Macarthur wind farm

Bushfire Mitigation Plan 2020-2021

Hydro DMS: ML AL FI 02 (Rev 3.2)

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Plan Revision History

Date	Version	Author	Comment	Sections
0.1	27/11/2014	B. Ryan	Initial 2014 Draft	All
0.2	28 Dec 2016	S. Cariss	Revised for 2016 and in preparation for submission to ESV	All
1.0	1 Feb 2017	S. Cariss	Revised for 2017/18 in preparation for submission to ESV	All
1.1	10 Feb 2017	S. Cariss	Revised relating to evaluation by ESV	All
1.2	24 Feb 2017	S. Cariss	Reference to Asset Inspector qualifications and training resulting from ESV evaluation	All
2.0	01 Aug 2018	R. Widdowson	BMP Working Group Review	All
2.1	31 Aug 2018	S. Cariss	Minor changes and rebranding	All
2.2	27 June 2019	R. Widdowson	Annual review AGL / Vestas	All
3.0	09 July 2020	S. Cariss	Annual review AGL Macarthur	All
3.1	29 Aug 2020	S. Cariss	Feedback post annual review	Section 13
3.2	8 Oct 2020	S. Cariss	Incorporating feedback from ESV	Section 1 Section 2 Section 7.5.1 Section 10.5.3 Section 12

Distribution

Copy	Position
1	Energy Safe Victoria
2	AGL Macarthur Reception
3	Macarthur wind farm Reception
Electronic File	Head of Renewables
Electronic File	Operations and Governance Manager
Electronic File	Wind and Solar Asset Manager
Electronic File	Wind and Solar Asset Leader
Electronic File	Site Supervisor – Macarthur wind farm
Electronic File	HSE Business Partner
Electronic File	AGL Web Site
Electronic File	AGL Macarthur Document Management System

Plan Approval

AGL Macarthur

Bushfire Mitigation Plan for 2020-21

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Preparation:	**Implementation:**
Stuart Cariss	Paul Barrand
Operations Governance Manager, Renewables	Wind and Solar Manager
Signature:	Signature:
Approval Date: 28/10/2020	Approval Date: 28/10/2020

1. Regulation Compliance Summary

Reg	Requirement	Reference in this Plan
6 (1)(a)	the name, address and telephone number of the specified operator	Responsible Persons (Section 2)
6 (1)(b)	the position, address and telephone number of the person who was responsible for the preparation of the plan	Responsible Persons (Section 2)
6 (1)(c)	the position, address and telephone number of the persons who are responsible for carrying out the plan	Responsible Persons (Section 2)
6 (1)(d)	the telephone number of the specified operator's control room so that persons in the room can be contacted in an emergency that requires action by the specified operator to mitigate the danger of bushfire	Responsible Persons (Section 2)
6 (1)(e)	the bushfire mitigation policy of the specified operator to minimise the risk of fire ignition from its at-risk electric lines	Introduction (Section 4) Policy (Section 7)
6 (1)(f)	the objectives of the plan to achieve the mitigation of fire danger arising from the specified operator's at-risk electric lines	Objectives (Section 5)
6 (1)(g)	a description, map or plan of the land to which the bushfire mitigation plan applies, identifying the location of the specified operator's at-risk electric lines	Scope (Section 6) Appendix 14 – Location Maps
6 (1)(h)	the preventative strategies and programs to be adopted by the specified operator to minimise the risk of the specified operator's at-risk electric lines starting fires	Preventative Strategies (Section 9)
6 (1)(i)	a plan for inspection that ensures that all of the specified operator's at-risk electric lines are inspected at regular intervals of no longer than 37 months	Inspection Programs (Section 7.2)
6 (1)(j)	details of the processes and procedures for ensuring that each person who is assigned to carry out the inspections referred to in paragraph (i) has satisfactorily completed a training course approved by Energy Safe Victoria and is competent to carry out such inspections	Qualifications, Training and Competencies (Section 7.5.1)

Reg	Requirement	Reference in this Plan
6 (1)(k)	details of the processes and procedures for ensuring that persons (other than persons referred to in paragraph (j)) who carry out or will carry out functions under the plan are competent to do so	Qualifications, Training and Competencies (Section 7.5.1)
6 (1)(l)(i)	the operation and maintenance plans for the specified operator's at-risk electric lines — in the event of a fire	Operations and Maintenance Plans (Section 10)
6 (1)(l)(ii)	the operation and maintenance plans for the specified operator's at-risk electric lines — during a total fire ban day	Operations and Maintenance Plans (Section 10)
6 (1)(l)(iii)	the operation and maintenance plans for the specified operator's at-risk electric lines — during a fire danger period	Operations and Maintenance Plans (Section 10)
6 (1)(m)	the investigations, analysis and methodology to be adopted by the specified operator for the mitigation of the risk of fire ignition from its at-risk electric lines	Monitoring and Verification (Section 12)
6 (1)(n)(i)	details of the processes and procedures by which the specified operator will— monitor the implementation of the bushfire mitigation plan	Monitoring and Verification (Section 12)
6 (1)(n)(ii)	details of the processes and procedures by which the specified operator will— audit the implementation of the plan	Monitoring and Verification (Section 12)
6 (1)(n)(iii)	details of the processes and procedures by which the specified operator will— identify any deficiencies in the plan or the plan's implementation	Monitoring and Verification (Section 12)
6 (1)(n)(iv)	details of the processes and procedures by which the specified operator will— change the plan and the plan's implementation to rectify any deficiencies identified under subparagraph (iii)	Monitoring and Verification (Section 12)

Reg	Requirement	Reference in this Plan
6 (1)(n)(v)	details of the processes and procedures by which the specified operator will— monitor the effectiveness of inspections carried out under the plan	Monitoring and Verification (Section 12)
6 (1)(n)(vi)	details of the processes and procedures by which the specified operator will— audit the effectiveness of inspections carried out under the plan	Monitoring and Verification (Section 12)
6 (1)(o)	the policy of the specified operator in relation to the assistance to be provided to fire control authorities in the investigation of fires near the specified operator's at-risk electric lines	Responsibilities (Section 8)

2. Responsible Persons

Regulation	Specification – Contact Details
Name, address and telephone number of the specified operator	***Jo Stone*** ***Head of Renewables*** AGL Energy 699 Bourke St Melbourne 3000 Phone: (03) 8633 7860 Email: jstone@agl.com.au
Position, address and telephone number of the person who was responsible for the preparation of the plan	***Stuart Cariss*** ***Operations Governance Manager, Renewables*** AGL Energy Kiewa Valley Hwy Mt Beauty 3699 Phone: (03) 5754 3225 Email: scariss@agl.com.au
Position, address and telephone number of the persons who are responsible for carrying out the plan	***Paul Barrand*** ***Wind and Solar Manager, Renewables*** AGL Energy 699 Bourke St Docklands 3008 Phone: 0427 536 267 Email: pbarrand@agl.com.au
Telephone number of the specified operator's control room so that persons in the room can be contacted in an emergency that requires action by the specified operator to mitigate the danger of bushfire	***AGL Dispatch Centre*** ***Duty Generation Dispatcher*** 699 Bourke St Docklands 3008 Phone: (03) 5754 3142 Email: agldc@agl.com.au
Information, including a copy of the Plan is available to be viewed by ESV or members of the public at Macarthur wind farm located at 1850 Hawkesdale Macarthur Rd, Macarthur 3286 or by appointment during normal business hours. A copy of the Plan is also available on the AGL internet site at: https://www.agl.com.au/about-agl/how-we-source-energy/renewable-energy/macarthur-wind-farm	

3. References

- AGL Macarthur Line Clearance Plan 2020-2021
- AGL Macarthur Vestas Electricity Safety Management Scheme
- AGL Energy Customer Complaints Policy
- Electricity Safety Act 1998
- Electricity Safety (Electric Line Clearance) Regulations 2020
- Electrical Safety (General) Regulations 2019
- Electricity Safety (Management) Regulations 2019
- Electricity Safety (Bushfire Mitigation) Regulations 2013
- Electrical Safety (Bushfire Mitigation) Amended Regulations 2016
- Electricity Safety (Bushfire Mitigation Duties) Regulations 2017
- Australian Standard AS4373 Pruning of Amenity Trees

4. Introduction

Macarthur wind farm is operated by AGL Hydro Partnership (hereafter, AGL Macarthur), a subsidiary of AGL Energy. Please refer to Appendix 14.4 relating to the organisational structure.

