

Electricity Network Safety Management System Performance & Bushfire Preparedness Report

Part A - 1 July 2020 to 30 June 2021

**Part B - 1 October 2020 to 30 September
2021**



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

October 2021

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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 2020). As such, it is intended to provide sufficient information for IPART or members of the public and customers to assess Essential Energy’s performance against its ENSMS.

It is structured in two parts:

- > Part A sets out the annual safety performance for the period 1 July 2020 to 30 June 2021
- > Part B sets out Essential Energy’s bushfire preparedness activities undertaken for the period 1 October 2020 to 30 September 2021

Context

Essential Energy builds, operates and maintains the electricity network that services regional, rural and remote communities across 95 per cent of New South Wales (NSW) and parts of southern Queensland. The business maintains and develops the infrastructure that delivers power to more than 870,000 homes and businesses, 170 hospitals, and 1,250 schools. Figure 1 shows some key statistics of the Essential Energy network plus a summary of some of the key challenges faced in managing the network.

Essential Energy aims to continuously improve safety performance for employees, contractors and the community, while also striving to deliver other aspects of network performance that our customers expect and downward pressure on customers’ network charges.

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

Figure 2 depicts the ‘whole of lifecycle’ approach to safety that is taken by the ENSMS.

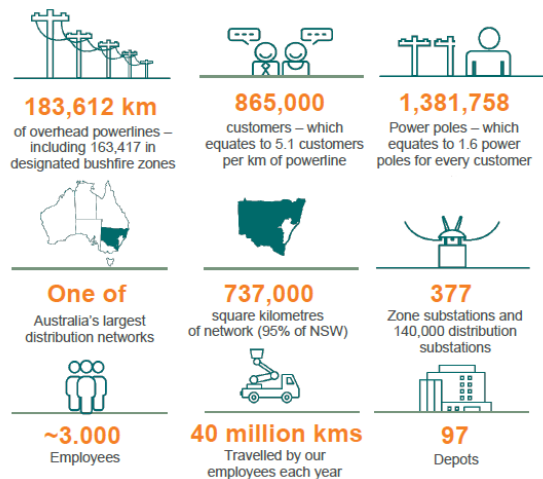


Figure 1 Essential Energy Snapshot



Figure 2 Network and Asset Lifecycle phases considered by the ENSMS

The ENSMS sits alongside other key management systems within the business, including the Essential Energy Asset Management System, Work Health and Safety Management System and Environmental Management System.

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)

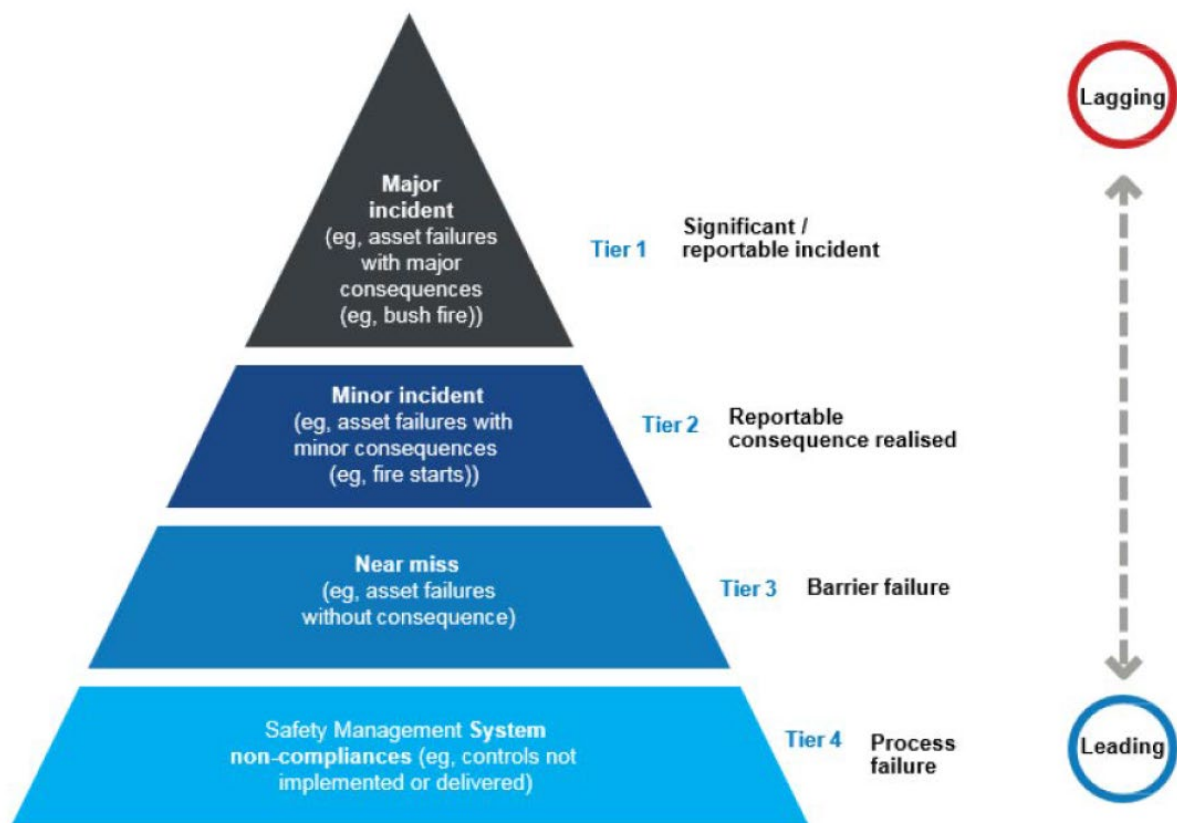


Figure 3 IPART Safety Performance Monitoring Framework

A summary of the key statistics from this report and the changes from the previous reporting period are shown in Figure 4 below.

	Number of events	Event classification	Change from 2019/2020	
	1	Tier 1 Major Incidents	▼ -4	
	14	Tier 2 Incidents	▲ +5	
Other incidents				
Subtotal of Incidents	1 585 ▲ +79	250	Electric shock and arc flash incidents originating from network assets	▼ -21
		624	Incidents of contact with energised overhead network asset	▲ +67
		62	Incidents of contact with energised underground network assets	▲ +11
		15	Incidents of unauthorised network access (intentional)	▼ -20
		56	Safe Approach Distance incidents	▼ -2
		539	Reliability and power quality events e.g. sustained voltage excursions outside of emergency range	▲ +72
		0	Reliability and power incident involving critical infrastructure (hospitals, tunnels)	-
		39	Network-initiated property damage events (damage to 3 rd party assets including vehicles, buildings, crops, livestock)	▼ -5
Subtotal of Failures	9449 ▼ -2612	3673	Unassisted Asset Failures (fires contained 46, fires escaped 77)	▼ -857
		3788	Assisted Asset Failures (fires contained 20, fires escaped 73)	▼ -1986
		1988	Incidents of vegetation with contact with conductors	▲ +231

Figure 4 Summary of key statistics from the ENSMS Performance Report

This reporting period has seen an increase in incidents of contact with the energised overhead and underground network. Stakeholders report an increase in crop yields due to favourable growing conditions, while labour movement restrictions due to COVID-19 travel restrictions mean less-experienced workers are working and fewer workers are needing to work longer hours. Both factors are known contributors to incidents where farm equipment comes into contact with the network. Additionally, Infrastructure Australia¹ reports changes in transport modes and an increase in regionalisation due to the COVID-19 pandemic which could account for the increase in incidents of contact with overhead network assets.

