

# Annual Safety Performance and Bushfire Preparedness Report

2020/21

Electricity Network Safety Management System



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# 1. Introduction

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This report provides general information about the performance of Transgrid's Electricity Network Safety Management System (ENSMS) as implemented in accordance with the Electricity Supply (Safety and Network Management) (ESSNM) Regulation 2014 and Australian Standard AS 5577. This report has been produced in accordance with IPART's *Electricity Networks Reporting Manual (Safety management systems performance measurement) September 2020* (Reporting Manual). In addition, the reporting provides an update of Transgrid's bushfire preparations for the upcoming (2021/22) fire season.

In the reporting period, Transgrid continued to maintain its ENSMS and supporting Management Systems to meet the requirements of the ESSNM Regulation. Transgrid's ENSMS defines the interface and integration of the various corporate frameworks and management systems that implement risk controls to ensure that the objectives of the ESSNM Regulation are met. Transgrid is committed to delivering the following objectives through its ENSMS:

- the safety of members of the public
- the safety of person(s) working on the network
- the protection of property (whether or not belonging to Transgrid)
- the management of safety risks arising from the protection of the environment (for example, preventing bushfires that may be ignited by network assets)
- the management of safety risks arising from the loss of electricity supply.

Transgrid's ENSMS is supported by the following Management Systems:

- a Health and Safety Management System certified to AS/NZS 4801
- an Asset Management System certified to ISO 55001
- an Environmental Management System certified to ISO 14001.

Section 2 of this report provides an overview of the ENSMS safety performance for the period 1 July 2020 to 30 June 2021 in line with Reporting Manual Appendix A.

Section 3 of this report covers Bushfire Preparedness for the period from 1 October 2020 to 30 September 2021 in line Reporting Manual Appendix C. It allows Transgrid to provide meaningful data to IPART and the broader community on bushfire risk mitigation programs as well as our performance in managing bushfire risk.

## 2. Annual Safety Performance Reporting for 2020/21

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### 2.1. Tier 1 - Major incidents

Zero incidents were recorded in the reporting period.

Tier 1 incidents are defined as a 'Major Incident' in accordance with the *Electricity networks reporting manual – Incident reporting* (Reporting Manual - Incident Reporting).

Table 1 Tier 1 – Major Incidents

ESSNM Objective		Description of each major incident reported under the Reporting Manual - Incident Reporting requirements
Safety of members of the public		NA
Safety of persons working on network		NA
Protection of property	Third party property	NA
	Network property <sup>1</sup>	NA
Safety risks arising from loss of electricity supply <sup>2</sup>		NA

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<sup>1</sup> Network property losses are not reportable under IPART's Reporting Manual - Incident Reporting requirements. For the purpose of this report, Transgrid is to report each event in which losses exceed \$500,000 in relation to damage caused to electricity works as defined in the *Electricity Supply Act 1995*.

<sup>2</sup> As defined for major reliability incidents in IPART's Reporting Manual – Incident Reporting.

## 2.2. Tier 2 – Incidents

Tier 2 incidents are defined as an ‘Incident’ in accordance with the Reporting Manual - Incident Reporting.

Table 2 Tier 2 - Incidents

ESSNM Objective	Description of each incident reported under the Reporting Manual - Incident Reporting requirements
Safety of members of the public	An intruder received lacerations when they climbed a transmission tower. Police were required to remove the intruder after the transmission line was made safe by Transgrid.
Safety of persons working on network	A contractor opened a construction site gate to allow a small truck to enter. Whilst the truck was entering the site, a strong gust of wind caused the site gate to strike the truck. The gate bounced off the truck, striking the contractor, resulting in a head injury to the contractor. The contractor was transported to hospital for observation and was released the next morning after an overnight stay.
Protection of third party property	NA
Safety risks arising from loss of electricity supply <sup>3</sup>	NA

<sup>3</sup> As defined for reliability incidents in IPART’s Reporting Manual – Incident Reporting.

## 2.3. Tier 3 – Control failure near miss

Transgrid's near miss data is presented in table 3.

Table 3 Tier 3 – Control failure near miss

Performance measure	Population	5-year average annual functional failures <sup>4</sup>	Annual functional failures (for reporting period)					
			Unassisted			Assisted		
			No fire	Fire		No fire	Fire	
				Contained	Escaped		Contained	Escaped
Towers	14,710	1.2	0	0	0	2	0	0
Poles (including stay poles) <sup>5</sup>	22,964	2.2	0	0	0	1	0	0
Conductor – Transmission OH <sup>6</sup>	13,112	27.2	1	0	0	4	0	0
Conductor – Transmission UG <sup>7</sup>	86	0	0	0	0	0	0	0
Power transformers <sup>8</sup>	237	4.2	3	0	0	1	0	0
Reactive plant <sup>9</sup>	165	14.4	6	0	0	2	0	0
Switchgear – transmission	13,401	22.6	13	0	0	0	0	0
Protection relays or systems	3,299	10.8	7	0	0	4	0	0
Transmission substation SCADA system	2,037	6.2	6	0	0	3	0	0
Transmission substation Protection Batteries <sup>10</sup>	233	15.6	11	0	0	0	0	0

<sup>4</sup> Transgrid defines an asset functional failure to be when a network asset is unable to meet the expected or specified performance standard.

<sup>5</sup> Transgrid pole population is the count of pole structures. e.g. a structure consisting of 1-4 poles is counted as 1

<sup>6</sup> OH means 'overhead'. Transmission voltages are generally 33kV AC nominal and above. Transmission conductors form part of a transmission network.

<sup>7</sup> UG means 'underground'.

<sup>8</sup> Power Transformers are transformers where the secondary/output voltage is 5kV nominal or above.

<sup>9</sup> Reactive plants includes reactors, capacitors and static VAR compensators

<sup>10</sup> The count of battery systems, included total count of batteries and chargers.

### Commentary on Table 3

In 2019/20, a large number (> 100) of conductors were damaged due to external bushfires. This is why the 5-year functional average failure is so much higher than the number recorded in 2020/21. The other functional failures in 2020/21 are comparable to the 5 year average for most asset classes.

The following performance measures are not applicable (as Transgrid does not own any of these assets) to Transgrid; hence, these are excluded from this report:

- Poles (street lighting columns/poles)
- Conductor – HV OH and HV UG. HV means 'high voltage'. OH means 'overhead'. UG means 'underground'. HV are voltages 1kV AC nominal and above and not part of a transmission network
- Conductor – LV OH and LV UG. LV means 'low voltage'. LV are voltages below 1kV AC nominal
- Transgrid is unable to provide accurate statistics for Pole top structures/components, hence these are excluded from this report
- Service line OH and UG. As defined in the NSW Service and Installation Rules
- Distribution transformers
- Switchgear – zone/sub-transmission substation
- Switchgear – distribution (OH)
- Switchgear – distribution (Ground based)
- SCADA system – zone/sub-transmission substation
- Protection batteries – zone/sub-transmission substation



## 2.4. Vegetation contact with conductors

Table 4 Vegetation contact with conductors

Performance measure <sup>11</sup>	Event count					Comments
	Current reporting period	Last reporting period	Two periods ago	Three periods ago	Four periods ago	
Fire starts – grow in	0	0	0	0	0	
Fire start – fall in and blow in	0	0	0	0	0	
Interruption <sup>12</sup> – grow in	0	0	1	0	3	
Interruption – fall-in and blow in	1	2	1	0	3	In 2020/21 a hazard tree fall-in occurred during a lightning storm

<sup>11</sup> Vegetation hazard definitions as per the Industry Safety Steering Committee Guide for the Management of Vegetation in the Vicinity of Electricity Assets (ISSC3).

