Electricity Network Safety Management System Performance & Bushfire Preparedness Report

Part A 1 July 2021 to 30 June 2022
Part B 1 October 2021 to 30 September 2022

Protecting people, property and the environment from safety risks posed by our electricity network

February 2023

essential energy

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Introduction

This document is the Annual Performance Report for the Essential Energy Electricity Network Safety Management System (ENSMS).

It is produced to meet the requirements set out in the Independent Pricing and Regulatory Tribunal (IPART) Electricity Networks Reporting Manual (September 2022). As such, it is intended to provide sufficient information for IPART or members of the public and customers to assess our performance against our ENSMS objectives.

The report is structured in two parts:

- Part A sets out the annual safety performance for the period 1 July 2021 to 30 June 2022
- Part B sets out our bushfire preparedness activities undertaken for the period 1 October 2021 to 30 September 2022

The timeframes for Parts A and B differ due to the relative focus of the content, with Part A aligned to financial year and Part B aligned to fire season.

Context

We build, operate and maintain the electricity network that services regional, rural and remote communities across 95 per cent of New South Wales (NSW) and parts of southern Queensland. We maintain and develop the infrastructure that delivers power to more than 880,000 homes and businesses, 170 hospitals, and 1,250 schools.

We aim to continuously improve safety performance for employees, contractors and the community, while also striving to deliver on our other customer priorities including reliability and affordability.

The ENSMS is critical to delivery of network safety outcomes. It translates safety objectives into effective and efficient actions for the control of safety risks associated with the electricity network. These risks include public and worker safety, bushfire and other environmental impacts, safety risks arising from any loss of electricity supply, and risks to public property and network assets. It applies a 'Plan-Do-Check-Act' approach, supporting continuous improvement in all aspects of safety performance and practices.

Figure 1 depicts the 'whole of lifecycle' approach to safety that is taken by the ENSMS.

Figure 1 Network and asset lifecycle phases considered by the ENSMS

The ENSMS works in harmony with other key management systems within the business, including the Asset Management System, Work Health and Safety Management System and Environmental Management System.

Background

As critical infrastructure that is co-located in the communities it serves, the safety risks associated with an electricity network need to be managed accordingly. This is a core function of a Distribution Network Service Provider (DNSP).

The hazards associated with an electricity network have the potential to cause harm to network and other workers, the public and the environment. Contact with electrical energy can cause significant and fatal injuries and arcing may start fires in adjacent vegetation. In addition to these hazardous events, the loss of supply in some circumstances can result in harm, particularly to vulnerable persons dependent on electricity supplied medical

equipment, and populations that have a greater risk of impact from heat illness. Electricity network operators must take account of all these hazards and take steps to manage them *so far as is reasonably practicable*[1].

The Electricity Regulatory Authorities Council (ERAC) provide an annual report[2] on electricity network related fatalities in Australia and New Zealand. A chart of the fatality statistics that involve electricity distribution network equipment and injured party classification for the period 2000-2020 can be found in Figure 2. Over the last 20 years, through the improvements in safety performance of electricity networks, there has been a downwards trend in the number of fatal injuries associated with electricity networks.

We operate and maintain a safety management system which provides a systematic approach to the identification, analysis and control of hazards associated with the electricity network. We also report incidents to our industry regulator within specified timeframes and collate incidents that have occurred over a year to provide a view of the overall safety performance.

The performance measures contained in this report are a combination of lead measures (that indicate future performance) and lagging measures (that indicate past performance) of the safety of our electricity network. These are consistent with the expectations of our regulator, IPART.

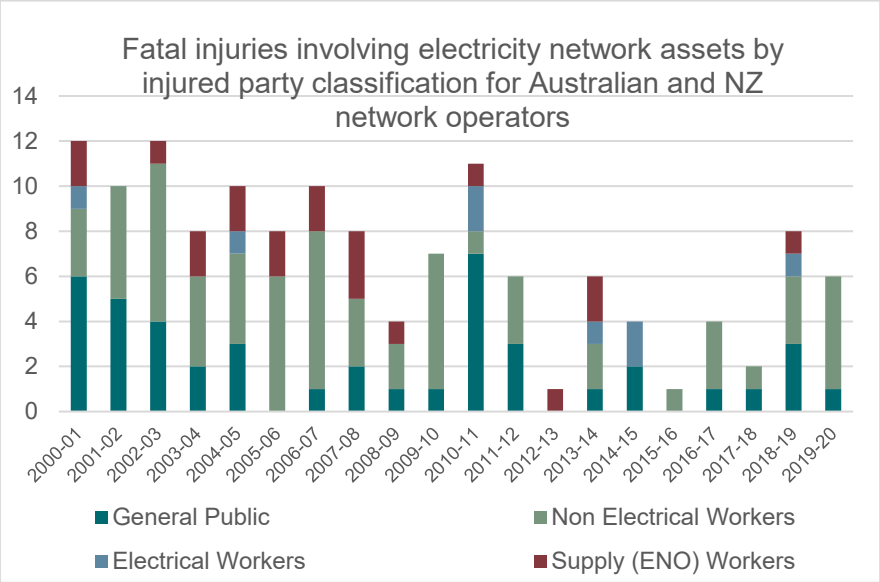


Figure 2 Fatal injuries involving electricity network assets by injured party classification

[1] This is a key concept in safety management and is a requirement in law in many jurisdictions. It requires ensuring that all 'reasonably practicable' measures to manage safety are in place, where the limit of what is reasonably practicable involves weighing the risk against the measures necessary to eliminate or reduce it, in what is essentially a benefit-cost comparison.

[2] https://www.erac.gov.au/wp-content/uploads/2021/01/ERAC-Electrical_fatality_benchmarking_2019-2020.pdf

Part A – ENSMS Annual Performance Report

Part A reports against a framework of safety performance indicators defined within the Electricity Network Reporting Manual as per Figure 3.

Part A is structured around the four 'Tiers' defined in Figure 3 as follows:

- Section 1 describes Tier 1 indicators (Major incidents)
- Section 2 describes Tier 2 indicators (Minor incidents)
- Section 3 describes Tier 3 indicators (Control failure near misses)
- Section 4 describes Tier 4 indicators (Control implementation)

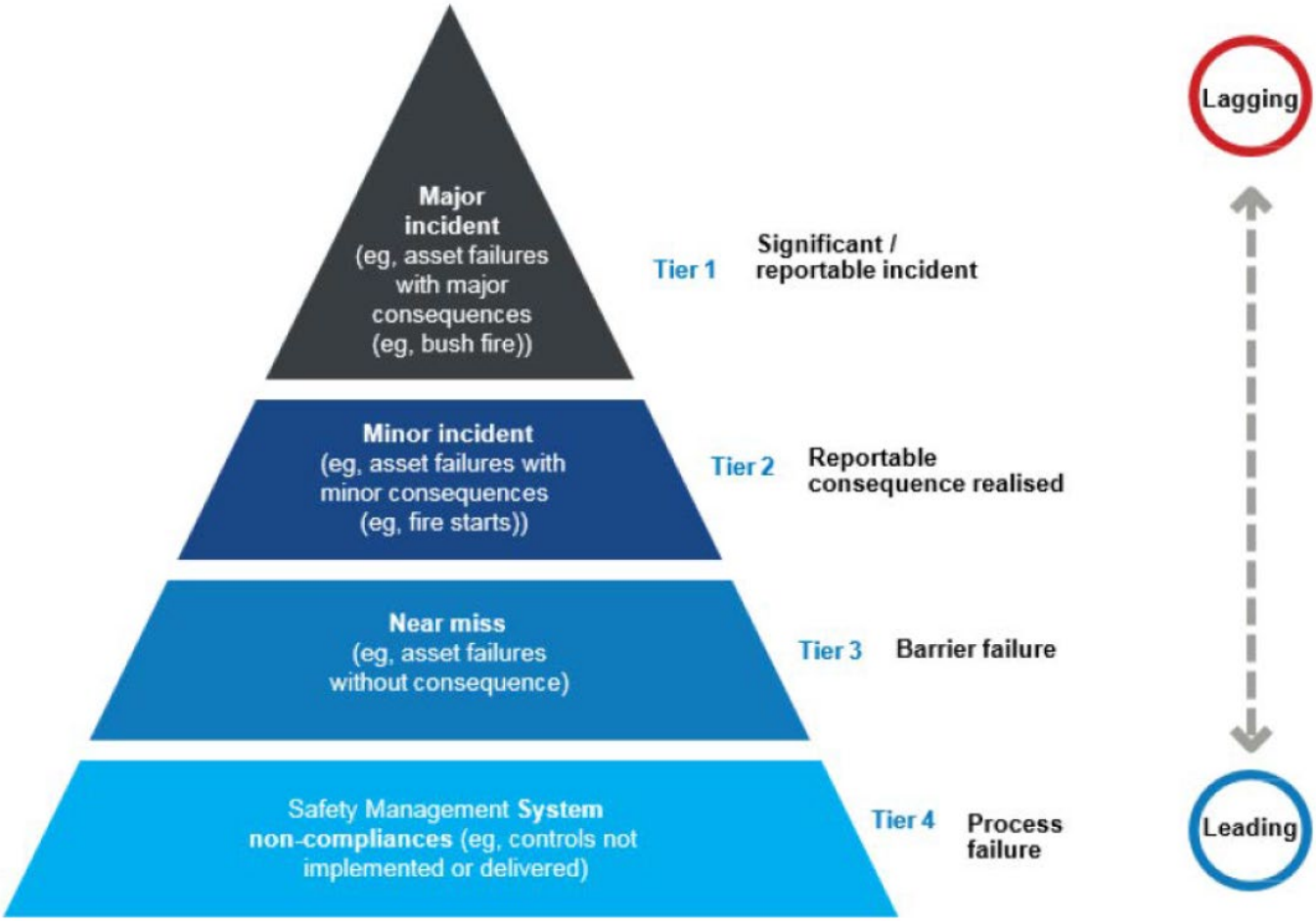


Figure 3 IPART Safety Performance Monitoring Framework

Trends of the key statistics from this report, FY2022, and from previous reporting periods are shown in Figure 4 below.