¹ Infrastructure beyond COVID-19: A national study on the impacts of the pandemic on Australia, Infrastructure Australia, December 2020

Section 1 and 2

These tables provide a view of electricity network-related incidents that resulted in harm to the public, Essential Energy's workers, network assets and public and private property, the environment and harm due to loss of supply. Tables 1 and 2 are a record of these incidents that Essential Energy reported to IPART in accordance with the Electricity Networks Reporting Manual – Incident Reporting.

1. Tier 1 – Major Incidents

Major incidents are defined in the IPART Electricity Networks Reporting Manual – Incident Reporting (March 2021) 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 e.g. due to major bushfires that were started by the network, as well as significant power outages.

Table 1 provides a brief description of all 'Major Incidents' that occurred on the Essential Energy network during the reporting period. Each of these was reported to IPART during the year, in accordance with definitions and timeframes set out by IPART.

Table 1 Major incidents

ESSNM ² Objective		Description of major incident reported under the incident reporting requirements
Safety of members of the public		Nil reported incidents
Safety of persons working on network		Nil reported incidents
Protection of property	Third party property	Nil reported incidents
	Network property	Nil reported incidents
Safety risks arising from loss of electricity supply		1 December 2020 - Young - 2 66kV poles were damaged by a storm, resulting in loss of the primary supply to the Young Zone Substation (ZS) while crews assessed the storm damage. While the primary supply was out of service, the Young ZS was being supplied by the secondary supply. Approximately 20 minutes after the loss of the primary supply, 6 poles on the secondary line were damaged by the same storm system resulting in the loss of supply to 5,535 customers for 433 minutes.

² Electricity Supply (Safety and Network Management) Regulation 2014

Young storm outage event

Essential Energy reported one incident in the 2020-2021 reporting period that was classified as a major incident, related to a power outage in the region of Young, northwest of Wagga Wagga. On the 1 December 2020, a storm cell passed near Cootamundra and Young. The Bureau of Meteorology weather station at Young recorded wind speeds of 80km/h.

Overhead electricity networks are vulnerable to damage from high winds and are designed to cope with high wind speeds. However, it is not practical or affordable to design a network to cope with the most extreme wind speeds that occur very rarely.

In conjunction with electricity network design standards, electricity networks are planned and designed where possible to allow major substations to be supplied from multiple sources so that in the event of a failure of one source, the community can be supplied from another source.



Figure 5 Electricity network damage due to high winds, Young, December 2020

On this occasion, both sources of supply were impacted by the weather system that passed through the area resulting in the loss of supply to 5,535 customers for 433 minutes while the network was restored.

Essential Energy has committed to maintaining customer reliability to reduce the adverse impact of loss of supply on our customers and the community that we serve.

2. Tier 2 – Incidents

Incidents are defined in the IPART Electricity Networks Reporting Manual (March 2021) 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 2 provides a brief description of all 'Incidents' that occurred on the Essential Energy network during the reporting period. Each of these was reported to IPART during the year, in accordance with definitions and timeframes set out by IPART.

Table 2 Incidents

ESSNM Objective	Description of each incident reported under the incident reporting requirements
Safety of members of the public	Public worker at a grain handling facility was relocating an auger via walk beside remote operation. During the auger's travel the boom of the auger contacted overhead 22kV conductors. The public worker suffered electric shock and burns to feet and hands. Public worker was transported to hospital for medical assessment and treatment.
Safety of persons working on the network	An electricity network worker was assisting with pole change. He was preparing to remove a lifting chain under tension from the pole when his finger became caught between the pole and the chain. This resulted in crush injury to the right ring finger. The worker was transported to hospital for medical treatment.
Protection of third-party property	<ul style="list-style-type: none"> > 21 October 2020 - A harvester contacted overhead conductors and started a fire that resulted in 60 ha of wheat being burnt. > 4 November 2020 - A tipper truck travelling with a raised bucket came into contact with overhead conductors and started a fire that burnt 100 ha. > 16 November 2020 - Evidence suggests a pole failed due to gale force winds, in excess of 70km/h, that caused a fire burning 751 ha. > 17 November 2020 - A harvester contacted overhead conductors and started a fire that burnt 161 ha. > 6 December 2020 - A crossarm failed in high winds due to fungal decay, resulting in a pole top fire escaping to the surrounding stubble that burnt 66 ha. > 14 December 2020 - Harvester struck overhead conductors resulting in a crop paddock fire that burnt 15 ha. > 16 January 2021 - Conductor failure started a fire that burnt 24 ha. > 24 January 2021 - A wire-reinforced tarpaulin blew into overhead low voltage conductors, that melted and ignited grass under the line that burnt 30 ha.
Safety risks arising from loss of electricity supply	<ul style="list-style-type: none"> > 27 July 2020 - Storms and high winds across NSW > 1 December 2020 - Storms and high winds across NSW > 19 March 2021 - Severe floods across eastern NSW > 20 March 2021 - Severe floods across eastern NSW

Grain handling facility worker injury

A public worker at a grain handling facility was relocating machinery and contacted overhead 22kV lines. The worker received an electric shock and burns.

Agricultural workers contacting the electricity network is recognised as a key public safety risk and Essential Energy actively engages with the community to educate public workers on the risks associated with operating equipment near the electricity network.

Essential Energy has recently partnered with Energy Queensland in the Look Up and Live (lookupandlive.com.au) app which provides the public and public workers with a view of the location and voltage of the network. With this knowledge in the planning phase of work, members of the public and public workers can identify suitable controls to manage the risk of contact with the network.

Additionally, Essential Energy has rolled out a program to install aerial markers on lines where public workers are working in the vicinity of overhead lines in certain circumstances. These markers increase the visibility of the network. Landowners can request the installation of aerial markers in high risk locations at the cost of the aerial markers only.



Figure 6 Look Up and Live sample display

Essential Energy worker crushed finger



Figure 7 HIRAC mindset model

Whilst changing a pole, an Essential Energy employee's finger was caught between a chain being used to lift the pole and the pole when the chain came under tension. This resulted in the employee's finger being crushed.

Safety risk to employees and the public from lifting operations is classified by Essential Energy as a 'Network Fatal Risk', this means that there are potential for fatal injuries as a consequence of this hazard. Essential Energy workers are prompted to consider the Network Fatal Risks in the planning and execution of their work.

Essential Energy has recently rolled out a program to reset expectations relating to the pre-task risk assessment, which introduced a safety mindset model featuring the elements – Communicate, Plan, Prepare, Start, and Adapt.