<sup>12</sup> Includes momentary interruptions.

## 2.5. Unintended contact, unauthorised access and electric shocks

Table 5 Unintended contact, unauthorised access and electric shocks

Detail	Event count					Comments
	Current reporting period	Last reporting period	Two periods ago	Three periods ago	Four periods ago	
Electric shock <sup>13</sup> and arc flash incidents <sup>14</sup> originating from network assets <sup>15</sup> including those received in customer premises						
Public	0	0	0	NA	NA	
Public worker	0	0	0	NA	NA	
Network employee / network contractor <sup>16</sup>	2	0	0	NA	NA	<ul style="list-style-type: none"> <li>A contractor replacing a card reader made inadvertent contact with the 240V terminals in a security cabinet. The contractor attended hospital for observation and was given the all clear to return to normal work duties.</li> <li>Workers performing the removal of redundant low voltage cables have cut a live low voltage cable supplied from a distribution network service provider's street lighting supply. No injuries or electric shock were received.</li> </ul>
Livestock or domestic pet	0	0	0	NA	NA	
Contact with energised overhead network asset (e.g. conductor strike)						
Public road vehicle <sup>17</sup>	0	0	0	NA	NA	
Plant and equipment <sup>18</sup>	1	0	0	NA	NA	<ul style="list-style-type: none"> <li>A civil contractor performing excavation works for a cable installation, made contact with a distribution network service provider's overhead 415V service, causing it to fall to the ground.</li> </ul>
Agricultural and other <sup>19</sup>	0	0	1	NA	NA	
Network vehicle	0	0	0	NA	NA	

<sup>13</sup> All electric shocks are to be reported except those resulting from static discharge, defibrillators, where the system is nominally extra low voltage or involving the DC rail traction system.

<sup>14</sup> Incidents that result in a burn or other injury requiring medical treatment and result from exposure to an arc.

<sup>15</sup> Events caused by network assets, network asset defects or network activities, including shocks received inside customer installations are reported.

<sup>16</sup> Includes all classes of authorised persons.

<sup>17</sup> Including plant and equipment packed up for travel (i.e. plant and equipment travelling on a public road to or from worksite).

<sup>18</sup> Cranes, elevated work platforms, cherry pickers, excavators, hand held tools, etc.

<sup>19</sup> Examples include agricultural equipment, aircraft and watercraft.

Contact with energised underground network asset (e.g. conductor strike)						
Plant and equipment	0	0	0	NA	NA	
Person with hand held tool	0	0	0	NA	NA	
Unauthorised network access (intentional)						
Transmission substation / switching station	5	1	3	NA	NA	<p>The following events occurred in 2020/21:</p> <ul style="list-style-type: none"> <li>Unauthorised access to the same 500kV substation occurred on three separate occasions. Two of these events resulted in electrical material being stolen.</li> <li>The other events also included the theft of electrical materials at two separate 330kV substations.</li> </ul>
Tower / poles	1	2	0	NA	NA	<ul style="list-style-type: none"> <li>In 2020/21, an intruder received lacerations when they climbed a transmission tower.</li> </ul>
Other (e.g. communication sites)	1	0	0	NA	NA	<ul style="list-style-type: none"> <li>Electrical material was stolen from a communication radio tower site.</li> </ul>
Safe Approach Distance (SAD) <sup>20</sup>						
Network employee / network contractor	1	0	0	0	0	<ul style="list-style-type: none"> <li>Workers setting up a piling rig breached the Safe Approach Distance. The transmission line was out of service at the time of breach.</li> </ul>
Public	0	0	0	NA	NA	
Public Worker	0	0	0	NA	NA	

### Commentary on Table 5

Only NSW electricity distributors have obligations under the NSW Accredited Service Provider Scheme, hence the following performance measures have been excluded from reporting:

- Contestable designs
- Contestable projects

<sup>20</sup> Encroachment into the applicable Safe Approach Distance for the type of individual involved.

## 2.6. Reliability and Quality of Supply

The performance measures specified in Table A.6 of the Reporting Manual is only applicable to Distribution Network Service Providers.

## 2.7. Reliability and Quality of Supply – Critical infrastructure incidents

Below is a listing of all reliability events during the reporting period.

Table 6 Reliability and Quality of Supply – Critical infrastructure incidents

Type of critical infrastructure <sup>21</sup>	Minutes of supply lost	Cause	Consequential safety impacts associated with supply issue
9J5 Wagga North to Temora tee Junee Line Relay	28	Process Issue	Nil
97K Cooma to Mungah tee Snowy Adit Line	17	External	Nil
97K Cooma to Mungah tee Snowy Adit Line	3	External	Nil
Tenterfield Bus	159	Plant Failure	Nil
Tenterfield Transformer	18	Plant Failure	Nil

### Commentary on Table 6

- No quality of supply incidents occurred during 2020/21.

<sup>21</sup> All Transgrid assets are considered critical infrastructure

## 2.8. Network-initiated Property damage events

Table 7 Network-initiated Property damage events

Detail	Event count <sup>22</sup>					Comments
	Current reporting period	Last reporting period	Two periods ago	Three periods ago	Four periods ago	
Third party property (assets including vehicles, buildings, crops, livestock)						
Damage (e.g. Fire, Physical impact or Electrical)	7	0	0	0	0	The following events occurred in 2020/21: <ul style="list-style-type: none"> <li>7 utility services (gas, water and communications) were damaged during trenching and excavation works for the new 330kV cable project (Powering Sydney's Future)</li> </ul>
Network property (including non-electrical assets including vehicles, buildings)						
Damage (e.g. Fire, Physical impact or Electrical)	1	2	2	2	6	The following events occurred in 2020/21: <ul style="list-style-type: none"> <li>Line 99M earth wire failure damaged the substation fence at Murrumburrah.</li> </ul>

<sup>22</sup> Event counts should include any event where there is a reasonable likelihood that damage was caused by electricity works.

## 2.9. Tier 4 Control implementation

Table 8 Amendments and improvements to Formal Safety Assessments (FSA) or associated Risk Treatments<sup>23</sup>

FSA	Amendments/improvements
Public Safety	Changes to this FSA were approved in 2020/21.
Worker Safety	No changes occurred during 2020/21.
Bushfire	No changes occurred during 2020/21.
Environment and Property	No changes occurred during 2020/21. This FSA is currently under review.
Reliability Safety	<p>The FSA is in the final stages of review and approval following:</p> <ul style="list-style-type: none"> <li>• Inclusion of a review of new and emerging technologies.</li> <li>• An update to external stakeholder communication.</li> <li>• A significant revision of bowties with improved level of analysis and identification of controls.</li> <li>• An update to the summary of risk treatment for each top event and threat.</li> </ul>

<sup>23</sup> Adjustment or modification to Transgrid's formal safety assessments, or risk treatment action plans, including those changes informed by consideration of the results of the investigation and analysis of incidents, near misses or asset failures, where Transgrid has assessed that existing assessments or risk treatments do not eliminate or reduce risk so far as is reasonably practicable.

## 2.10. Design, construction and commissioning

Table 9 Design, constructions and commissioning

Performance measure	Number of designs/projects				
	Current reporting period	Last reporting period	Two periods ago	Three periods ago	Four periods ago
Designs for which Safety in Design (SiD) Reports have been completed	277	497	381	NA	NA
Designs for which Safety in Design (SiD) Reports have been audited	277	497	381	NA	NA
Safety reviews performed <sup>24</sup>	262	98	NA	NA	NA
Project closeout reports completed	172	60	45	NA	NA
Project closeout reports audited	0	0	0	NA	NA

### Commentary on Table 9

Only NSW electricity distributors have obligations under the NSW Accredited Service Provider Scheme, hence the following performance measures have been excluded from reporting:

- Contestable designs
- Contestable projects

<sup>24</sup> A safety review includes checking that work on or near the network is being performed safely.