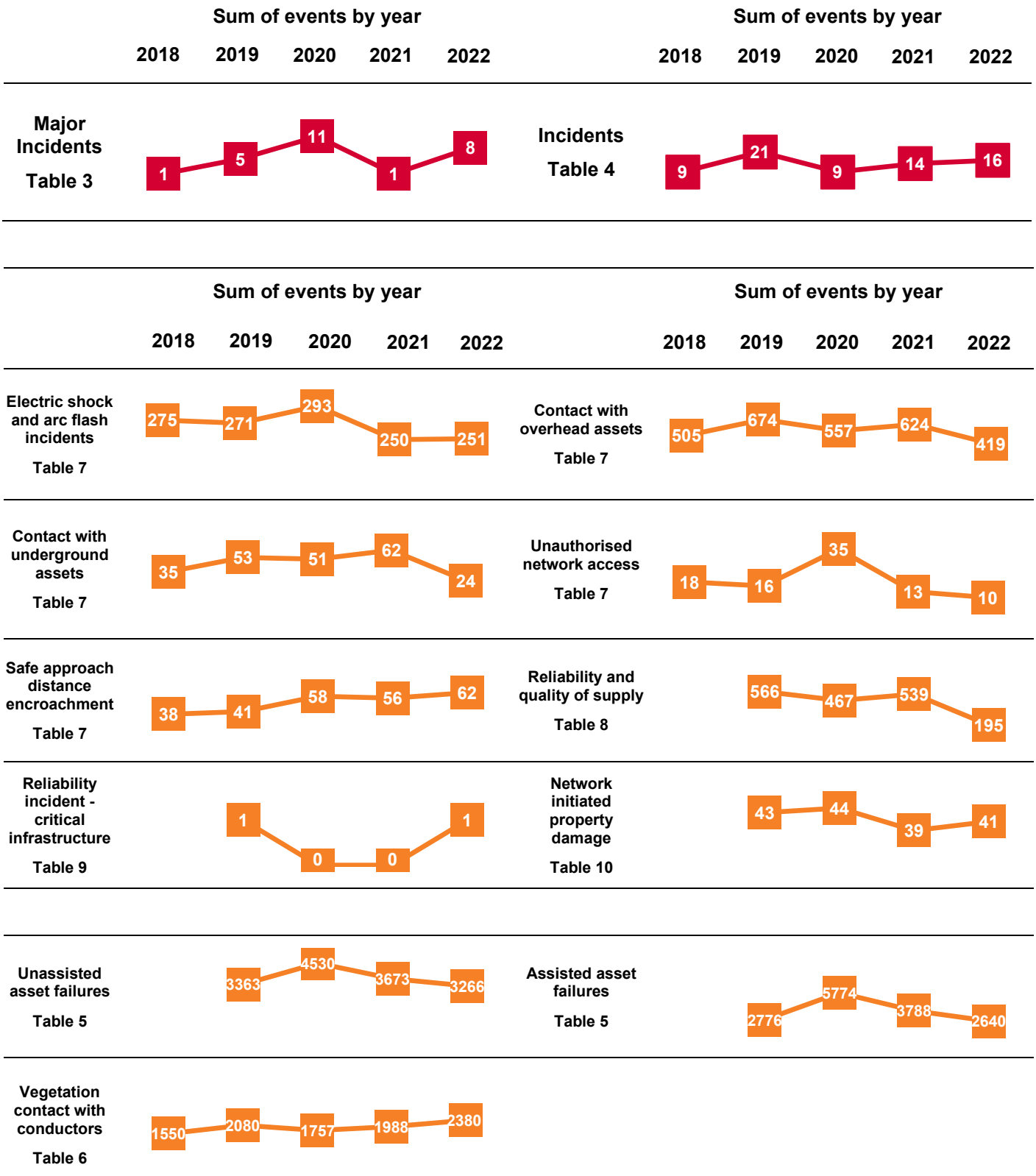


Figure 4 Key statistic trends from the ENSMS Performance Report

This reporting period has seen an increase in Major Incidents and Incidents, this has been driven by North Coast Floods, and a number of tragic incidents involving agricultural workers contacting the electricity network which are covered in more detail below.

Case Study - Weather impacts on delivery of controls

Persistent wet weather coupled with responses to multiple major network events and natural disasters (including the North Coast Floods) have had major impacts on our ability to deliver planned network and vegetation maintenance. Collectively, we have lost 76,000 effort hours to inclement weather-related responses, equating to 5 percent of available effort hours in FY2022. This excludes the impact of wet ground on access to our network by people and equipment. Figure 5 shows the soil moisture content across the Essential Energy footprint, while Figure 6 is a histogram of tasks by soil moisture content for the month of August 2022. With an estimated limit of trafficability (the soil moisture content that would inhibit vehicular traffic) of 30%, it shows that a large proportion of outstanding tasks are not accessible (August 2022).

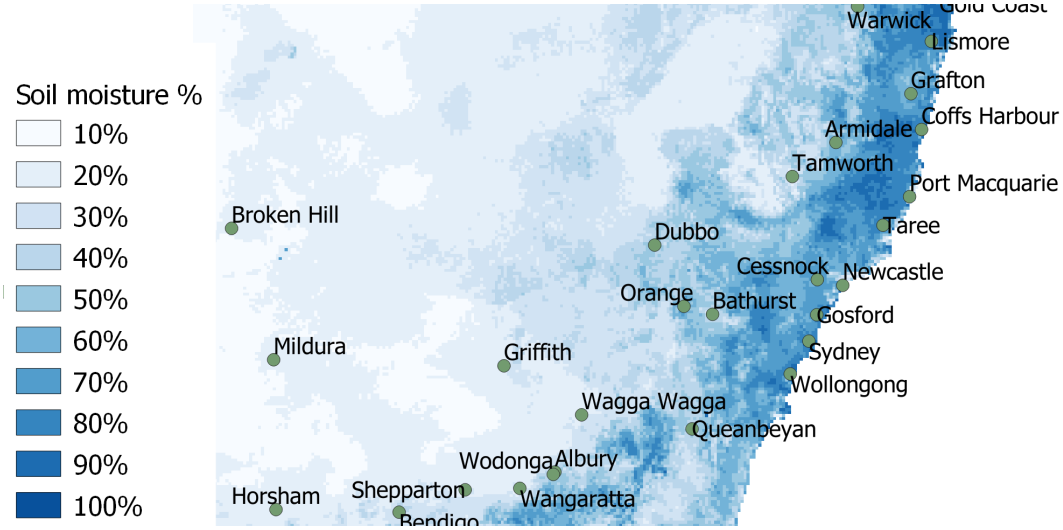


Figure 5 South Eastern Australia soil moisture content August 2022 (Source: BOM)

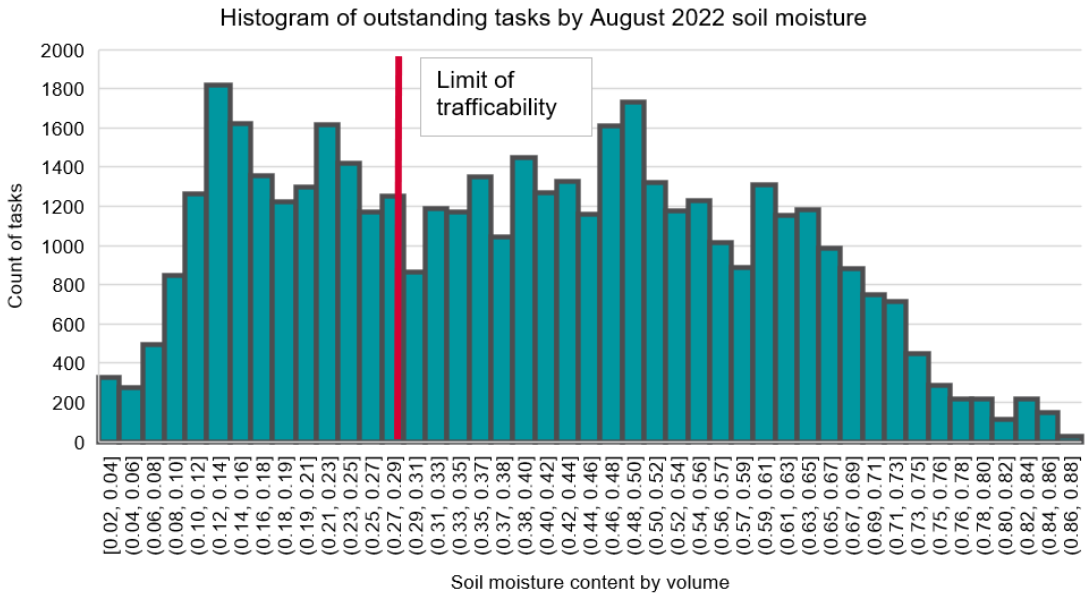


Figure 6 Histogram of outstanding asset tasks by August 2022 soil moisture content

We have adapted our plans to meet the challenges of these conditions. However, the unprecedented nature of the conditions remain demanding. Table 1 summarises the actions to manage the outstanding asset and vegetation task backlog, with these efforts continuing.

Table 1 Practicable options to address outstanding asset and vegetation tasks

Asset tasks	Vegetation tasks
• Travelling resources across our footprint to locations that can be accessed to treat outstanding tasks • Leasing and sourcing of specialist access equipment (tracked equipment) • Increased reporting and monitoring of performance at shorter intervals • Inspecting outstanding tasks to confirm that task categorisation remains correct (no expedited degradation) and appropriate prioritisation is applied.	• Travelling resources and adjusting schedules to bring forward accessible and priority works such as Pre Summer Bushfire Inspection tasks and fall in risk tasks • Critical review of Vegetation Management Area (VMA) risk to identify opportunities to adjust program • Sourcing and/or leasing tracked access equipment for use in boggy ground • Implementation of performance-based contracts for vegetation management contractors

Action status, along with delivery performance and task completion rates are reported on frequently and monitored closely. This will continue in response to the challenging conditions, with practices adapted accordingly.

Section 1 and 2

These tables summarise electricity network-related incidents that resulted in harm to the public, our workers, network assets, public or private property, or the environment. Table 2 and Table 3 are a record of these incidents that have been reported to IPART in accordance with the Electricity Networks Reporting Manual – Incident Reporting.

1. Tier 1 – Major Incidents

Major Incidents are defined as those that have resulted in significant consequences such as fatalities, life changing or life-threatening injuries where the electricity network was the cause of the incident, for example due to an asset failure. Major incidents also include incidents resulting in significant loss of property such as major bushfires that were started by the network, as well as significant power outages.

Table 2 provides a brief description of all Major Incidents that occurred on or involved our network during the reporting period.

Table 2 Major Incidents

ESSNM [3] Objective		Description of major incident reported under the incident reporting requirements
Safety of members of the public		24 December 2021 - Two agricultural workers received a fatal electric shock when metal fence panels they were moving contacted the overhead 22kV network. 6 May 2022 – An agricultural worker operating a spray rig (boom sprayer) contacted the overhead 11kV network, the worker received a fatal electric shock upon exiting the spray rig whilst the spray rig was still in contact with the energised 11kV network.
Safety of persons working on the network		Nil
Protection of property	Third party property	Nil
	Network property	28 February 2022 – Heavy rain and associated flooding across the North Coast of NSW caused damage to the electricity network that cost approximately $30 million to remediate.

[3] *Electricity Supply (Safety and Network Management) Regulation 2014*

ESSNM [3] Objective	Description of major incident reported under the incident reporting requirements
Safety risks arising from loss of electricity supply	4 December 2021 - Storms across the NSW North Coast resulted in a widespread outage across the Essential Energy electricity network. The major contribution to outages was due to storms impacting the subtransmission 66kV network, in particular the radial network from Gilgandra to Gulargambone. This contributed 2,881 customers losing supply for 5.8hrs. The major outage to the 66kV was due to a pole failure in high winds, the area was experiencing high winds over 100 km/hr. Other major impacted area was Gunnedah (11kV and 66kV faults) due to storms. 18 December 2021 - Storms across South/South Eastern NSW caused the total customers affected across the network to exceed 5,000 for over 4 hours. Storms in the Southern area of the state predominately in the Queanbeyan-Yass area. A significant contributor to this event was a pole failure on the 66kV subtransmission network. 28 February 2022 - Lismore - Heavy rain and major flooding across North Coast NSW caused the total customers affected across the network to exceed 5,000 for over 4 hours. Floods and heavy rain caused major interruptions to the electricity network. The flood waters did not recede for many days preventing safe access to damaged equipment across the network to allow restoration of power. This weather event became known as the 2022 North Coast Floods. 28 February 2022 - Lismore - Heavy rain and major flooding caused the Lismore Hospital to lose supply for over 2 hours. The floods and heavy rain caused major interruptions to the electricity network. The flood waters prevented safe access to damaged equipment across the network, for inspection and re-energisation. This weather event became known as the 2022 North Coast Floods. 30 May 2022 - Storms and severe winds across Northern NSW caused the total customers affected across the network to exceed 5,000 for over 4 hours. The storms resulted in widespread and prolonged outages over 30th and 31st May.

Case Study - Electrical safety of agricultural workers

The electricity network in regional, rural and remote New South Wales (NSW) crosses a range of land, with a variety of uses, including agriculture and farming activities. Agricultural workers face risks associated with working close to electrical infrastructure, particular overhead network and assets. Tragically, there have been five incidents this reporting period resulting in fatal and life changing injuries to agricultural workers that involved our network. Whilst our investigations have revealed that the condition of our network was not a contributing factor to these incidents, we continue to search for ways to manage the hazards associated with working around electricity infrastructure in agricultural settings.

Electrical network safety briefings have been delivered to agricultural organisations and agricultural operators, and we have been promoting the 'Look up and live' app at every opportunity with agricultural workers. We have also been promoting the installation of aerial conductor markers in locations that agricultural operators identify as high risk. At major agricultural field days, we are providing information on electrical safety and have an active and targeted print, radio and social media electricity safety campaign strategy.

Further to these efforts to raise awareness, we are collaborating with the SafeWork NSW Centre for Workplace Health and Safety to help us understand what the perceptions of electrical risk are for agricultural workers. Information from this partnership will help us continue to improve our safety campaigns and knowledge sharing, ensuring it remains relevant and effective.

Figure 7 Essential Energy presenting at an agricultural industry safety forum

Case Study - North Coast flooding

Between 25 February and 2 March 2022 a significant rain and flooding event impacted the east coast of Australia ranging from the Sunshine Coast in Queensland to the South Coast of NSW. In NSW the Tweed, Brunswick and Richmond/Wilsons River catchments experienced severe flooding, resulting in significant impact to the electricity network in those catchments. Our workers, many of whom were personally impacted by the disaster, worked tirelessly and diligently to restore vital electricity supply to impacted communities in a safe, steady and sustainable manner.

Over recent years we have seen a number of natural disasters impact our network and the communities we serve, of increasing intensity. The electricity network, as a critical piece of infrastructure, must be hardened to meet these challenges. Improving the electricity network's resilience is a key component of our forward business planning, being a feature of our 2024-2029 regulated funding submission to our economic regulator (the Australian Energy Regulator – AER). We are consulting closely with our stakeholders to ensure a range of expectations, including safety, reliability and cost, are being met.

We have engaged with climate risk and natural disaster experts to help us model how network risk is changing under a number of climate change scenarios. This work will inform future network plans and investment, ensuring climate related risks are addressed in a prudent and effective manner.

Figure 8 Essential Energy network damaged by floodwaters

2. Tier 2 – Incidents

Incidents are defined in the *IPART Electricity Networks Reporting Manual (February 2022)* as incidents that result in safety consequences such as hospitalisation and a person receiving care from a health care professional, where the electricity network was the cause of the incident, for example due to an asset failure. This category also includes lower-level impacts to public property (such as smaller fires) and smaller power outages.

Table 3 provides a brief description of all Incidents that occurred on, or involved our network during the reporting period.

Table 3: Incidents

ESSNM Objective	Description of each incident reported under the incident reporting requirements
Safety of members of the public	3 December 2021 A public worker was using an improvised unloading zone directly underneath the overhead HV conductors. The worker climbed on top of the cattle crate and contacted the energised overhead HV conductor receiving an electric shock. 5 December 2021 A public worker parked under the HV network conductors in a non-designated parking location overnight. On arrival the next morning the worker ascended the header to perform a cleaning activity and contacted an energised overhead HV conductor. 24 April 2022 A public worker was negotiating a passage through a gate when the telehandler fork tines contacted an overhead conductor. Both public workers (Telehandler operator/driver and spotter on the ground) received HV burns.
Safety of persons working on the network	12 September 2021 An Essential Energy worker was undertaking a pole removal and replacement task with a chain and hook assembly. The chain hook failed under tension and impacted the worker's chest.
Protection of third-party property	21 September 2021 Suspect that a large bird has come between three phase 11kV conductors, resulting in a conductor failure and subsequent grass fire. The conductors were modelled post incident using powerline design software, and mid span separation was found to be compliant to *AS/NZS 7000:2016 Overhead line design*. 23 December 2021 A harvester impacted overhead powerlines resulting in a fire in a paddock. The conductors were modelled using powerline modelling software using data from the previous LiDAR found to be compliant to *AS/NZS 7000:2016 Overhead line design*. 22 February 2022 A single conductor tie broken mid span due to pelican impact causing a single conductor to fall to the ground resulting in a grass fire.
Safety risks arising from loss of electricity supply	4 December 2021 - Storms and high winds across Northern NSW 18 December 2021 - Storms across South Eastern NSW 19 December 2021 - Storms across South Eastern NSW 5 January 2022 - Storms across Central NSW 6 January 2022- Storms across Central NSW 27 February 2022 - Flooding across North Coast NSW 28 February 2022 - Flooding across North Coast NSW 1 March 2022 - Flooding across North Coast NSW 2 March 2022 - Flooding across North Coast NSW 30 March 2022 - Flooding across North Coast NSW 30 May 2022 - Storms and severe winds across Northern NSW 31 May 2022 - Storms and severe winds across Northern NSW

3. Tier 3 – Control failure near miss

Failure of electricity network assets, particularly functional failure where assets stop performing a required function, for example supporting electrical conductors at a prescribed height above the ground, or the carriage of electrical energy from source to load, can result in a dangerous release of energy. Eliminating the failure of assets is not practically or financially achievable, and Essential Energy manages these risks so far as is reasonably practicable.

Various inspections are performed on our assets to identify conditions that lead to asset failure. Analysis of inspection data and failure rates influence replacement programs to manage the risk that is associated with failure. These tables demonstrate how effective the inspection and maintenance programs are in minimising asset failures.

This section sets out events such as an asset failure or where a worker, member of the public or livestock or a pet came into contact with the network, but that did not result in a safety consequence that meets the criteria reported in Sections 1 and 2 above. These are categorised as 'near misses' and are reported across six tables:

- Table 4 sets out near misses related to 'functional' failures of network assets
- Table 5 sets out near misses related to trees or branches ('vegetation') contacting overhead wires ('conductors')
- Table 6 sets out near misses related to unintended contact, unauthorised access and electric shocks originating from network assets. 'Unintended contact' describes incidents such as construction or agricultural vehicles coming into contact with overhead or underground conductors. 'Unauthorised access' describes incidents such as trespass onto the Essential Energy network e.g. into zone substations
- Table 7 sets out near misses related to electric shocks, due to specific causes related to network assets and workmanship and near misses related to the quality of the electricity supply
- Table 8 sets out near misses due to supply interruptions to 'critical infrastructure' e.g. hospitals and road tunnels
- Table 9 sets out network-initiated property damage events, for example where public property including cars, buildings, crops or livestock have been damaged by the network
- Table 10 also includes events where non-electrical assets belonging to Essential Energy have been damaged by the network e.g. damage to Essential Energy vehicles or buildings.

The remainder of this section provides a brief description of each of the tables, to explain the terms used and provide some context for the reported performance. This is followed by each of the tables that sets out the performance for the reporting period.

3.1 Network asset failures

Table 4 lists those asset failures that occurred on our network during the reporting period, split by the major asset types. These are reported in the context of the total population for each asset type and the 5-year average annual failure numbers.

For each asset type, the table reports the failures that occurred during the reporting period, broken out by:

- 'Unassisted' and 'Assisted' failure types, where:
  - 'unassisted' failures are those considered to be within our control. For example, failures caused by asset degradation and aging due to corrosion, termite attack and wood decay.
  - 'assisted' failures are those attributed to external causes, for example vehicle impacts, vandalism, lightning, fires and storms that resulted in wind speeds in excess of relevant design standards.
- Whether the failure resulted in a fire, or no fire; and
- If the failure did result in a fire, was the fire limited to the asset ('Contained'), or did it spread to the surrounding environment ('Escaped')

Table 4: Network asset failures

Performance Measure	Population	5-year average annual functional failures	Functional failure total FY2022[4]	Annual functional failures (for reporting period)					
				Unassisted			Assisted		
				No fire	Fire		No fire	Fire	
					Contained	Escaped		Contained	Escaped
Towers	196	0	0	0	0	0	0	0	0
Poles (including street lighting columns/poles & stay poles)	1,417,865	977	579	140	7	15	390	0	3
Pole-top structures		872	885	413	12	12	444	0	2
Crossarms	1,485,491								
Insulators	4,503,192								
Conductor ties	4,732,036								
Conductor – Transmission OH	n/a	-	-	-	-	-	-	-	-
Conductor – Transmission UG	n/a	-	-	-	-	-	-	-	-
Conductor – HV[5] (including sub-transmission) OH[6]	157,397 km	1,139	1,165	443	3	20	664	0	34
Conductor – HV (including sub-transmission) UG[7]	2,929 km	47	26	19	0	0	7	0	0

[4] This column is the sum of the columns to the right

[5] High Voltage (HV)

[6] Overhead (OH)

[7] Underground (UG)

Performance Measure	Population	5-year average annual functional failures	Functional failure total FY2022[4]	Annual functional failures (for reporting period)					
				Unassisted			Assisted		
				No fire	Fire		No fire	Fire	
					Contained	Escaped		Contained	Escaped
Conductor – LV OH[8]	25,315 km	712	613	300	1	2	304	0	3
Conductor – LV UG	7,093 km	331	311	160	2	6	139	0	3
Service line OH	572,203	2,203	1,976	1,253	2	2	714	0	0
Service line UG	176,096	40	32	24	0	0	8	0	0
Power transformers	687	1	1	1	0	0	0	0	0
Distribution transformers	140,389	1,289	1,286	337	2	2	945	0	0
Reactive plant	435	15	10	3	0	0	6	0	1
Switchgear – zone / sub transmission / transmission substation	15,300	9	21	21	0	0	0	0	0
Switchgear – distribution (Overhead)	582,306	1,422	1,157	297	1	4	852	0	3
Switchgear – distribution (Ground based)	46,315	27	18	8	1	0	9	0	0
Protection relays or systems[9]	5,421	40	54	54	0	0	0	0	0

[8] Low Voltage (LV)

[9] As per previous ENSMS Reports, population is based on Zone Substation Protection Systems

Performance Measure	Population	5-year average annual functional failures	Functional failure total FY2022	Annual functional failures (for reporting period)					
				Unassisted			Assisted		
				No fire	Fire		No fire	Fire	
					Contained	Escaped		Contained	Escaped
Zone / sub transmission / transmission substation SCADA system	387	48[10]	54	54	0	0	0	0	0
Zone / sub transmission / transmission substation Protection Batteries	714	0	0	0	0	0	0	0	0
Network SAPS	3	0	0	0	0	0	0	0	0

[10] 4 year average functional failures

Case Study – Vegetation Management

Vegetation contact with conductors can be a source of fire, public safety risk and loss of supply. As such, management of vegetation in the vicinity of powerlines is a key activity to ensure risks are as low is as reasonably practical. Effort / investment towards vegetation management is made available and prioritised accordingly.

As part of our vegetation management program, we focus on:

- Maintaining minimum clearances from vegetation; and
- Identifying, so far as is reasonably practicable, trees outside the clearance space that may present a risk of falling or blowing into our electricity network.

Persistent wet weather patterns have led to rapid vegetation growth and access difficulties across the state. This has slowed progress and increased workload, resulting in a vegetation treatment task backlog. A heightened level of focus remains on the task backlog, and efforts to actively manage and reduce this continue.

Our End to End Vegetation Management Strategy is progressing through implementation. An element of the End to End Vegetation Management Strategy is the implementation of revised contracts with our service partners, which has driven improvements in underlying performance.

Figure 9 Vegetation near the Essential Energy electricity network

3.2 Vegetation contact with conductors

Table 5 breaks out the numbers and causes of vegetation contact with conductors into the following categories:

- 'Grow in' vegetation is any vegetation that has grown into the space around the conductors, allowing contact to occur. This might come from trees that are below, to the side or above electricity network conductors.
- 'Fall in' vegetation is usually dead, diseased, or, dying vegetation from trees surrounding or above the electricity network conductor that has fallen onto the electricity network conductor e.g. dead branches that fall onto electricity network conductors when they drop from a nearby tree.
- 'Blow in' vegetation is usually branches that have been picked up by high winds from some distance away from electricity network conductors and which has been 'blown into' the electricity network conductors.

For context, Essential Energy operates and maintains approximately 575,000 vegetated spans across our electricity network.

Figure 10 Vegetation near the network can cause failures and fires

Table 5: Vegetation contact with conductors

Performance measure	Event count – 1 July 2021 – 30 June 2022	Event count – 1 July 2020 – 30 June 2021	Event count –1 July 2019 – 30 June 2020	Event count – 1 October 2018 – 30 September 2019	Event count – 1 October 2017 – 30 September 2018
Fire starts – grow in	0	0	1	1	5
Fire start – fall in and blow in	25	22	48	43	38
Interruption – grow in	158	132	138	147	147
Interruption – fall in and blow in	2,197	1,834	1,570	1,883	1,367

We have seen an increase in fall in and blow in interruptions year on year from FY2020. We attribute this to an increase in trees falling into the electricity network due to soft ground at the root zone and high winds associated with storm events. Note that the number of fires started by trees falling into the network remains lower than average.

Case Study – Reducing exposure to contact with the electricity network

Electricity networks are designed and constructed to reduce the likelihood of exposure to the public, public workers and network workers to the hazard of unintended discharge of electricity. There is a variety of design aspects that reduce the likelihood of exposure to unintended discharge, with many included in the applicable Australian Standards the electricity network is constructed to. Some of these include:

- Conductor height above ground (overhead networks)
- Cable construction, burying depths and protection (underground assets)
- Security arrangements (substation sites)

Asset inspections provide verification that the electricity network is being maintained and is in its 'as designed' condition. Essential Energy also creates an annual Public Electricity Safety Awareness Plan (see Section 4.5 of this report for details) to create public awareness of the hazards of electricity.

Figure 11 Public safety messaging related to contact with the electricity network

3.3 Unintended contact, unauthorised access and electric shocks

Table 6 displays events that resulted in electric shocks that were not classified as 'Major Incidents' or 'Incidents' in accordance with *IPART's Electricity networks reporting manual – Incident Reporting*. Table 6 also records instances of unintended or unauthorised contact or close access to the electricity network that had the potential to result in an electric shock.

Examples of events included in Table 6 include:

- Member of the public receiving an electric shock (not classified as a major or incident), due to a faulty network connection to a residence;
- Tipper truck contacting overhead powerlines while operating;
- Construction excavator contacting underground powerlines while operating;

- Theft of copper earth wires from power poles; and
- Construction scaffolding erected too close to the network.

Table 6: Unintended contact, unauthorised access and electric shocks

Detail	Event count – 1 July 2021 – 30 June 2022	Event count – 1 July 2020 – 30 June 2021	Event count – 1 July 2019 – 30 June 2020	Event count – 1 October 2018 – 30 September 2019	Event count – 1 October 2017 – 30 September 2018
Electric shock and arc flash incidents originating from network assets including those received in customer premises					
Public	219	231	262	241	252
Public worker	9	4	2	6	3
Network employee/ contractor	9	2	9	6	9
Accredited Service Provider[11]	0	0	3	0	2
Livestock or domestic pet	15	13	17	18	9
Contact with energised overhead network asset (e.g. conductor strike)					
Public road vehicle	305	401	355	342	341
Plant and equipment	113	91	93	77	65
Agricultural and other	156	130	107	250	99
Network vehicle	0	2	2	5	0
Contact with energised underground network asset (e.g. conductor strike)					
Plant and equipment	37	55	47	52	34
Person with handheld tool	4	7	4	1	1
Unauthorised network access (intentional)					
Zone / BSP[12] / Transmission substation / switching station	2	0	0	3	2
Distribution substation	4	8	20	3	0
Towers / poles	8	4	14	7	11
Other (e.g. communication sites)	2	1	1	3	5
Safe Approach Distance (SAD)					
Network employee / network contractor	5	1	3	2	4
Accredited Service Provider	6	3	3	3	1

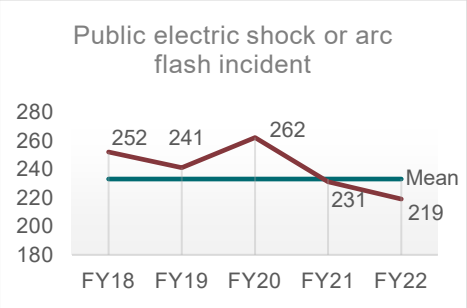
[11] Accredited Service Providers are persons who have been accredited through a NSW Government-recognised accreditation scheme, to undertake contestable work on the Essential Energy network

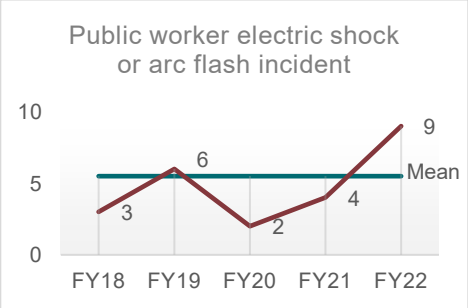
[12] Bulk Supply Point (BSP)

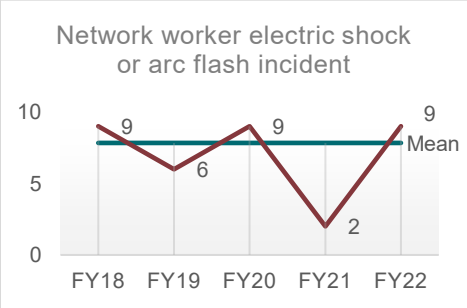
Detail	Event count – 1 July 2021 – 30 June 2022	Event count – 1 July 2020 – 30 June 2021	Event count – 1 July 2019 – 30 June 2020	Event count – 1 October 2018 – 30 September 2019	Event count – 1 October 2017 – 30 September 2018
Public	11	11	8	5	6
Public Worker	60	41	44	31	27

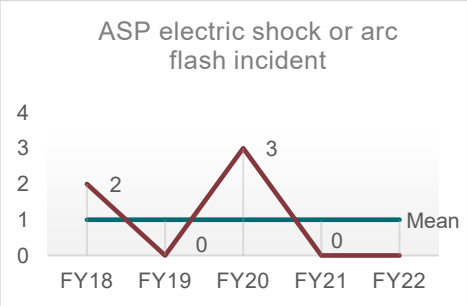
The trends for electric shock, contact with the energised overhead network, and contact with the underground network for the reporting periods FY2018- FY2022 are shown on the next page. Of note are the upwards trends in incidents relating to contact with the overhead network by plant and equipment and agricultural workers. We prepare an annual Public Electricity Safety Awareness Plan (PESAP) that is informed by these incidents (and trends). The contents of our PESAP are detailed in section 34 of this report.

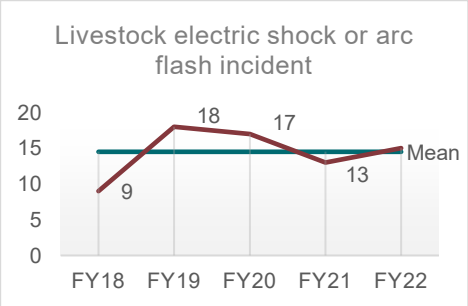
Electric shock or arc flash incident trends FY2018-FY2022



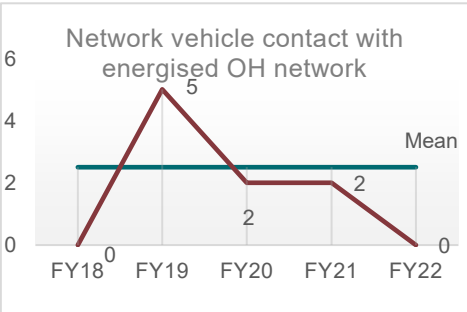


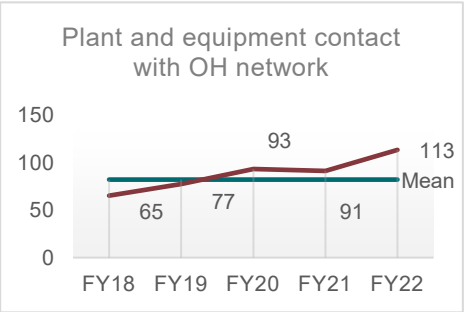


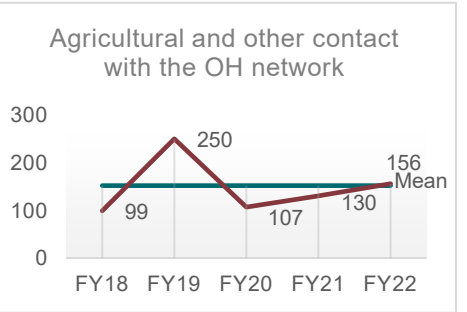


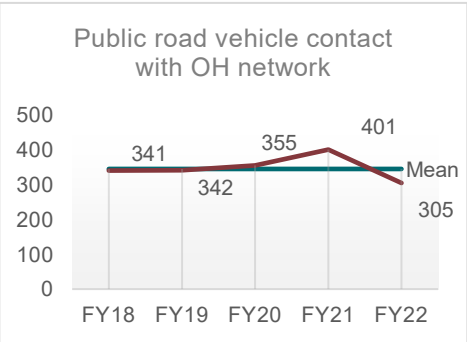


Contact with energised overhead (OH) network trends FY2018-FY2022

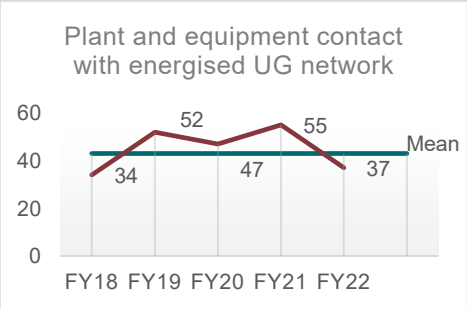


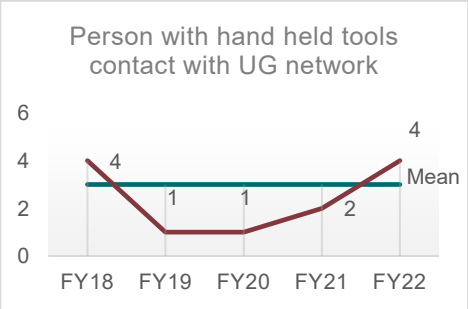






Contact with energised underground (UG) network trends FY2018-FY2022





3.4 Reliability and Quality of Supply

Table 7 details occurrences of:

- Three types of events that resulted in electric shocks that were not classified as Major Incidents or Incidents in accordance with *IPART's Electricity Networks Reporting Manual - Incident Reporting* but resulted in dangerous network conditions (high voltage into low voltage, reverse polarity, and neutral integrity due to poor workmanship or incorrect procedure).
- Events resulting in sustained (longer than 10 minutes) network voltages that either exceed or are lower than the limits prescribed in the Australian Standard *AS61000.3.100-2011 Limits—Steady state voltage limits in public electricity systems.* The basis of reporting for sustained voltage excursions outside of emergency range has been updated to align with industry accepted reporting. This has resulted in a step change between the periods FY2021 and FY2022.
- Electric shocks that were caused by a defective neutral connection that resulted from asset defects or failures, but were not reportable incidents under *IPART's Electricity Networks Reporting - Incident Reporting* (Neutral integrity due to asset defect or failure).

Table 7: Reliability and Quality of Supply

Performance Measure	Event count – 1 July 2021 –30 June 2022	Event count – 1 July 2020 – 30 June 2021	Event count – 1 July 2019 – 30 June 2020	Event count – 1 October 2018 – 30 September 2019	Event count – 1 October 2017 – 30 September 2018
High voltage into Low voltage	21	21	16	13	-
Sustained voltage excursions outside emergency range	6	344	259	359	-
Reverse polarity	1	3	1	6	-
Neutral integrity due to poor workmanship or incorrect procedure	2	2	1	15	-
Neutral integrity due to asset defect or failure	165	181	190	173	-

Note: This reporting requirement was introduced from October 2018; historical data is not available beyond this date.

Case Study - Smart meter data to improve identification of neutral integrity issues

The Low Voltage Network Visibility Pilot has been expanded with the addition of approximately 30,000 smart meters, bringing the total number of meters involved to 65,000 or 7.4% of total meters. The pilot is using smart meter data to (amongst other measures) identify neutral integrity issues, highlighting safety issues with customer installations and ensuring network protection functions as designed. Prior to the establishment of the trial, neutral integrity issues were identified through public reporting of 'shocks and tingles', domestic appliance damage, or intermittent tripping of residual current devices, indicative of neutral integrity issues that were apparent to the customer. This technology will allow Essential Energy to proactively identify locations where neutral integrity has been compromised and take action, in some cases before the customer is aware that an issue exists. If the trial is successful, we plan to transition this project to business as usual by June 2023.

Figure 12 High impedance neutral identified through the trial

3.5 Reliability and Quality of Supply – Critical infrastructure incidents

Table 8 details events where supply was lost to critical infrastructure, which are defined as:

- Peer group A1, A2, A3 and B hospitals;
- Road tunnels on motorways that have emergency evacuation systems;
- Events and buildings where more than 5,000 people could be affected by an outage; and
- Other community infrastructure determined by the network operator to be of National, State or Regional significance.

Table 8: Reliability and Quality of Supply – Critical infrastructure incidents

Type of critical infrastructure (e.g. hospital, tunnel)	Minutes of supply lost	Cause	Consequential safety impacts associated with supply issue
Lismore Hospital	490	A Major Incident was reported on 28 February 2022, caused by large scale flooding across the North Coast of NSW. A consequence of this incident was flooding of assets in the Lismore area and surrounds. The floods and heavy rain caused major interruptions to the electricity network including electricity supply to the Lismore Hospital. The flood waters prevented safe access to damaged equipment across the network, for inspection and re-energisation	There were no safety impacts reported from this incident

Case Study - Quantifying the safety consequences of loss of electricity supply

We are leading an Energy Networks Australia (ENA) project to help network operators quantify the safety consequences of the loss of electricity supply. To deliver on our safety, cost and performance objectives, we must trade-off between reliability and safety. When faced with these decisions, we make use of the best information available, and in the case of the safety consequences of the loss of supply this is largely unquantified, or intangible information. This project will help us establish a framework that informs better decisions that balance safety risk and performance.

3.6 Network-initiated property damage events

Table 9 details events where public or network property was damaged, and it is considered that there is a reasonable likelihood that the damage was caused by the network.

Table 9: Network-initiated property damage events

Detail	Event count – 1 July 2021 – 30 June 2022	Event count – 1 July 2020 – 30 June 2021	Event count – 1 July 2019 – 30 June 2020	Event count – 1 October 2018 – 30 September 2019	Event count – 1 October 2017 – 30 September 2018
Third party property (assets including vehicles, buildings, crops, livestock)					
Damage (e.g. Fire, Physical impact or Electrical)	43	39	44	41	-
Network property (including non-electrical assets including vehicles, buildings)					
Damage (e.g. Fire, Physical impact or Electrical	0	1	1	2	-

Note: This reporting requirement was introduced from October 2018; historical data is not available beyond this date

4. Tier 4 - Control implementation

This section sets out Essential Energy's performance in planning, implementing, reviewing, and delivering key safety risk controls, as set out in the Electricity Network Safety Management System (ENSMS). It is structured as follows:

- Table 10 details amendments and improvements made to Essential Energy's suite of Formal Safety Assessments and associated risk treatments during the reporting period
- Table 11 sets out activities undertaken in connection with design, construction and commissioning work on the Essential Energy network
- Table 12 sets out activities undertaken and outstanding in relation to asset inspections
- Table 13 sets out asset 'corrective action tasks'
- Table 14 sets out activities undertaken and outstanding in relation to vegetation inspections
- Table 15 sets out activities undertaken in relation to public electrical safety awareness
- Table 16 sets out internal audit activities performed on aspects of the ENSMS
- Table 17 sets out external audit activities performed on aspects of the ENSMS

Case Study - Formal Safety Assessments: Understanding our risks and the system of control

Formal Safety Assessments (FSA) are a structured method for undertaking risk assessments of safety hazards (e.g. electricity) and hazardous events (e.g. bushfire) that could arise from the operation of an electricity network. They capture our understanding of the network safety risks and inform decision making on the actions we take to address them.

FSAs encompass the network context, internal experience and external stakeholder views. They develop:

- Threat scenarios that could result in hazardous events being realised;
- Document the potential consequences of the exposure;
- Identify, evaluate and establish related controls and assurance processes;
- Document performance measures and plans to treat risk to an acceptable level; and
- Ensure the residual risk is evaluated against Essential Energy's risk criteria and meets the organisation's risk appetite.

These are the documents that our safety regulators test for completeness and measure our performance against during regular external audits.

In the last year, we have identified better ways to align our suite of FSAs to meet our businesses practices and processes. This will deliver improved management of the hazards and risks identified in the Formal Safety Assessments, leading to improved outcomes for our employees, customers and stakeholders. We are now piloting a new FSA development process while we undertake this re-alignment. We expect to complete the first two FSAs developed through the new structure and process by the end of October 2022.

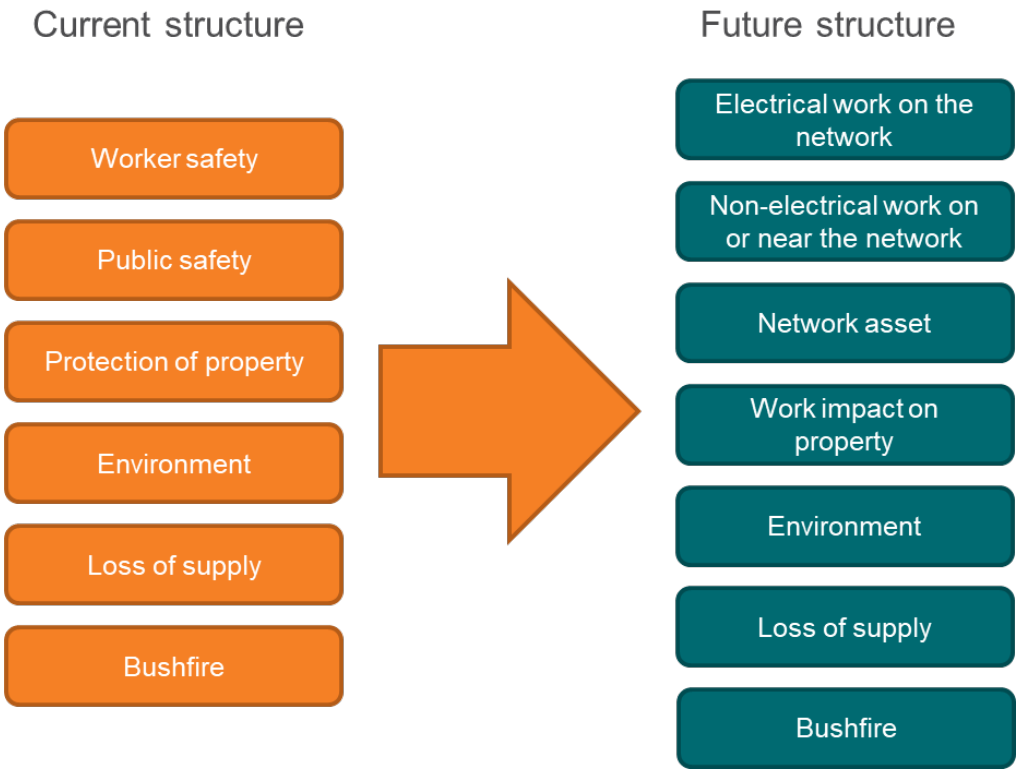


Figure 13 Formal Safety Assessment current and future structure

4.1 Amendments and improvements to Formal Safety Assessments

Table 10 describes amendments and improvements to Formal Safety Assessments (FSAs) during FY2022.

Table 10: Amendments and improvements to Formal Safety Assessments (FSA) or associated risk treatments

FSA	Amendments or improvements
Worker Safety	Nil
Public Safety	A cyclic review of the Public Safety FSA was completed in 2022. Treatments identified include: • Implementation of the Network Visibility project, which will provide detection of high impedance neutrals by monitoring customer smart meter data • Evaluation of composite streetlight columns as an alternative to steel columns which reduce the likelihood of contact with energised parts in the event of a wiring fault • Implementation of the physical security project to reduce the likelihood of unauthorised access to electricity network infrastructure • Increased efforts to reduce the Cat3/Cat4 backlog • Expanded delivery of the Blackspot pole program in the 2024-29 regulatory proposal
Protection of Property	Nil

FSA	Amendments or improvements
Loss of Supply	Essential Energy considered the loss of supply events associated with the 2019-20 bushfire season to be a trigger for an event driven review of the Loss of Supply FSA. The FSA review identified additional controls and a broader set of key risk/performance indicators to provide insight into loss of supply safety risk. Treatments identified include: • Delivery of the E2E Vegetation Management Strategy • Consideration of fauna interactions in the Overhead System Strategy • Implementation of data analytics projects to model the impact of climate change on network reliability • Implementation of Network Reliability Strategy • Integration of loss of supply safety consequence ENA project findings into risk models • Implementation of the physical security plan • Implementation of the cyber security plan • Implementation of Network Access Request system upgrades • Development of a suite of risk and criticality informed contingency plans • Development and implementation of the Network Visibility Strategy • Lead ENA working group to quantify the safety consequences of loss of supply • Include business case for regulated SAPS expenditure in the 2024-29 regulatory determination • Evaluate Fault Location Calculator and Line Fault Indicator sensors for improved fault response times
Bushfire	Nil
Environment	Preparation of a demonstration of how the Essential Energy Environmental Management System satisfies the requirement of AS 5577 Appendix A. Updated the Environmental Aspects Register to align with the corporate risk matrix. Identified treatments for medium or greater environmental risks.

4.2 Design, construction and commissioning

Table 11 details metrics relating to the design, construction and commissioning of new or altered network assets during the reporting period. This includes ‘contestable’ designs and installation, undertaken by Accredited Service Providers (ASP), which are reviewed and certified by Essential Energy.

The greatest opportunity to influence network safety occurs during the planning and design phase of the network lifecycle. These metrics track the safety assessments and audits on those assessments, and safety reviews undertaken on Level 1 (work to extend or increase the capacity of the overhead and underground network) and Level 2 (work on overhead or underground service lines) ASP projects.

Table 11: Design, construction and commissioning

Performance measure	1 July 2021 – 30 June 2022	1 July 2020 – 30 June 2021	1 July 2019 – 30 June 2020	1 October 2018 – 30 September 2019	1 October 2017 – 30 September 2018
Designs for which Safety in Design (SiD) Reports have been completed	984	809	1,200	1,455	-
Designs for which Safety in Design (SiD) Reports have been audited	984	90	58	62	-
Contestable designs certified	1,947	1,915	1,785	1,837	-
Contestable level 1 project safety reviews performed	584	447	1,554	1,569	-
Contestable level 2 project safety reviews performed	9	0			
Project closeout reports completed for contestable projects	1,250	1,266	6,432	6,234	-
Project closeout reports completed for non-contestable projects	4,541	3,736			-
Project closeout reports audited for contestable projects	0	0	-	-	-
Project closeout reports audited for non-contestable projects	4,541	3,736			-

Note: This reporting requirement was introduced from October 2018; historical data is not available beyond this date. Note that in FY2022 every Safety in Design Report issued has been reviewed by a Design Team Leader; this is a step change from the sample approach taken previously.

4.3 Inspections (assets)

Table 12 details asset inspections undertaken during the reporting period and Table 13 details 'corrective action tasks' addressing conditions identified from inspections undertaken during the reporting period or within previous reporting periods, that fell due during the reporting period. Within the 'corrective action tasks' section of Table 13:

- 'Tasks identified' are those that were reported during the reporting period
- 'Tasks achieved' are those that were completed during the reporting period
- 'Cancelled' tasks are tasks that were not required due to equipment being placed out of service
- 'Open' tasks are tasks that were identified prior to or during the reporting period, but that did not fall due during the reporting period
- 'Outstanding' tasks are tasks that fell due during the reporting period, but that weren't completed

Table 12: Inspections (assets)

Performance measure	Inspection tasks				
	FY2022 Target	Achieved FY2022	Cancelled	Open	Outstanding
Transmission Substations	-	-	-	-	-
Zone Substations	2,617	2,445	162	0	2
Distribution Substations[13]	2,037	1,816	21	66	50
Transmission OH	-	-	-	-	-
Transmission UG	-	-	-	-	-
Distribution OH	312,151	233,275[14]	1,903	3,885	18,779
Distribution UG	12,888	12,625	0	0	263
Network SAPS	0	0	0	0	0

Note: Inspection tasks may be outstanding due to issues such as wet weather and access constraints. Outstanding tasks are monitored on an appropriate basis and risk assessed to determine the suitable course of action. Additionally, tasks planned for FY2022 may have been achieved in earlier or later financial years. The scope of this report covers only those tasks completed in FY2022.

[13] Excludes OH substations inspections, OH substation inspections are included in the Distribution OH row

[14] Of the 312,151 OH inspection tasks planned for FY2022, 14,065 were completed in FY2021 and 30,277 were completed in FY2023

Table 13: Asset corrective action tasks

Performance measure	Corrective action tasks			
	Tasks identified (all categories)	Achieved	Open	Outstanding
Transmission Substations	-	-	-	-
Zone Substations	3,386	3,148	694	396
Distribution Substations[15]	4,543	2,572	3,888	542
Transmission OH	-	-	-	-
Transmission UG	-	-	-	-
Distribution OH	142,420	94,368	459,990	49,107
Distribution UG	5,162	3,932	5,436	736
Network SAPS	0	0	0	0

Note: Tasks may be outstanding due to issues such as wet weather and access constraints. Outstanding tasks are monitored on an appropriate basis and risk assessed to determine the suitable course of action. We are actively managing these tasks in conjunction with managing new higher risk tasks e.g. tasks in higher bushfire risk areas. Where outstanding tasks exist in higher risk locations, these are actively assessed and managed.

Case Study - Pre-summer bushfire inspections

In the window between the storm season (mid to late summer) and the bushfire season (late spring and summer), we conduct a predominately aerial inspection of the highest bushfire risk areas of our electricity network. The purpose of these inspections is to identify onsetting failures that could subsequently lead a bushfire ignition.

Where an onsetting failure that could trigger a bushfire is identified, tasks to rectify the identified conditions are created and completed prior to the bushfire season.

Figure 14 Aerial patrol aircraft

4.4 Inspections (vegetation)

Table 14 details vegetation inspection tasks undertaken during the reporting period. The table includes two types of vegetation inspections; those undertaken using aerial inspection methods and those undertaken using ground-based inspection methods.

[15] Excludes OH substations corrective tasks, OH substation corrective tasks are included in the Distribution OH row

We carry out aerial pre-summer bushfire inspections across our 'P1' bushfire risk areas. These are the parts of the network considered the highest bushfire risk. Further detail of Essential Energy's approach to bushfire risk prevention is provided in Part B of this report.

Other terms used in Table 14 are similar to those used in Table 12.

Table 14: Inspections (vegetation) Aerial/Ground based

Bushfire risk category	Population (total spans)	Target	Achieved	Outstanding
Aerial				
P1	106,981	7,377	6,265	1,112
P2	377,926	2,080	2,038	42
P3	644,884	0	0	0
P4	640,743	0	0	0
Total	1,770,534	9,457	8,303	1,154
Ground-based				
P1[16]	106,981	29,129	25,642	3,487
P2[17]	377,926	174,801	136,077	38,724
P3[18]	644,884	174,276	149,513	24,763
P4[19]	640,743	480,508	461,037	19,471
Total	1,770,534	858,714	772,269	86,445

Note: Tasks may be outstanding due to issues such as wet weather and access constraints. Outstanding tasks are monitored on an appropriate basis and risk assessed to determine the suitable course of action. We are actively managing these tasks in conjunction with managing new higher risk tasks e.g. tasks in higher bushfire risk areas. Where outstanding tasks exist in higher risk locations, these are actively assessed and managed.

4.5 Public electrical safety plans and activities

Table 15 details activities undertaken as part our Public Electrical Safety Awareness Plan (PESAP). This outlines the programs and activities that we initiate or continue to perform in order to promote public safety awareness and education relating to the electricity network.

[16] Areas considered high bushfire risk

[17] Areas considered moderate bushfire risk

[18] Areas considered low bushfire risk

[19] Areas considered non-bushfire prone

Table 15: Public electrical safety plans and activities

Network operator public safety programs / campaigns	Details
Public Electrical Safety Awareness Plan 2021-22 (PESAP)	The Public Electrical Safety Awareness Plan (PESAP) includes the key initiatives and campaigns we are undertaking to raise electrical safety awareness in our communities and across key industry sectors. Our key objectives are to: • Raise awareness and improve understanding in the general community and in priority industry sectors about safety hazards associated with the electrical distribution network • Foster positive, proactive association with our communities to increase awareness about electrical safety • Identify areas of risk and implement strategies to prevent incidents resulting from interaction with the network • Demonstrate Essential Energy's commitment to the safety of everyone interacting with our network Annual campaign planning includes analysing historical data to identify incident trends, locations and ensuring these are addressed with public safety campaigns (paid and unpaid media activities). In addition, industry insights and other third-party data points are used as forward planning tools, in combination with historical data, aiming to predict a forecast for incident occurrence. The PESAP is regularly updated to reflect our latest incident analysis, ensuring our electrical safety awareness programs target those groups most at risk of incidents involving the electricity network. Essential Energy's Public Safety Working Group steers the day-to-day management and strategic direction of Public Safety efforts, including reviewing public safety marketing campaigns and any requirements for additional communications in line with at-risk industries or trends.
General public	Summer Safety – targeting all customers (General Public), in market November – March including Storm, Flood, Bushfire & Motor Vehicle Accident safety messages. Flood messaging was included in response to predicted increased flood activity. 'Shocks and Tingles' safety messages also featured during summer Vegetation Management & Plan Before You Plant messaging featured on organic social media Public Safety Survey – initial and pulse surveys implemented for the first time with community members surveyed across the Essential Energy network area, with data used to inform campaign planning moving forward
Agribusiness	Grain, Cotton, Sowing Safety – at seasonally relevant times Key messaging: Stay, Call, Wait & Emergency Escape Procedure, Look up and Live, Aerial Markers Increased stakeholder collaboration – Collaboration with Cotton Australia, Grain Corp, NSW Farmers on Seasonal Worker checklist. Holistically, we've worked with groups in our NSW network area to provide broader context and visibility of PESAP activities Safety Electronic Direct Mail implemented. Shared with email subscribers

Network operator public safety programs / campaigns	Details
Building/Construction/Demolition – Including construction safety/Dial before you dig	Powerline safety for construction sites and those involved in the construction industry via online advertising Introduction of online, user friendly Request for Safety Advice & aerial marker promotion Specific educational factsheet & support for those involved in Flood restoration efforts
Transport - High Loads Safety	Paid digital advertising and social media messaging through the year Message focus on Look up and Live, know driving height, fully lower before moving off Additional collateral developed in response to incidents involving tipper trucks (fact sheet)
Emergency services & Public Authorities	Volunteer Magazine placement – flood wrap up & press ad Emergency Services DVD – review and update in progress
Aviation Safety	Powerline safety awareness for aviation safety industry participants – shared across the Essential Energy network across digital and social media advertising Collaboration with Aerial Applicators Association of Australia (AAAA) to share information with member networks

Figure 15 Essential Energy's presence at Primex 2021

4.6 Internal audits

Table 16 details internal audits performed on any aspects of the ENSMS during the reporting period.

Table 16: Internal audits performed on any aspect of the ENSMS (as per AS 5577 clause 4.5.4)

Audit scope	Summary of identified non-compliances	Summary of actions
During March and April 2022 Internal Audit performed a review of the ENSMS element *Measurement and Evaluation*. The objective was to: • Assess the design of the Line 1 and Line 2 mechanisms in place to measure and evaluate network safety performance against the AS 5577 standard, • Assess if Management's documented mechanisms for measuring and evaluating network safety performance is operating as intended and in alignment with AS 5577 requirements, • Assess corrective action status from recent self-assessment, and, • Identify areas where there may be gaps or weaknesses in the measurement and evaluation element (against the standard AS 5577 and Management's application of the element in practice). Note: This was a design / desktop review. Line 2 activities are in place to assess controls are operating as designed.	The auditor identified opportunities to improve embedment of procedures that support the ENSMS and governance of ENSMS risk controls including the development of a set of leading indicators for network safety risk. Additionally, the auditor identified that there is an opportunity to improve the governance around ENSMS Assurance activities.	Actions to address findings were agreed, assigned, and are being implemented.

4.7 External audits

Table 17 details external audit performance on any aspect of the ENSMS during the reporting period.

During FY2022 there were two external audits performed:

- IPART Bushfire Risk Management Audit
- Queensland Electrical Safety Office Electricity Safety Management System Audit

Table 17 sets out the findings from these audits, along with the recommendations and agreed actions.

Table 17: External audits performed on any aspect of the ENSMS (as per AS 5577 clause 4.5.4)

Audit scope	Identified non-compliances		Actions
	Audit Criteria	Recommendation	
ENSMS (Bushfire Risk Management)	The Bushfire FSA does not explicitly address the requirements of Table A.1.6(d) of the IPART audit guidelines.	Update the Bushfire FSA to include evidence that shows that completeness checks have been performed as per the requirements of Table A.1.6(d) of the IPART audit guidelines.	1. Update the Bushfire FSA to include a completeness check that provides a positive demonstration that the FSA considers the elements included IPART Electricity Networks Safety Management Systems Audit Guideline Table A.1.6(d) (below). 'A completeness check has been undertaken based on the network's functional units, comparing the interactions of: • identified hazards (including the loss of electricity supply), • critical exposed groups (e.g. members of the public and persons working on networks), • other critical exposed elements (e.g., property and the environment), and, • all relevant phases (e.g., design, construction, commissioning, operations maintenance and decommissioning), as well as, • abnormal and emergency situations.' Due: 30 September 2022 Status: Complete 2. Additionally, the Essential Energy FSA template will be updated to include a completeness check that explicitly addresses the requirements of IPART Electricity Networks Safety Management Systems Audit Guideline Table A.1.6(d). Due: 30 June 2022 Status: Complete

Audit scope	Identified non-compliances		Actions
	Audit Criteria	Recommendation	
ENSMS (Bushfire Risk Management)	CEOP1000.27 Safe Design does not explicitly address the requirements of AS5577 4.3.2 of AS5577 "Control measures required to reduce safety risks to the public, property, the environment, and network personnel to an acceptable level shall be incorporated in the appropriate procedures".	Review and update all relevant procedures to explicitly address all the requirements of section 4.3.2 of AS5577.	Update CEOP1000.27 Safe Design to explicitly address all of the requirements of section 4.3.2 of AS 5577. The procedure update will encompass: • Legislation review table • Link to the Corporate Risk Procedure risk appetite • Identify and control hazards for Workers, Public, Property and the Environment Due: 31 July 2022 Status: Complete Perform a scan of all procedures that refer to CEOP1000.27 to ensure that the requirements of section 4.3.2 of AS 5577 are reflected any documents subordinate to CEOP1000.27 Safe Design. Due: 30 September 2022 Status: Complete
ENSMS (Bushfire Risk Management)	ENSMS Plan Section 4 is not providing sufficient information to comply with AS5577 Section 4.4.2 and procedures that are used to implement and manage this the ENSMS.	Update ENSMS and FSA to address the requirements of section 4.4.2 of AS5577 identifying the resourcing, equipment, and material requirements for the network's safe operation and maintenance.	Update the Bushfire FSA to include a demonstration that there are sufficient resources available to deliver the controls and treatments identified in the FSA. Due: 30 September 2022 Status: Complete Additionally, the Essential Energy FSA template will be updated to include a demonstration that there are sufficient resources available to deliver the controls and treatments identified in the FSA. Due: 30 June 2022 Status: Complete
ESMS – WHSMS & ENSMS (all aspects)	Nil	Nil	Nil

Part B – Bushfire Preparedness Report

Part B reports demonstrates our bushfire preparedness, leading up to the 2022 bushfire season, covering the period 1 October 2021 to 30 September 2022.

Part B is structured as follows:

- Section 5 describes the bushfire risk profile across our supply area
- Section 6 identifies the permanent and temporary fire risk declarations by Rural Fire Service and outlines the actions taken in response
- Section 7 describes the scope of private lines ('aerial consumer mains') on bushfire prone land
- Section 8 describes the status of our pre-summer bushfire inspections, vegetation and asset maintenance tasks

5. Bushfire risk profile across Essential Energy's supply area

5.1 Identification of hazardous bushfire areas

Bushfire prone lands have been identified across our network footprint. The bushfire-prone lands are further segmented into bushfire risk classifications based on scientific bushfire risk modelling. The modelling considers the impact of fires which may originate from network assets.

Bushfire risk priority classifications (P1, P2, P3, & P4) are applied and determine:

- Bushfire mitigation work priorities;
- Pre-summer inspection requirements;
- Investment program priorities; and
- Operational procedures and practices.

Figure 18 is a sample map of these zones based on designated maintenance areas within our network footprint.

The P1 - P4 classifications are a blend of ratings from two different bushfire risk models:

a. Essential Energy Fire Risk model; and
b. Phoenix Rapid Fire model (developed by leading fire researchers and the Bushfire and Natural Hazards Cooperative Research Centre).

These are defined in Table 18: Bushfire risk classifications.

Table 18: Bushfire risk classifications

Bushfire Risk Classification	Definition
P1	High risk severity
P2	Moderate risk severity
P3	Low risk severity
P4	Non-bushfire prone

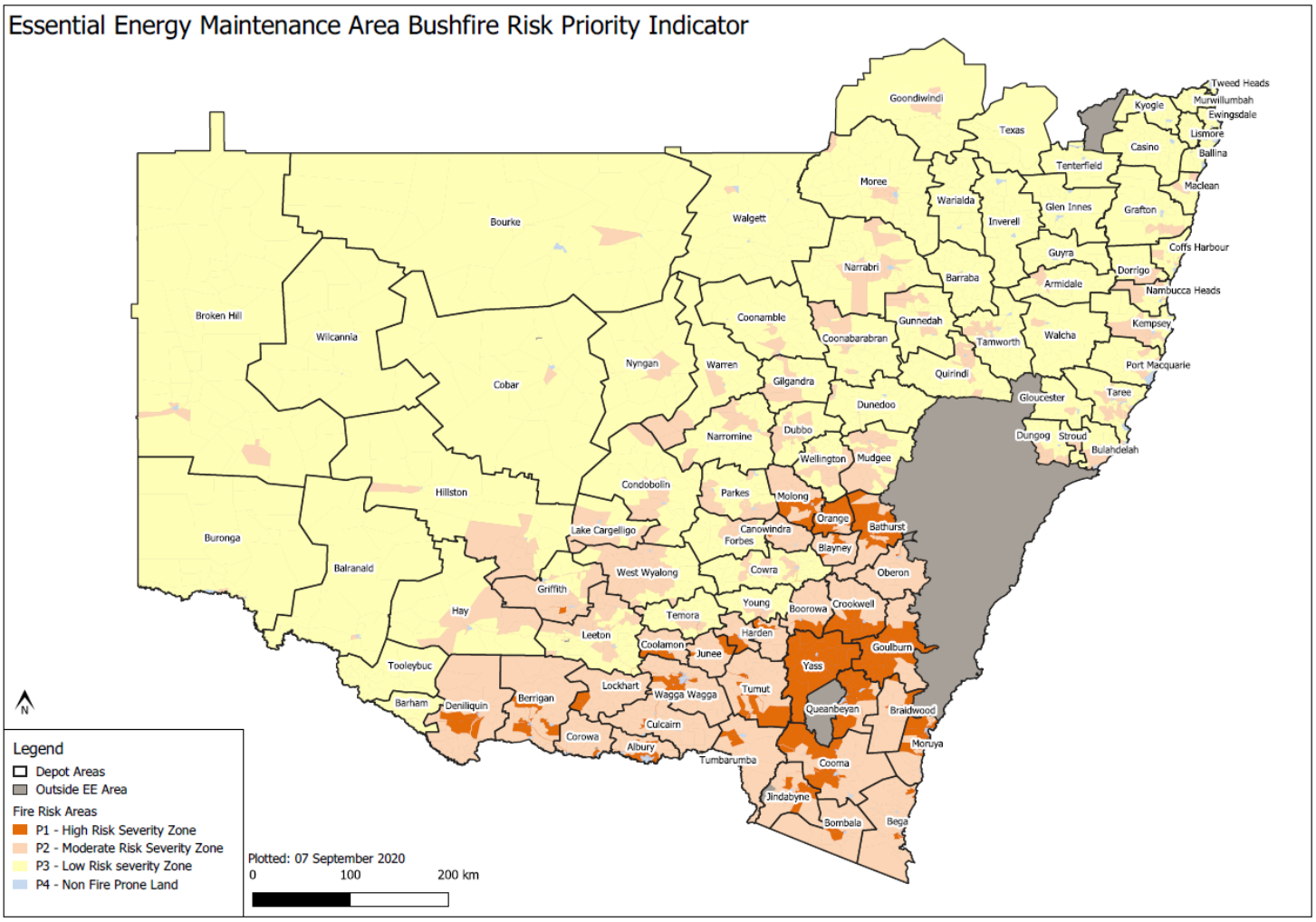


Figure 16 Maintenance area bushfire risk priority indicator

Our Bushfire Prevention Strategy provides an over-arching approach to managing bushfire risk. It sets out amongst other things, the inter-relationship with the ENSMS and associated risk controls and related plans.

One of those plans is the Bushfire Risk Management Plan which describes the activities undertaken to mitigate potential fire ignition. The Plan is published on our website (essentialenergy.com.au) and public feedback is welcomed and included.

We use intelligence obtained from national natural hazard agencies such as the Australian and New Zealand National Council for fire and emergency services (AFAC) to inform the operational posture for an upcoming fire season. An overview of the upcoming season is provided in section 5.2 below.

5.2 Commentary from AFAC for forthcoming bushfire season

Persistent rainfall across much of NSW over 2022 has resulted in a higher than average grass and shrub fuel load. Despite the forecast of wetter than average conditions the high grass and shrub fuel loads could result in periods of elevated grass fire risk in the event of periods of low rainfall and high temperatures. The below normal fire potential conditions for south-eastern NSW are driven by reduced fuel loads as a result of the 2019/20 fire season. Figure 17 below shows the fire outlook for spring 2022.

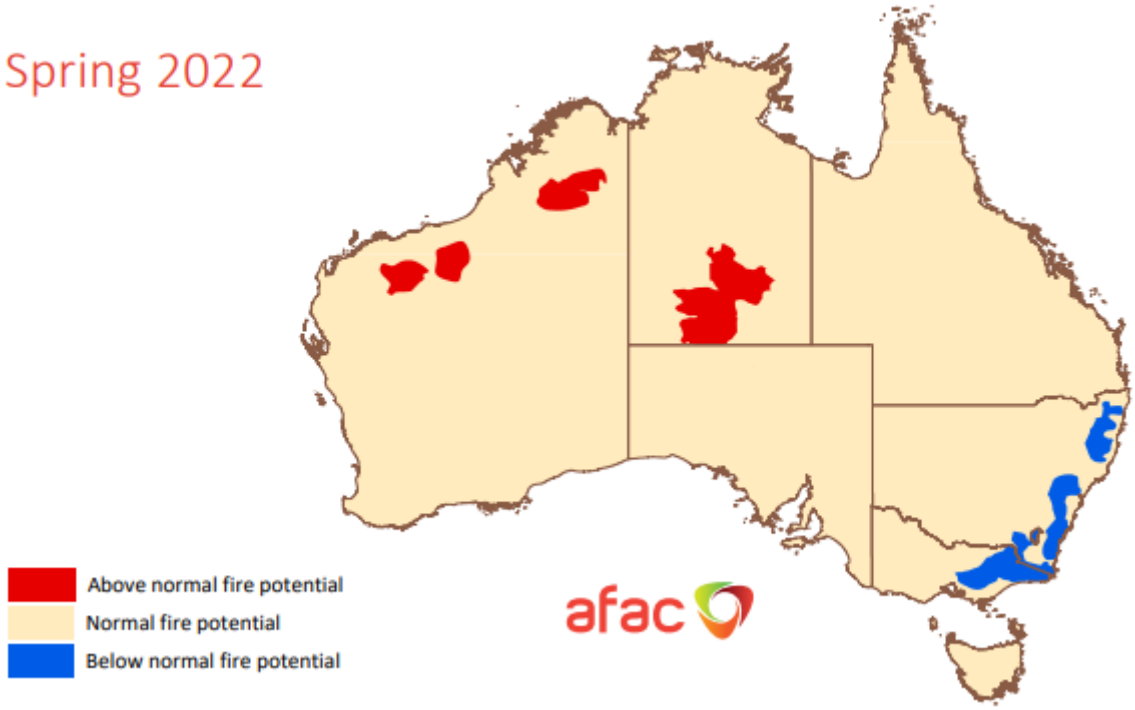


Figure 17 AFAC spring 2022 fire outlook

6. Permanent / temporary declaration of areas by RFS and network operator's actions

Fire season district declaration notifications from NSW RFS are monitored closely by Essential Energy.

It is noted that six local government areas were declared on 1 August 2022, and a further 21 were declared on 1 September 2022. This is in line with permanent early declarations for these areas.

Essential Energy undertakes a number of actions in preparation for the bushfire season. These include:

- Producing a pre-fire season communication plan for our employees. For example, the primary communications included information on:
    - the early start to the bushfire danger period;
    - the procedures in place to be followed in periods of higher fire danger;
    - how to enrol in receiving SMS Total Fire Ban updates; and
    - information on access to the RFS Fires Near Me app, and where to contact for further information.
- A briefing on the upcoming fire season is conducted with key business leaders. This includes expected early starts to the fire danger period and the research from the Bureau of Meteorology (BOM), Australian and New Zealand National Council for Fire and Emergency Services (AFAC) and Natural Hazards Research Australia (NHRA). This provides an opportunity to refresh staff awareness of the relevant Essential Energy policies for days of elevated fire risk.
- Issuing an Essential Energy Safety Brief to employees on the early start to the fire season to ensure appropriate risk mitigation measures are put in place.
- Monitoring and reviewing of research into fires and the changing climatic conditions via relationships with organisations such as the BOM, AFAC, NHRA and universities.
- Conducting regular operational Bushfire Preparedness meetings to assess maintenance tasks priorities including prioritisation of tasks associated with the annual network Pre-Summer Bushfire Inspections in high fire risk areas.

- Pre-season briefing presentations from NSW RFS management to key managers and senior leaders including seasonal outlooks.

7. Aerial consumer mains on bushfire prone private land (HV and LV)

7.1 Low voltage private lines

Our asset inspectors undertake regular ground-based patrols of private overhead lines as part of routine network asset inspections. Customers are notified of maintenance tasks identified on a private line.

As an example, in the Part B reporting period 2021-22 we inspected 22,250 private poles resulting in the identification of 1,460 private maintenance tasks which required follow up notification and consultation with our customers.

We have a dedicated private lines team that manages customer engagement in regard to notifiable tasks to ensure safety related matters are dealt with. We have in place hardship arrangements for customers who may have limited financial means to deal with the costs of maintenance of private lines.

We have processes in place to regularly review private line tasks to ensure they are correctly classified as private tasks and customers receive the appropriate information to deal with maintenance of their assets.

Case Study - Bushfire prevention through the management of private lines

Figure 18 Working together to reduce bushfire risk

We are responsible for the maintenance and safe operation of electricity network assets. Where a customer's installation includes low voltage overhead components between the connection point and the customer's switchboard or meter box, we are responsible for the inspection of these components, known as private assets, and the customer is responsible for the rectification of defects. Where conditions are identified that may result in failure (a defect), we inform the customer of these conditions and sets deadlines for rectification that are required by the *Electricity Supply Act 1995.*

We have a team that tracks the completion of tasks on private assets and in some circumstances, such as where an urgent defect has been identified, complete the work and charge the customer reasonable costs of repair. We have identified 1,460 defects, of which customers rectified 1,339. Of the 121 outstanding, 41 we have made the defect safe and have raised tasks for our local depots to take action, 7 can't be accessed due to wet ground conditions and 18 have been disconnected or are waiting for disconnection due to vacant property. Of the remaining we are working with the customer to achieve a resolution to keep our community safe.

The inspection of private assets and management of any subsequent tasks identified helps to keep our community safe from the impact of asset failure which could include bushfire.

7.2 High voltage private lines

We have a small proportion of customers connected to the network as Private High Voltage Installations. At these sites, customers take supply at high voltage, and they own and operate their own private electrical network under special requirements set out in the Connection Agreements and the NSW Service and Installation Rules.

We communicate annually with high voltage customers connected to our network about their obligations to implement a suitable safety management system or plan. This includes drawing specific attention to their obligation to maintain private electrical installations such that they mitigate the risk of these assets becoming a source of bushfire ignition.

7.3 Activities undertaken to manage the risk of aerial consumer mains on bushfire prone private land

Table 19 details the activities undertaken to manage the risk of aerial consumer mains on bushfire prone private land. This is broken into performance measures describing activities relating to private LV lines and HV customers.

Table 19: Aerial consumer mains on bushfire prone private land (HV and LV)

Performance Measure	1 October 2021 – 30 September 2022		1 October 2020– 30 September 2021		1 October 2019 – 30 September 2020		1 October 2018 – 30 September 2019		1 October 2017 – 30 September 2018	
	Target	Actual	Target	Actual	Target	Actual	Target	Actual	Target	Actual
Private LV lines checked by the network operator	25,195	22,250	27,330	22,549	23,494	23,478	25,996	24,228	-	12,592
Number of directions for bushfire risk mitigation issued to LV customers by the network operator	n/a	1,460	n/a	1,266	n/a	1,492	n/a	1,243	n/a	311
Number of directions for bushfire risk mitigation issued to LV customers by the network operator that are outstanding by more than 60 days	n/a	121	n/a	212	n/a	212	n/a	67	n/a	206
HV customers[20] (metering point count) advised to undertake pre- season bushfire checks in accordance with ISSC31	198	245	189	192	128	128	150	150	-	-
HV customers (metering point count) providing statements of compliance in accordance with ISSC31	245	223	192	189	128	106	150	141	-	-
HV customers (metering point count) requiring additional risk mitigation prior to start of the reporting year	n/a	22	n/a	3	n/a	22	n/a	9		
HV customers (metering point count) where additional risk mitigation has been completed prior to start of the reporting year	n/a	22	n/a	3	n/a	0	n/a	0	n/a	

Note: This reporting requirement was introduced from October 2018; historical data is not available beyond this date. We are actively managing those customers with outstanding tasks or that require additional remediation.

[20] For this section HV Customers includes Load and Generator customers

8. Bushfire inspections, vegetation and asset maintenance tasks

We undertake specific preparation activities ahead of the bushfire season. Tables 20 – 22 provide a summary of the leading indicators of bushfire preparedness ahead of the bushfire season. These indicators provide an insight to our preparations for the upcoming bushfire season and the discipline applied to the management of tasks that could impact on the performance of the electricity network.

Table 20 describes the status of pre-summer bushfire inspections, undertaken via aerial inspection methods and as described in Table 15.

Table 20: Pre-summer bushfire inspections

Pre-summer bushfire inspections	Population (poles)	Target	Achieved	Outstanding
Inspections	122,530	101,536	101,481	0

Table 21 describes the status of vegetation tasks as of 30 September 2022.

For Table 21 and Table 22 the following definitions apply:

- Identified – tasks that are identified through various inspection programs in place at Essential Energy and also through public and staff reporting;
- Achieved – identified tasks that have been completed;
- Open – identified tasks that are not yet complete, but are within the rectification timeframes for the task; and
- Outstanding – identified tasks that are not yet complete, and exceed the rectification timeframes for the task.

Vegetation / asset task categorisation and bushfire risk priority area categorisation is used to prioritise vegetation / asset task completion to reduce the likelihood of vegetation contact with the network or asset failure.

Figure 19 Powerlines and vegetation – balancing risk, cost and amenity

Table 21: Vegetation tasks

Bushfire risk category	Status	Encroachment Classification A1[21]	Encroachment Classification A2[22]	Encroachment Classification A3[23]	Encroachment Classification A4[24]	Hazard trees[25]
P1	Identified	1,465	1,614	1,506	2,378	701
	Completed	903	1,228	1,095	1,594	517
	Open	59	98	106	263	184
	Outstanding	503	288	305	521	147
P2	Identified	4,767	6,892	14,036	20,298	5,768
	Completed	1,569	2,509	4,367	11,169	2,763
	Open	899	1,270	3,906	4,033	3,005
	Outstanding	2,299	3,113	5,763	5,096	2,245
P3	Identified	3,182	2,919	7,888	28,895	6,107
	Completed	1,990	1,679	4,653	16,646	3,797
	Open	606	708	1,478	8,562	2,310
	Outstanding	586	532	1,757	3,687	1,709
P4	Identified	19,015	15,260	17,987	26,776	2,524
	Completed	10,036	8,705	10,067	18,083	1,828
	Open	5,859	4,546	5,106	6,090	696
	Outstanding	3,120	2,009	2,814	2,603	451
Total	Identified	28,429	26,685	41,417	78,347	15,100
	Completed	14,498	14,121	20,182	47,492	8,905
	Open	7,423	6,622	10,596	18,948	6,195
	Outstanding	6,508	5,942	10,639	11,907	4,552

[21] A1 vegetation has encroached as far as 75-100% into the minimum vegetation clearances, as defined in *ISSC3 Guide for the Management of Vegetation in the Vicinity of Electricity Assets* (ISSC3)

[22] A2 vegetation has encroached as far as 50-75% into the minimum vegetation clearances, as defined in ISSC3

[23] A3 vegetation has encroached as far as 25-50% into the minimum vegetation clearances, as defined in ISSC3

[24] A4 vegetation has encroached as far as 0-25% into the minimum vegetation clearances, as defined in ISSC3

[25] Hazard Trees are blow-in/fall-in vegetation hazards as defined in ISSC3

Table 22 details the status of asset tasks as of 30 September 2022. This includes all asset tasks identified which are in progress (Open) and those where the nominated rectification timeframe for completion has elapsed (Outstanding). Tasks may be outstanding due to issues such as wet weather and access constraints. Outstanding tasks are monitored on an appropriate basis and risk assessed to determine the appropriate course of action.

Table 22: Asset tasks

Bushfire risk category	Status	Category 1[26]	Category 2[27]	Category 3[28]	Category 3A[29]	Category 4[30]	Totals
P1	Identified	474	362	3,827	1,559	1,991	8,213
	Completed	468	351	3,605	1,305	1,400	7,129
	Open	0	14	1,037	788	6,843	8,682
	Outstanding	0	4	311	37	947	1,299
P2	Identified	1,651	1,418	14,237	5,199	5,360	27,865
	Completed	1,626	1,333	14,122	4,387	3,763	25,231
	Open	0	39	4,110	2,958	18,899	26,006
	Outstanding	1	28	1,979	177	5,129	7,314
P3	Identified	2,730	2,338	22,591	7,949	8,533	44,141
	Completed	2,683	2,186	22,330	7,204	6,522	40,925
	Open	0	107	7,444	5,577	34,664	47,792
	Outstanding	3	59	5,544	594	12,340	18,540
P4	Identified	1,240	1,533	13,149	6,336	4,897	27,155
	Completed	1,217	1,438	13,862	5,729	3,003	25,249
	Open	0	55	2,755	2,551	10,973	16,334
	Outstanding	4	12	1,537	152	1,870	3,575
Un-classified[31]	Identified	7	775	1,559	189	483	3,013
	Completed	7	724	1,468	131	889	3,219
	Open	0	9	305	72	218	604
	Outstanding	0	108	321	0	65	494
Total	Identified	6,102	6,426	55,363	21,232	21,264	110,387

[26] Cat 1 (Emergency) task to rectify asset condition that presents an immediate risk to safety, should be rectified within 48 hours

[27] Cat 2 (Urgent) task to rectify asset condition that is expected to deteriorate rapidly to present a risk to safety, should be rectified within one month

[28] Cat 3 (Risk – near term) task to rectify asset condition that is expected to deteriorate within the near term and present risk to safety, should be rectified within six months

[29] Cat 3A (Risk – medium term) task to rectify asset condition that is expected to deteriorate within the medium term and present risk to safety, should be rectified within two years

[30] Cat 4 (Condition assessment) task to rectify asset condition that presents a low risk of deterioration, however should be reinspected every five years

[31] Includes private assets

Bushfire risk category	Status	Category 1[26]	Category 2[27]	Category 3[28]	Category 3A[29]	Category 4[30]	Totals
	Completed	6,001	6,032	55,387	18,756	15,577	101,753
	Open	0	224	15,651	11,946	71,597	99,418
	Outstanding	8	211	9,692	960	20,351	31,222