AGL and its contractors are committed to avoiding fire ignition caused by electrical assets and achieving compliance with relevant legislative and regulatory requirements while encouraging innovation, system improvement and the effective use of our flexible resources.

This Bushfire Mitigation Plan outlines the policies, procedures, standards, codes, and guidelines that AGL Macarthur applies to construction, operation and management of our electrical infrastructure and sub-networks. The Plan also provides an overview of AGL Macarthur's bushfire risk management strategies in relation to key stakeholders including local government, government agencies and emergency services.

5. Plan Objectives

The objectives of AGL Macarthur's Bushfire Mitigation Plan are as follows:

- Public safety
- Compliance by AGL Macarthur with the *Electricity Safety Act 1998* and the Electricity Safety (Bushfire Mitigation) Regulations 2013
- To maintain a program of inspection of assets on a regular basis dictated by the risks assessed at each location
- Reduce the risk of fire starting from its assets
- Vegetation management with compliance to minimum clearances and environmental practices
- Asset maintenance to a level consistent with industry standards
- Liaise with fire attack and land management agencies to formulate strategies to minimise damage to the environment in the case of bushfires
- Measurement, monitoring, reporting, and verification of program achievement and performance including the rectification of non-conformances; and
- Regular assessment of all programs in accordance with the relevant standards, regulations, and codes

6. Scope

Macarthur wind farm's electric line assets are in the Moyne Shire in Victoria. Maps identifying the areas where the assets are located are provided in Appendix 14.

Macarthur wind farm's bushfire mitigation strategy is described by this Bushfire Mitigation Plan along with other documents, including the Electric Line Clearance Management Plan, Line Clearance Plan, the ESSA Guidelines for Design and Maintenance of Overhead Distribution and Transmission Lines, and all subordinate documents. Maps identifying the areas where the assets are located are provided in Appendix 14.

6.1. Overhead Lines

This section provides a description of all overhead line assets within Macarthur wind farm including line pole structures and protection. It outlines operating facilities; the actions associated with the lines and provide detail of recommended maintenance practices.

Overhead line circuits within the wind farm comprise:

- 33 kV line CG1L (Collector Group 1 Line) from the transition compound at Pole 26 to the transition compound adjacent to Macarthur Substation
- 33 kV line CG6L (Collector Group 6 Line) from the transition compound at pole 19E to the transition compound adjacent to Macarthur Substation
- 132 kV line MWF1 (Macarthur wind farm 1 Line) from Macarthur Substation to Tarrone Terminal Station 132kV switchyard
- 132 kV line MWF2 (Macarthur wind farm 2 Line) from Macarthur Substation to Tarrone Terminal Station 132kV switchyard
- 132 kV line TRSL (Tarrone Substation Line) from Tarrone Terminal Station 132kV switchyard to the 500 kV/132 kV transformer bay; and
- 500 kV span at Tarrone Terminal Station between SP AusNet 500 kV gantry and AGL 500 kV/132 kV transformer bay gantry

In the sections that follow, descriptions and operating features of lines are described individually. Maintenance requirements are common for all lines and are presented in a single section.

6.2. 33kV Collector Group Lines

33kV overhead collector lines are run from the 33kV transition compound adjacent to Macarthur Substation to terminating transition compounds at Poles 19E and 26. Between the substation transition compound and location 19, both circuits are carried on a double circuit line approximately 4.5 km in length. From pole 19W to 26, CG6L continues a single circuit line of length 1.9 km. Both collector circuits provide connection for 35 turbines and use duplex Sulfur AAAC conductor (ie. 2 x Sulfur conductors per phase). The overall line route is shown on appendix 14.2.

6.2.1. Line Pole Structures

Free standing monopoles of 25m height are used for all line structures and generally construction type is suspension with both circuits supported on a single pole. For all strain locations two monopoles are installed and are designated by the structure location and position. Each structure carries circuit nameplate and phase identification markers. Nameplates carry circuit designation CG1L or CG6L and the structure number. Where two circuits are supported by a single pole, nameplates are provided on both sides of the pole for the circuit directly above. Surge arresters are used at each line termination within the transition compound yards and also mounted on structures 13E and 13W in the place of bridging insulators.

6.2.2. Line Protection

Collector protection is provided by Areva P141 relays (X Protection) and SEL 751 relays (Y Protection). These provide IDMT overcurrent and earth fault protection for lines as well as other wind farm protection functions (such as under and over frequency protection). The protection functions don't rely on the Optical Ground Wire (OPGW) communications path. No auto reclosing is provided collector circuits so that collector cables are not unduly stressed.

6.3. 132kV Lines to Tarrone Substation

The double circuit 132kV line from Macarthur Substation to Tarrone Terminal Station 132kV switchyard is 13.6 km long, with each circuit, designated MWF1 and MWF2, rated at 210 MVA.

The circuits are terminated at gantry structures at both substations and supported by steel or concrete poles at 63 locations. Steel poles are used from Macarthur substation to Pole 52, from Pole 26 to Tarrone Terminal Station and for Pole 46 on the Kangertong Rd road reserve. Concrete poles are used from Poles 27 to 45 and from 45 to 51.

Duplex Sulfur AAAC conductor is used for steel pole sections (i.e.. 2 x Sulfur conductors per phase) and simplex Sulfur AAAC conductor (1 per phase) for concrete pole sections. The overall line route is shown on appendix 14.3.

6.3.1. Line Pole Structures

Free standing monopoles of 25m or 30m height are used for all line structures and generally construction type is suspension with both circuits supported on a single pole. For all steel angle and strain locations, two monopoles are installed in each location and are designated by the structure location and position. Each structure carries circuit nameplate and phase identification markers. Nameplates carry circuit designation MWF1 or MWF2 and the structure number. Where two circuits are supported by a single pole, nameplates are provided on both sides of the pole for the circuit directly above. Surge arresters with counters are used at each line termination within the substation switchyards.

6.3.2. Line Protection

Line protection is provided by GE L90 current differential relays (X Protection) and SEL 311L current differential relays (Y Protection). These rely on communications between the two substations, provided by the redundant OPGWs, being intact. On failure of communications, L90 relays switch to backup distance protection function at each end. Auto reclosing is provided on each line circuit and this can be enabled or disabled locally at the protection panel. All switching is 3 pole and reclosure is only for single phase faults, any three-phase fault will lockout without reclosure.

6.4. 132kV and 500kV Tarrone Substation Lines

A short 132kV single circuit line is run within Tarrone Terminal Station, from the 132kV switchyard to the 500kV/132kV transformer bay. It's terminated on gantries at both ends and supported between by 4 steel poles. Triplex Sulfur AAAC conductor is used (i.e. 3 x Sulfur conductors per phase) and the earth wire is Grape ACSR conductor. The 500kV overhead line consists of a single span between AusNet Services and AGL 500kV gantries and its droppers. The conductor used is quad Orange ACSR (i.e. 4 x Orange conductors per phase). The earthwire used is Grape ACSR. The overall line route is shown on Appendix 14.3.

6.4.1. Line Pole Structures

Free standing 25 m monopoles are used for 132kV TRSL. Single suspension poles are used at all locations. Their arrangement is as for poles used for Macarthur wind farm 132kV lines. Each structure carries circuit nameplate and phase identification markers.

6.4.2. Line Protection

The short 132kV line is within the transformer differential protection zone and so is protected by transformer T60 (X Protection) and SEL 357E (Y Protection). The 500kV span is within AusNet Services connection zone and so is protected by AusNet Services. Protection operations for faults in either line will result in tripping of 132 kV circuit breakers and the AusNet Services 500 kV circuit breakers.

7. Policy

Macarthur wind farm is committed to maintaining fire safe assets by:

- Periodic inspection of the assets to identify the works necessary to maintain fire safety
- Operation programs to remove or manage the identified risks; and
- Monitoring and reporting regimes to measure the state of preparedness for the declared bushfire season and the effectiveness or programs

7.1. Private Overhead Electric Lines

Macarthur wind farm, as a generator of electricity, does not have Private Overhead Electric Lines (POEL's) as defined by the relevant legislation. All Macarthur wind farm line assets are either used for the internal transmission of generated electricity or the supply of electricity to assets. Macarthur wind farm does not supply customers via POEL's.

7.2. Inspection Programs

The purpose of the inspection programs is to assess the condition of electricity distribution assets, record test results and observations, and log results for further evaluation and action. Inspection programs have been designed for the surveillance of identified causes of fire ignition.

The following inspections are undertaken:

- Pole top inspection is conducted annually prior to the fire season. Inspection results are recorded in the Macarthur wind farm asset condition database
- All poles, cross arms, conductors, and hardware belonging to Macarthur wind farm are inspected annually prior to the fire season. The results are recorded in the Macarthur wind farm asset condition database
- A vegetation line clearance verification of all Macarthur wind farm line assets is conducted annually by an appropriately qualified contractor with results recorded in the Macarthur wind farm asset condition database; and
- All issues or actions arising from any of these inspections are reported to the Asset Leader and prioritised as below.

Priority 1 *- Requires remedial action within 4-weeks during both fire and non-fire seasons*

Priority 2 - *Requires further assessment or remedial action, within a period of 6-months; and*

Priority 3 - *Other maintenance item identified. Requires regular inspection within the normal inspection programs, at periods to be triggered in the site contractors' computerised maintenance management system.*

Inspection reports identifies the number of assets inspected, number of defect items, defect description, location and remedial actions required (See extract in Appendix 14.8).

7.3. Pole Inspections

All poles are constructed of galvanised steel or concrete and will be rectified in the advent of failed inspection.

7.4. High Voltage Cross Arms

All pole cross arms are constructed of galvanised steel and will be rectified in the advent of failed inspection.

7.5. Personnel

This section outlines the process to be employed by all personnel, including contracted staff, carrying out asset inspections and tests carried out in a responsible manner and applies to all persons associated with this management plan.

All personnel, including contracted staff, must have satisfactorily completed the required competency-based training and their performance monitored on an annual basis.

Random verifications are completed on all work conducted by contractors during the currency of each task. Any non-compliance issues are communicated to the relevant contractor or employee and corrective actions are taken immediately. These are recorded for verification purposes.

7.5.1. Qualifications, Training and Competencies

Macarthur wind farm engages contractors to perform annual inspections of at-risk electric assets and all work is carried out by suitably qualified and licensed personnel having experience in the types of work to be executed.

Macarthur wind farm utilises trained and qualified external contractors that must have a minimum of Certificate II in ESI Powerline Vegetation Control, Cert III Horticulture (Arboriculture) and hold appropriate certificates for both themselves and their equipment that legally entitles them to undertake the work.

Asset Inspectors must have completed the Energy Safe Victoria approved course - ESI Certificate II in Asset Inspection (UET20612) as a minimum.

Personnel engaged in vegetation clearance work will comply with Regulation 614, 616 and 617 of the Electricity Safety (General) Regulations 2019 (Vic) and workers shall only undertake work for which they have been trained, assessed and deemed competent to enable them to safely perform work. All personnel engaged in line clearance activities shall be inducted in the Macarthur wind farm Bushfire Mitigation Plan.

Macarthur wind farm records all training and qualifications in the site Induction Register maintained by the Site Supervisor or representative. Identification of qualifications is undertaken as part of the contractors' Site Induction process. All incidents and hazardous observations are tracked, and actions assigned.

The following technical standards are applied regarding, or in connection with, bushfire mitigation and electric line clearance work:

- AS 4373 –2007 Pruning of Amenity Trees.
- Electricity Safety Act 1998 (Vic)
- Electricity Safety (General) Regulations 2019 (Vic)

- Electrical Safety (Bushfire Mitigation) Regulations 2013 (Vic)
- Electrical Safety (Bushfire Mitigation) Amended Regulations 2016 (Vic)
- Electricity Safety (Electric Line Clearance) Regulations 2020 (Vic)

7.6. Response Review and Reporting

- Macarthur wind farm undertakes to respond as soon as practicable to all fires arising from their actions or asset. In the case of potential ignition sources from asset operations on days of total fire ban, Macarthur wind farm may open-off HV lines running through high-risk areas, dependent on weather conditions where a risk of ignition is identified such as unstable trees encroaching the power line. All employees and contractors employed by Macarthur wind farm are instructed to report all fires immediately.
- The Bushfire Mitigation Plan, Electric Line Clearance Management Plan, Bushfire Mitigation Manual, 500kV, 132 kV AND 33 kV Overhead Line Overhead and Maintenance Manual, Line Inspection Manual, and all subordinate documents will be reviewed on an annual basis or more frequently if required.
- All Macarthur wind farm procedures, documentation and asset readiness relating to bushfire mitigation, shall be reviewed each year in November prior to declaration of the fire season. All corrective actions identified shall be identified prior to the declaration of the fire danger period. A verification report and progress on corrective actions shall be forwarded to the Wind and Solar Manager prior to the declaration of the fire season.

8. Responsibilities

8.1. Management Structure, Processes and Practices

The Macarthur wind farm management structure with respect to this plan is as follows. Please also refer to Appendix 14.4 – Reporting Organisational Structure.

Head of Renewables - responsible for:

- Overall management of AGL Macarthur
- Timely completion and actioning of bushfire mitigation strategies; and
- Ensuring the actions of AGL Macarthur meet legislative requirements.

Operations Governance Manager – responsible for:

- Compliance and Verification of the bushfire mitigation plan
- Ensure proper liaison with other fire attack and land management agencies; and
- Ensure the administration of the Bushfire Mitigation Plan meets legislative requirements

Wind and Solar Manager – responsible for:

- Ensuring all outstanding work is completed in a timely manner and adequate resources are made available for the implementation of the plan
- Ensuring all outstanding compliance issues are addressed and to ensure that matters are communicated to senior management; and
- Ensuring all compliance and verification outcomes are reported to the Operations Governance Manager in a timely manner

Asset Leader -– responsible for:

- Day to day operation of electric line asset maintenance in accordance with this plan
- Asset inspection, vegetation control program and liaison with other land management agencies in accordance with this plan; and
- Allocation of contracts, with the responsibility of ensuring training and competencies are maintained in accordance with this plan. Refer 4.5
- Development of the verification report prior to the declared fire season

Site Supervisor — as agent for the Asset Leader, is responsible for:

- Day to day operation of electric line asset maintenance in accordance with this plan
- Asset inspection and vegetation control programs as approved by Asset Leader
- Engagement of contractors, with the responsibility of ensuring training and competencies are met in accordance with this plan.

Senior Electrical Engineer — responsible for:

- Providing technical advice as required to ensure that the assets are maintained to the required standard; and
- Assist with contractor evaluation and selection to ensure they are technically competent and can provide the required levels of service

AGL Dispatch Center — responsible for:

- Informing Macarthur wind farm Site Supervisor and the Wind and Solar Asset Leader of the declaration days of total fire ban, verbally and in writing before 7:30 am on days of Total Fire Ban and emergencies.

8.2. Liaison with Management Agencies

Macarthur wind farm will liaise with Moyne Shire to ensure that fire mitigation strategies are in place prior to the declaration of fire season.

Macarthur wind farm shall maintain links with the CFA to ensure swift and effective, response to fire ignition within its area of responsibility. A fire response plan shall be circulated to the CFA prior to the fire season each year detailing what resources are available to fire attack agencies.

9. Preventative Strategies

9.1. Preventative Programs

The following preventative programs are adhered to in order to minimise the risk of bushfire initiation Macarthur wind farm assets:

- All conductor spans in all areas will be inspected prior to the start of the fire season to identify any trees infringing the clearance space and any other obvious line defects, which may be a cause of the ignition of fire.
- The inspection will be carried out by the method determined by the Asset Leader. This may be by ground patrol or line inspection, thermography, ultrasonic inspection; and
- The clearance space prescribed in the Electricity Safety (Electric Line Clearance) Regulations 2015 will be maintained clear of vegetation at all times. In carrying out the work necessary to achieve this,

the duties assigned to the responsible person in the Electricity Safety (Electric Line Clearance) Regulations 2015 will be observed.

9.2. Monitoring of Asset Condition and Vegetation

The procedures employed by Macarthur wind farm meet the requirements of Electricity Safety (Electric Line Clearance) Regulations 2015.

The procedures are as follows:

Recurrent pruning and clearing will be conducted by a suitably qualified vegetation management contractor on a maximum 3-yearly cycle for hazardous fire areas, however, all reasonable efforts will be made to achieve an annual pruning and clearing cycle with the following objectives;

- To maintain the clearance space during this period additional pruning and clearing will be required (regrowth space) and diseased and unstable vegetation in the area beyond this which is a hazard to the line (hazard space) must be removed or other remedial action taken
- Establishing the appropriate regrowth space will enable pruning and clearing to be limited to the 3-year cycle, but as this is dependent on climatic conditions during the cycle pre-summer, clearing may be necessary at some locations outside the normal cycle
- The pre-summer inspection program is by site contractor staff
- The pre-summer verification program of all Macarthur wind farm line assets for vegetation clearance is conducted by an independent, competent, external contractor on an annual basis. Asset Leader monitors this program
- The ongoing inspection program is scheduled using the site computerised maintenance management system and undertaken by site contractor staff
- The ongoing verification program consists of annual desktop verifications of procedure and maintenance tasks and regular fault reporting arising out of routine line verifications; and
- To maintain a high standard of compliance through technology and information exchange Macarthur wind farm undertakes to maintain best industry practice via communication and liaison with competent companies such as AusNet Services.

9.3. Engineered Solutions

Macarthur wind farm will consider engineering solutions prior to any clearing activities. Alternative methods shall be used where the benefits outweigh those of conventional practices.

AGL undertake to provide uniform and consistent asset management strategies for undertaking corrective (reactive) and preventive (pro-active) actions committed to avoiding fire ignition caused by electrical assets and achieving compliance with relevant legislative and regulatory requirements.

Asset management strategies comprise major capital upgrades and consideration to underground infrastructure aimed at reducing risk and ongoing O&M costs with respect to overhead lines and easements. Refer to Appendix 14.9 – Engineered Solutions.

9.4. Hardware Maintenance and Replacement

Macarthur wind farm has instructed its line maintenance service providers that all work carried out and hardware purchased and installed on Macarthur wind farm's behalf must be fully compliant with this Bushfire Mitigation Plan and Electricity Safety (Bushfire Mitigation) Regulations 2013.

10. Operations and Maintenance Plans

10.1. In the Event of Fire

In the event of fire which prevents the safe operation of the HV overhead line, the line will be de-energised to minimise further ignition sources. Where the fire is in the area but presents no risk to the safe operation of the overhead line, the overhead line will continue to operate and remain in service.

10.2. During Fire Danger Period

Macarthur wind farm will be operated in accordance with normal operating practices during the Fire Danger Period. Early in December or before the declared bushfire danger period, the bushfire mitigation actions will be reviewed by Asset Leader to ensure that they have been carried out in accordance with this plan. A report on the condition of the overhead lines will be provided to the Asset Leader monthly.

10.3. Days of Total Fire Ban and Fire Emergencies

On days of Total Fire Ban and emergencies, the AGL Dispatch Centre (AGLDC) Generation Dispatcher will inform Macarthur wind farm Site Supervisor of the declaration days of total fire ban, verbally and in writing before 7:30 am. Macarthur wind farm Site Supervisor will organise to reschedule any planned works that may be considered by the CFA, or under codes of practice, regulations, or statutory requirements, to pose a risk of fire ignition.

Where such tasks need to be performed to ensure the security and safety of the network all permits required by the CFA, or under codes of practice, regulations, or statutory requirements, will be obtained.

Records of events and instructions for days of Total Fire ban will be kept by AGL Macarthur for inspection by Energy Safe Victoria and the CFA if required. The Asset Leader will liaise with CFA or DSE Officers in the approach to the fire season to confirm season start date.

10.4. Key Timings

Key timings for preventative strategies are as follows:

- The Bushfire Mitigation Plan will be completed and ready for submission to Energy Safe Victoria prior to the 1 July each year
- The Electric Line Clearance Management Plan (LCP) will be completed prior to the 1st of July each year and submitted to Energy Safe Victoria upon request
- During the declared fire season, a report on fire preparedness will be tabled at the Macarthur wind farm monthly MSA meeting
- Inspection program dates are triggered by a computerised maintenance management system. Timing for rectification works are determined by the Asset Leader and the priority status of work required; and
- Desktop verification of plan and fire procedures shall occur in the first week of November each year.

10.5. Fire Reporting and Investigations

Macarthur wind farm will undertake an investigation and analysis of all fire ignitions originating from its electric line assets.

10.5.1. Definitions

Fires are categorised under two definitions as follows:

- Fire: the ignition of combustible materials on the ground including trees and other vegetation possibly caused by Macarthur wind farm assets; and
- Significant Fire: a fire which causes injury or death, or significant damage to stock or property which includes trees, pasture and fencing possibly caused by Macarthur wind farm assets.

10.5.2. Fire Reporting Procedures

Should a fire occur which may have been caused by AGL Macarthur assets it is to be reported by:

- A telephone report to the Asset Leader, Wind and Solar Manager and Head of Renewables
- A written Fire Report Form (Refer Appendix 12.3); and
- An HSE incident raised in the AGL HSE Management System (myHSE)

When reporting fires causing minimal damage, and where it is unlikely that there will be external stakeholder or media involvement, the Wind and Solar Manager and Operations Manager must be provided with at least the following information:

- Current status of the fire (i.e. out, under control etc)
- Attendance of any other authority (Police, CFA)
- Date and time of discovery
- Pole number
- Locality or line/spur name
- Injured personnel
- Material damage
- Line voltage
- Possible cause; and
- Details of preliminary information from the initial site inspection

In the event of a significant fire, or if external stakeholder or media involvement is likely, the Wind and Solar Asset Manager, Operations Manager and Head of Renewables are to be provided with the following information, in addition to that above, as soon as possible:

- Name of the person reporting the fire
- Whether Macarthur wind farm employees or contractors still on site; and
- If the police attended the incident

A written Fire Report Form (Refer Appendix 14.5) must be submitted in addition to the telephoned fire report within 48 hours of first notification of the incident. Sufficient detail is to be included to allow a full understanding of the incident (including weather, pole/cross arm materials, conductor materials, etc.).

10.5.3. Report to Energy Safe Victoria

If as the result of an incident, serious property damage, or a serious reduction in the level of public safety, has occurred or is likely to occur, then all details of the incident must be reported to Energy Safe Victoria in accordance with the Electrical Safety (Management Regulations) 2019.

10.5.4. Investigations

In the event of any fire involving Macarthur wind farm assets; the Wind and Solar Manager with the assistance of the Operations Manager is to initiate an investigation into the cause and effects of the fire and produce, if necessary, a plan for minimising the likelihood of a further similar occurrence.

AGL Investigation Procedure (AGL-HSE-PRO-12.2) outlines the control objectives and minimum controls that provide a consistent and systematic approach to the investigation of hazards, near misses and incidents at AGL.

The two investigation methodologies most commonly used at AGL are:

- The 5 Whys Analysis; and
- ICAM (Incident Cause Analysis Method).

Other investigation methodologies may be used if the AGL Wind and Solar Manager or Head of Renewables determine that the Five Whys or ICAM methods are not suitable.

Every effort is to be made to commence the investigation within two calendar weeks of the incident and have the investigation completed and the recommendations and action plan produced within six calendar weeks of the incident. Investigation findings, recommendations and action plans are then to be forwarded to Energy Safe Victoria for all notifiable incidents.

10.6. Assistance from Fire Agencies for Fires near Electrical Assets

The following procedures apply when assistance is required from fire agencies for fires near electrical assets:

- Access to assets - for personal safety reasons no access to any high voltage source (e.g. switchyards, HV Lines, poles) by any fire authority or personnel is permitted without prior approval from the Site Supervisor of Macarthur wind farm
- Co-ordination of resources - each year Macarthur wind farm shall circulate the Macarthur wind farm preparedness and capability statement with local fire agencies that includes the role of each agency in the event of a fire endangering or affecting any HV assets
- Appointed contact persons — in the event of an incident affecting any Macarthur wind farm asset, the Site Supervisor shall notify the Asset Leader or their delegate for allocation of resources; and
- Information exchange - Macarthur wind farm shall maintain a free exchange of information to all fire control agencies to enable a rapid, appropriate response to all incidents. The Wind and Solar Manager will use this information exchange to best advantage to identify risks to and from Macarthur wind farm Assets and effectively apply lessons learnt from past events to manage future fire risk

11. Public Awareness Program

Macarthur wind farm has no private electric supply lines connected to any of its overhead assets. Where Macarthur wind farm has overhead lines passing over private or public land it shall inform, and make aware, the land holders of their obligations with regard to; ensuring limits of approach and clearance distances are maintained, allowing access for periodic inspections, and what actions will need to be undertaken if there is a non-compliance.

The following communications will achieve this:

- Macarthur wind farm shall inform land holders of inspection times, their rights and the procedure for settlement of any grievances arising; and
- Macarthur wind farm shall circulate a form on an annual basis detailing the needs of Macarthur wind farm for asset access and the land holder’s responsibilities for not encroaching on limits of approach to high voltage line assets.

12. Monitoring and Verification

12.1. Reviews

Macarthur wind farm will undertake annual reviews of its bushfire preparedness in relation to overhead line assets and generation structures.

Verification by senior managers, and other nominated staff, will be held annually to validate the plan, the efficiency of maintenance programs, program compliance, and program relevance. Verification Managers will include:

- The Operations Manager
- The Wind and Solar Manager
- The Asset Leader
- The Senior Electrical Engineer
- The Site Supervisor; and
- Other nominated personnel as deemed necessary

Note: A delegate may be nominated in the absence of one of the above managers.

Verifications will be undertaken during October/November of each year into all facets of the implementation of the bushfire mitigation plan and include checks and assessments of the following:

- Planning
- Monitoring inspections carried out
- Asset inspector competency and qualifications
- Line maintenance database and computerised maintenance management system
- Urgent work
- Line hardware and poles
- Trees/vegetation
- Electrical related faults
- Near-miss events
- Communication effectiveness with the CFA/DSE
- Any previous fire starts from the at-risk electric lines
- Response to days of Total Fire Ban and high fire danger; and
- HV switching procedures

Verification of competency and qualifications of all contracted service providers is also undertaken through site contractor engagement and authority to mobilise processes.

12.2. Plan Effectiveness and Monitoring

All issues or actions arising from any of these verifications are recorded and prioritised. The Wind and Solar Manager reviews each verification report and coordinates follow-up action to verify the implementation of the corrective action is raised and tracked.

The results of verifications and reviews that identify deficiencies with this plan, procedures or the plan implementation associated with the management of bushfire mitigation are added to the HSE Action register for action. This register tracks the issue, responsible person, and progress status. The results of each verification including the documented actions are advised to the Renewables Leadership Team.

The change to a procedure or this plan will be implemented in a timely manner depending on the significance of the issue identified. All items identified will be incorporated into the next annual revision of the Macarthur wind farm Bushfire Mitigation Plan.

12.3. Reporting

Macarthur wind farm will comply with the following external reporting requirements:

- Macarthur wind farm reviews its Bushfire Mitigation Plan annually and will submit the revised plan to Energy Safe Victoria prior to 1 July each year
- Macarthur wind farm annual Electric Line Clearance Management Plan will be completed and submitted to Energy Safe Victoria upon request
- All notifiable fire incidents will be reported to the Energy Safe Victoria immediately in accordance with the Electrical Safety (Management Regulations) 2019; and
- Refer to the AGL Macarthur Electrical Safety Management Scheme Manual for assistance with the reporting process requirements

13. Macarthur Assets

13.1. Macarthur Wind Farm Substation

13.2. Tarrone Substation

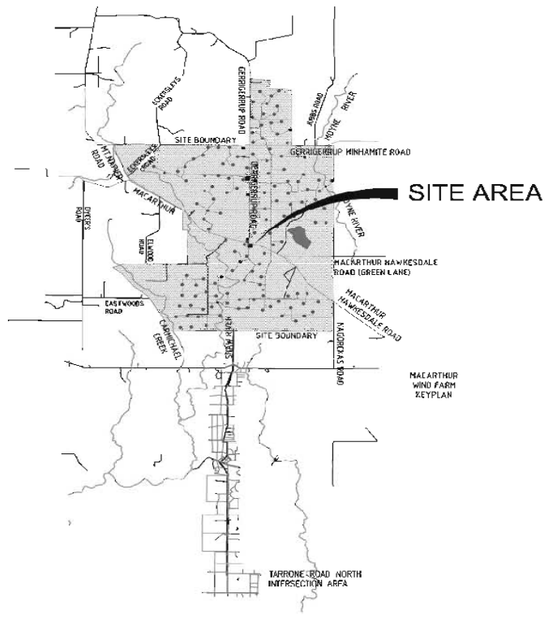
13.3. Tarrone Terminal Station

14. Appendices

14.1. Location Map – Assets in Hazardous Bushfire Risk Area

MACARTHUR WIND FARM

CIVIL AND STRUCTURAL
SITE LAYOUT DRAWINGS



LOCALITY PLAN

NOT TO SCALE

DRAWING SETS

NUMBER SETS	DRAWINGS
0000	CIVIL & STRUCTURAL DRAWINGS COVER SHEET
0001–0999	CIVIL SITE LAYOUT DRAWINGS REFER DRAWING 0000 FOR DRAWING LIST
1000–1999	WTG HARDSTANDS DRAWINGS REFER DRAWING 1000 FOR DRAWING LIST
2000–4999	INTERNAL ROADS DRAWINGS REFER DRAWINGS 2000 FOR DRAWING LIST
5000–5999	PUBLIC ROAD INTERSECTIONS REFER DRAWING 5000 FOR DRAWING LIST
6000–6999	CATCHMENT PLAN DRAWINGS REFER DRAWING 7000 FOR DRAWING LIST
8000–8999	GENERAL SITE LAYOUT DRAWINGS REFER DRAWING 8000 FOR DRAWING LIST
9000–9999	STRUCTURAL DRAWINGS REFER DRAWING 9000 FOR DRAWING LIST

GENERAL CONSTRUCTION NOTES:

1. DO NOT SCALE FROM DRAWINGS.
2. ALL WORKS TO BE IN ACCORDANCE WITH CURRENT LOCAL AUTHORITY STANDARDS UNLESS OTHERWISE DIRECTED.
3. EXISTING SERVICES SHOWN ARE INDICATIVE ONLY. THE CONTRACTOR SHALL VERIFY THE LEVEL AND POSITION OF ALL EXISTING SERVICES WITH RELEVANT AUTHORITIES PRIOR TO COMMENCING CONSTRUCTION.
4. FEATURE SURVEY INFORMATION HAS BEEN COMPILED BY OTHERS. WHERE PROPOSED WORKS TIE INTO EXISTING WORKS THE CONTRACTOR SHALL VERIFY THE FEATURE SURVEY INFORMATION PRIOR TO CONSTRUCTION
5. WHERE WORKS CARRIED OUT BY OTHERS AFFECT CONSTRUCTION OF THE PROPOSED WORKS, THE COMPATIBILITY WITH THE PROPOSED WORKS IS TO BE VERIFIED BY THE CONTRACTOR.
6. THE CONTRACTOR SHALL VERIFY SETOUT PEGS AND BENCH MARK LEVELS AND ADVISE THE SUPERINTENDENT OF ANY DISCREPANCY PRIOR TO COMMENCING CONSTRUCTION AND WHEN USED FOR SETOUT OR AUDITING.
7. THESE PLANS ARE TO BE READ IN CONJUNCTION WITH OTHER CONSULTANTS DRAWINGS.
8. VIC ROADS ROADWORK SIGNING CODE OF PRACTICE WHICH COMPLIES WITH AUSTRALIAN STANDARD 1742.3 2002 IS TO BE ADHERED TO DURING CONSTRUCTION WORKS.
9. SIGNAGE AND LINE MARKING TO BE AS PER CURRENT AS1742.1 AND AS1742.2 AND VIC ROADS TRAFFIC ENGINEERING MANUAL VOLUME 2 – SIGNS AND MARKINGS
10. THESE PLANS ARE TO BE READ IN CONJUNCTION WITH THE SPECIFICATIONS

DRAWING SETS – CIVIL SITE LAYOUT

NUMBER SETS	DRAWINGS	AS BUILT PLANS
C000	CIVIL AND STRUCTURAL DRAWINGS COVER SHEET	AS BUILT
C001	GENERAL LAYOUT – SHEET 1 OF 2	AS BUILT
C002	GENERAL LAYOUT – SHEET 2 OF 2	AS BUILT
C003	GENERAL LAYOUT – SOUTHERN SECTION	AS BUILT
C004	GENERAL LAYOUT – WESTERN SECTION	AS BUILT
C005	GENERAL LAYOUT – EASTERN SECTION	AS BUILT
C006	GENERAL LAYOUT – NORTHERN SECTION	AS BUILT
C007	WIND TURBINE GENERATOR SUMMARY SHEET 1 OF 3	
C008	WIND TURBINE GENERATOR SUMMARY SHEET 2 OF 3	
C009	WIND TURBINE GENERATOR SUMMARY SHEET 3 OF 3	
C010	ELECTRICAL LAYOUT – SHEET 1 OF 2	AS BUILT
C011	ELECTRICAL LAYOUT – SHEET 2 OF 2	AS BUILT
C012	WTG FOOTING RISK SUMMARY SHEET 1 OF 3	
C013	WTG FOOTING RISK SUMMARY SHEET 2 OF 3	
C014	WTG FOOTING RISK SUMMARY SHEET 3 OF 3	

DRAWING SETS – CIVIL SITE LAYOUT

NUMBER SETS	DRAWINGS
6001	MAJOR CATCHMENT PLAN – Q100 EXTENT
6002	MAJOR CATCHMENT PLAN – Q20 EXTENT
6003	FULL CATCHMENT AREA FOR MOYNE AND SHAW RIVER
6004	WTG'S AT RISK OF INNUNDATION OR BUOYANCY ISSUES
6005	LOCALISED INTERNAL CATCHMENT PLAN – SHEET 1 OF 2
6006	LOCALISED INTERNAL CATCHMENT PLAN – SHEET 2 OF 2

DRAWING SETS – GENERAL SITE LAYOUT

NUMBER SETS	DRAWINGS	AS BUILT PLANS
~~8001~~	~~OWNER AGREED VEHICLE VESTAS VERSUS MICROPOSITED COORDINATES~~	
~~8002~~	~~OHL ROUTE OPTIONS & WTG (V100-1.8 vs V100-2.0) WITH ROAD LAYOUT~~	
~~8003~~	~~OHL ROUTE OPTIONS & WTG (V100-1.8 vs V100-2.0) WITH AERIAL PHOTO~~	
~~8004~~	~~OHL ROUTE COMPARISON – WITH ROAD LAYOUT~~	
~~8005~~	~~OHL ROUTE COMPARISON – WITH AERIAL PHOTO~~	
8006	SITE LAYOUT – SOUTHERN AREA	AS BUILT
8007	SITE LAYOUT – EASTERN AREA	AS BUILT
8008	SITE LAYOUT – WESTERN AREA	AS BUILT
8009	SITE LAYOUT – NORTHERN AREA	AS BUILT
~~8010~~	~~OHL ROUTE WITH AERIAL PHOTO – SHEET 1 OF 2~~	
~~8011~~	~~OHL ROUTE WITH AERIAL PHOTO – SHEET 2 OF 2~~	
8013	RESIDENTIAL LOCATIONS WITHIN A 2km RADIUS OF SITE BOUNDARY	
8014	OVERALL SITE PLAN	
8015	WTG CLEARANCE FROM TITLES & FENCELINES	

Rev	Amendments	RSW By	LD Appr	22/10/12 Date
1	ISSUED FOR AS-BUILT READY			

Consultant: EXALLOS DIVISION SPECIALIST ENGINEERING SERVICES CONSTRUCTION PROPERTY EQUIPMENT INFRASTRUCTURE MINING AND RESOURCES

North: AMG ZONE 54

Vestas MACARTHUR WIND FARM

Leighton Contractors Pty Limited
Incorporated in NSW
ACN 002 813 607
5 Queens Road
Melbourne Victoria 3501
Australia
Telephone (03) 9228 7700
Facsimile (03) 9228 7800

Consultant

Designer	LJD
Drafter	JFJ
Drawing Check	-
Team Leader	DNH
Proof Engineer	-
LCPL Des Manager	-

MACARTHUR WIND FARM
CIVIL SITE LAYOUT
CIVIL & STRUCTURAL DRAWINGS
COVER SHEET

Scale: AS SHOWN

Client: AGL MERIDIAN

Drawing No.: D4159/MWF/RBG/C/D/0000/D

Rev No.: 1

PLOTTED: 23 October 2012 – 2:55 PM

Cad File No: P:\2009 JOBS\09688 Macarthur Wind Farm\Drawings\Civil\E4759-MWF-RBG-C-D-0001.dwg

14.2. Location Map – 33 kV Transmission Line – Line route

MACARTHUR
33kV ANGLE STRUCTURE COORDINATES

Structure No	Easting	Northing	Elevation	Line Angle
1W	604016.248	5786210.827	148.955	0
1E	604022.152	5786209.753	148.955	0
7W	604285.9852	5787694.947	154.8	-12
7E	604291.4738	5787694.614	154.8	-12
9W	604272.4481	5788151.598	162.11	-17
9E	604276.8719	5788152.422	162.11	-17
13W	603937.7463	5789108.527	161.85	21
13E	603942.1937	5789109.213	161.85	21
19W	603984.968	5790673.230	167.858	0
19E	603990.516	5790673.062	167.858	0
26 W	604042.650	5792490.570	172.81	0

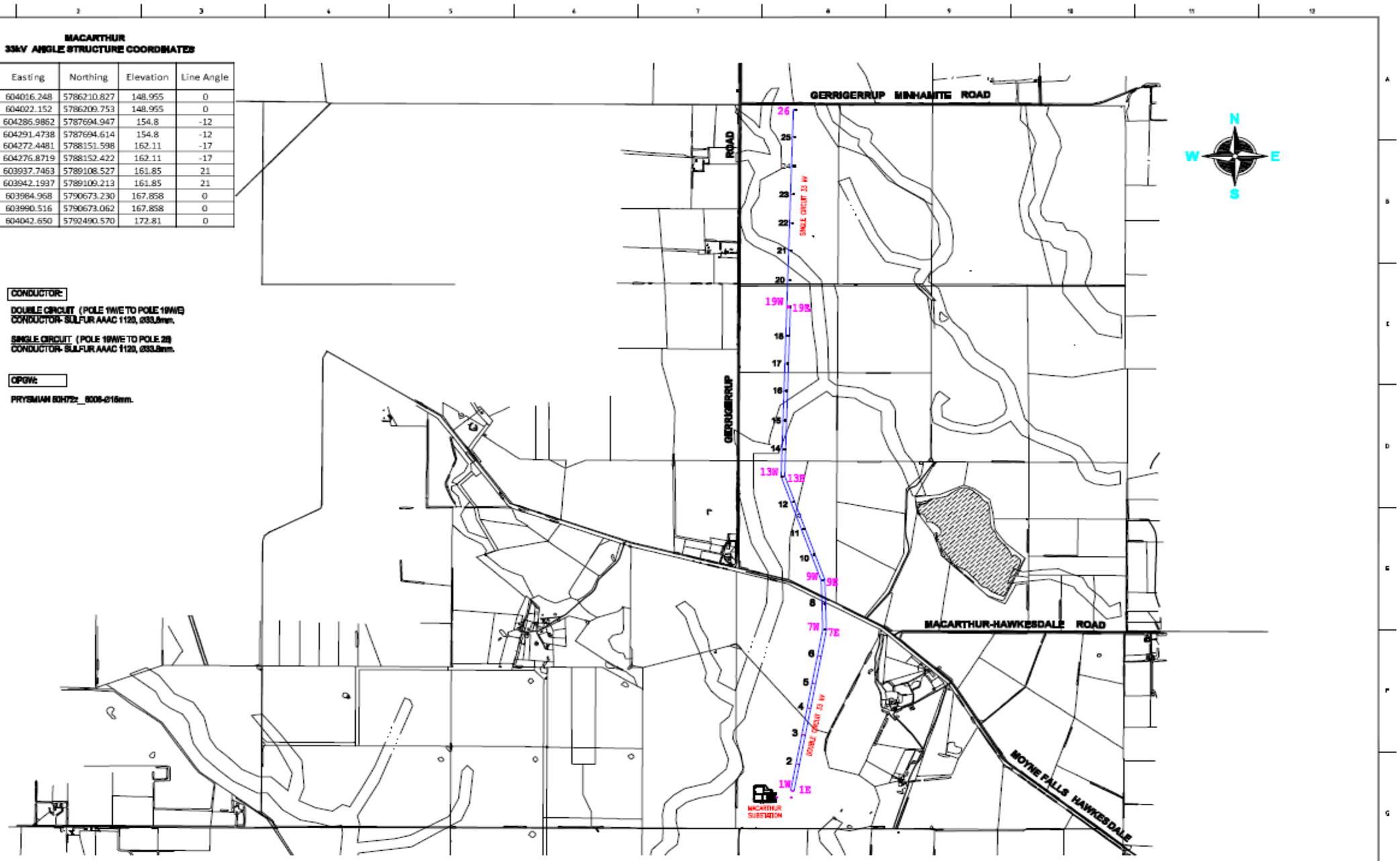
CONDUCTOR:

DOUBLE CIRCUIT (POLE 1W/E TO POLE 19W/E)
CONDUCTOR- SULFUR AAAC 1120, Ø33.8mm.

SINGLE CIRCUIT (POLE 19W/E TO POLE 26)
CONDUCTOR- SULFUR AAAC 1120, Ø33.8mm.

OPGW:

PRYSMIAN 80H72z_8006-Ø16mm.



Rev	Amendments	By	Appr	Date
C-02	CONDUCTOR INFORMATION ADDED	NB	RL	12.06.2012
C-01	ISSUED FOR CONSTRUCTION	NB	BMC	23.06.2011
B-01	ISSUED FOR 80% REVIEW	NB	BMC	04.05.2011

Consultant: CONSOLIDATED POWER PROJECTS AUSTRALIA Pty Ltd

Vestas MACARTHUR WIND FARM

Leighton Contractors Pty Limited
5 Dexam Road
Hallam Victoria 3803
Australia
Telephone (03) 9220 7700
Facsimile (03) 9220 7800

Designer	BMC/PW	
Drafter	NB	
Drawing Check	RL	
Team Leader	DD	
Proof Engineer		
LCPL Des. Manager		

MACARTHUR WIND FARM
MACARTHUR 33kV TRANSMISSION LINE
LINE ROUTE

Scale: NTS
Client: AGL MERIDIAN
Drawing No.: D4159-TRA-CPP-T-D-0020
Rev No.: C-02

14.3. Location Map – 132 kV Transmission Line – Line route

TARRONE-MACARTHUR
132kV DOUBLE CIRCUIT ANGLE and TWIN/SINGLE STRUCTURE COORDINATES

Structure No	Easting	Northing	Elevation	Line Angle	Pole Type	Conductor Configuration
Gantry	603100.54	5773673.31	78.99	0		
2W	603098.62	5773773.35	81.70	-90	Steel	Twin
2E	603102.52	5773777.23	81.70	-90		
5W	602705.38	5773775.21	78.66	90	Steel	Twin
5E	602709.28	5773779.09	78.66	90		
23W	602726.65	5778200.54	101.37	-35	Steel	Twin
23E	602731.89	5778202.20	101.37	-35		
25W	602589.21	5778396.70	102.74	32	Steel	Twin
25E	602594.41	5778398.50	102.74	32		
26W	602579.69	5778582.53	104.43	0	Steel	Twin/Single
26E	602585.18	5778582.81	104.43	0		
30	602531.39	5779590.04	110.99	12	Concrete	Single
36	602729.70	5780772.42	117.72	-9	Concrete	Single
39	602731.79	5781385.26	120.33	-14	Concrete	Single
41	602618.19	5781852.65	133.94	33	Concrete	Single
45	602924.47	5782716.48	129.04	-19	Concrete	Single
52W	602934.65	5784498.40	136.65	45	Steel	Single
52E	602939.72	5784496.27	136.65	45		
52aW	602999.60	5784563.01	138.31	0	Steel	Single/Twin
52aE	603003.47	5784559.10	138.31	0		
58W	603875.88	5785430.56	149.46	-35	Steel	Twin
58E	603880.74	5785428.00	149.46	-35		
61W	604005.67	5786145.73	148.91	-100	Steel	Twin
61E	604009.89	5786149.25	148.91	-100		
Gantry	603827.10	5786147.49	148.93	0		

132kV DOUBLE CIRCUIT

CONDUCTOR:

TWIN CONDUCTOR (POLE 1 TO POLE 26 W/E)
CONDUCTOR- SULFUR AAAC 1120, Ø33.8mm.

SINGLE CONDUCTOR (POLE 26W/E TO POLE 52 a W/E)
CONDUCTOR- SULFUR AAAC 1120, Ø33.8mm.

TWIN CONDUCTOR (POLE 52 a W/E TO POLE 63)
CONDUCTOR- SULFUR AAAC 1120, Ø33.8mm.

OPGW:

PRYSMIAN 60H72z_ 6006-Ø16mm.

132kV SINGLE CIRCUIT (TARRONE SUBSTATION)

CONDUCTOR:

TRIPLE CONDUCTOR
CONDUCTOR- SULFUR AAAC 1120, Ø33.8mm.

OPGW:

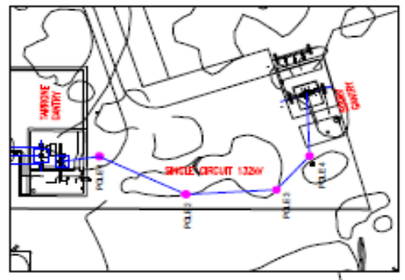
PRYSMIAN 60H72z_ 6006-Ø16mm.

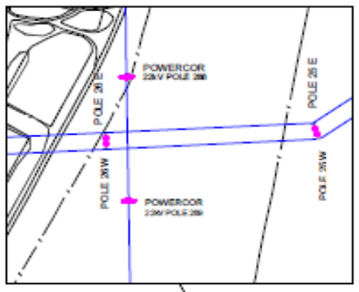
EARTH WIRE:

GRAPE 30/7/2.50

TARRONE
132kV SINGLE CIRCUIT STRUCTURE COORDINATES

Structure No	Easting	Northing	Elevation	Line Angle	Pole Type	Conductor Configuration
1	603100.24	5773622.32	77.66	34	Steel	Triple
2	603063.78	5773545.90	76.62	-29	Steel	Triple
3	603068.15	5773466.23	77.12	-45	Steel	Triple
4	603100.62	5773437.03	78.19	-44	Steel	Triple





Consultant: CONSOLIDATED POWER PROJECTS AUSTRALIA Pty Ltd

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Vestas MACARTHUR WIND FARM

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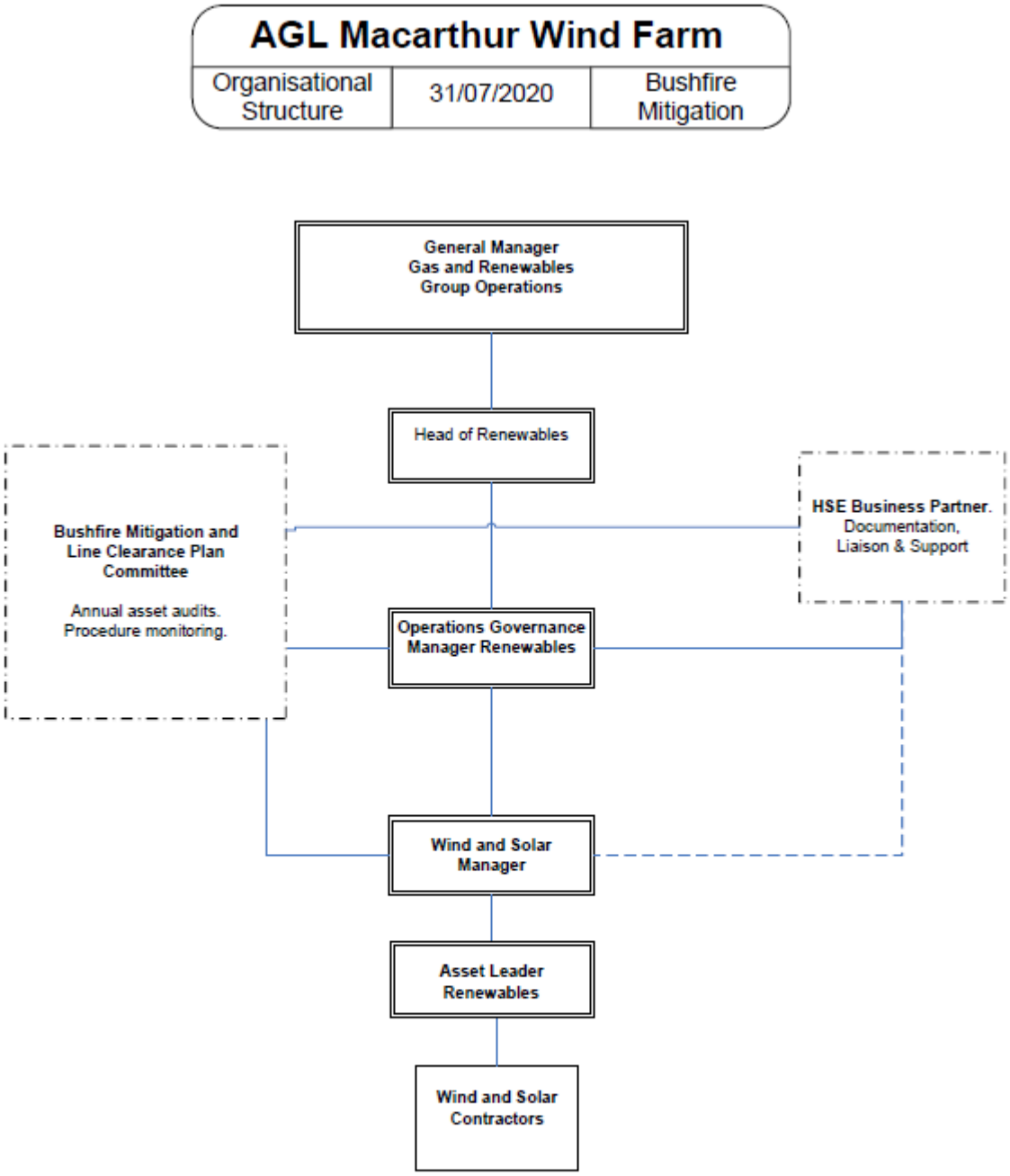
Rev	Amendments	By	Appr	Date
C-12	DWG UPDATED TO INCLUDE CONCRETE POLE DESIGN	MB	PW	13.06.2012
C-11	ISSUED FOR CONSTRUCTION	MB	BMC	01.06.2011
B-11	ISSUED FOR RISK REVIEW	MB	BMC	04.05.2011

		BMC/PW
Designer		MB
Drafter		RL
Drawing Check		DD
Team Leader		
Proof Engineer		
LCPL Des. Manager		

MACARTHUR WIND FARM
MACARTHUR 132kV TRANSMISSION LINE
LINE ROUTE

Scale: NTS
Client: AGL MERIDIAN
Drawing No.: D4159-TRB-CPP-T-D-0020
Rev No.: C-02

14.4. Reporting Organisational Structure



14.5. Fire Report Form

FIRE REPORT FORM

Date:	Time:	Reporting Officer:

Significant fire, ie: injury or death or damage to stock or property which includes tress, pasture and fencing, details should be immediately phoned to the Manager of Renewables, Hydro Manager and Renewable Operations Manager.

Incident Details:	
Date and Time of Fire:	
Fire Source and Locality:	
Pole Number:	
Asset Number:	
Map Reference:	

Environmental Details:	
Weather at time of Fire:	
Consequences of Fire: (list damage)	
Injury or Death:	
Area of Fire:	
Day of Total Fire Ban:	
Temperature:	
Wind Direction:	
Wind Speed (Kph):	
Humidity (%):	

Pole Information:			
Pole Number:		Pole Location:	
Nearest Asset:		Line Number:	
Last Inspection Date:			
Pole Material:	Wood: Yes / No	Steel: Yes / No	Concrete: Yes / No
Cross-arm Material:	Wood: Yes / No	Steel: Yes / No	Concrete: Yes / No
Conductor Material:	SC: Yes / No	AAC: Yes / No	ACSR: Yes / No
	CU: Yes / No		

FIRE REPORT FORM

Voltage and Current Information:		
Fault Type:	**Three Phase:** Yes / No	**Phase to Ground:** Yes / No
Voltage (KV):		
Fault Current (A):		

Contributing Factors:					
Assets	**Tick**	**Assets**	**Tick**	**Assets**	**Tick**
Conductor		Joint Failure		"D" burn Through	
Clashing		Conductor Failure		Fuse	
Tie Failure		Bridging		EDO operation	
EDO Hang up		BA Failure		Low Voltage	
PFF failure		Transform Failure		Switch Failure	
Insulator	**Tick**	**Surge Diverter**	**Tick**	**Cross-Arm**	**Tick**
Mechanical Failure		Earth Leads		Fire	
Electrical Failure		End Cap		Broken Cross-arm	
Pollution		Surge Diverter failure		Termites	
Salt				Age rot	
Other				Other	
Fauna	**Tick**	**Lightning**	**Tick**	**Miscellaneous**	**Tick**
Intermediate		Fuse Separation		Service Failure	
Structure		Transformer Fail		U/G Asset Failure	
Complex Structure		Pole Failure		Overload	
Substation Pole		Miscellaneous		Earthing Failure	
Mid Span/Bird/Animal		Vehicle		PEL Failure	
Zone Sub Feeder	**Tick**	**ACR's**	**Tick**	**Fuses**	**Tick**
Feeder CB tripped		ACR Tripped		Fuses Operated	
CB Tripped to lockout		ARC Tripped lockout		No of Fuses Operated.	
Auto Reclose Suppressed		Auto Reclose Suppressed		Fuse Type PFF	
No of trips		Miscellaneous		Fuse Type EDO	
Mid Span/Bird/Animal		Vehicle		Fuse Type Acid Boric	
Protection Operation		Protection Operation		Protection Operation	
Other:		Other:		Other:	
Other:		Other:		Other:	

FIRE REPORT FORM

Additional Information	
Comments	Property Owners

Signed: ..... Date : .....

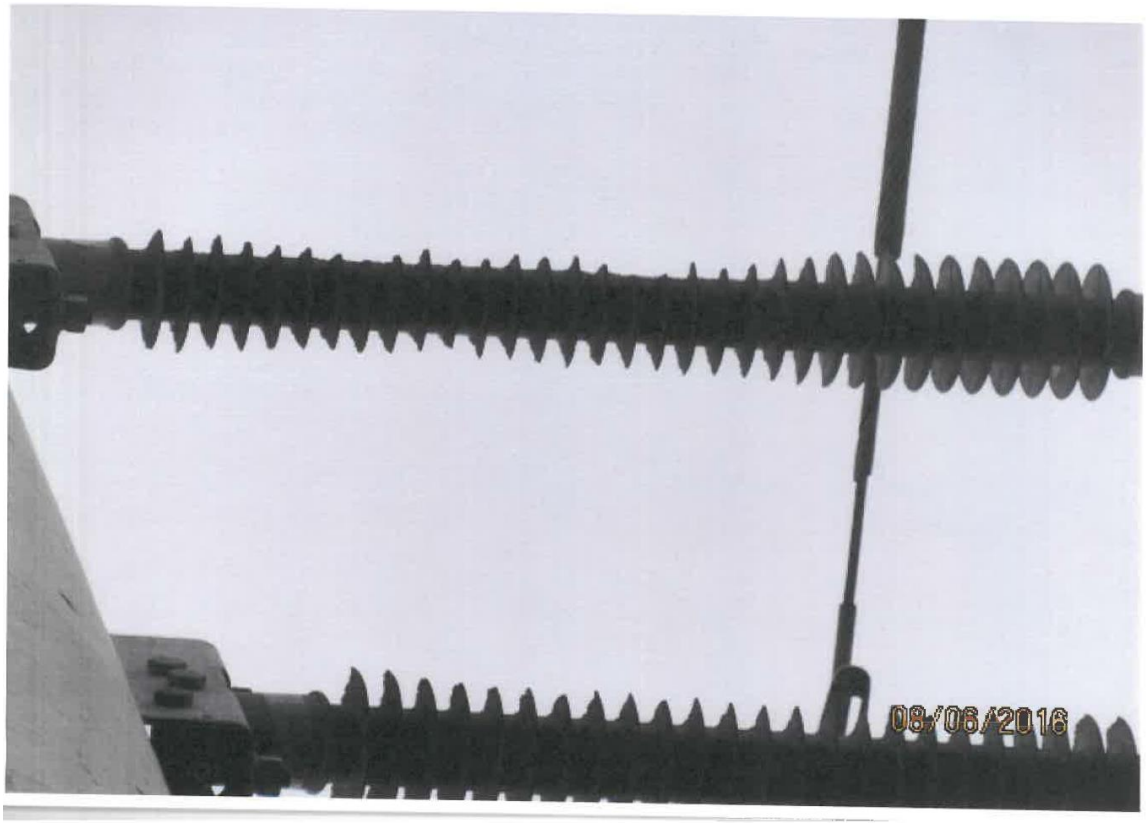
(AGL Responsible Officer)

Signed: ..... Date: .....

(Operations Manager)

14.6. