

Energy Queensland

Natural Hazards Management Plan

Inc. Summer Preparedness 2021/22



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Joint Reference Document between Energex and Ergon Energy
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Availability of the Natural Hazards Management Plan

This plan is available on the Ergon Energy and Energex websites www.energex.com.au and www.ergon.com.au

Version	Date	Description
1.0	October 2021	Natural Hazards Management plan to replace EQL Summer Preparedness Plan

Executive Summary

Each year Ergon Energy Network and Energex, as part of the Energy Queensland group, undertake diligent preparation and planning activities to ensure we are prepared for the potential impact of the numerous natural hazards that occur in Queensland each year.

As the climate, our environment and our customer needs change, we are presented with a myriad of challenges. In order to minimise impact to our customers and community we need to ensure our network is resilient, able to withstand the impact of natural hazards and that our response capability is efficient and effective. This Natural Hazards Management Plan has been developed on behalf of both Ergon Energy Network and Energex. It details our planning and preparation activities critical to providing Queensland with a reliable network where disruptions are minimised during natural hazard events. When disruptions do occur, we will ensure we respond as quickly as possible to restore supply safely and maintain our vision to Energise Queensland Communities.

This plan supersedes Energy Queensland's Summer Preparedness Plans from previous years, acknowledging the changing climate, an expanded view of natural hazards and the additional preparation, planning and response now required outside the typical Summer period. It has been developed to assist both internal and external stakeholders to understand the arrangements in place.



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1. Introduction

Our climate is changing and presenting numerous challenges for us and our communities. The traditional focus on the Summer Storm season has shifted. Natural hazard emergency events are occurring with increased frequency and severity across the whole calendar year.

Due to its expansive distances and varying climates from tropical, subtropical, hot arid and warm temperature climates, Queensland is exposed to numerous natural hazards.

As the primary distribution network service providers for all of Queensland, Ergon Energy Network and Energex are responsible for maintaining the delivery of electricity to Queensland communities in all climates. Its network, depots and offices are exposed to these changing environmental conditions.

This Natural Hazards Management Plan has been developed on behalf of both Ergon Energy Network and Energex. Ergon Energy Network and Energex reviews natural hazards regularly, identifying possible risks to our infrastructure, and ensuring we are ready to respond and support the community in a safe and timely manner (so far as is reasonably practical). When disruptions do occur, we are prepared to respond as quickly as possible to restore supply safely and maintain our vision to Energise Queensland Communities.

2. Context

2.1. Climate Change

Our environment and climate are changing, and we are experiencing a shift in the seasons, severity of hazards and subsequent impacts of events on the electricity network.

The QLD State Natural Disaster Risk Assessment 2017 indicates ‘the State will experience higher temperatures, hotter and more frequent hot days, harsher fire weather, fewer frosts, reduced rainfall in the south-east, more intense downpours, less frequent but more intense tropical cyclones in the north, rising sea level, more frequent sea level extremes, warmer and more

acidic seas. Climate change is influencing all extreme weather events in Australia as these events are now occurring in an atmosphere that is warmer and wetter than it was in the 1950s¹.

The Qld State Natural Hazards Risk Assessment 2017 comprises macro-level hazard-specific risk information. The 2017 assessment focused on the seven most frequent and significant natural hazards and it is expected future assessments will consider the impacts and influences of climate change and variability.

Like other disaster management groups and response agencies, EQL must reassess the applicability of these hazards on our operations and integrate into all aspects of Prevention, Preparedness, Response and Recovery.

Climate change is also reinforced in the recently released *Queensland Bushfire Plan 2020* outlining the arrangements to enable Queensland’s management of bushfire hazard. Future challenges include:

- Accelerating changes in weather, resulting from climate change and the subsequent changes to fuels, means that bushfire is becoming one of the primary natural risk drivers in Queensland
- Queensland is becoming hotter and drier, with a growing number of days per year likely to reach or exceed very high fire danger
- Bushfire seasons are starting earlier, resulting in a longer season
- The frequency, duration and severity of heatwaves and droughts is projected to increase significantly².

Due to the expanse of the state, varying geography and current climate conditions, the impact of climate change is expected to vary resulting in the uneven distribution of climate projections³

EQL acknowledges and aligns with the Queensland State Government *Pathways to a climate resilient Queensland, Queensland Climate Adaptation Strategy 2017-2030* and has developed an internal *Low Carbon Future Statement*

¹ Queensland State Natural Disaster Risk Assessment 2017

² Queensland Bushfire Plan 2020

³ <https://www.disaster.qld.gov.au/cdmp/Documents/Adaptation-Plan/Climate-Change-Factsheet.pdf>

and Environmental Sustainability and Cultural Heritage Policy.

These documents will guide our development and future focus on climate change, network resilience and reducing the impact of natural hazards.

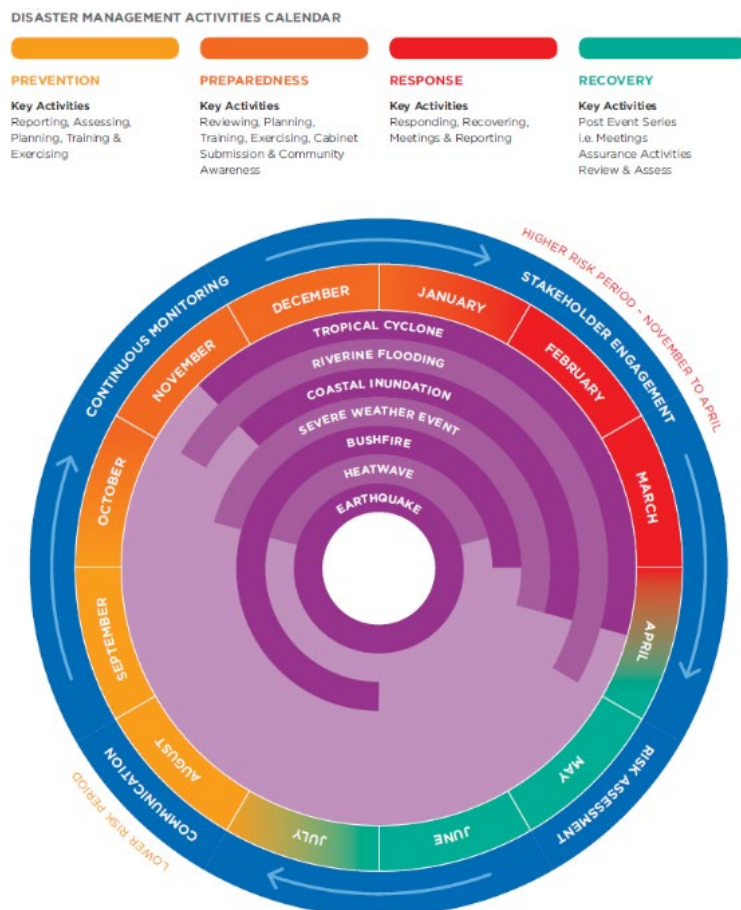


Image 1- The Disaster Management Activities Calendar⁴

⁴ Queensland State Disaster Management Plan

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3. Our Network

Ergon Energy Network and Energex operate in a vast area covering 1.7 million square kilometres. This consists of approximately 207,000 km of overhead and underground high voltage and low voltage distribution power lines and 1.7 million poles.

The high voltage network operates at a variety of voltages ranging from 220kV, 132kV, 110kV, 66kV, 33kV, 22kV, 19.1kV, 12.7kV, and 11kV. The low voltage network is reticulated at 415/240/230 Volts.

The network also includes 33 isolated power stations, 72 bulk supply points and 571 zone substations.

Ergon Energy Network and Energex are responsible for the provision of electricity from the NSW and NT border up to the Torres Strait. It has 124 depots located across 17 operational areas to provide fault response, and planning and maintenance activities for electrical related emergencies.

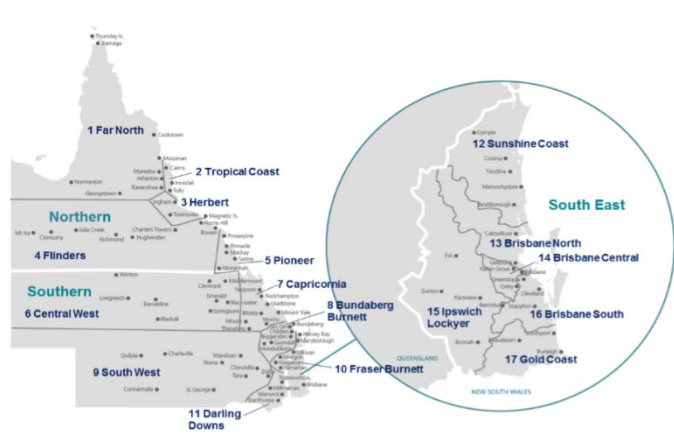


Image – Ergon Energy Network and Energex Operational Regions and Areas

Part A – Governance

4. Framework

EQL applies an Organisational Resilience Strategy, and an Emergency and Business Disruption Framework to assist the organisation in the management of crisis, emergencies and business continuity events. This framework is comprised of a suite of documents designed to guide the EQL Group in their Prevention, Preparedness, Response and Recovery (PPRR) for emergencies including natural hazard events.

These documents are structured hierarchically with an Organisational Resilience Strategy, this Natural Hazards Management Plan, and Emergency Management Plans and various supporting response documents to be used when planning for and responding to natural hazards and other emergencies.