## 2.11. Inspection (assets)

Table 10 Inspection (assets)<sup>25</sup>

Performance measure	Inspection tasks				Corrective action tasks				Comments
	Planned <sup>26</sup> inspections	Achieved <sup>27</sup>	Open <sup>28</sup>	Outstanding <sup>29</sup>	Tasks identified	Achieved	Open	Outstanding	
Transmission Substations	198	195	1,026	3	1,857	1,848	1,335	9	Refer comments below
Transmission OH	1,390	1,383	1,721	7	1,021	1,016	403	5	
Transmission UG	139	139	317	0	89	89	36	0	

### Commentary on Table 10

Open tasks include all tasks which have been raised before the end of 2020/21 but where the time elapsed since being identified has not exceeded the standard time that Transgrid has set.

For the Transmission OH outstanding tasks:

- All but one inspection task remained outstanding at the end of September with the task planned to be completed in October.
- For the corrective tasks, two remain unfinished at the end September. Both are associated with tower structure member replacement.

For the Transmission Substations outstanding tasks:

- All but two inspection task remained outstanding at the end of September with the tasks planned to be completed in October.
- For the corrective tasks, six remain unfinished at the end September:
  - These are all considered low risk activities. Will be completed in conjunction with the next outage / maintenance task.

<sup>25</sup> Inspection counts do not include activities reported in Table 15 or 17.

<sup>26</sup> Includes all 'Open' and 'Outstanding' tasks from the previous reporting period.

<sup>27</sup> Inspection tasks must only be reported as 'Achieved' when all associated corrective action tasks to address the faults of a particular asset have been identified.

<sup>28</sup> 'Open' and 'Outstanding' tasks are those tasks categorised as such at the end of the reporting period.

<sup>29</sup> Commentary provided to explain the management of risk associated with outstanding tasks and when the outstanding tasks are expected to be completed.



## 2.12. Inspections (vegetation) Aerial/Ground based

Table 11 Inspections (vegetation) Aerial/Ground based

Inspection type	Population (spans)	Target	Achieved	Outstanding	Comments
Aerial					
Total	37,847	37,847	37,383	464	Data issues prevented the LiDAR reports from being generated for these spans until after the reporting period. The outstanding spans were covered by ground based compliance inspections to mitigate the risk, all of which were completed during August 2021.
Ground-based					
Total	464	464	0	464	All outstanding tasks were completed by August, prior to the bushfire danger period.

## 2.13. Public electrical safety plans and activities

Transgrid continued to implement its Public Electricity Safety Awareness Plan (PESAP) during 2020/21. The PESAP was updated in 2020/21 to align with the updated Public Safety FSA. The following programs and activities were undertaken to promote public knowledge and understanding of electricity network safety hazards, and are targeted to a broad public spectrum on the basis of the key hazardous events identified in Transgrid's ENSMS:

- Community and stakeholder engagement
- Communication with property owners who have Transgrid's electricity transmission network infrastructure on their land
- Communication with businesses (aviation, agricultural, waterway transport, etc.) operating in vicinity of our assets
- Communication with emergency services
- Communication with public authorities
- Electricity safety awareness and education programs for students
- Dial Before You Dig service
- Safety awareness and warning signage

The brief description of these programs with reference to hazard assessments that have identified the 'at risk' groups targeted by each program is provided in Transgrid's PESAP. Specific campaigns are noted in the table below.

Table 12 Public electrical safety plans and activities<sup>30</sup>

Transgrid public safety programs / campaigns	Details
<p>A Public Safety Awareness campaign was delivered in June - July 2021.</p>	<p>Key points in the campaign included:</p> <ul style="list-style-type: none"> <li>• Contact with overhead or underground electric lines can be fatal. Stay safe by staying away.</li> </ul> <p>Target audience</p> <ul style="list-style-type: none"> <li>• People living and working around transmission lines, easements and substations.</li> <li>• Males aged from 21 and over.</li> <li>• Digital activity targeted to areas in NSW, ACT and VIC where Transgrid owns electrical assets.</li> </ul> <p>Communication method and dates</p> <ul style="list-style-type: none"> <li>• Newspapers adverts               <ul style="list-style-type: none"> <li>- Canberra Times (19 June 2021)</li> <li>- Canberra Weekly (17 and 24 June 2021)</li> </ul> </li> </ul> <p>Social media campaign</p> <ul style="list-style-type: none"> <li>• Facebook (15 June - 31 July 2021)</li> <li>• LinkedIn (15 June – 21 July 2021)</li> </ul>

<sup>30</sup> Details the plans and other activities that Transgrid undertook to provide safety information to the public. Examples may include a publication of a Public Electrical Safety Awareness Plan, advertisements associated with electrical safety and awareness, publication of a bushfire risk management plan, shocks and tingles awareness program, etc.

## 2.14. Internal audits performed on any aspect of the ENSMS (as per AS 5577a clause 4.5.4)

Table 13 Internal audits performed on any aspect of the ENSMS

Audit scope	Identified non-compliances <sup>31</sup>	Actions
Internal audit performed a comprehensive review of the completeness and accuracy of risk registers across all major projects including an assessment of the effective application of corporate risk procedures to the establishment and maintenance of project risk information.	Nil	<ul style="list-style-type: none"> <li>The Risk function will establish a plan to address the comments that have been raised by this audit.</li> <li>Linking key risks and controls, linking risks to objectives, effective 2nd line assurance and appropriate training are all important aspects of the project risk management system for the major projects.</li> </ul>
An assessment of Transgrid's Major Project's processes / artefacts against the requirements of the Asset Management standard ISO55001.	Nil	<ul style="list-style-type: none"> <li>A number of minor improvement were identified.</li> <li>Concluded that "Major Projects overall demonstrate sufficient evidence to meet the requirements of the ISO 55001 Standard".</li> </ul>
Internal audit performed a Major Project Stakeholder Engagement review.	Nil	<ul style="list-style-type: none"> <li>Developed a plan which provides greater detail on the interactions that are planned for landholders / landowners.</li> <li>Develop an engagement training matrix for major projects staff who interact with landowner, community and stakeholders.</li> <li>Establish community engagement governance and approval framework, including minimum requirements and guidelines for engagement plans and resources required.</li> </ul>
Internal audit performed a review of Waste and Scrap Management.	Nil	<ul style="list-style-type: none"> <li>Procedures should be updated to require staff to plan how they will manage and dispose of waste prior to construction beginning</li> <li>HSE to conduct workshop to develop an assurance framework to manage HSE risks (including developing and implementing a process to assess works based on safety and environmental factors and assign staff to inspect sites on a periodic basis)</li> </ul>
A Target Area Review was conducted on the effectiveness of controls related to the unauthorised public access to Transmission Line assets.	Nil	<ul style="list-style-type: none"> <li>Consideration should be given to widening (extending further from the tower) the footprint of the high-risk climbing deterrent design to prevent bypassing without the use of cutting tools.</li> <li>Review the criteria for risk assessing the requirement for the high-risk design considering ENA-015 guidance.</li> <li>Document the criteria for assessing the requirement to use the high-risk climbing deterrent version on new lines in the Safety in Design process.</li> <li>Review classification and reporting of public safety incidents including criteria for entry to CAMMS.</li> </ul>

<sup>31</sup> Only non-compliances that are related to ENSMS or safety issues.

Audit scope	Identified non-compliances <sup>31</sup>	Actions
		<ul style="list-style-type: none"> <li>• Signage standards were considered acceptable but further consideration should be given to placement of a direct contact number and/or lifeline number to these.</li> <li>• Consideration should be given to use of new low cost wireless surveillance technologies for targeted use where mischief is being identified.</li> <li>• Collaboration with other networks through industry forums should be continued to ensure a group understanding of 'Good Industry Practice' and implement coordinated safety campaigns to deter climbing of towers</li> </ul>
<p>A Target Area Review was conducted on aspects of the network safety system and processes related to the Public Safety Formal Safety Assessment. (PSFSA)</p> <p>This review focused on assessing the relevance, currency, and accuracy of the control artefacts identified in the PSFSA for events that involve the possible direct interaction of the public with Transgrid's assets or its activities except those pertaining to the management of Unauthorised Access to Electricity Infrastructure (except for Transmission Towers).</p>	Nil	<ul style="list-style-type: none"> <li>• Review and improve line-of sight from Threat to Control to Control artefact for all threats. Improve reference to Controls and Control Artefacts using formal document references where appropriate.</li> <li>• Review document control to various publications on the Transgrid Network Safety Management portal.</li> <li>• Consider developing internal and external facing procedures or guidelines that are applicable and relevant to the transmission line fault threat being managed.</li> <li>• Develop a plan for and initiate a program of network Site Security Risk assessments.</li> </ul>
<p>A Target Area Review was conducted on processes related to the submission of asset Pre-Energisation Checklists (PEC). This review focused on process control including governance documentation and the associated forms required to be completed and submitted as part of the asset commissioning and energisation process for new assets.</p>	Nil	<ul style="list-style-type: none"> <li>• Review project delivery and associated documentation to ensure that the requirement to develop and submit a PEC is clear and valid for all assets that form part of or support Transgrid's network.</li> <li>• Review the PEC requirements in the Project Delivery Manual to clarify requirement for PEC's to be completed as part of project planning and delivery to ensure that the PEC is ready for submission in time for asset energisation.</li> <li>• Undertake a further follow-up preview of the PEC process</li> </ul>
<p>A Control Assurance Review - Review Forced and Emergency Outages and action any identified process failures</p>	Nil	<ul style="list-style-type: none"> <li>• Staff training or improper LV isolations contributed to six Forced or Emergency outages during the year. These processes should be reviewed to identify if any improvements can be made to prevent re-occurrences in the future.</li> </ul>
<p>A Control Assurance Review conducted on asset management processes related to transmission line forced and emergency follow-ups, in particular:</p> <ul style="list-style-type: none"> <li>• Initiation of after fault patrols</li> </ul>	Nil	<ul style="list-style-type: none"> <li>• A few improvements were identified.</li> </ul>

Audit scope	Identified non-compliances <sup>31</sup>	Actions
<ul style="list-style-type: none"> <li>Flagging lines or line sections for attention for next inspection.</li> </ul> <p>A Control Assurance Review covered the overall connection of all of these assets to the network within Transgrid's existing Buronga substation (including three synchronous condensers during 2020).</p>	<p>Nil</p>	<ul style="list-style-type: none"> <li>A number of improvements were identified for the Safety in Design processes and documents.</li> <li>To undertake the pre-operations risk assessment process as per the Safety in Design procedure.</li> <li>Asset Management to provide guidance on the requirements for third party assets in Transgrid substations.</li> <li>Asset Monitoring Centre to review and improve, if needed, the pre-energisation checklist to ensure adequate coverage for third part assets within Transgrid substations.</li> </ul>

## 2.15. External audits performed on any aspect of the ENSMS (as per AS 5577a clause 4.5.4)

Table 14 External audits performed of any aspect of the ENSMS

Audit scope	Identified non-compliances	Actions
2020 Asset Management Certification Audit	1 minor non-compliance	<ul style="list-style-type: none"> <li>The completion, approval and implementation of the Non-Prescribed Asset Strategy.</li> <li>18 opportunities for improvement were also identified.</li> </ul>
The Asset Management Council assessed Transgrid's Asset Management Maturity in May-June 2021.	Nil	<ul style="list-style-type: none"> <li>Several opportunities for improvement were identified.</li> </ul>
The ACT Utilities Technical Regulator commenced a Bushfire Risk Management Audit for assets in the ACT, during 2020/21 but was not finalised until August 2021.	Nil	<ul style="list-style-type: none"> <li>Report findings to be included in next year's report.</li> </ul>

### 3. Bushfire Preparedness Reporting for Summer 2021/22

Transgrid has reviewed advice from the Bureau of Meteorology, the Australian Energy Market Operator, the Bushfire and Natural Hazard Cooperative Research Centre and the NSW Rural Fire Service in preparation for this year’s bushfire season. The consistent theme is that the 2021/22 season is expected to be wetter than average year, leading to lower than average fire risk, although the recent year’s good rainfall has promoted strong grass growth which may lead to a risk of grass fires should the grass dry out through the summer months.

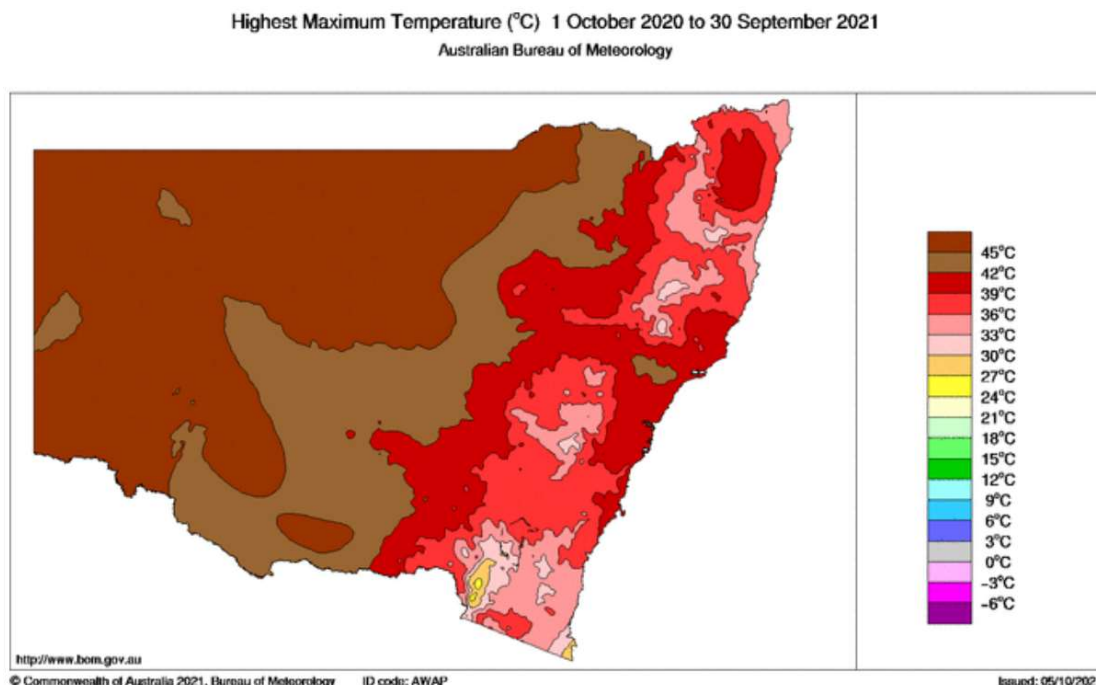
In regards to Transgrid’s pre-summer preparedness, Transgrid is very well placed, with large volumes of inspection and defective tasks having been completed and only a small number of tasks remaining outstanding at the time of report submission.

For further details please read the remainder of the report.

#### 3.1. Bushfire risk profile across Transgrid’s supply area

Climate factors relating to bush fire risk include temperature, humidity, wind and the dryness of the landscape. These factors are reflected in Fire Danger Ratings and Total Fire Bans issued by the Rural Fire Service (**RFS**). Of these factors, historical data for maximum temperature and rainfall is available from the Australian Government Bureau of Meteorology (BOM), as shown in Figure 1, 2 and 3.

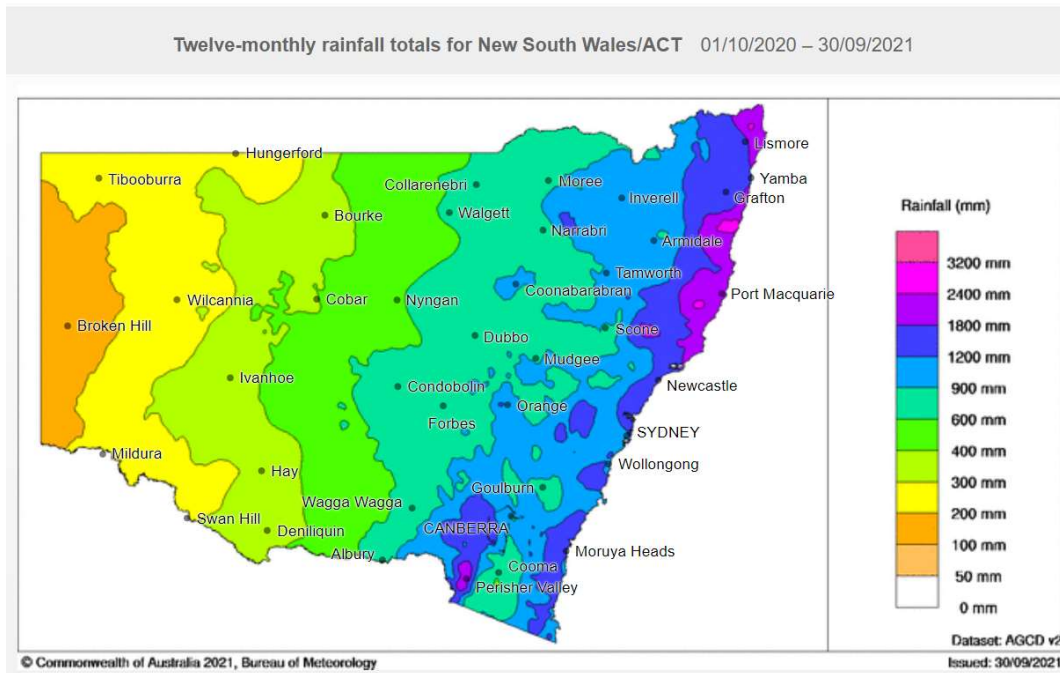
Figure 1 Maximum Temperature across NSW/ACT



Reference Data source:

<http://www.bom.gov.au/jsp/awap/temp/index.jsp?colour=colour&time=latest&step=0&map=maxextrm%2Fhi&period=12month&area=ns>

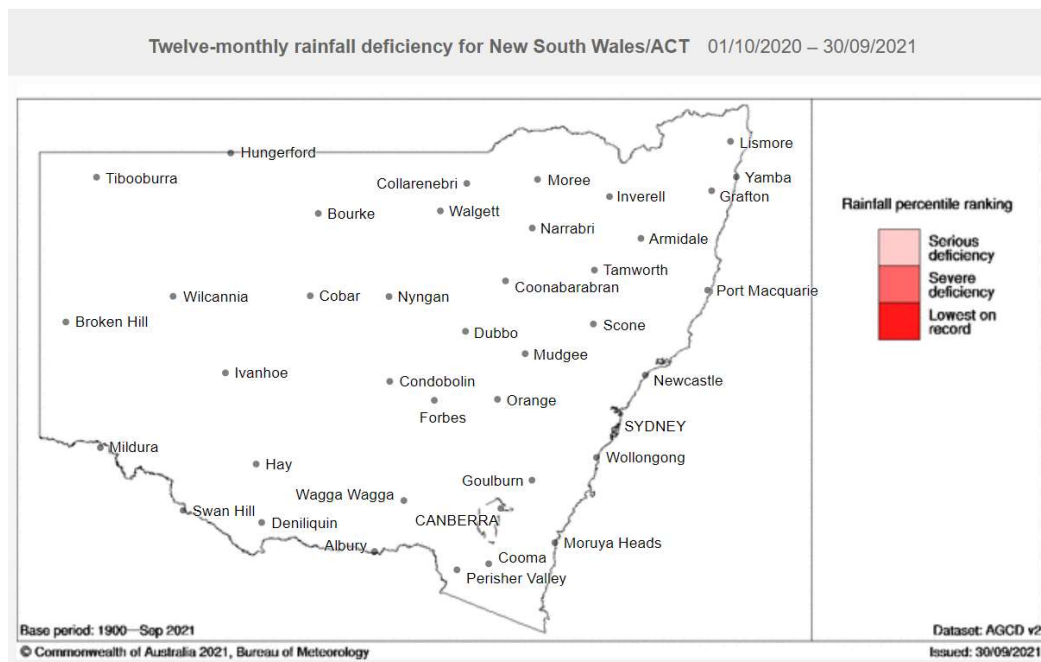
Figure 2 Maximum Rainfall across NSW/ACT



Reference data source:

<http://www.bom.gov.au/climate/maps/rainfall/?variable=rainfall&map=totals&period=12month&region=ns&year=2021&month=09&day=30>

Figure 3 Rainfall deficiency across NSW/ACT



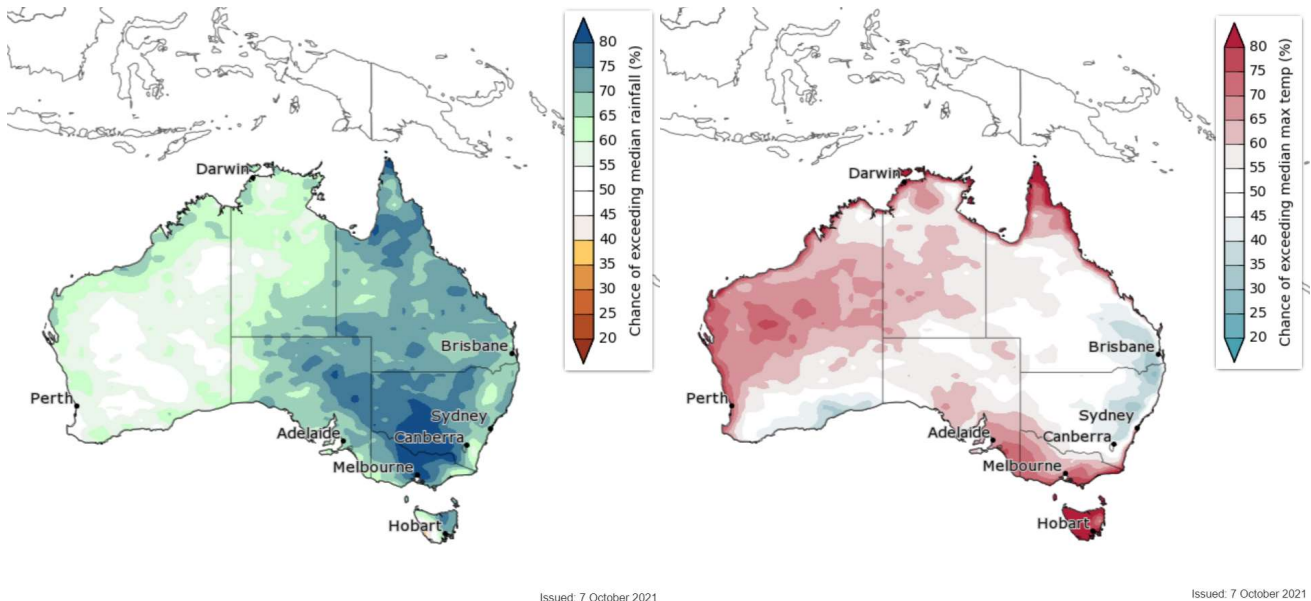
Reference data source:

<http://www.bom.gov.au/climate/maps/rainfall/?variable=rainfall&map=drought&period=12month&region=ns&year=2021&month=09&day=30>



The good rainfall over the last 12 months has resulted in all NSW/ACT being out of drought conditions.

Figure 4 Climate Outlook

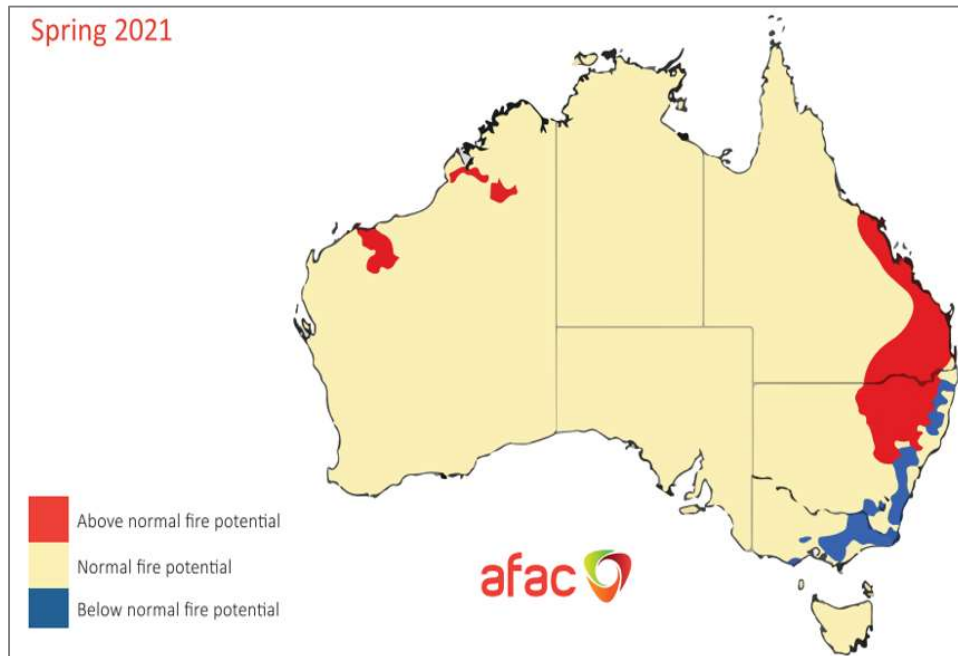


The BOM advised on 7 October 2021:

- November to January rainfall is likely to be above median for the eastern half of Australia, as well as coastal areas of WA and the NT.
- Maximum temperatures for November to January are likely to be above median for much of northern and western WA, south-east Australia, and along the coastline of northern Australia. Below median daytime temperatures are more likely for southeast WA, and also southeast Queensland and eastern parts of NSW.
- Above median minimum temperatures for November to January are very likely for almost all of Australia, with roughly equal chances of warmer or cooler than median nights for southeast WA.
- The El Niño–Southern Oscillation is neutral, with cooling of the tropical Pacific towards La Niña levels likely in the coming months. This may be increasing the chances of above average rainfall for much of eastern and northern Australia. The negative Indian Ocean Dipole has weakened, but the residual pattern in the Indian Ocean typically favours above average rainfall for parts of Australia.

As shown in Figure 5, AEMO has advised that parts of northern NSW will have above fire potential during Spring, whilst parts of eastern NSW are below normal fire potential.

Figure 5 Spring bushfire outlook



The Bushfire and Natural Hazard Cooperative Research Centre advised in May that:

*“Long-term rainfall deficits have been reduced across most of NSW, with autumn being wetter than average for much of the state. As a result of preceding conditions, subsequent fuel state and the climate outlook, normal fire potential has been assessed for winter.*

*Wetter than average soil moisture through the central west, combined with higher chances of above average rainfall, will likely result in continued favourable conditions for grass and winter crop growth. This situation would create higher fuel levels and, in the event of fires during the fire season, higher intensity grass and crop fires in these areas.”*

The bushfire risk profile across NSW and ACT related to transmission line spans, substations and communication sites is represented in Figures 5-7.

Figure 6 Transmission Line Span Bushfire Risk Profile

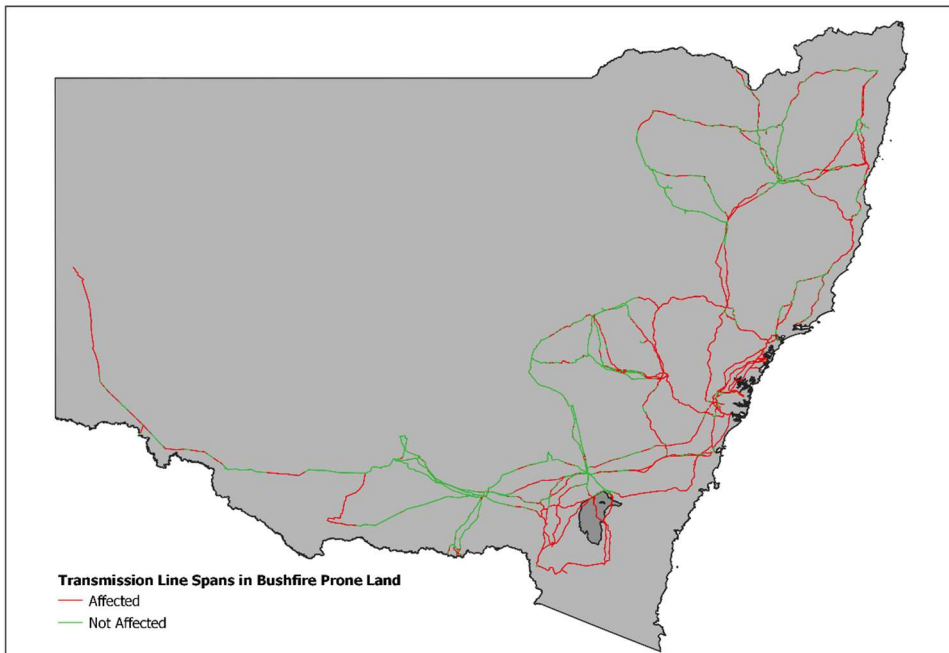


Figure 7 Substation Bushfire Risk Profile

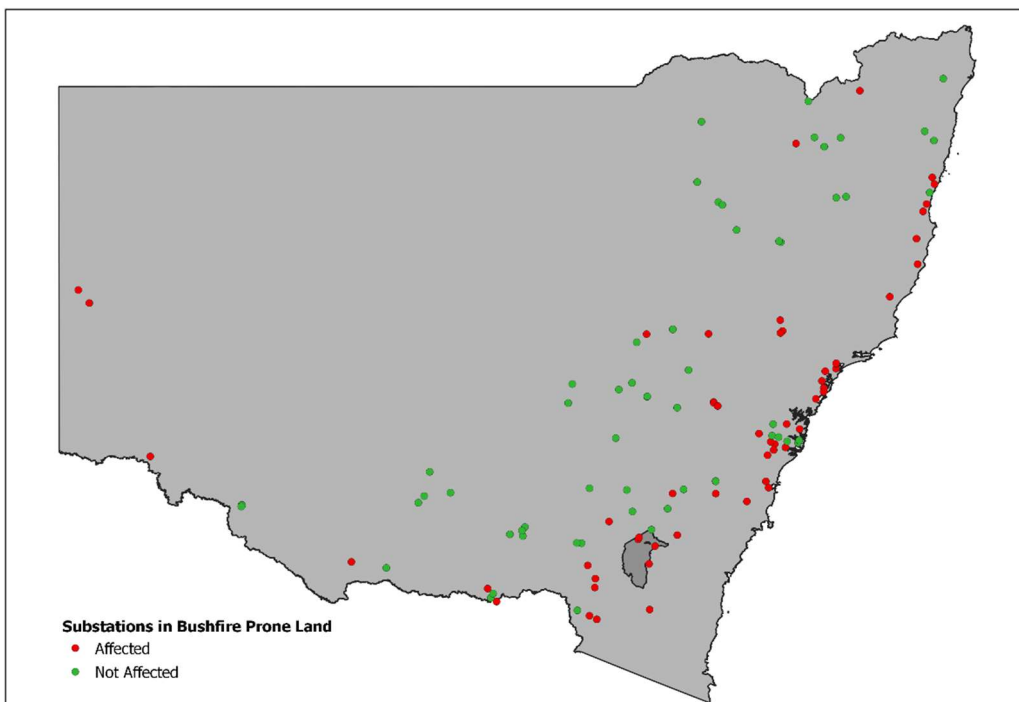
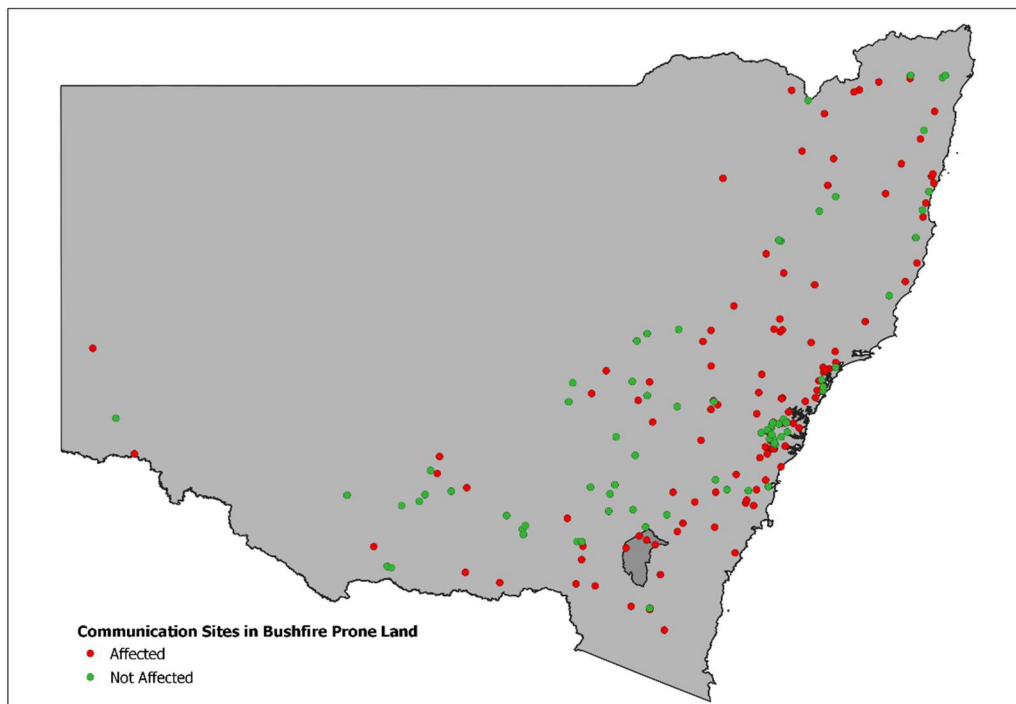


Figure 8 Communication Site Bushfire Risk Profile



### 3.2. Permanent / temporary declaration of areas by RFS and Transgrid's actions

Six local government areas commenced their bushfire danger period on 1 August 2021. An additional twenty one were declared from 1 September 2020. And from the start of October, all but nine local government areas of NSW will be in the bushfire season, with only a handful in southern NSW starting 1 November 2021.

The early start of the bushfire danger period was communicated by Transgrid to staff for the 6 LGA's in August and on 1 September to other 21 LGA's. This communication was in accordance with the requirements set out in Section 5.2 of the Bushfire Risk Management Plan.

The email reminded staff of the threats to bushfire risk when performing work on the assets and the actions they need to take prior to commencing work in the affected Fire Area. For example, completing the Transgrid fire risk assessment form that requests the staff to identify the weather conditions and appropriate controls to implement prior to commencing work.

Transgrid published a HSE notice related to the Bushfire Danger Period (2021-2022 season). This notice advised staff that:

- If you are undertaking hot work or fire risk work, you will need to ensure you have considered the proposed work, the bushfire danger rating and the daily weather forecast.
- If you are undertaking hot work outside a designated hot work area, you MUST complete a Hot Work Permit.
- If you are undertaking fire risk work you MUST complete a Fire Risk Assessment and Control Measures form.
- If in doubt, refer to the Hot Work and Fire Risk Work procedure.

A bushfire risk assessment, as per Transgrid's Bushfire Risk Management Plan, was completed on work orders in the early start area that satisfy the below criteria:

- Work orders are specific to managing the asset's bushfire risk exposure.
- Work orders are on assets located in the affected Fire Area.
- Work orders are open or outstanding.

The bushfire risk assessment is performed to provide assurance that Transgrid's bushfire risk exposure of assets is managed to as low as reasonably practicable.

The Rural Fire Services have advised:

*“With the Bureau of Meteorology continuing to forecast wetter than average conditions through spring we are expecting to see strong grass and crop growth particularly in areas west of the divide. As we enter the warmer months this will begin dry out and may prove problematic for both landholders and firefighters. Grass fires typically move three times quicker than bush fires and can impact on lives and livelihoods with little to no warning.”*

Transgrid will remain in close contact with the RFS (NSW and ACT) and Energy Utilities Functional Area Co-ordinator EUSFAC across the season.

### 3.3. Asset and Vegetation Tasks

The status of Transgrid’s pre-summer bushfire inspections is given in the tables below.

Table 15: Pre summer bushfire inspections

Pre-summer bushfire inspections	Population (spans / structures)	Target (No. of inspections)	Achieved (No. of inspections)	Outstanding (No. of inspections)	Comments
Inspections	37,847	1,531	1,511	20	For Substations, Transmission Lines, Network Property, Automation and Easements (includes vegetation inspections)

#### Comment on Table 15

Only tasks associated with managing bushfire risk have been included. All but one aerial / compliance pre-bushfire season transmission line inspection has been completed prior to the season.

Within Bushfire Prone Areas, where the task is associated with managing bushfire risk, there are no outstanding tasks.

Within Non-Bushfire Prone Areas, where the task is associated with managing bushfire risk, the outstanding work orders as at 01 October 2021:

- For Transmission Lines, 19 tasks, mostly associated with climbing inspections. Nine have now been completed. The remaining tasks have been delayed by wet weather or Covid-19 restrictions and are planned to be completed during October and November. Noting that climbing inspections are typically a 3-6 year routine inspection task.
- For Substations, one is associated with an annual substation inspection is planned to be completed during October.

Table 16: Vegetation tasks

Bushfire risk category	Status	Encroachment Classification A1 <sup>32</sup>	Encroachment Classification A2 <sup>33</sup>	Encroachment Classification A3 <sup>34</sup>	Encroachment Classification A4 <sup>35</sup>	Hazard trees <sup>36</sup>
Bushfire Prone	<b>Identified</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7</b>
	Completed	0	0	0	0	7
	Open	0	0	0	0	0
	Outstanding	0	0	0	0	0
Non-Bushfire Prone	<b>Identified</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>
	Completed	0	0	1	0	0
	Open	0	0	0	0	0
	Outstanding	0	0	0	0	0

### Comment on Table 16

Only tasks associated with managing bushfire risk have been included. No tasks are outstanding.

Transgrid's vegetation management practice is to identify vegetation encroachment into the minimum vegetation clearance (total sum of the expected growth rate of the vegetation and the minimum safe working distance). Any encroachment within this envelope is treated as a Planner Priority 01 – Within 24 hours (P1) as Transgrid does not perform vegetation management based on degree of encroachment.

*ISSC3 Guide for the Management of Vegetation in the Vicinity of Electricity Assets* specifically excludes transmission network service providers. Consequently, the definition of hazard trees in this guideline does not apply to Transgrid. Transgrid's definition of hazard trees is:

- A tree with the potential to impact or come within electrical clearances of the transmission line or its structures should whole or parts of the tree fall. In many cases, hazard trees are outside the easement. Also known as Danger Tree. The potential to impact is calculated at Maximum Line Operating Conditions (Tmax only).

Transgrid's definition of a hazard tree aligns with the definition of hazard tree provided in ISSC3.

<sup>32</sup> A1 – vegetation has encroached as far as 75-100% into the minimum vegetation clearance.

<sup>33</sup> A2 – vegetation has encroached as far as 50-75% into the minimum vegetation clearance.

<sup>34</sup> A3 – vegetation has encroached as far as 25-50% into the minimum vegetation clearance.

<sup>35</sup> A4 – vegetation has encroached as far as 0-25% into the minimum vegetation clearance.

<sup>36</sup> 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.

Table 17: Asset tasks (Defects and Condition Based Maintenance)

Asset Category	Status	Within bushfire prone areas						Outside bushfire prone areas					
		Work order priority					Totals	Work order priority					Totals
		1	2	3+3A	4	5 <sup>37</sup>		1	2	3+3A	4	5	
		< 24 hours	< 1 month	< 6 months	< 12 months	Next outage / Maintenance / Manually set		< 24 hours	< 1 month	< 6 months	< 12 months	Next outage / Maintenance / Manually set	
<b>Substation</b>	<b>Identified</b>	<b>1</b>	<b>7</b>	<b>1</b>	<b>3</b>	<b>21</b>	<b>33</b>	<b>6</b>	<b>7</b>	<b>5</b>	<b>1</b>	<b>6</b>	<b>25</b>
	Completed	1	7	0	0	9	17	6	6	3	0	2	17
	Open	0	0	1	3	12	16	0	1	2	1	4	8
	Outstanding	0	0	0	0	0	0	0	0	0	0	0	0
<b>Transmission Line</b>	<b>Identified</b>	<b>3</b>	<b>67</b>	<b>206</b>	<b>251</b>	<b>123</b>	<b>650</b>	<b>1</b>	<b>116</b>	<b>168</b>	<b>261</b>	<b>78</b>	<b>624</b>
	Completed	3	63	149	122	62	399	1	106	116	129	49	401
	Open	0	4	51	127	51	233	0	9	50	129	27	215
	Outstanding	0	0	6	2	10	18	0	1	2	3	2	8
<b>Automation</b>	<b>Identified</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>9</b>
	Completed	0	0	0	0	0	0	1	3	0	4	0	8
	Open	0	0	0	0	0	0	0	1	0	0	0	1
	Outstanding	0	0	0	0	0	0	0	0	0	0	0	0
<b>Network Property</b>	<b>Identified</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>5</b>	<b>14</b>	<b>94</b>	<b>53</b>	<b>1</b>	<b>167</b>
	Completed	0	0	0	0	0	0	5	12	67	45	1	130
	Open	0	0	0	1	2	3	0	2	26	6	0	35
	Outstanding	0	0	0	0	0	0	0	0	0	2	0	0

<sup>37</sup> Includes work orders where priority has been manually set by an authorised person



### Commentary on Table 17

Only tasks associated with managing bushfire risk have been included. Some Work Orders have been delayed due to Covid-19 work restrictions and wet weather.

Open and overdue unplanned Bushfire Work Orders are scheduled in a prioritised manner to ensure high bushfire risk work is completed first. Bushfire maintenance reports are issued each week as per Transgrid's Bushfire Risk Management Plan.

Within Bushfire Prone Areas, for the outstanding work orders as at 01 October 2021:

- Transmission Lines – 18 tasks associated with pole replacements, and fitting, insulator and structure leg repairs.
  - 2 have been completed since the end of the period
  - 1 has been reclassified as a monitor only task.
  - 7 are scheduled to be completed during October and November, subject to favourable weather.
  - 8 to be programmed into the future, typically with the next maintenance activity at the site.

Within Non-Bushfire Prone Areas, for the outstanding work orders as at 01 October 2021:

- Transmission Lines – 8 tasks are associated with pole replacements, and earthing, insulator and structure leg repairs.
  - 3 are scheduled to be completed during October, subject to favourable weather.
  - 5 to be programmed into the future, typically with the next maintenance activity at the site.

Transgrid's Work Order Planner Priority timeframe is as follows:

- P1 – 24 hours
- P2 – 1 month
- P3 – 3 months
- P3A – 6 months
- P4 – 12 months
- P5 – Next outage or maintenance
- RZ – Manually required by date

## 4. Glossary

Term	Description
Assisted failure	Any functional failure of a piece of equipment (component of an asset or asset) where the equipment was subject to an external force or energy source against which the network operator's standards for design and maintenance do not attempt to control.
Fire	<p>A state, process, or instance of combustion in which fuel or other material is ignited and combined with oxygen, giving off light, heat and flame. This includes 'smouldering' or 'smoke' events.</p> <p>Network Scope: Applicable to any fire caused by, or impacting, a network asset.</p>
Functional failure	Transgrid interprets a network asset functional failure to be the incident when the particular network asset types were unable to meet the expected or specified performance standard in the reporting period, thereby causing an outage or incident.
Incident	Defined in accordance with IPART's <i>Electricity networks reporting manual - Incident reporting</i> , available on the IPART website.
Major incident	Defined in accordance with IPART's <i>Electricity networks reporting manual - Incident reporting</i> , available on the IPART website.
Network worker	A person who has been authorised by the network operator to plan or conduct work on or near the network. Includes persons employed by the network, persons engaged under a contract by the network operator, and persons authorised by the network operator and working for an Accredited Service Provider.
Open (with respect to defects / tasks)	A defect / task that has not been rectified by the network operator but where the time that has elapsed since being identified has not exceeded the standard time that the network operator has set for having the defect rectified.
Outstanding (with respect to defects / tasks)	A defect / task that has not been rectified by the network operator where the time that has elapsed since being identified has exceeded the standard time that the network operator has set for having the defect rectified.
Public worker	A party or parties that are conducting work that is not directly associated with the electricity network such as building work, landscaping, landfill work, excavations, road works and includes the construction, maintenance, adjustment or dismantling of mobile plant and scaffolding.
Unassisted failure	Any functional failure of a piece of equipment (component of an asset or asset) where the cause of the failure is of a type for which the network operator's design and maintenance standards include specific controls to mitigate against the risk of failure and which is neither an assisted failure nor a maintenance induced failure. These failures are generally caused by a deterioration of the condition of the equipment and also include overhead connection failures and vegetation within the mandatory vegetation clearance window.