, as Ausgrid experienced an enormous growth in customer demand for information about the network's emergency and restoration efforts.

As part of its ongoing information and communications strategy, Ausgrid has a multipronged approach to communicating with customers and stakeholders about network incidents. Throughout the April storm event, Ausgrid communicated with customers using a variety of channels such as its Contact Centre, social media (Facebook and Twitter), Ausgrid's website, media updates and paid advertising (radio and newspaper) to disseminate accurate, meaningful and helpful information as quickly as possible. Ausgrid sought to engage and keep customers informed as much as possible during the storm event as this helped to ensure customer and public safety, alleviate customer concerns, and manage expectations about when restoration work could be undertaken and power supply restored.

To manage the huge influx of calls, Ausgrid closed its general enquiry line so that only hazard calls, no supply calls, and PFA (police, fire and ambulance) calls were offered to the Contact Centre. During the initial period of the storms (20-22 April) Ausgrid's communication focus was on safety. Ausgrid sought to prioritise Contact Centre call taking on hazard reporting with Avalanche messages urging customers to stay on the line only if they had an emergency or threatening incident to report, and directed customers to Ausgrid's Facebook and Twitter account for outage updates and information on when Ausgrid anticipated power could be returned. Sample Avalanche messages provided to customers during the initial days of the April storm event have been provided below.[121]

> *We have wide spread storm damage across our network. To ensure community safety, we can only take wires down and life threatening hazard calls at this time. General information about affected areas and restoration times is available on Ausgrid's Facebook page, twitter account and web site. To report a wires down or life threatening call please hold on the line.*
>
> *We have wide spread storm damage across our network. We apologise but we are not able to give specific information as to when any power will be restored. If you are reporting wires down and life threatening hazards, please stay on the line and we will prioritise your call. If you have no supply - that you have not already reported, you may experience extensive delays, but please wait on the line. Some information is available on Ausgrid's Facebook page, twitter account and web site.*

As Contact Centre calls prioritised hazard reports, customers relied heavily on social media to communicate with Ausgrid. During the first 72 hours of the storm the number of customers following Ausgrid on Twitter and Facebook soared. Throughout the storm period, about 230,000 people came to Ausgrid's Facebook page to get information and an estimated 150,000 people also received information via Twitter.

[121] Sample taken from Avalanche messages on 21 and 22 April 2015.

Ausgrid's website was also updated to include a direct link to a newly created storm page providing real-time information on the number of customers without power and customers restored in each suburb. Website traffic during the storm reached 40 times its normal levels.

On Facebook, Ausgrid's audience grew by 161% from 10,228 to 26, 696 – eclipsing all growth since the page was first established in 2011. An external analysis of customer interactions and sentiment between 21 April to 1 May found that:

- Ausgrid's Facebook page recorded approximately 2,595 posts, 24,000 comments and up to 10,000 private messages from customers.
- Most posts related to people requesting an update or further information on an outage, praising Ausgrid's efforts or reporting a power outage or hazard.
- 54% of posts were neutral, 37% were positive and 9% were negative.
- Despite the extended length of this outage, the volume of negative mentions was no higher than during previous reported outages. This suggests that Ausgrid's communication strategy was effective in getting people to understand the magnitude of this outage and the length of time to restore power supply to affected areas.
- The highest volume of negative mentions was recorded on 25 April, whilst the highest volume of positive and neutral mentions was recorded on 23 April. This is likely due to people initially enquiring about the outage in a positive or neutral manner but becoming increasingly frustrated as the length of time without power increased.

Ausgrid's Twitter audience grew by 43% from 7,868 to 11,307, with the highest volume of posts and tweets occurring between 21 and 24 April 2015. On Twitter, there were almost 12,500 mentions of Ausgrid including questions and comments from customers and tweets and retweets by Ausgrid. Almost 200 customers used Twitter to communicate directly with Ausgrid, including reporting hazards and outages. External analysis found that:

- 77% of mentions were neutral, 18% were positive and 5% were negative.
- The percentage of negative mentions on Twitter was quite low considering the impact of this outage. This may be due to people more reluctant to vent their frustrations openly on Twitter or that people felt that they were adequately kept informed of the incident and Ausgrid's efforts to restore power as quickly and as safely as possible.
- The highest volume of mentions was recorded on 21 April whilst the highest volume of negative mentions were recorded on 23 April and the highest volume of positive mentions on 22 April.
- This was likely due to people initially reporting the outage and making enquiries about the outage in a neutral manner but becoming increasingly frustrated as the length of time without power increased.

Overall, Ausgrid considers that customer response and engagement during the April storm event was positive, given that the vast majority of customer engagement was aimed at requesting outage updates and restoration timeframes, rather than complaints. Ausgrid received considerable positive feedback and very little negative feedback from customers via social media channels during the April storm event, which reflects the effectiveness of our communications and overall approach to responding to the April storm.

Positive sentiment expressed by customers included thanking Ausgrid for its hard work both when enquiring about updates as well as once the power was back on, commending its social media updates, and defended Ausgrid when others complained about outages or the length of time to restore power.

Negative sentiment from customers across both channels included people complaining that the power was still out, that others close by have power, the lack of Ausgrid personnel seen in the area or that they were seen but did not fix the problem, incorrect information being provided on the website or by the automated call system, a general lack of information or too generic information being provided (people accused Ausgrid of copying and pasting the same responses to several tweets) and the adverse impact the situation was having on them or their family members.

A sample of both positive and negative sentiment analysis taken from Twitter and Facebook has been provided in Attachment 15.

E4 Challenges faced in responding to the April storm event

Outlined below are some of the key challenges Ausgrid faced in responding to the April storm event, and the subsequent constraints placed on restoration work.

E4.1 Access Issues

Some localised areas within Ausgrid's North Region (including Hinton, Port Stephens, Seaham, East Seaham, Maitland, Morpeth, Duns Creek, Wallalong and Nelsons Plans) experienced resource and vehicle access restrictions as a result of heavy flooding which blocked bridges and roads. In addition, localised areas in the North Region (Cessnock), Central

Region (Wyong and Scotland Island in the Northern Beaches) also had vehicle access issues as a result of fallen vegetation and flooding. Work was also delayed on the following sub-transmission feeders as a result of access issues:

- Sub-transmission feeder 794 repairs were delayed with track mats needing to be installed and a significant amount of vegetation clearing being required**;**
- Sub-transmission feeder 88J repairs were delayed by 3-4 days due to a flooded paddock with difficult access and track mats needing to be hired to provide vehicle access for repair work to be undertaken;
- Sub-transmission feeder 824 repairs were delayed several days due to inaccessibility as a result of flooding;

The impact of access issues often meant that repair work was delayed until the access issue was resolved. Whilst Ausgrid was able to overcome access issues associated with minor to moderate flooding by using track mats to enable vehicle access, in the case of areas where there was major flooding there was nothing Ausgrid could do but wait until the flood waters had receded. Consequently, some communities isolated by flooding caused by the storms experienced power outages lasting more than a week.

E4.2 Skills shortages to respond to works

Ausgrid was required to comply with its fatigue management policyto ensure the safety of its workers and general public. [122] Consequently, crews had to be stood down for 10 hours once they had undertaken a maximum shift allowance of 14 hours, resulting in reduced numbers of overhead crews available to undertake the work. However, this generally was not an issue as Ausgrid sought to coordinate its resources so that the majority of work was undertaken during the day with crews being stood down overnight. Further, Ausgrid sought to manage skills shortages through its approach to its dispatch and packaging of jobs, whereby restoration work was broken down into a variety of tasks that accommodated the skill sets that were available at the time.

E4.3 OMS information

The overwhelming number of jobs entered into OMS, particularly during the initial onslaught of the storms (20 to 22 April), posed a significant challenge for Ausgrid in coordinating restoration work as these jobs were often unrelated to known network problems and prone to duplicates as a result of the same incident being reported by multiple customers. Dedicated resources were required in regional offices to try to group duplicates and package jobs in a manner which minimised repeat visits to sites. Further, the lack of technical information captured in OMS data meant that job planning staff were required to pre-visit sites to determine the scope of work and prepare ‘job packs’ prior to work crew undertaking construction. In addition, the closure of inspected hazard jobs took a significant amount of time to enter into OMS, which impacted on the reported number of hazard jobs complete.

E4.4 Weather conditions

Weather conditions during the storms (20-23 April), and the second storm cell that impacted Ausgrid’s network on 25 April, constrained Ausgrid’s ability to undertake restoration work due to the safety risks that these conditions posed to its staff. During the 20 to 23 April, cyclonic winds impacted parts of Ausgrid’s network, making it unsafe for overhead line work or pole work to be undertaken. Widespread heavy rainfall during this period meant that added care was required when driving to sites to assess or undertake repair work due to the reduced visibility and subsequent risk of road accidents and slips and trips from wet ground conditions. Where heavy rainfall posed safety risks to employees and external staff, repair work was delayed until conditions improved. When work had to be delayed due to the safety risks posed by weather conditions, Ausgrid instead focused on investigating faults, planning and prioritising repair work, and packaging jobs so that they could be appropriately dispatched to crews with the appropriate skill sets available to undertake the work, so that restoration work was carried out quickly and effectively when weather conditions improved.

[122] Refer to Attachment 16 - Ausgrid’s Be Safe Hazard Guideline 16: Managing Fatigue.