EQL has modelled its Emergency and Business Disruption Framework on the Queensland Government's Emergency Risk Management Framework. EQL has structured its framework on the principles of the Australasian Interservice Incident Management System (AIIMS) to align EQL's framework with that employed by the emergency services and other response agencies and organisations.

4.1. Review

This plan is reviewed annually to ensure currency and application of learnings from previous events and to identify improvement opportunities.

4.2. Risk Management

Natural hazard risks are managed in accordance with the Energy Queensland Risk Management Policy, Framework and Process. The Risk Management Process aligns with the internationally recognised Standard AS/NZ ISO 31000:2018 Risk Management – Principles and Guidelines. Management of risk is critical to effective asset management and is integral to the ISO 55000 Asset Management suite of Standards. EQL regularly reviews inherent and emerging risks to and as a result of operations. In line with the Queensland State Natural

Hazard Risk Assessment 2017, severe storms, cyclone, bushfire, heatwave, flood (riverine and coastal), earthquake and landslide are considered, assessed and managed via the Energy Queensland electronic Governance Risk Compliance (GRC) electronic tool. Pandemic has also been considered under the banner of natural hazards.

4.3. Committees

A Summer Preparedness Working group operates to ensure our business divisions have conducted preparations throughout the year and in the lead up to the summer storm season. This assures a safe and robust network, sound emergency response procedures and safety awareness to our employees and the broader community.

There are also hazard specific committees and technical advisory groups covering bushfire, flood, heatwave and pandemic hazards.

4.4. Roles and Responsibilities

A dedicated organisational structure has been developed for organisational oversight and emergency management teams. Charters and role statement handbooks outline each role and the associated responsibilities required for an emergency response.

4.5. Continuous Improvement

To ensure EQL continues to maintain a current and effective emergency management framework to safely support the community, EQL conduct regular assurance checks of its framework, procedures, processes and work practices.

EQL conducts hazard specific reviews to identify the risk and exposure to business continuity, its functions and assets and the potential effect on customers and the community.

Following the activation of escalated emergency response functions, debriefs are conducted to identify both success and improvement opportunities for application in future events.

4.6. Memoranda of Understanding

EQL currently maintains a number of Memoranda of Understanding (MoU) with other Distribution entities and supporting bodies to assist with its ability to prepare, plan for and respond to emergency events.

4.6.1. Distribution Network Service Providers

MoU's have been developed with other Distribution Network Service Providers (DNSP's) including Essential Energy, Endeavour Energy, Ausgrid and Power and Water Corporation outlining the key support principles and arrangements between the companies, including additional resources to assist with large scale responses. As part of the annual preparation, a review of these MoU's is conducted. Arrangements are also in place for assistance from approved contractors and suppliers.

4.6.2. Queensland Fire and Emergency Services

A MoU has been established with Queensland Fire and Emergency Services (QFES) for data sharing including licensed data relating to all Hazards/Incident events, risks and operational responses.

This data includes planning and operational data within the Queensland Emergency Management Risk Framework (QERMF) tool within the Queensland Disaster Management Arrangements (QDMA). The data layers from the QDMA sharing group are used by Ergon Energy Network and Energex for planning and operational purposes.

4.6.3. Queensland Fire and Emergency Services and Powerlink

A MoU is maintained with QFES and Powerlink (PLQ) and includes protocols for joint response. It outlines the approaches relating to bushfires, emergency contacts, and communication protocols for significant incidents and emergency events where the assets of the parties are impacted. During a significant network emergency, each emergency management team considers common

issues and priorities to ensure the optimum state response.

4.7. Interagency Co-operation

Ergon Energy Network and Energex have responsibilities under the Disaster Management Act (2003) to ensure adequate liaison occurs with emergency services. The Queensland Disaster Management Arrangements (QDMA) outlines the various committees and governance across the state for stakeholders and inter-agency collaboration and co-operation.

EQL maintains representation on the following groups to ensure appropriate collaboration and interagency information sharing with emergency services. These committees are convened throughout the year (both during and outside emergency events):

- Queensland Disaster Management Committee (QDMC)
- State Disaster Co-ordination Group (SDCG)
- District Disaster Management Groups (DDMG)
- Local Disaster Management Groups (LDMG)
- State Inter-Departmental Committee on Bushfire (SIDC)
- Regional Inter-Departmental Committee on Bushfire (RIDC).

Field Operational Managers also establish and maintain relationships with local emergency services leaders through disaster management groups and regular stakeholder interactions. These ensure the ability to work co-operatively during emergencies as well as support community resilience and continuity.

The Ergon Energy Network and Energex Operational Control Centres also maintain protocols for direct contact with QFES FIRECOM ensuring rapid response to incidents.

4.8. Seasonal Exposure to Hazards

As the seasons change, EQL adjusts its preparations and response plans as necessary to ensure readiness. The expansive distances of Queensland also mean that the exposure to the numerous hazards is different for each part of the state and therefore to the electricity network, depots and customers.

PART B – Prevention, Preparedness, Response and Recovery

5. Prevention

5.1. Mitigation and Resilience Activities

With a large overhead electricity network traversing long distances through densely vegetated areas in rural Queensland, there is a high exposure to the elements and severe weather events can have a significant impact on supply reliability. In order to minimise these impacts, we have identified and implemented critical maintenance activities, including a vegetation management and cyclical maintenance program.

EQL also has a range of measures in place to protect its depots and offices that may be impacted by these natural hazards as they support the network response effort of our teams in the field.

5.2. Inspection and Maintenance Programs

5.2.1. Assets

Ergon Energy Network and Energex operate an ongoing asset inspection and maintenance program on the network which complies with The Electrical Safety Act and the Code of Practice - Works.

Our aim is to provide a resilient and safe network through a detailed annual program of work to improve, develop, maintain and operate the network. Included as part of this inspection program is the:

- Routine inspections of substation equipment are completed dependant on equipment types, classification and condition
- Routine inspections of overhead lines and poles are completed through ground-based condition assessments.
- Testing of overhead high and low voltage earthing systems to ensure their effectiveness in

the protection of plant and equipment and public and staff safety

- Inspection of water way crossings, underground pillars and a range of other network assets
- Use of thermal surveying inspections of bulk, zone and distribution substation sites and plant
- Periodic Light Detection and Ranging (LiDAR) inspections on feeders in accordance with our inspection programming to identify vegetation and conductor clearance issues. Issues are then prioritised to ensure immediate actions where required or are programmed into our regular maintenance programs.
- In selected high rainfall areas, detailed pole top inspections are also carried out on selected feeders on a four-year cycle (mid cycle from the main asset inspection program).

5.2.2. Vegetation

Ergon Energy Network and Energex actively seek to minimise the risk of vegetation around the overhead assets, and includes consideration of public safety, network reliability, quality of supply, customer service and network operating costs. This includes from the impact of natural hazards.

The approaches used to manage vegetation include:

- A cyclic program, to treat or cut vegetation on all overhead line and high-risk proximity tree routes with cycle times dependent upon local conditions, urban density and growth rates
- A warranty period after cycle cut during which time all zones are assessed to ensure that vegetation will remain typically clear for the whole of the assigned treatment cycle
- Reactive treatment activities to address localised instances where vegetation is found to be within clearance requirements. If a member of the public or employee identifies individual vegetation sites which are close or make contact with the mains, Ergon Energy Network and Energex will assess and if necessary, rapidly deploy a crew to re-establish safe clearances

- Regular audits of activities for completion and quality of works providing recommendations and actions for rectification.

5.2.3. Field Mobile Computing

Ergon Energy Network and Energex have field mobile computing systems that are used in the routine inspection of poles and line components. The system enables asset inspectors to issue work, locate poles, validate the pole details, record any inspection measurements or data required, confirm asset defect work orders and raise new defect work orders. This information is retrieved and integrated into corporate systems for future planning and rectification works required.

5.3. Asset Design

Ergon Energy Network and Energex design our electrical network to maximise reliability, safety, performance and shareholder value over the long term (commensurate with the life expectancy of network assets) whilst meeting community expectations for environmental impact and regulatory expectations, so far as is reasonably practical.

The design and construction of new power lines considers bushfire risk mitigation and flood risk mitigation opportunities. Identification of high bushfire risk areas using Geographic Information Systems assists better planning and reduces the risk to assets through improved route selection and placement.

Standards have been developed to ensure optimum design, configuration and construction quality across the network. All EQL's assets and other structures are designed to comply with relevant standards.

5.4. Feeder Performance Assessments

Ergon Energy Network and Energex are ensuring that the investment in the Worst Performing Feeder Improvement program is prudently spread across different feeders and regions. Ergon Energy Network distribution feeders are ranked (status assigned) according to their three -year average System Average

Interruption Duration Index (SAIDI) performance over that time against the Minimum Service Standards (MSS).

5.5. Asset Improvements Initiatives

In addition to the feeder specific reliability initiatives, Ergon Energy Network and Energex have a range of asset refurbishment programs aimed at achieving the optimal service life from assets, whilst planning replacement of the assets prior to their "end of life". These programs help to improve resilience, safety and reliability across the entire network.

Examples of the range of initiatives undertaken by Ergon Energy Network and Energex include, but are not limited to:

- Line refurbishment programs— such as replacement of aged (or corroded) conductor, installation of insulated/covered conductors
- Lines defect remediation – repair and remediation of defects identified through asset inspection, such as cross-arms, insulators tie wires etc
- Programs of condemned pole replacement
- Customer Service line replacement programs
- Trialling and development of a range of pole materials/technologies (such as composite fibre) along with the ongoing use of concrete and steel rebutted poles where appropriate
- Ongoing research and development and trials of fire-resistant coatings (fireproof paint and fireproof wraps) for wood poles in fire prone areas.

5.6. Capital Investment Programs

We are required to ensure adequate system capacity and maintain an acceptable customer service level under the respective Distribution Authority. Capital investment programs have been developed and implemented to achieve the outcomes end users of

electricity seek with regard to the safety, quality and reliability of electricity services. The capital investment programs are based on the following five key criteria:

- Safety Net Targets for restoration of supply following a contingency event
- Minimum Service Standards (MSS) that set a level of required reliability
- Feeder improvement programs to improve reliability on constrained 11kV feeders and
- Regulatory requirements as per the National Electricity Rules (NER).
- Asset age and condition to improve safety requirements.

5.7. Private Asset Ownership

The owners of Private Overhead Electric Lines and poles are obliged to maintain them in a safe condition. Poorly maintained private lines and poles have the potential to pose significant electrical risk or to start bushfires. Ergon Energy Network and Energex are not responsible for the condition or maintenance of privately owned Electric lines within Queensland, but currently perform a visual inspection of Private Overhead Electric Lines and the first pole on the private property, advising the customer of defects noted. Ergon Energy Network, Energex and the Electrical Safety Office provide safety and maintenance advice on privately owned electric lines.

The owners of private overhead electric lines are responsible for keeping their assets free from obstruction of vegetation and should ensure that trees planted in the vicinity of powerlines are appropriate low growing species. Ergon Energy Network is responsible for the inspection of private property poles in New South Wales that are connected to the Ergon Energy Network, in accordance with IPART requirements.

6. Preparedness

Dedicated activities commence annually in May and continue throughout the year to prepare for the commencement of the bushfire season (typically August) and into the summer storm and cyclone period

(October). These activities include planning and documentation updates, training in the Emergency and Business Disruption framework, familiarisation of emergency management plans, conducting emergency response exercises, emergency response refresher training for all field personnel and providing online training to all EQL Group employees involved in emergency management.

6.1. Preparing the Network

The specific activities undertaken to prepare the network and improve resilience against natural hazards include network capacity and security improvement programs, safety net requirements, plant emergency rating information, strategic spare components, peak load monitoring, temporary load support, demand management and inspection programs. Contingency plans are developed to ensure security and encompass a number of aspects:

- Network contingency and load transfer plans to cater for single contingencies
- Strategies for spares and replacement of major plant such as power transformers
- Availability of mobile generators for deployment to provide an emergency supply in situations where practicable
- Availability of two 33/11kV mobile substations in the South East, two 10MVA 66/33/22/11kV mobile substations (NOMADs) in the Southern region and one NOMAD in the Northern region for deployment to provide an emergency supply where practicable noting that they can be moved across regions and
- Application of available demand management options.

6.2. Contingency Plans

6.2.1. System Normal

Each year, the entire network is reviewed to ensure that all substations and feeders can supply a 10 PoE (10% Probability of Exceedance) forecast peak load under system normal conditions i.e. against the Normal Cyclic Capacity (NCC). A process has been implemented to

monitor loads during the summer peak period so that as hot weather develops, emerging “hot spots” where demand growth may have exceeded the previous annual forecasts are identified. In these cases, corrective action to avoid an overload is taken well before a capacity constraint occurs.

6.2.2. Safety Net

Network contingency plans detail the load transfer and load management options available to restore supply following a single contingency event affecting bulk supply substations, zone substations and sub-transmission feeders. In cases where existing capacity or load transfer capability is not sufficient to enable supply to be restored following a single contingency, more comprehensive plans are developed depending on the tolerability of the risk level identified.

Restoration targets are defined in Schedule 4 of Ergon Energy’s Distribution Authority and Schedule 3 of Energex’s Distribution Authority “...to the extent reasonably practicable”. This acknowledges that regardless of level of preparation, there will always be circumstances where it is impossible to meet the restoration targets at the time of an event (for example, if it is unsafe to work on a line due to ongoing storm activity), though these should be rare.

Efficient investments under the Safety Net provisions will provide mitigation for credible contingencies that could otherwise result in outages longer than the Safety Net targets. Safety Net is defined as effective mitigation of the risk of any low probability/high consequence network outages to avoid unexpected customer hardship and/or significant community or economic disruption. Safety Net targets for power restoration times are prescribed for different locations and energy loads at risk.

We continue to review the changing state of the network for Safety Net compliance as part of the normal network planning process, ensuring that care is taken to understand our customers’ needs when considering the competing goals of service quality and reliability against cost of network.

6.3. Under Frequency Load Shedding

Under Frequency Load Shedding (UFLS) is an automatic load shedding process that happens almost instantaneously to protect the power system if there is a major unplanned outage in the National Electricity Market. An event such as the sudden failure of a major generator or transmission line resulting in available electricity supply falling below customer demand results in a reduction in system frequency and potential instability.

To prevent this, the electricity grid is equipped with strategically located Under Frequency Relays. The relays are grouped into blocks of varying customer types to minimise impact. This automatic load shedding process is developed to minimise impact on critical loads.

The Australian Energy Market Operator (AEMO) requires Energy Queensland to have 60% of its loads available for Under Frequency Load Shedding. We work closely with Powerlink to review the UFLS blocks. The increasing level of roof top solar generation is also changing the load on distribution feeders available for shedding if it is required during the day. We have also confirmed a continuous review of load shedding schedules to better understand where significant rooftop solar generation is connected on the distribution network.

Each event which initiates load shedding is quite different and the amount and type of load shed depends on system loading (day of the week, the time of day and season), system synchronous capacity available etc. Similarly, the time required to re-energise and restore electricity supply after UFLS is also variable.

6.4. Demand Management

Ergon Energy Network and Energex have a Demand Management (DM) Program, which involves working with our customers and industry partners to reduce demand to maintain system reliability in the short term and over the longer term to defer capital projects. Each year load at risk areas on the network are identified through the Distribution Annual Planning Report (DAPR).

These areas are analysed for suitability for DM solutions. Where deemed suitable, Target Areas are established, and incentives offered to customers for DM solutions. Contracts are established with customers to provide permanent or point in time (e.g. at certain times in summer) load reduction. DM solutions can include energy efficiency, power factor correction, load curtailment, load shifting and customer embedded generation. Details of Target area locations and constraint are found on the Ergon Energy Network and Energex websites.

A number of non-network alternative generation contracts exist which provide network support, if needed, over higher risk periods. Broad based DM is also incentivised across the State. It delivers demand reductions across the whole network, rather than just in a local load at risk area. These demand reductions achieved from appliances connected to control load and Peak Smart air conditioners, which can be called upon during emergency or extreme peak demand summer events.

The DM Plan 2021-22 highlights the DM capability that can be called upon during times of peak network demand or as part of emergency response. This capability is called upon to minimise interruptions from extreme weather conditions. This same capability can also be called upon to provide network demand response to the Australian Energy Market Operator (AEMO) i.e. lack of reserve events.

6.5. Critical Community Assets

There are a number of locations throughout the network where continual electricity supply is considered critical to the health and wellbeing of the general community. These installations include hospitals, life support systems, water supply pumping stations, sewerage pumping stations and communications infrastructure.

Ergon Energy Network and Energex representatives work collaboratively with local councils and customers to ensure that these locations are known, prioritised and incorporated into restoration plans. Listings of these installations are integrated into our disaster

management plans, network control centre restoration plans and also our geospatial information system. a Restoration of supply to these locations is given highest priority during emergency events to ensure essential services are provided to the community as soon as safely possible.

6.6. Emergency Mobile Generation

Mobile standby generators are used to provide emergency response to sub-transmission and distribution network faults that cannot be rectified by switching or immediate fault restoration. This assists in restoration of supply in a manner that minimises customer disruption. The fleet of mobile generators also provide flexibility for feeder support during extreme temperature/load events where existing network assets need to be supplemented.

These generators are also pre-emptively deployed to locations likely to be isolated during significant flooding or storm damage.

Our Ergon Energy Network mobile generator fleet is approximately 21MVA in total capacity available. The current fleet includes 37 low voltage generators ranging in size from 60kVA to 1250kVA and five Pegasus 1250kVA HV injection units. There are currently 6.7MVA committed to network support. The HV injection units comprising of a 1250kVA generator and 1250kVA Pegasus unit are capable of being directly connected to either the underground or overhead 11kV or 22kV networks.

The Energex mobile generator fleet is 23.3 MVA in total capacity. The current fleet includes 45 low voltage generators ranging in size from 60kVA to 500 kVA and five high voltage mobile 1250kVA units. There are currently 8.25MVA (4 x 500kVA generators and 5 x 1250kVA generator) committed to network support.

In addition to our own generation equipment, EQL has arrangements in place to hire low voltage generators to ensure adequate generators for unplanned and planned feeder support.

Where flooding has potential to interrupt supply to critical sites or groups of customers, generators may be mobilised on a priority basis as approved by Emergency Managers (including advice from Disaster Management Groups). Where there is a major flood and access to communities is likely to be inaccessible, generators will be considered for strategic early deployment.

Regional plans have been developed to identify and optimise switching points and generator connection points. Permanent connection points for HV generation are included in our Geospatial Information Systems (GIS) to assist in planning considerations.

6.7. Seasonal Outlooks and Forecasts

The Bureau of Meteorology (BOM) provide specific seasonal outlooks, rainfall predictions and weather warnings. These also include other information and analysis sources such as fire weather predictions, flood and rainfall forecasts, cyclone outlooks, tsunami warnings, space weather and weather warnings.

Bushfire season specific outlooks are also provided by The Natural Hazards and Bushfire Cooperative Research Centre (CRC).

Specialist weather forecasting arrangements are in place to provide a range of services to assist in preparation for severe weather events.

Access to this type of information enables us to make informed decisions on the potential impact of the threat and prepare the necessary organisational response.

Annual pre-storm season briefings are also provided to key response and operational teams to assist in understanding the driving factors and potential impacts of the impending season.

6.8. Training and Exercise Management

A suite of training and exercise activities is conducted annually to ensure employees and response teams undertake refreshers and understand their roles and responsibilities.

Hazard specific communications and awareness sessions are conducted for field employees including appropriate work practices and vehicle use during natural hazard conditions.

6.9. Preparing Customers

Both Ergon Energy Network and Energex use targeted awareness campaigns to communicate with customers about how to prepare for storm and cyclone season, and how to be safe around fallen powerlines. The 'Take Care. Stay Line Aware' media campaign will be used this summer across both Ergon Energy Network and Energex areas to promote important safety messages, educate customers about the dangers of fallen powerlines, to be prepared for storms and cyclones, and where to find outage information and updates.

Safety advertising is placed in various channels including television, digital, press and social media. It helps reinforce awareness of the dangers of fallen powerlines during storms, staying clear of fallen powerlines and contacting emergency services, Energex or Ergon Energy Network to report the danger. Our Safety Champions education program in primary schools is a key component of readiness activities and electrical safety awareness.

The primary communication channels with our customers include direct contact via our National Contact Centres (including interactive voice recording (IVR) messages), traditional media (print, radio and television), online (Ergon Energy Network and Energex websites, including Outage Finder tools) and social media (Facebook and Twitter).

We also utilise State Government media channels, via the Crisis Communication Network, and through the partnership of Queensland Government Departments and Agencies.

7. Response

7.1. Intelligence Systems

7.1.1. Internal

Ergon Energy Network and Energex use Geographical Information Systems (GIS) which utilise corporate data and enable the retrieval of relevant information about our electricity assets. This includes the physical location, layout of the assets, specification on equipment and the types and lengths of overhead lines and underground network. The GIS system also includes visual layers that provides the high bushfire risk areas in South East Queensland, Regional Queensland and current QFES known fires, amongst other natural hazard information.

7.1.2. External

There are a variety of online resources, web links and interactive mapping available from external agencies and organisations. Where possible these have been integrated into our GIS platform or links made available through a centralised internal Emergency Information Centre. Resources include:

- Weather forecasting through the Bureau of Meteorology including seasonal outlooks and information sources, fire weather predictions, flood / rainfall, cyclone outlooks, tsunamis, space weather and weather warnings are available for analysis
- Storm surge and inundation information collected during previous flooding events across Queensland depot areas. This is recorded in the internal systems and flood plans. Flood data is consolidated and incorporated from a variety of sources including independent assessments, Queensland State Government agencies and Local Councils and included in restoration and network plans. The Department of Resources, Mines also provide interactive mapping based on previous flooding to the public
- Bushfire real time and forecast mapping to assist in fire response
- Critical community asset locations including hospitals, medical centres, water treatment plans and dams.

7.2. Weather Forecasting

EQL engage specialist weather forecasting arrangements to provide a range of services to assist in preparation for severe weather events and natural hazards. The data includes:

- Current wind speed, wind direction, temperature and humidity conditions
- Historical observations of this weather data
- Comments on observed data and weather patterns specific to our network areas
- A five-day high-resolution forecast of temperature and wind speed
- General forecasts and weather warnings
- Links to satellite and radar information and displays, and
- Longer term climate outlook forecast.
- Forecast weather patterns including heatwaves, storms and lightning levels.
- Integration with QFES Sentinel satellite fire detection
- Bushfire real time and forecast mapping.

7.3. Hazard Specific Alerts

Information regarding hazard specific alert systems and warnings are included in **Part C**.

7.4. Emergency Response Levels

Ergon Energy Network and Energex will respond to various levels of incidents through a standard fault response and emergency escalation framework. An initial assessment of potential damage will determine whether the response is managed operationally or escalated to a Level 2 or Level 3 Emergency Management structure.

A **Level 1** event response utilises local resources, routine business structures and processes without the need to escalate to a full emergency framework or additional command and control structures.

A **Level 2** event requires escalation and support from an emergency management structure, framework and processes relevant and scalable for the nature and location of the event.

The Emergency Management Plan (EMP) Distribution Network details the framework and processes to be applied when preparing for and responding to a **Level 3** Emergency event which disrupts the supply and distribution of electricity or the provision of related services to customers and communities.

For predicted Level 3 events with lead times or advance warning, the business will advise of its response status utilising phases aligned with Queensland Disaster Management Arrangements (Alert, Lean Forward, Stand Up and Stand Down). When any event is sudden or unexpected, the response may move rapidly through the relevant phases, while still ensuring that all actions to establish response teams, response centres, mobilise resources and communicate to all stakeholders are completed.

The response is managed within an escalation process that increases resource capabilities and coordination, drawing across regions as required to meet the response requirements in the impacted area.

7.5. Priority Assets and Restoration Approach

The main priorities immediately following the impact of an event is safety of employees and the community, identifying the number of customers affected, extent of damage, types of customers and availability of response teams. This information allows review and refinement of resourcing and restoration strategies and plans. Initially making the network safe for staff and the public occurs before restoration activities commence.

Where there are multiple interruptions to the network, the priority for restoration is to emergency services including as essential services, hospitals and emergency services.

We continue to enhance our mobile and digital technology platforms to assist in improving our ability to respond, analyse damage and perform repairs including the capture of near real time intelligence through our Field Force mobility, LiDAR and geospatial mapping systems. This facilitates rapid damage assessment, make safe activities, and immediate restoration priorities.

7.6. Isolation for Safety

During major storms, flood events, bushfire events or on days where a Total Fire Ban has been declared, Ergon Energy Network or Energex may be directed or be requested to isolate sections of the network in the immediate area of the event. These requests may be received from appropriately authorised Officers of Qld Police Service (QPS) or QFES. There may be instances where Ergon Energy Network and Energex will proactively isolate during forecast flood and fire events in the interests of public safety and protection of its equipment and private property.

Ergon Energy Network and Energex will, where practical and within the best interests of the community, conduct a patrol of any isolated overhead mains before re-energising this equipment. This practice is to ensure that lines have not sustained damage from the event, all faults have been repaired and the network is safe to re-energise.

On completion of the patrol, clearance will be given by the field supervisor who completed the patrol to allow the line to be re-energised once any identified faults have been addressed.

Areas known to succumb to inundation have been reviewed and identified for potential de-energisation before the waters rise to unsafe or inaccessible levels. This process ensures an increased level of safety for the public, potential reduced damage from water ingress and improved response times.

Key distribution electrical assets which were impacted by previous major flooding the 2011, 2013, 2017 and 2019 flood events in regional cities including Rockhampton, Toowoomba, Bundaberg, Dalby, Fraser Coast, Townsville and Far North Queensland have been recorded and identified for consideration in the event of or forecast of a flood event. Similar lists are available along the South East Queensland River systems including Brisbane, Ipswich, Gympie, Gold Coast, Logan and Albert rivers. These flood levels and resultant inundation now inform our preparedness and response.

Our customer teams have identified critical and Life Support Customers that will be contacted prior to any pre-emptive isolation. Memorandums of Understanding (MOUs) have also been developed with critical infrastructure agencies to ensure communication, disconnection and reconnection protocols are in place.

8. Recovery

Recovery is the coordinated process to permanently restore operational capability, the network infrastructure or electricity supply to the community. This is usually conducted in parallel with the emergency response and these activities may occur in the Stand Up and Stand Down stages. Follow on recovery activities can also be triggered when further permanent works have been identified to be completed after the emergency event during planned programs of work.

Disaster recovery requires a collaborative, coordinated, adaptable and scalable approach in which responsibility for delivery is shared between all sectors of the community and all levels of government. EQL play a key role in both immediate recovery activities, as well as working with government agencies on infrastructure resilience, business continuity, reliability and community and customer support.

9. Community Engagement

For over 20 years, both Ergon Energy Network and Energex have built strong brand recognition as the public face of the electricity network to our customers and the primary information broker for electricity supply outage and restoration information. We have a strong and proven reputation of providing effective, timely, and accurate information during significant disruption events such as cyclones, floods, storms, bushfires, and peak demand (heatwaves) events.

The media and community engagement teams of Ergon Energy Network and Energex deliver timely, accurate, and targeted communications to internal and external stakeholders before, during, and after major weather events.

We utilise our local and state-wide media and community stakeholder relationships to keep the important storm season messages 'top-of-mind' throughout the storm season. Key messages are delivered through media releases and targeted stakeholder engagement to raise community awareness of weather-related issues, such as cyclone preparation and electrical safety.

These communications focus on delivering key safety messages, setting customer expectations regarding network restoration, and directs customers to the online Outage Finder for updates to the National Contact Centre to report damage and faults.

9.1. Event Community Outreach

During significant events, our Community Outreach teams are deployed within impacted communities to provide face-to-face customer engagement focusing on safety messages, restoration updates, the re-connection process (following inundation/structural damage), as well as referrals to Ergon Energy Retail for account services and assistance. We also engage and inform customers on social media and the online Outage Finder to provide relevant and timely updates.

These digital platforms have now become the more popular information and communication channels for customers.

9.2. Online Event Storm Centre

Our event-activated online Storm Centre directs customers visiting our websites to important information on preparations, what to do during major storms and cyclones, and the general process we follow to restore supply to our customers in impacted areas. During major events the site is updated regularly with the latest information regarding the response and restoration efforts.

10. Safety

The safety of personnel and the community is paramount. Ergon Energy Network and Energex employees will not put themselves at risk either prior,

during or immediately following a natural hazard impact or emergency event. Our teams seek advice and direction from a number of intelligence sources including Bureau of Meteorology, Department of Transport and Main Roads and Emergency Services personnel before moving into an area to respond. We continue our commitment to ensure the health and safety of our people and the community and on being a leader in safety – to take performance into the top quartile of industry-recognised benchmarks. This has meant placing a priority on developing a sustainable safety culture across the business, a culture where safety is inherent in everything we do.

The safety and wellbeing of our response teams are critical considerations in bushfire responses. Fatigue management and heat stress management are regularly reinforced during responses and consider the effect of extreme heat and smoke, regular hydration, rotation of tasks, personal and protective equipment and additional rest.

10.1. Safety Programs

Our Natural Hazards Planning and Emergency Planning includes scenario planning and reviewing all emergency response aspects and continued refinement of safety systems, such as fatigue management and driving plans. Our commitment to safety is also demonstrated by our determination to get our safety messages heard through our Community Powerline Safety Plan. Underpinned by a detailed analysis of incident data, the plan addresses known community electrical incident problem areas using awareness campaigns targeted at industry sectors or extreme risk activities.

This has seen a continued decline in community electrical safety incidents. These engagement efforts, and the specific communication activities discussed in this plan, are about ensuring that the risks associated with electricity are well understood.

Part C – Natural Hazard Profiles and Sub Plans

Section 1 - Storms

EQL is exposed to and experiences storms of varying intensity across the state in all its depots and areas of responsibility.

While severe storms are predominantly seasonal, storms may occur at any time throughout the year. They can be unpredictable and occur with little warning to prepare.

The main exposure risk timeframe is the summer season commencing in October in South East Queensland and November in regional Queensland, through to March.

The exposure of overhead assets and poles and wires to these storms may result in

- clashing conductors,
- catastrophic failure due to lightning strike
- vegetation falling across wires, poles and/or assets
- inundation of lower lying areas and assets.

While there are established and maintained clearance zones to minimise vegetation impacts on assets, the risk of vegetation falling into clearance zones is still present.

The Bureau of Meteorology describes the following types of Thunderstorms and associated events all of which are experienced in Queensland and can impact on the electrical network and require emergency response activities to be implemented ⁵:

Thunderstorms

These are described as storms that are likely to produce:

- large hail measuring more than 2cm in diameter
- wind speeds of more than 90 km an hour, and
- heavy rainfall conducive to flash flooding.

A severe storm warning will only be issued by the BOM for storms that are likely to produce all three elements.

Where the thunderstorm is more intense, the BOM describes it as a ‘microburst’ or ‘an intense thunderstorm downdraught concentrated on a small area’.

Tornadoes

The BOM describes tornadoes as being at the ‘weaker end of the scale in terms of a hazard, but even so, can leave a trail of damage to trees and buildings’ and to EQL assets and infrastructure.

Pulse Storms

A pulse storm is also referred to single or multicell thunderstorm and has a brief lifecycle - typically under an hour.

Squall Lines

Squall lines are described as ‘long lines of thunderstorm cells, sometimes several hundred kilometres in extent, that share common precipitation cores or cloud mass. Squall lines can last for hours or even days, with new storm cells continually forming along the leading edge of the line. They form in conditions with moist air near the ground and larger vertical wind shear, with the winds near the surface being very different from the winds higher up’.

Supercells

Supercells are among the most violent storms and can sometimes be accompanied by strong tornadoes and huge hail. Supercells are rarely found within tropical regions except in the vicinity of tropical lows and tropical cyclones which supply wind shear for the development of such storms.

⁵ <http://www.bom.gov.au/weather-services/severe-weather-knowledge-centre/tropicalsevere.shtml>

Tropical Monsoon and East Coast Lows

Monsoonal weather is seasonal in the Far North, while also experienced further south to Townsville and inland areas.

East coast lows are intense low-pressure systems which occur on average several times each year off the eastern coast of Australia, in particular southern Queensland, New South Wales and eastern Victoria. East coast lows will often rapidly intensify overnight making them one of the more dangerous weather systems to affect the south-east Australian coast.

These monsoonal troughs generally lead to flash flooding both localised and riverine and when combined with winds may also cause coastal erosion.

Storm Alerts and Warnings are provided for these through BOM.

Further information can also be found in the [Severe Wind Hazard Assessment for Queensland Factsheet](#).

Section 2 – Tropical Cyclone

Tropical Cyclone

EQL is exposed to tropical cyclones due to the extensive electricity network that is constructed as overhead poles and wires. In addition, the associated rainfall, storm surge and inundation also impact on the underground electricity network.

High winds, rain and flooding potentially causes damage to the electricity network including:

- destabilising poles and overhead wires
- damage from debris contacting the electricity network assets including vegetation and community infrastructure
- movement of assets foundation due to movement and flooding.

The cyclone season traditionally commences on 1 November through to 30 April each year⁶.

Cyclones can be described as powerful weather systems that can cause significant damage to the built and natural environments. These develop from low pressure systems that develop over warm oceans in the tropics, and generally intensify over several days, generating severe winds, heavy rain and flooding. Cyclones produce very strong and potentially destructive winds that rotate clockwise around a calm centre (the ‘eye’)⁷.

Tropical Cyclone Outlooks

EQL utilises the tropical cyclone outlooks provided by the BOM in October each year as the official prediction of the upcoming season.

During the season, three-day forecasts provided by the BOM are also utilised to assist in planning and monitoring.

Alerts and Warnings

When cyclones enter Australian waters, the BOM will issue a cyclone tracking map. Depending on the severity, direction it may also issue cyclone warnings and advice to ensure preparations can be made.

The BOM will issue information and technical bulletins, and warnings and alerts when a tropical cyclone is likely to cause winds in excess of 62 km/h (gale force) within 48 hours. The BOM will issue either of the following:

- A Tropical Cyclone Watch is issued for coastal communities when the onset of gales is expected within 48 hours, but not within 24 hours
- A Tropical Cyclone Warning is issued for coastal communities when the onset of gales is expected within 24 hours or are already occurring.

A Tropical Cyclone Advice will be issued every six hours, increasing to every three hours when cyclone warnings are required. In some circumstances, when a cyclone approaching the coast is under radar surveillance, the advices may be issued hourly.

When Cyclone tracking maps are issued with the warnings and alerts, they are entered into the EQL GIS systems and placed as an overlay onto the electricity network. This allows operational planning teams to commence analysis on the potential impacts to the electricity network, planning and preparation of sources, and repositioning of stores and emergency generation.

⁶ <http://www.bom.gov.au/cyclone/tropical-cyclone-knowledge-centre/warnings/>

⁷ <https://www.getready.qld.gov.au/understand-your-risk/types-natural-disasters/cyclone-and-storm-surge>

Section 3 – Bushfire

Bushfire

The fire season in Queensland normally commences in the Gulf Country and Cape York Peninsula during July. It progresses south into the central inland and coastal areas during spring and south to the NSW border in early summer. The season extends into February for the southern part and for south west Queensland.

These timeframes can vary significantly from year to year due to fuel availability and condition, long term climate conditions and variations on short-term weather conditions in each area. Dependant on seasonal predictions and local weather forecasts, QFES may declare a fire danger period or declare local fire ban or state of fire emergency.

Bushfires are an inherent part of the Queensland environment. The vastness of the land, community centres and the resulting electricity network increases the risk of potential impact to the network. Failure of components of an overhead electricity reticulation system may also present a potential source of ignition and combined with unfavourable environmental conditions may increase the risk of a bushfire.

The Queensland Bushfire Plan 2020 states that ‘In future years, climate change is expected to result in more severe fire weather days, more intense fires and decreased opportunities to rely on fire conditions easing overnight in Queensland’⁸ This is already evident during recent years with more intense fire conditions, longer seasons and risk exposure.

We are committed to best practice asset management strategies, and whilst ever evolving and changing, we will continue to adapt both strategically and operationally to ensure the safe and reliable operation of our network.

This includes maintaining a Bushfire Risk Management Committee and the development and application of Bushfire Risk Management activities to target issues and

initiatives relating specifically to bushfires, how assets are managed to minimise the risk of bushfires to the network, maintain customer supply reliability and ensure a high level of safety for the community during times of bushfire.

Geographical spatial systems and publicly available mapping layers are made available to the emergency planning and response staff to identify high risk bushfire zones to assist in planning and mitigation strategies as well as response activities.

Bushfire Specific Mapping

Under the state planning policy, QFES identifies bushfire hazard areas or land that is likely to support a significant bushfire and could be subject to resulting damage.

These bushfire risk areas periodically change and are regularly reviewed. It is essential that the information can be shared and utilised within the business to assist in the planning, preparation response and recovery to events.

Ergon Energy Network and Energex include this information annually in our Geographical Information Systems (GIS) to allow the production of risk maps identifying network assets in the high bushfire risk areas.

Aside from the impact of bushfires, many areas of Queensland are subject to land management activities including the use of fire to reduce fuel load to mitigate the impact of significant bushfires, to manage primary production systems or to maintain or restore ecological process for conservation. QFES coordinates an annual bushfire mitigation period designated ‘Operation Cool Burn’ during which landholders, land management agencies and the Rural Fire Service (RFS) plan and conduct a range of prescribed burning activities across the state.

All bushfires and prescribed burning activities can potentially impact Ergon Energy Network and Energex assets.

⁸ Queensland Bushfire Management Plan 2020

Check this is the latest version before use

Real time spatial information about the extent of these landscape fires is available through satellite data obtained from a network of geostationary and non-stationary satellites and displayed through mapping applications.

These services provide up to date information on current fires, their location and depending on service provider include additional data such as fire tracking and burnt area mapping. This information is utilised to assist in identifying electrical assets in the fire path and allows restoration planning to be conducted proactively for when the fire areas are safe to access.

The following are available:

- QFES data feed detailing current incidents, line scans and air operations information including burn scars and fire fronts for display on Geospatial systems
- Sentinel Hotspot Fire Detection provided by Geoscience Australia
- Mapping of fires and provision of fire information through Landgate Satellite Remote Sensing Service
- Mapping of current bushfire incidents including permit burns from the Rural Fire Service website.

Bushfire Alerts and Warnings

QFES and RFS provide an automated email system to communicate the declaration of fire bans or fire weather warnings during high bushfire danger conditions. As part of the Bushfire Risk Management Plan, the Rural Fire Service in each region are contacted by key Energex and Ergon Energy Network operational employees to update contact details.

This contact list is updated annually prior to the commencement of the fire season to ensure that the appropriate people receive fire weather information in time to make any necessary operational arrangements or responses.

Ergon Energy Network and Energex's Local Area Managers are also registered to receive automated bushfire update emails, warnings and alerts.

Information from area-based staff and contractors is considered and assessed to identify high fuel loads or previously impacted areas. This will inform any required changes to maintenance practices to minimise and mitigate future asset damage.

Restrictions on Field Activities

A communications advice will be distributed to Operational Managers during a High Fire Danger period, a Local Fire Ban or State of Fire Emergency declaration or to advise of any restrictions to process and practices that must be adopted during the gazetted fire danger period. The communications notice may also outline precautions to take while performing field work activities deemed to have high potential to start fires.

Network Protection Settings

Ergon Energy Network and Energex have automated fault protection systems installed to minimise the effects of different types of faults. The protection systems are designed to isolate electricity supply when the network is damaged and potentially unsafe.

The "sensitive earth fault protection" is set to operate when very low levels of fault current are identified as a result of minor contact with conductors such as tree branches or debris. Hence sensitive earth protection helps to reduce the risk of fires being initiated from vegetation or line defects.

In addition, reclosing devices have been installed in many areas and are designed to automatically isolate supply temporarily in the event of a minor fault, and then where enabled, attempt to automatically restore supply a short period later. If the fault is persistent, supply is totally isolated (lock-out) until the line can be inspected by field employees and if necessary, repairs carried out. The recloser can then be re-set and power restored.

Network Recloser Settings

During periods when weather conditions justify total fire bans there is potential for ignition if a recloser is automatically reclosed and supply is restored to an existing fault.

To minimise this risk, automatic reclose function can be disabled where possible on lines in areas determined to be of a high bushfire hazard during total fire bans, State of Fire Emergency declaration or Extreme to Catastrophic Fire Danger.

Ergon Energy Network and Energex do not suppress automatic reclose functionality on its feeders unless specifically requested by QFES during high risk conditions. This approach considers the adverse impacts of loss of electricity supply will have on equipment such as water pump motors to assist in fire control activities, the need for electricity to power vital telecommunications facilities in managing fire response activities and the health impacts of the loss of air-conditioning for at risk customers (life support or the elderly).

EQL and QFES have developed a process under a Memorandum of Understanding (MOU) for the disabling of auto reclose function on selected parts of the network and the disconnection of electricity supply. The process involves communication between the QFES State Incident Management Team and the Network Operations Shift Coordinator. The EQL and QFES MOU can be found on the Ergon Energy Network and Energex intranet sites.

Motor Vehicle / Machinery Use

Operating vehicles and trucks in off-road environments are a potential fuel hazard due to the high operating temperatures, auto burn functions or catalytic converters igniting dry grass fuel.

Specific advice is given to field employees on the use of light patrol vehicles, medium and heavy trucks used for construction activities and the operation of earth moving machinery in rock terrain.

Employees are instructed to conduct a formal hazard assessment, including relating to starting fires before operating vehicles off formed roads.

Small Engines and Hot Equipment

In areas where there is a high fire risk or there are work activities with potential to start fires with equipment such as generators, chainsaws, brush cutters, metal cutting or welding, precautions must be taken to isolate fuel from the possible ignition source.

The potential for “hot work” and other activities to ignite fires, particularly during a Local Fire Ban or State of Fire Emergency periods is to be considered in risk assessments conducted as part of a formal risk assessment.

During State of Fire Emergency declarations certain activities such as hot work and other activities may be prohibited or restricted. These restrictions will be listed in the declaration.

Copper Chrome Arsenate (CCA) Burnt Poles

Ergon Energy Network and Energex have processes that outline the requirement for inspection and management of fire damaged or burning copper chrome arsenate (CCA) burnt poles, based on the ENA guidelines.

Bushfire Incident Investigation and Reporting

Ergon Energy Network and Energex will undertake investigations and report on the status of the following areas:

- Monitoring and rectification of high priority defects on owned assets identified
- Investigations into suspected asset related bushfires
- Details of the maintenance, reliability and safety aspects of the electricity network are also reported in the Distribution Annual Planning Report (DAPR).

The reporting or recording of incidents of fire starts that have been caused directly or indirectly by Ergon Energy Network and Energex assets is included in its corporate systems (DMS, FdrSTAT and SAP Fiori). This includes incidents associated with motor vehicle accident, equipment failure, vegetation or third-party contact. This information is analysed to determine trends and investigate specific causes where equipment failure is possible. Analysis of equipment types with potential to cause fires will enable development of strategies for replacement or redesign to minimise asset-initiated fires.

Further analysis of the location of rural fires that cause damage to Ergon Energy Network and Energex assets assists in reviewing bushfire risks and possible implementation of preventive measures, such as modified vegetation management or use of fire-resistant materials.

Consideration of incident investigations and findings as well as any feedback received from stakeholders will be integrated into future reviews of the Bushfire Risk Management Plan.

Fire Safety and Awareness

Employees are not expected to participate in firefighting activities; however, an awareness of safety precautions is essential if responding to events. As a result:

- A Bushfire Awareness & Safety Presentation is delivered to field staff annually.
- An EQL Bushfire Smoke Fact Sheet has been developed to assist staff in their awareness of the hazards and risks associated with bushfires and bushfire smoke.

Section 4 – Heatwave

Heatwave

Queensland is exposed to varying climatic conditions including prolonged heat. As EQL has employees and assets across the state, heatwave is a major consideration in the summer months.

The State Heatwave Risk Assessment 2019, indicates that Queensland is projected to become increasingly hotter, with increases in mean daily maximum and mean overnight maximum temperatures. Parts of Queensland are also expected to become significantly drier.

Queensland health define a heatwave as ‘any long period of very hot weather, usually ranging from 37°C to 42°C’⁹.

Heatwaves are calculated using the forecast maximum and minimum temperatures over the upcoming three days and is compared to actual temperatures over the previous 30 days, and the ‘normal’ temperatures expected for the location at the time¹⁰.

Heatwave conditions can have an impact on both employees and the electricity network.

For employees there is an increased risk of heat-related illnesses, in particular for field bases employees.

The impact on the electricity network can range from increased demand for electricity by customers due to the use of air conditioners and equipment and also the direct heat onto the network assets (e.g. wires sagging and some equipment overheating).

EQL has procedures in place to monitor and manage both its employees and the electricity network during heatwave conditions.

Preparing for Heatwave

The Bureau of Meteorology maintains a Heatwave Knowledge centre and during the summer season, the BOM activate a Heatwave Service to provide current

⁹ <https://www.qld.gov.au/emergency/dealing-disasters/disaster-types/heatwave>

assessments on heatwaves, including the lead up conditions and a detailed forecast with predictions. It also provides assessment maps with colour coding and text to advise of the different heatwave intensities.

Hot weather Response Technical Committee

A Hot Weather Response Technical Committee is convened to discuss any warnings and advice from the BOM to gauge the potential impact on the electricity network and identify appropriate actions to implement proactively or in response to heatwave conditions.

The Hot Weather Response Technical Committee is chaired by Network Operations and has a membership which includes engineers, network managers, operations managers and communications staff. This committee is tasked with identifying and implementing suitable strategies to minimise thermal related damage to electrical infrastructure assets and enacting relevant actions to restore supply for instances where failure of network assets has occurred.

Network Configuration

Strategies that are implemented range from returning network configuration to normal arrangements, minimising planned works on the electricity networks, strategic placement of mobile generation, operational management of network assets that are potentially at risk of exceeding designed limits, stockpiling adequate quantities of consumable items and ensuring sufficient response staff are available.

Heatwave Alerts and Warnings

Based on specialist weather advice relating to high temperature forecasts and correlation with pre-defined temperature limits, the hot weather technical committee is formed. A key outcome of the hot weather technical committee is the early and regular messaging to all staff, management and stakeholders.

¹⁰ <http://www.bom.gov.au/australia/heatwave/knowledge-centre/heatwave-service.shtml>

As the temperatures achieve forecast levels, pre-defined escalation messages and actions are deployed following the established escalation model. Based on experience, the response to a single hot weather day is different to a sustained period of hot weather, and the Hot Weather Technical Committee has the flexibility to prepare and respond based on the forecasts and organisation policy.

Safety

As per the EQL Heat Stress Policy, Heat Stress needs to be mitigated at multiple levels. Consideration of heat in the planning of work can have a significant impact. In the long term, where possible, higher heat risk work can be scheduled in the cooler months and other controls such as scheduling increased crew numbers implemented. In the near real time upcoming weather forecasts can be used to modify or reschedule work such as change the time of day the work is completed, schedule increased crew numbers and/or allow an increased window of time to facilitate self-pacing. In real time environmental conditions can be assessed and modifications made to the work being done or the suitability of the work to continue taking into account the nature of the work and the workers completing it. Better awareness of signs and symptoms of heat stress allow workers to better interpret early signs of heat strain in themselves and others. This combined with a work culture that understands heat stress and is accepting of individuals raising their hand when they are struggling in the heat can help prevent heat illness no matter when an individual may experience it. In the event of a serious heat illness having access to highly effective field-based cooling methods as part of the first aid response is imperative. EQL has rolled out Heat Stress Kits and deployed appropriate Field Workwear across the business to reduce the impacts of heat stress.

Section 5 – Flood – Riverine and Coastal Flooding – Riverine and Coastal

Many Queensland towns and cities are located within catchment areas, along major waterways and the east coast areas.

Queensland has many climatic zones across the state and as such experiences a range of storms, tropical lows and cyclones. The increase in rainfall and run off from these systems may have an immediate or delayed flood impact on population centres or electrical assets.

Flood Planning

Flood Planning data is collected to assist in the mitigation, planning and response to potential flood events. A consolidated mapping system utilising internal collated data relating to asset impact in previous events and externally sourced information from government organisations assists to improve our knowledge, planning and response activities.

Flood data is reviewed annually and details the approach and key activities to manage flood events and improve flood resilience to the network assets. This incorporates learnings from major flood events across Queensland which have the greatest impact on the electricity network and continuity of electricity supply to customers including ex-TC Debbie flooding in April 2017 and North Queensland and Townsville Monsoon Flooding in March 2019.

Flood Specific Mitigation

Planning and design consider potential installation of mitigation measures including permanent or temporary bunding, barriers around key substation equipment, sealing wall and floor penetrations in substation buildings to withstand a major flood event, raising ground pad mounted transformers on plinths or the relocation of critical substation assets above flood levels.

Additionally, flood mitigation works have previously been implemented in regional Queensland to minimise impacts for flood areas in cities such as Rockhampton,

Mackay and Bundaberg following several major flood events.

These works include HV and LV isolation points to assist in isolating impacted areas as flood waters rise or where rising flood waters breach regulated line clearances. Sufficient isolation points were created so the isolation areas were kept to a minimum. Our regions have flood levels available in our geospatial systems to identify plant that needs to be de-energised at specific flood heights.

Isolation for Safety

In some circumstances, supply is required to be isolated to areas which are not inundated but flood waters impact neighbouring areas supplied by the same system. This has caused considerable concerns for these customers. For these areas, where feasible, alternate supplies have been constructed to maintain supply or as above more isolation points have been installed to reduce the outage footprint.

Liaison officers work with the Local and/or District Disaster Management Group to implement any proactive or reactive isolation required.

Flood Mapping

To identify major and moderate flood risk areas, we utilise information from a variety of sources in addition to our own network and asset data. These sources provide critical information to assist in planning, preparation and response activities in key areas.

Current flood modelling practices rely on the data and information collected from previous flood events to determine and develop Defined Flood Levels (DFLs). These DFL's and associated modelling then form the basis of town planning, emergency response and business continuity planning. The models are reviewed and DFL's revised based on the information available from subsequent events.

The information is essential and can be shared and utilised within the business to assist in the planning, preparation and subsequent response to events. It is

important to recognise that due to changing infrastructure and urban development, water courses, run off and drainage changes, the flow of water may also alter and affect previous data validity.

Our GIS databases are regularly updated to allow risk maps to be produced identifying network assets in the flood prone areas and allow visibility of equipment which may be affected both prior to and during flood events including:

- Bulk and zone substations
- Commercial and Industrial substations
- Overhead lines
- Padmount and ground transformers
- Underground pillars, and
- Streetlights.

In south-east Queensland, major flood data layers have been recorded for the Brisbane and Bremer rivers and information from the regional councils assist to document local flood levels. Additional flood layers covering moderate flooding for the Brisbane, Gold Coast, Logan, Moreton Bay and Gympie river systems are also available for operational purposes.

Flood data is also available for the South Western Region, Rockhampton, Bundaberg and Maryborough areas. Data continues to be consolidated for other major regional centres including Mackay, Townsville and parts of Far North Queensland.

Storm surge and inundation information collected during flooding across Queensland depot areas is integrated into our network flood mapping and modelling. Information sources include:

- Localised experience
- Independent assessments
- Open source interactive mapping for use by the public from:
 - Local Councils
 - Queensland State Government agencies
 - Department of Natural Resources, Mines and Energy.

Flood Alerts and Warnings

Network Operations Controllers, regional operational staff, and our Emergency Planning and Response team monitor storm and flood events using information from various organisations including BOM, disaster management groups, local council hydrologists, water agencies and flood modelling experts.

Network Operations have access to various Flood Management systems, which include rainfall stations, river and creek gauges across the state. The system can also provide information on roads and areas which are in flood.

When moderate to major flood warnings are issued on rivers and creeks, the Network Control Shift Coordinator will escalate the situation and alert the Regional Network Managers and operational Area Managers of the flood warning. A dedicated Emergency Management Team will be convened as required for Level 2 and 3 emergencies relating to flood events.

Emergency Managers will coordinate the tasking of planning teams and field crews to commence river height monitoring using the BoM website, Weather Watch, Floodwise system and/or SES information and commence preparing for the flood response. Specific preparations may include the movement of crews, fleet, generation and equipment to areas expected to be isolated by floodwaters.

Section 6 – Earthquake

Queensland is fortunate to be positioned away from the edge of tectonic plates and seismic fault lines and has not had any major earthquakes in recent years.

It has experienced minor earthquakes and tremors recording 10 earthquakes in the past 5 years¹¹ although none of these have resulted in any significant property or infrastructure damage.

The Australian government utilises Geoscience Australia to display and detail any previous and recent earthquakes. <https://earthquakes.ga.gov.au/>

Earthquakes can trigger secondary events such as landslides, tsunamis and fires caused by downed power lines and ruptured gas mains.

In addition, direct damage to the electricity network from the earth's movement may include but not limited to:

- damaged wire conductors due to clashing due to pole movement
- fallen powerlines due from disturbed foundations
- twisted/snapped power poles (metal and wood)
- ruptured underground electricity cables
- damage to electricity substations – e.g. buildings and equipment structures or foundations and fixed electrical switching equipment.

Where required and the impact is significant to either employee's safety, EQL property and facilities or the electricity network, the emergency management framework will be utilised to coordinate a larger emergency response.

EQL has local procedures in place for employees to respond to earthquakes.

Building emergency cards detail emergency procedures, reference documents such as Facility Emergency Management Guide that provides guidance to Supervisors/ Managers, Emergency wardens and employees.

Further information can be found in the State Earthquake Risk Assessment:

<https://www.disaster.qld.gov.au/qermf/Documents/QFE-S-State-Earthquake-Risk-Assessment.pdf>

<https://www.disaster.qld.gov.au/qermf/Documents/QFE-S-State-Earthquake-Risk-Assessment-Executive-Summary.pdf>

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<https://earthquaketrack.com/p/australia/queensland/recent>

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Section 7 – Tsunami

The threat of tsunami may have a direct impact on the Ergon Energy Network and/or Energex electricity network due to our location along coastal areas. Similar to coastal flood inundation, flood mapping and inundation data mapping is available to assist in any response to a tsunami threat.

The safety of our employees is the priority and providing advice to move to a safe place is a higher priority over assets and equipment.

Tsunami Alerts and Warnings

The Joint Australian Tsunami Warning Centre (JATWC) operated by the Bureau of Meteorology and Geoscience Australia) monitors and provides warnings for Tsunami threats with the following escalation levels:

- No Threat
- Watch
- Marine Warning
- Land Warning
- Cancellation.

<http://www.bom.gov.au/tsunami/>

The JATWC provides warnings through announcements on local radio and TV. Other information on warnings is available through **1300 TSUNAMI (1300 878 6264)** for latest warning information.

Where there is a risk to electrical assets and time permits, EQL may de-energise and isolate its assets for safety. Automatic safety protection devices are also installed on the network.

The Queensland Tsunami Notification Guidelines (Guidelines) were developed by Emergency Management Queensland, Department of Community Safety, in accordance with the Disaster Management Act 2003 and these provide the guidance for EQL mitigation and response.

¹² <https://www.getready.qld.gov.au/understand-your-risk/types-natural-disasters/tsunami>

According to a recent [tsunami modelling study](#) by Queensland Government's Department of Environment and Science, the following regions having been identified as having the highest tsunami hazard risk (in descending order)¹²:

- Gold Coast
- Ocean side of Bribie, Moreton and Stradbroke islands
- Sunshine Coast
- Fraser Island
- Bundaberg
- Flying Fish Point
- Capricorn Coast
- Agnes Water
- Hervey Bay.

Further information can be found in the Tsunami Guide for Queensland.

<https://www.disaster.qld.gov.au/qermf/Documents/Tsunami-Guide-For-Queensland.pdf>

Section 8 – Landslide

A subsequent hazard for EQL is landslide. Landslide may occur as a secondary hazard from either storms, cyclones, earthquakes, flooding or infrastructure failure such as water mains. The damage is therefore normally more isolated to the landslide area rather than widespread damage.

The Ergon Energy Network and Energex network traverses hills and mountains, follows escarpments and also follows low areas along rivers and creeks, roads, drainage systems and beach fronts.

Landslides and the movement of the earth may impact both overhead and underground assets.

The Queensland Government defines a landslide as the movement of large amounts of earth, rock, sand or mud, or any combination of these. Landslides can be sudden and fast moving, moving millions of tonnes of debris¹³. It also lists the major type of landslides as:

- **Rockfall** - typical settings where rockfalls may occur include cliffs in coastal zones, mountain sides, gorges, road cuttings or quarry faces.
- **Deep-seated landslide** - deep-seated landslides typically occur in steep terrain.
- **Debris flow** - debris flows can originate on slopes in the range of approximately 16 to 40 degrees, where loose rock and soil materials are subjected to high intensity rainfalls. Where water content is high, debris flows can travel at rapid velocities with considerable destructive potential. Houses and other structures may be situated on or near the source area or run-out path of such features.
- **Shallow landslide** - shallow landslides occur in areas with a shallow layer of weak material and are often triggered by brief episodes of intense rainfall. They tend to occur on the edge of embankments and on steep natural slopes of 30 degrees or more. The infrastructure most

commonly affected is roads and railway lines, although shallow landslides occasionally damage houses and other private property. Numerous shallow landslides occur during the wet season.

¹³ <https://www.getready.qld.gov.au/understand-your-risk/types-natural-disasters/landslide>

Section 9 – Pandemic

EQL has developed a Pandemic, Epidemic or Outbreak Event Plan for the management of an actual or potential pandemic or epidemic event, or outbreak of a communicable disease that impacts EQL employees. The plan includes actions and activities for incident, emergency and business continuity management and response.

The purpose of the plan is to outline the strategic and tactical arrangements, activities and actions required when managing an actual or potential pandemic or epidemic event, or outbreak of a communicable disease that impacts EQL.

It can be used for the management of any contagious disease that has caused (or the potential to) harm to EQL employees and/or our ability to continue our critical business function. For the purpose of this plan the term 'pandemic' will be used generically to describe the event. Where required, the individual event types will be referred to in context e.g. pandemic, epidemic or outbreak of communicable disease.

The objectives of this plan are to:

- Provide a practical, scalable and risk -based approach to the management of a pandemic event
- Establishment of command, control and coordination arrangements
- Clarify roles and responsibilities of EQL, including relationships with State and National arrangements
- Describe the context within which the Australian and State Governments and EQL will function during an event
- Describe the mechanisms through which a pandemic, epidemic or communicable disease incident of national interest (CDNI) is declared, how this plan will be escalated and stood down
- Describe the preparedness and response measures that may be taken by EQL and/or State and National Departments in anticipation of or during an event.

Section 10 - Space Weather

Space Weather relates to changes that may occur between Earth and the Sun in the space environment. Natural occurrences and changes in the Sun cause solar anomalies generating solar winds that are directed towards the earth. The earth's atmosphere in many cases deflects these solar winds, however if significant enough the release of magnetic energy from the Sun (solar Flare) may cause changes in the earth's atmospheric conditions. This burst of magnetic energy may affect the various technological systems.

The Ergon Energy Network and Energex electricity networks are vulnerable to geomagnetic storms which can occur at any time.

The effects are assessed by levels and vary from minor (weak power grid fluctuations can occur) to extreme (with widespread voltage control problems and protective system problems can occur, some grid systems may experience complete collapse or blackouts). Transformers may experience damage, HF (high frequency) radio propagation may be impossible in many areas for one to two days, satellite navigation may be degraded for days, low-frequency radio navigation can be out for hours).

Space Weather Alerts and Warnings

The Bureau of Meteorology provide space weather forecasts and warnings for HF Radio, satellite and geophysical operations. <http://www.sws.bom.gov.au/>

Part D - Definitions, Abbreviations and Acronyms

BAU Business as Usual – resources and effort are focused on the planned and budgeted work required to operate and maintain electricity infrastructure, its operational functions and capabilities.

Disaster A disaster is a serious disruption in a community, caused by the impact of an event, that requires a significant coordinated response by the State and other entities to help the community recover from the disruption (*definition: Disaster Management Act 2003, Section 13*). NOTE: a disaster can only be declared by a Disaster District or the State Government with the specific approval of the responsible Minister.

Disaster Management Disaster management means arrangements about managing the potential adverse effects of an event, including, for example, arrangements for mitigating, preventing, preparing for, responding to and recovering from a disaster (*definition: Disaster Management Act 2003*).

Disruption Events Events that disrupt the normal functions of businesses, the economy and/or communities and include those that are man-made (e.g. terrorist attack, bomb threat) and natural (e.g. storm, cyclone, fire, flood, network or non-network asset failure, influenza pandemic).

Emergency A sudden and unexpected event that disrupts the normal operating functions, capabilities, resource and/or people of the organisation and requires an immediate response to prevent escalation of its scale or severity. For example, but not restricted to:

- Localised electricity network damage, or potential damage, due to fire, flood, storm or accident etc.;
- Loss of operating facilities and/ or resources;
- Loss of ICT operating systems.

Flooding-Major In addition to the criteria for moderate flooding, extensive rural areas and/or urban areas are inundated. Properties and towns are likely to be isolated and major traffic routes likely to be closed. Evacuation of people from flood affected areas may be required

Flooding-Minor Causes inconvenience. Low-lying areas next to watercourses are inundated which may require the removal of stock and equipment. Minor roads may be closed, and low-level bridges submerged.

Flooding-Moderate In addition to the criteria for minor flooding, the evacuation of some houses may be required. Main traffic routes may be covered. The area of inundation is substantial in rural areas requiring the removal of stock.

Flooding-Q100 Refers to a flood level or peak that has a one in a hundred, or 1%, chance of being equaled or exceeded in any year (also referred to as annual exceedance probability)

Hazard An event, object or scenario that has the potential to cause harm to people and/or cause damage to property or assets.

IPC Insulation Piercing Connector

LiDAR Light Detection and Ranging, is a remote sensing method that uses light in the form of a pulsed laser to measure ranges which are transformed to measurements of actual three-dimensional points of

the reflective target in object space. LiDAR produces mass point cloud datasets that can be managed, visualised, analysed, and shared using ArcGIS.

**Level
Emergency** **1** Events are routine incidents that are managed as part of normal business operations and are not managed through emergency, or crisis management arrangements.

**Level
Emergency** **2** These events are the first level of non-routine events. They are more complex either in size, resources, or risk; and are events that are beyond the capability of normal business operations and require specific command and control arrangements. e.g. Impacts to EQL's normal operations may be substantial but may be relatively foreseeable and contained.

**Level
Emergency** **3** These events are the most significant emergencies. They require substantial effort and resources across different regions / areas of EQL and have the potential to substantially disrupt business operations or significantly harm EQL's reputation. These emergencies require specific command and control arrangements and resourcing to a much greater degree than a level 2 event.

Risk Potential impact on objectives (either losses or opportunities) due to a particular event, hazard, or scenario. Risk is the product of likelihood and consequence.

11. References

Internal

- Energy Queensland Risk and Resilience Policy
- Energy Queensland Organisational Resilience Strategy
- Energy Queensland Emergency and Business Disruption framework
- Energy Queensland Union Collective Agreement 2017
- Energy Queensland Crisis and Emergency Leadership Team Charter
- Bushfire Management Plan 2021/22
- Energy Queensland Pandemic, Epidemic or Outbreak Event Plan, June 2020
- Emergency Management Plan – Distribution Network
- EQL Low Carbon Future Statement
- EQL Environmental Substantiality and Cultural Heritage Policy.

- Queensland Bushfire Plan 2020
- NSW Legislation obligations under the *Electricity Supply (Safety and Network Management) Regulation 2014* (NSW) under section 7(2)(b)
- ISSC 33 Guideline for network configuration during high bushfire risk days
- ISSC 31 Guideline for the management of private overhead lines
- Work Health and Safety Act (Qld) 2011
- Work Health and Safety Regulation (Qld) 2011

External

- AS ISO 31000:2018 Risk Management - Guidelines
- Electricity Act 1994 (Qld) Electricity Regulation 2006 (Qld)
- Electrical Safety Act 2002 (Qld)
- Electrical Safety Regulation 2013 (Qld)
- Disaster Management Act 2003 (Qld)
- Emergency Management Assurance Framework (QLD)
- Queensland Disaster Management Arrangements
- Queensland State Disaster Management Plan 2018
- Queensland State Natural Hazards Risk Assessment 2017
- State Earthquake Risk Assessment
- Severe Wind Hazard Assessment for Queensland
- Queensland State Government Pathways to a climate resilient Queensland, Queensland Climate Adaption Strategy 2017-2030