Bushfires

The Essential Energy electricity network can be a source of ignition during network faults or during the operation of HV fuses. Essential Energy reported 8 fires that met the reporting criteria for incidents (> 10 ha burnt area, not in the control of the NSW Rural Fire Service Commissioner) where the electricity network was suspected to be a source of ignition. Five of these incidents were a result of third-party contact with the network and three were likely to be a result of equipment failures.

Essential Energy considers bushfire risk from the operation of the electricity network to be a significant risk and has a Bushfire Prevention Strategy to translate organisational bushfire risk reduction objectives to actions to prevent bushfires. Essential Energy has seen a year-on-year reduction in the number of bushfires started by the electricity network over the last 5 years, indicating that the strategies that Essential Energy has in place to reduce the risk of bushfires, such as vegetation management, construction specifications and operational restrictions during high fire risk weather, are delivering a reduction in the number of fires started.

3. Tier 3 – Control failure near miss

Failure of electricity network assets, particularly functional failure where assets stop performing a required function i.e. 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. The level of spending required to eliminate these failures through redesign or maintenance of the electricity network would be unaffordable, so a balance is achieved where the risk of failure is managed as low as reasonably practicable.

Essential Energy performs various inspections on its assets to identify conditions that precede asset failure. Analysis of inspection data and failure rates influence replacement programs to manage risk (safety to public, workers, and the environment) that is associated with failure. These tables provide a view of the effectiveness of the inspection and maintenance programs in the identification of conditions that could lead to failure.

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 as follows:

- > Table 3 sets out near misses related to 'functional' **failures of network assets**
- > Table 4 sets out near misses related to trees or branches (**'vegetation'**) contacting overhead wires ('conductors')
- > Table 5 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 6 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 7 sets out near misses due to supply interruptions to '**critical infrastructure**' e.g. hospitals and road tunnels.
- > Table 8 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 8 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



Figure 8 Pole failure in a cotton field

Table 3 lists those asset failures that occurred on the Essential Energy 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 the control of Essential Energy. 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 3 Network assets failures

Performance Measure	Population	5-year average annual functional failures	Functional failure total FY21 ³	Annual functional failures (for reporting period)					
				Unassisted			Assisted		
				No fire	Fire		No fire	Fire	
					Contained	Escaped		Contained	Escaped
Towers	190	0	0	0	0	0	0	0	0
Poles (including street lighting columns/poles & stay poles)	1,405,404	1,043	646	239	5	7	375	8	12
Pole-top structures									
Crossarms	1,350,802	964	859	360	19	14	464	0	2
Insulators	3,937,091								
Conductor ties	2,875,665								
Conductor – Transmission OH	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Conductor – Transmission UG	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Conductor – HV ⁴ (including sub-transmission) OH ⁵	157,412 km	1,182	1,225	628	7	32	519	2	37
Conductor – HV (including sub-transmission) UG ⁶	2,866 km	58	60	16	2	1	40	0	1
Zone / sub transmission / transmission substation Protection Batteries	709	0	0	0	0	0	0	0	0
Conductor – LV ⁷ OH	25,341 km	813	732	340	3	5	375	0	9
Conductor – LV UG	6,872 km	381	399	194	1	5	199	0	0
Service line OH	570,194 km	2,151	2,110	717	2	1	1,384	4	2

³ This column is the sum of the columns to the right

⁴ High Voltage (HV)

⁵ Overhead (OH)

⁶ Underground (UG)

⁷ Low Voltage (LV)

Performance Measure	Population	5-year average annual functional failures	Functional failure total FY21	Annual functional failures (for reporting period)					
				Unassisted			Assisted		
				No fire	Fire		No fire	Fire	
					Contained	Escaped		Contained	Escaped
Service line UG	171,787 km	184	204	85	0	1	118	0	0
Power transformers	685	1.25	0	0	0	0	0	0	0
Distribution transformers	139,785	1,120	1,072	645	1	1	420	2	3
Reactive plant	438	20	21	11	0	0	10	0	0
Switchgear – zone / sub transmission / transmission substation	15,226	4.4	7	7	0	0	0	0	0
Switchgear – distribution (Overhead)	580,379	537	465	196	5	10	249	4	7
Switchgear – distribution (Ground based)	45,205	50	71	9	1	0	61	0	0
Protection relays or systems ⁸	5,379	36	35	35	0	0	0	0	0
Zone / sub transmission / transmission substation SCADA system	373	46 ⁹	68	68	0	0	0	0	0

⁸ As per previous ENSMS Reports, population is based on Zone Substation Protection Systems

⁹ 3 year average

Vegetation Management

Vegetation contact with conductors can be a source of fire, public safety risk and loss of supply. Essential Energy invests a significant proportion of its operational budget to manage vegetation in the vicinity of powerlines to reduce risk of bushfire, public and worker safety impacts, and supply outages that result from vegetation contacting the electricity network.

Essential Energy has recently developed and is currently implementing a 15 year End-to-End Vegetation Management Strategy that will deliver a reduction in bushfire risk and supply outages over its life through improved identification of trees that could impact the network, and implementation of cut cycles that are optimised for vegetation growth rates across the network footprint. In addition to the technical improvement, the strategy will deliver improved contractor management for vegetation management activities, which is predominately undertaken by contractors. It will also delivery improved management of amenity tree and reduced costs.



Figure 9 Vegetation worker trimming vegetation

3.2 Vegetation Contact with Conductors

Table 4 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 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.



Figure 10 Vegetation near the network can cause failures and fires

For context, Essential Energy has approximately 575 000 vegetated spans across its network.

Table 4 Vegetation contact with conductors

Performance measure	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	Event count – 1 October 2016 – 30 September 2017	Comments
Fire starts – grow in	0	1	1	5	6	Nil
Fire start – fall in and blow in	22	48	43	38	28	Nil
Interruption – grow in	132	138	147	147	167	Nil
Interruption – fall in and blow in	1,834	1,570	1,883	1,367	1,672	Nil

Reducing exposure to contact with the electricity network

Electricity networks are designed and constructed to comply with Australian Standards to reduce the likelihood of exposure to the public, public workers, and network workers to the hazard of unintended discharge of electricity. Design aspects that reduce the likelihood of exposure to unintended discharge of electricity include conductor height

above ground for overhead networks, conductor burying depths and protection for underground assets and security arrangements for substations. Maintenance inspections provide verification that the electricity network being maintained in the design 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 5 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 5 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 5 could 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 5 Unintended contact, unauthorised access and electric shocks

Detail	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	Event count – 1 October 2016 – 30 September 2017	Comments
Electric shock and arc flash incidents originating from network assets including those received in customer premises						
Public	231	262	241	252	195	Nil
Public worker	4	2	6	3	9	Nil
Network employee / network contractor	2	9	6	9	12	Nil
Accredited Service Provider ¹⁰	0	3	0	2	1	Nil
Livestock or domestic pet	13	17	18	9	15	Nil
Contact with energised overhead network asset (e.g. conductor strike)						
Public road vehicle	401	355	342	341	328	Nil
Plant and equipment	91	93	77	65	52	Nil
Agricultural and other	130	107	250	99	169	Nil
Network vehicle	2	2	5	0	6	Nil
Contact with energised underground network asset (e.g. conductor strike)						
Plant and equipment	55	47	52	34	27	Nil
Person with handheld tool	7	4	1	1	2	Nil
Unauthorised network access (intentional)						
Zone / BSP ¹¹ / Transmission substation / switching station	0	0	3	2	4	Nil
Distribution substation	8	20	3	0	0	Nil
Towers / poles	4	14	7	11	5	Nil
Other (e.g. communication sites)	1	1	3	5	7	Nil

¹⁰ 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

¹¹ Bulk Supply Point (BSP)

Detail	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	Event count – 1 October 2016 – 30 September 2017	Comments
Safe Approach Distance (SAD)						
Network employee / network contractor	1	3	2	4	5	Nil
Accredited Service Provider	3	3	3	1	4	Nil
Public	11	8	5	6	11	Nil
Public Worker	41	44	31	27	33	Nil

3.4 Reliability and Quality of Supply

Table 6 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 periods where the voltage on the network was sufficiently outside of the nominal low voltage operating range of 225 volts to 253 volts that it resulted in a complaint from a customer (Sustained voltage excursions outside emergency range), and
- 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 manual - Incident Reporting (Neutral integrity due to asset defect or failure)

Table 6 Reliability and Quality of Supply

Performance Measure	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	Event count – 1 October 2016 – 30 September 2017	Comments
High voltage into Low voltage	21	16	13	-	-	Nil
Sustained voltage excursions outside emergency range	344	259	359	-	-	Nil
Reverse polarity	3	1	6	-	-	Nil
Neutral integrity due to poor workmanship or incorrect procedure	2	1	15	-	-	Nil
Neutral integrity due to asset defect or failure	181	190	173	-	-	Nil

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

Smart meter data to improve identification of neutral integrity issues

Essential Energy is currently undertaking an innovation trial using smart meter data to indicate neutral integrity issues. A low impedance neutral path is critical to the safe operation of the customer installation and protective equipment. Prior to the establishment of the trial, neutral integrity issues were identified through public reporting of shocks and tingles or other manifestations of neutral integrity issues that were apparent to the customer. If the trial is successful, 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.



Figure 12 High impedance neutral identified through the trial

3.5 Reliability and Quality of Supply – Critical Infrastructure Incidents

Table 7 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 5000 people could be affected by an outage; and,
- > other community infrastructure determined by the network operator to be of National, State or Regional significance.

There were no events of this type within the reporting period.

Table 7 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
Nil incidents recorded	0	N/A	N/A

3.6 Network-initiated Property Damage Events

Table 8 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 8 Network-initiated property damage events

Detail	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	Event count – 1 October 2016 – 30 September 2017	Comments
Third party property (assets including vehicles, buildings, crops, livestock)						
Damage (e.g. Fire, Physical impact or Electrical)	39	44	41	-	-	Nil
Network property (including non-electrical assets including vehicles, buildings)						
Damage (e.g. Fire, Physical impact or Electrical)	1	1	2	-	-	Nil

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. 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** and Table 13 ‘**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

Inspections and improvements of the ENSMS - leading indicators

The indicators in this section provide a view of the future safety performance of the electricity network. For example, if Essential Energy has not been able to complete a large number of inspections of its assets in a year, this may result in an increase in future failures as conditions preceding failure may remain undetected on assets that have not been inspected which could lead to a failure of an asset in the future. Similarly, updates to the ENSMS ensure that Essential Energy is keeping abreast of changes to underlying causes of safety risks and new or more effective ways of managing safety risk. Table 9 provides examples of trials and pilots that Essential Energy is currently pursuing that, if successful, may provide additional controls that may be applied to the achievement of the ENSMS objectives.

Table 9 Pilots and trials planned for upcoming period and influence on ENSMS objective

Trial name	Timeframe	Description	Benefits	ENSMS objective that the trial may provide addition control					
				Public Safety	Worker Safety	Property	Loss of Supply	Environment	Bushfire
Network Visibility – Future Grid Pilot	March to November 2021	Pilot of Network Visibility Platform using data from a variety of sensors and systems to produce automated analytics for network performance and decision-making support.	<p>Use of smart meter power quality (PQ) data for detection of Loss of Neutral on the network which will allow Essential Energy to have visibility of unsafe neutral integrity issues without the requirement for customer identification of conditions that indicate loss of neutral integrity (e.g. shocks and tingles from taps and conductive fittings)</p> <p>Monitor low voltage (LV) network and provide alerts for sustained over-voltages and under-voltages at customer premises.</p> <p>Monitor network impedance for early warning on degradation of LV conductors.</p>	✓		✓	✓		
Fault Location Calculator	March 2021 to December 2021	Application available to both the System Controller and the Field Operator that identifies the probable location of fault placement to reduce the scope of a network segment to be patrolled once a protection device has operated to lock out.	Reduce time required to patrolling a line to locate fault. Reducing restoration time.		✓		✓		

Trial name	Timeframe	Description	Benefits	ENSMS objective that the trial may provide addition control					
				Public Safety	Worker Safety	Property	Loss of Supply	Environment	Bushfire
Line Fault Indicator sensors	Planned for FY22	Trial of Line fault indicator sensors with remote communications capability to provide information about probable location of outages, conductor breakage and vegetation encroachment	Reduce outage duration. Identify probable contact with live conductor. May aid in identification of and facilitate proactive treatment of dangerous conditions such as downed conductors and vegetation contact with the network.				✓		✓
Distribution Transformer On-load Tap Changers	Planned for FY22	Trial Distribution Transformers equipped with on-load tap changers as a way to improve power quality performance of the supply to customers in the face of increased network variability from DER.	Reduction in sustained over-voltages and under-voltages at customer premises.			✓			

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

Formal Safety Assessments 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. In essence, they capture our understanding of the network safety risks and inform decision making on the actions we take to address them.

Specifically, Formal Safety Assessments capture the network context, internal and external stakeholder views and threat scenarios that could result in hazardous events being realised, potential consequences of the exposure, control identification and evaluation, an analysis and evaluation of the risk against Essential Energy's risk criteria, performance measures and plans to treat risk to an acceptable level.

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

4.1 Amendments and improvements to Formal Safety Assessments

The Essential Energy ENSMS is underpinned by a suite of Formal Safety Assessments (FSAs). These identify and assess the safety risks associated with the electricity network, determine the effectiveness of current risk controls and identify improvements.

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

FSA	Amendments
Loss of Supply	Nil
Protection of Property	Nil
Bushfire	An event driven review of the Bushfire Formal Safety Assessment was completed in December 2020 in response to the 2019/2020 bushfire season, there were no significant changes made to the system of control for bushfire risk.
Public Safety	Nil
Environment	Nil
Worker Safety	Nil

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 certified and reviewed 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 2020 – 30 June 2021	1 July 2019 – 30 June 2020	1 October 2018 – 30 September 2019	1 October 2017 – 30 September 2018	1 October 2016 – 30 September 2017
Designs for which Safety in Design (SiD) Reports have been completed	809	1,200	1,445	-	-
Designs for which Safety in Design (SiD) Reports have been audited	90	58	62	-	-
Contestable designs certified	1,915	1,785	1,837	-	-
Contestable level 1 project safety reviews performed	447	1,554	1,569	-	-
Contestable level 2 project safety reviews performed	0				
Project closeout reports completed for contestable projects	1,266	6,432	6,234	-	-
Project closeout reports completed for non- contestable projects	3,736				
Project closeout reports audited for contestable projects	0	-	-	-	-
Project closeout reports audited for non-contestable projects	3,736			-	-

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

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 12 and Table 13

- > 'Tasks identified' are those that 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 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, and
- > 'Outstanding' tasks are tasks that fell due during the reporting period, but that weren't completed

Table 12 Inspections (assets)

Performance measure	Inspection tasks					Comments
	FY21 Target	Achieved FY21	Cancelled	Open	Outstanding	
Transmission Substations	n/a	n/a	n/a	n/a	n/a	Nil transmission assets
Zone Substations	2,632	2,515	117	0	0	See note
Distribution Substations	2,433	2,291	22	2	118	Excludes OH Substations See note
Transmission OH	n/a	n/a	n/a	n/a	n/a	Nil transmission assets
Transmission UG	n/a	n/a	n/a	n/a	n/a	Nil transmission assets
Distribution OH	319,331	274,058 ¹²	2,084	3,035	4,103	Includes OH Substations See note
Distribution UG	10,834	9,699 ¹³	448	0	213	See note

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 appropriate course of action.

¹² Of the 319,331 OH inspections planned for FY21 an additional 16,762 were completed in FY20 and 19,289 were completed in FY22

¹³ Of the 10,834 UG inspections planned for FY21 an additional 474 were completed in FY22

Table 13 Asset corrective action tasks

Performance measure	Corrective action tasks				Comments
	Tasks identified (all categories)	Achieved	Open	Outstanding	
Transmission Substations	n/a	n/a	n/a	n/a	Nil transmission assets
Zone Substations	2,990	5,025	792	427	Nil
Distribution Substations	3,471	3,868	2,598	412	Excludes overhead substations See Note
Transmission OH	n/a	n/a	n/a	n/a	Nil transmission assets
Transmission UG	n/a	n/a	n/a	n/a	Nil transmission assets
Distribution OH	159,964	115,992	442,733	46,746	Includes overhead substations See Note
Distribution UG	4,741	4,139	4545	638	See Note

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 appropriate course of action. Most outstanding distribution OH tasks are low risk tasks in low bushfire risk areas. Essential Energy is actively managing these tasks in conjunction with managing new higher risk tasks in higher bushfire risk areas. Where outstanding tasks exist in higher bushfire risk locations, these are actively assessed and managed.

Pre-summer bushfire inspections

In the window between the storm season (mid to late summer) and the bushfire season (late spring to summer), Essential Energy conducts a predominately aerial inspection of the very high bushfire risk areas of its electricity network. The purpose of these inspection is to identify conditions that could result in failures that subsequently lead to fire ignitions that could escalate to bushfires.



Figure 13 Aerial patrol aircraft

Where network condition is identified that has potential to escalate to a failure during the upcoming bushfire season, tasks to rectify the identified conditions are created and completed prior to the bushfire season.

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.

Essential Energy carries out aerial pre-summer bushfire inspections across its '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	Comments
Aerial					
P1	107,494	21,897	20,488	1,409	Nil
P2	381,058	204	204	0	Nil
P3	648,405	0	0	0	Nil
P4	642,146	5,259	4,924	335	Nil
Total	1,779,103	27,360	25,616	1,744	Nil
Ground-based					
P1 ¹⁴	107,494	39,501	39,484	17	Nil
P2 ¹⁵	381,058	54,496	54,266	230	Nil
P3 ¹⁶	648,405	160,539	154,138	6,401	Nil
P4 ¹⁷	642,146	218,713	197,137	21,576	Nil
Total	1,779,103	473,249	445,025	28,224	Nil

¹⁴ Areas considered high bushfire risk

¹⁵ Areas considered moderate bushfire risk

¹⁶ Areas considered low bushfire risk

¹⁷ Areas considered non-bushfire prone

4.5 Public Electrical Safety Plans and Activities

Table 15 details activities undertaken as part of Essential Energy's 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.

Public safety incidents



Figure 14 Agricultural activity near the network

Essential Energy creates an annual public awareness campaign, to improve the public awareness of the dangers of working or living near the electricity network.

The electricity network is ubiquitous in the urban and rural landscape, and members of the public work and engage in leisure activities near the network on a regular basis. Analysis of public safety incidents shows that 50% involve vehicles, aircraft, trucks and motor vehicles contacting the electricity network. Common incidents include collision with poles supporting the network either in paddocks or on the roadside.

Construction activity can impact the network when operating machinery in the vicinity of the overhead network and conducting excavations around the underground network. In addition to machinery operations, the erection of scaffolding or other access techniques may result in members of the public encroaching on the safe approach limits of the network, putting themselves and others in danger.

Table 15 Public electrical safety plans and activities

Network operator public safety programs / campaigns	Details
Public Electrical Safety Awareness Plan 2020-21 (PESAP)	<p>The Essential Energy Public Safety Strategy drives the outworking of the Public Safety Working Group (PSWG) - who meet monthly. The PSWG is made up of stakeholders from the various Divisions from across the organisation. The data and information gathered and discussed at this forum assists to drive initiatives and activities. The campaigns and social media outputs are delivered based on current and historical data and includes the ability to boost specific messaging based on prevailing conditions - such as storms or bushfires in a specific location. The following information is specific to the activities undertaken for each of the six identified 'at risk' groups.</p> <p>The PESAP for 2020/2021 covers the period of 01/07/2020 to 30/06/2021. This PESAP is available at essentialenergy.com.au.</p>
General public	Summer safety (MVA/collision with network), Bushfire safety, Storm safety, Stay clear when powerlines are near, Electrical Safety Week, Shocks & Tingles, Field day attendance, social media, fact sheets, media releases
Agribusiness	Grain harvest, Cotton harvest, Sowing harvest, Sugar cane harvest, Look Up and Live program & communication, Stay clear when powerlines are near, Summer safety, Storm safety, Aerial marker program & communication, Stakeholder engagement, Field day attendance, safety resources, social media, media releases
Building/Construction/Demolition – Including construction safety/Dial before you dig	Construction safety, Look Up and Live program & communication, Stay clear when powerlines are near, High Loads, Aerial marker program & communication, social media, fact sheets, safety stickers
Transport - High Loads Safety	High loads, Look Up and Live program & communication, Stay clear when powerlines are near, Event attendance (Brisbane Truck Show - exhibitor support to Energy Queensland), Aerial marker program & communication, social media, safety resources and stickers
Emergency services & Public Authorities	Summer safety, Bushfire safety, Storm safety, Look Up and Live program & communication, Stay clear when powerlines are near, Training DVDs/videos, RFS Training days, SES volunteer Magazine press, social media
Aviation Safety	Aviation safety, Look Up and Live program & communication, Stay clear when powerlines are near, Aerial marker program & communication, Stakeholder engagement

4.6 Internal Audits

Table 16 details internal audits performed on any aspects of the ENSMS during the reporting period. There were no related internal audits 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	Identified non-compliances	Actions
Nil	Nil	Nil

Trust but verify

Essential Energy's technical and safety regulator in NSW, IPART, has powers to request Essential Energy to undertake audits on the implementation of its ENSMS to ensure that the system of control described in the risk analysis documents (FSAs) is implemented. This approach adds another layer to the audit and assurance mechanisms in place at Essential Energy, to give the public confidence that the electricity network is being maintained and operated in a safe manner. Auditors are drawn from a panel that IPART deems are suitably qualified and experienced to assess whether Essential Energy is discharging its obligation to manage network safety risk so far as is reasonably practicable. Where non compliances are identified, action plans to address the issues are submitted to IPART and progress tracked through the audit process

4.7 External Audits

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

During 2020/21 there were two external audits performed:

- > IPART Bushfire Risk Management Audit
- > Queensland ESO Electricity Safety Management System Audit

Table 17 sets out the findings from this audit, along with the recommendations and agreed actions, which Essential Energy is now working to deliver.

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)	Implementation of actions and risk evaluation	<p>Opportunities have been identified for Essential Energy to establish a prioritised list of actions (refer to OFI-9) and for these to be managed within stated timeframes (refer to OFI-14).</p> <p>We recommend that Essential Energy agree reasonable timeframes to implement the actions with IPART, and then ensure that the implementation is monitored and confirmed. In accordance with audit criterion 6.b) in Table A.2 (page 11) of IPART's Electricity networks audit guideline – Safety management systems audits, the implementation plan should also include a commitment to funding and management approval.</p>	<ol style="list-style-type: none"> Essential Energy will collate opportunities for improvement that were identified through review of the 2019/2020 bushfire season and submissions to the NSW Bushfire Inquiry and the Royal Commission into National Natural Disaster Arrangements. This review will also include any commitments and agreed recommendations arising from inquiries into the 2019/2020 bushfire season. A draft of the collated actions will be presented to the Q2 (June) Bushfire Risk Assurance Panel (BRAP) for review and consideration. A final version of the collated actions will be presented to the Q3 (Sep) BRAP. Due September 2021, Status - Open The final collated actions will form the basis for the development of an action plan to implement identified controls that will be presented at the Q4 (Dec) BRAP. Due December 2021, Status - Open Monitoring and assurance of the implementation of the agreed implementation plan will be undertaken monthly through the Bushfire Risk Working Group (BRWG) which meets monthly. Due March 2022, Status - Open
ENSMS (Bushfire Risk Management)	Adequacy and accuracy of reporting data, systems, and processes	<p>We recommend that Essential Energy:</p> <ul style="list-style-type: none"> ➤ Implement its initiative to automate the process and validate the accuracy of outputs; ➤ For process elements where it is not practical to automate, ensure that an audit trail of evidence is retained that demonstrates; source data, data manipulation and analysis, with outputs presented that can be verified against the content of the report provided to IPART; and ➤ Document the process including associated assurance mechanisms. 	<ol style="list-style-type: none"> Essential Energy will develop and execute a plan for the improvement of the collection and any required manipulation of data that inputs to the Annual ENSMS Performance Report and Bushfire Preparedness Report. Due October 2021, Status - Open Essential Energy will document the process for data collection, storage, modification and analysis to support the preparation of the annual ENSMS Report. Due October 2021, Status - Open

Audit scope	Identified non-compliances		Actions
	Audit Criteria	Recommendation	
ESMS – WHSMS and ENSMS (all aspects)	All aspects of the ESMS	<p>Major Non-conformance 1–The requirement for the regular management review of the effectiveness and appropriateness of the ENSMS is not specified in ENSMS, and there was no evidence of this formal review process provided.</p> <p>Review the requirement and formally include it within the ENSMS, providing inputs to be considered as part review for effectiveness. Undertake a formal review annually and ensure a record is maintained.</p>	<p>1. An annual ENSMS review to be incorporated into the scope of the ENSMS Development Program, 'Managing the Management System' Project</p> <p>Due September 2021, Status - Closed</p>

Part B – Bushfire Preparedness Report

Part B reports against a framework of indicators aimed at demonstrating Essential Energy's bushfire preparedness, leading up to the 2021 bushfire season, covering the period 1 October 2020 to 30 September 2021.

Part B is structured as follows:

- > Section 5 describes the bushfire risk profile across Essential Energy's supply area
- > Section 6 identifies the permanent and temporary fire risk declarations by Rural Fire Service and outlines Essential Energy's 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 Essential Energy's 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

Essential Energy has identified locations which are generally bushfire prone. 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. Figure 15 below is a sample map of these zones based on designated maintenance areas within the Essential Energy footprint.

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

- Essential Energy Fire Risk model, and
- 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

Essential Energy Maintenance Area Bushfire Risk Priority Indicator

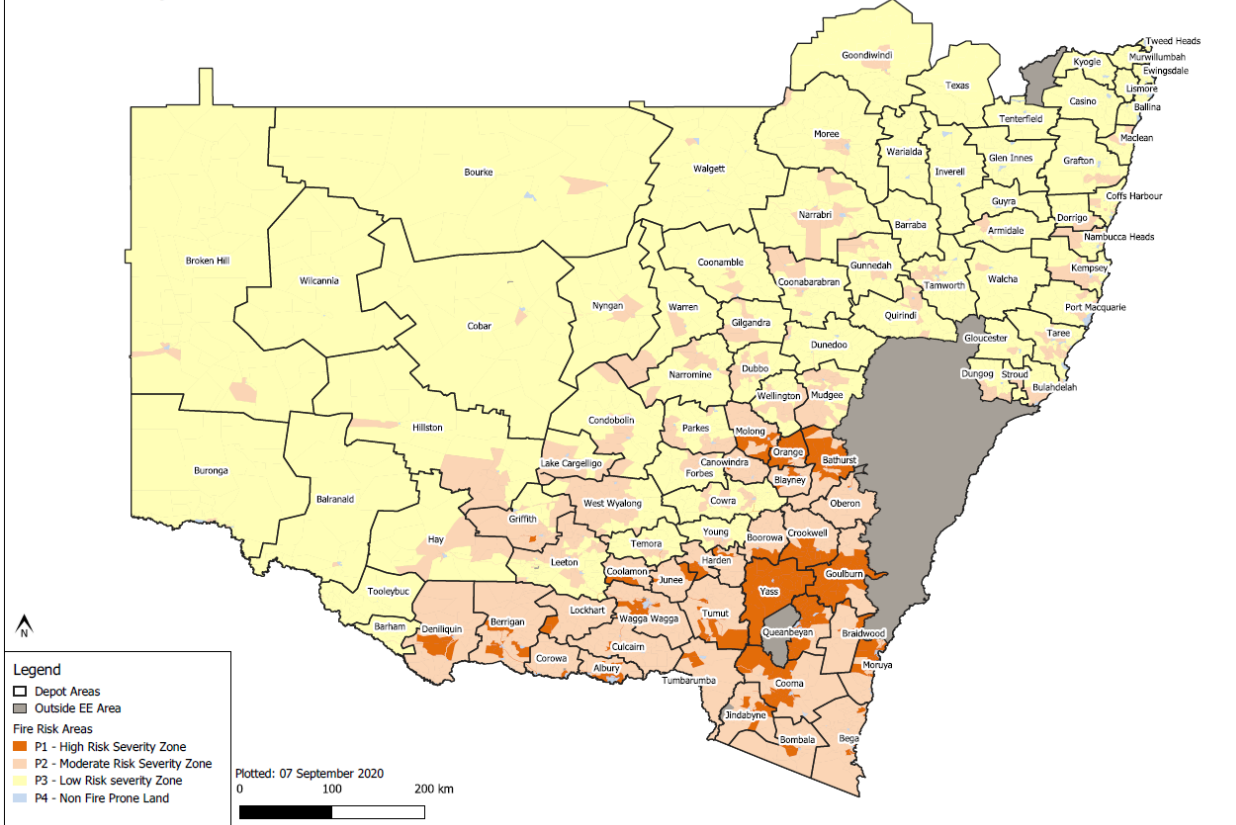


Figure 15 Maintenance area bushfire risk priority indicator

Essential Energy’s Bushfire Prevention Strategy provides an over-arching approach to managing fire 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 fire ignition potential. The Plan is published on our website essentialenergy.com.au and public feedback is welcome.

The Plan includes details of the fire risk profile across the supply area based on fire risk modelling with classifications P1, P2, P3 and P4.

Essential Energy uses intelligence obtained from national natural hazard management agencies such as AFAC (National Council for Fire and Emergency Services) 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

Much of eastern Australia currently has average or above average soil moisture as a result of rainfalls over 2021. The negative Indian Ocean Dipole is driving wetter outlooks for November and December.

The above normal fire conditions potential for northern NSW, west of the Dividing Range is driven by grass and crop growth in this area. 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 16, Figure 17 and Figure 18 below show the fire outlook for spring, the 2021 rainfall deciles, and rainfall outlook for Australia respectively.

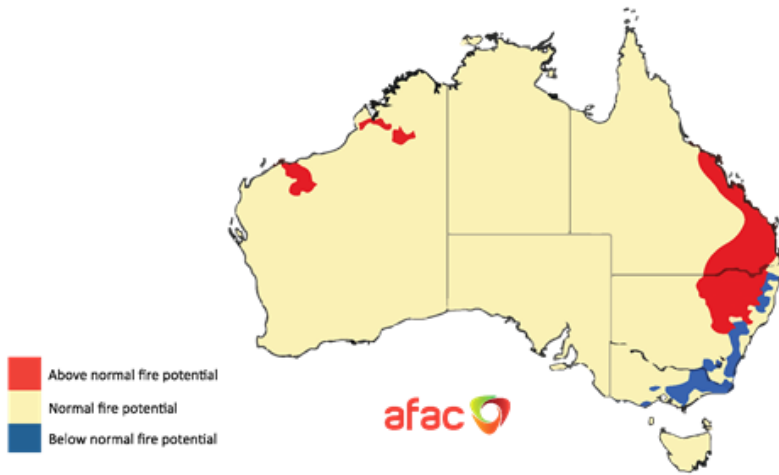


Figure 16 AFAC spring 2021 fire outlook

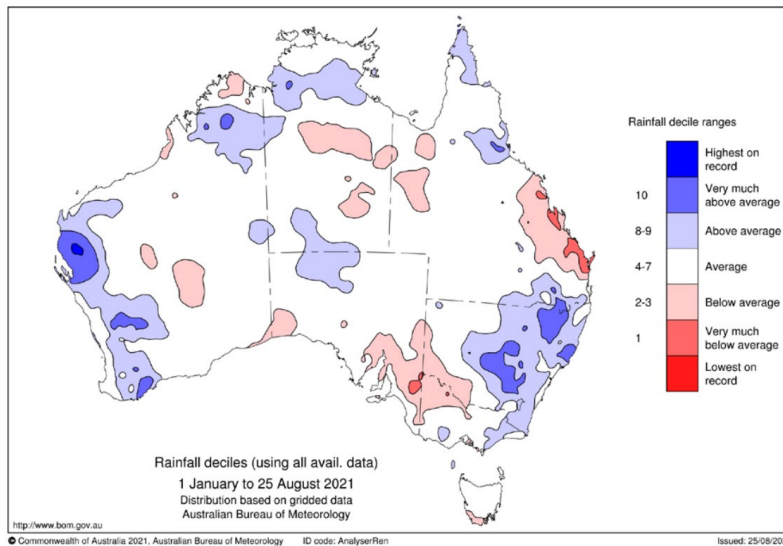


Figure 17 2021 Rainfall deciles

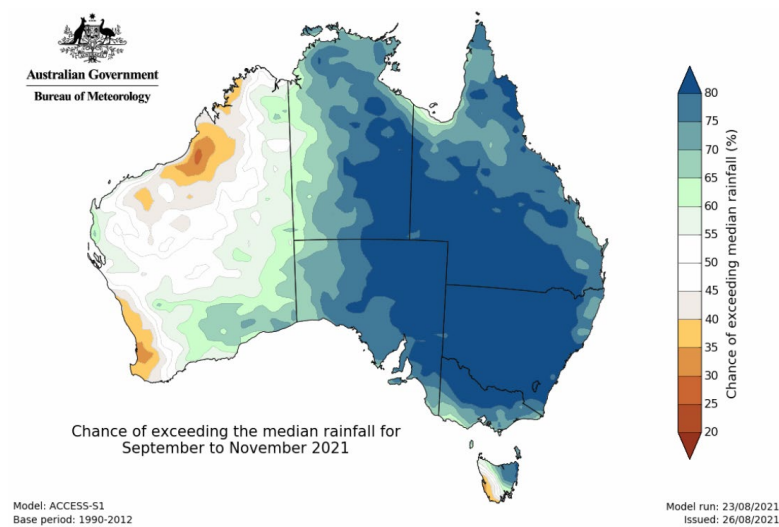


Figure 18 Rainfall outlook September to November 2021

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

Essential Energy monitors fire season district declaration notifications from NSW RFS.

It is noted that six local government areas were declared on 1 August 2021, and a further 21 were declared on 1 September 2021. This is in line with permanent early declarations for these areas.



Figure 19 RFS Media Release 1 and 31 August 2021

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

- > Producing a pre-fire season communication plan for its 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,
 - information on access to RFS fires near me app, and where to contact for further information.
- > A briefing on the upcoming fire season is conducted with all Operations Managers. 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 operational 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 e.g. 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 Essential Energy’s managers and senior leaders including seasonal outlooks.

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

Bushfire prevention through the management of private lines



Figure 20 Working together to reduce bushfire risk

Essential Energy is 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, Essential Energy is 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), Essential Energy informs the customer of these conditions and sets deadlines for rectification that are required by the *Electricity Supply Act 1995*.

Essential Energy has 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.

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

7.1 Low Voltage Private Lines

Essential Energy's 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 2020/21 Essential Energy inspected approximately 23,478 private poles resulting in the identification of approximately 1,492 private maintenance tasks which required follow up notification and consultation with our customers.

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

Essential Energy has 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.

7.2 High Voltage Private Lines

Essential Energy has 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.

Essential Energy communicates annually with high voltage customers connected to its 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.

Leading indicators of bushfire preparedness

Table 17 – 20 provide a summary of the leading indicators of bushfire preparedness ahead of the bushfire season. Essential Energy undertakes specific preparation activities ahead of the bushfire season. These indicators provide an insight to Essential Energy's 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.



Figure 21 Treatment of bushfire affected hazard trees adjacent to an electricity easement

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

Performance Measure	1 October 2020 – 30 September 2021		1 October 2019 – 30 September 2020		1 October 2018 – 30 September 2019		1 October 2017 – 30 September 2018		1 October 2016 – 30 September 2017	
	Target	Actual	Target	Actual	Target	Actual	Target	Actual	Target	Actual
Private LV lines checked by the network operator	27,330	22,549	23,494	23,478	25,996	24,228	-	12,592	-	11,416
Number of directions for bushfire risk mitigation issued to LV customers by the network operator	n/a	1,266	n/a	1,492	n/a	1,243	n/a	311	n/a	-
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	212	n/a	212	n/a	67	n/a	206	n/a	-
HV customers ¹⁸ (metering point count) advised to undertake pre- season bushfire checks in accordance with ISSC31	189	192	128	128	150	150	-	-	-	-
HV customers (metering point count) providing statements of compliance in accordance with ISSC31	192	189	128	106	150	141	-	-	-	-
HV customers (metering point count) requiring additional risk mitigation prior to start of the reporting year	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	3	n/a	0	n/a	0	n/a	-	n/a	-

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

¹⁸ For this section HV Customers includes Load and Generator customers

8. Bushfire inspections, vegetation and asset maintenance tasks

Table 20 describes the status of pre-summer bushfire inspections, undertaken via aerial inspection methods and as described in Table 14.

Table 20 Pre-summer bushfire inspections

Pre-summer bushfire inspections	Population (poles)	Target	Achieved	Outstanding	Comments
Inspections	121,638	100,603	100,603	0	Streetlight, urban, sub-transmission in P2 distribution areas removed

Table 21 describes the status of vegetation tasks as of 30 September 2021.

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

Essential Energy uses vegetation and asset task categorisation and bushfire risk priority area categorisation to prioritise vegetation and asset task completion to reduce the likelihood of vegetation contact with the network or asset failure.

Table 21 Vegetation tasks

Bushfire risk category	Status	Encroachment Classification A1 ¹⁹	Encroachment Classification A2 ²⁰	Encroachment Classification A3 ²¹	Encroachment Classification A4 ²²	Hazard trees ²³
P1	Identified	286	824	4,506	8,539	1,466
	Completed	278	805	4,211	7,547	1,538
	Open	32	63	219	275	122
	Outstanding	4	7	4	8	58

¹⁹ 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*

²⁰ A2 vegetation has encroached as far as 50-75% into the minimum vegetation clearances, as defined in ISSC3 *Guide for the Management of Vegetation in the Vicinity of Electricity Assets*

²¹ A3 vegetation has encroached as far as 25-50% into the minimum vegetation clearances, as defined in ISSC3 *Guide for the Management of Vegetation in the Vicinity of Electricity Assets*

²² A4 vegetation has encroached as far as 0-25% into the minimum vegetation clearances, as defined in ISSC3 *Guide for the Management of Vegetation in the Vicinity of Electricity Assets*

²³ Hazard Trees are blow-in/fall-in vegetation hazards as defined in ISSC3 *Guide for the Management of Vegetation in the Vicinity of Electricity Assets*

Bushfire risk category	Status	Encroachment Classification A1 ¹⁹	Encroachment Classification A2 ²⁰	Encroachment Classification A3 ²¹	Encroachment Classification A4 ²²	Hazard trees ²³
P2	Identified	1,872	2,933	8,939	12,789	5,193
	Completed	2,062	3,538	10,423	14,289	6,213
	Open	422	569	900	2 348	322
	Outstanding	44	11	16	20	112
P3	Identified	3,475	11,157	18,618	18,698	5,243
	Completed	3,787	12,263	18,802	18,111	4,410
	Open	428	1,131	1,857	8,244	2,103
	Outstanding	125	110	344	1,651	1,309
P4	Identified	8,225	26,278	37,012	28,829	1,781
	Completed	10,668	27,164	38,909	30,525	1,904
	Open	2,649	2,949	3,103	13,464	177
	Outstanding	218	28	21	42	95
Not specified	Identified	4	18	5	23	0
	Completed	4	19	8	33	0
	Open	0	1	0	0	0
	Outstanding	0	1	0	0	0
Total	Identified	13,862	41,210	69,080	68,878	13,683
	Completed	16,799	43,789	72,353	70,505	14,605
	Open	3,531	4,713	6,079	24,331	2,724
	Outstanding	391	157	385	1,721	1,574

Table 22 details the status of asset tasks as of 30 September 2021. 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	Category 2	Category 3	Category 3A	Category 4	Totals
P1	Identified	449	517	3,637	2,783	2,397	9,783
	Completed	459	530	4,286	2,585	2,571	10,431
	Open	0	14	1,176	654	7,976	9,820
	Outstanding	0	6	265	8	1,477	1,756
P2	Identified	1,563	1,408	12,076	7,734	5,434	28,215
	Completed	1,582	1,389	14,484	7,209	6,388	31,052
	Open	0	44	4,465	2,563	23,066	30,138
	Outstanding	3	12	2,351	46	6,556	8,968
P3	Identified	2,795	2,403	23,018	13,710	7,803	49,729
	Completed	2,778	2,290	29,651	13,292	12,384	60,395
	Open	0	108	8,028	5,171	43,944	57,251
	Outstanding	2	61	6,264	781	15,787	22,895
P4	Identified	1,310	1,532	13,165	7,775	4,016	27,798
	Completed	1,315	1,534	14,459	6,432	3,529	27,269
	Open	0	44	3,272	2,522	12,407	18,245
	Outstanding	1	36	2,463	34	1,447	3,981
Unclassified ²⁴	Identified	4	875	1,720	87	722	3,408
	Completed	5	837	1,895	79	685	3,501
	Open	0	34	237	26	441	738
	Outstanding	0	104	325	2	50	481
Total	Identified	6,121	6,735	53,616	32,089	20,372	118,933
	Completed	6,139	6,580	64,775	29,597	25,557	132,648
	Open	0	244	17,178	10,936	87,834	116,192
	Outstanding	6	219	11,668	871	25,317	38,081

²⁴ Includes private assets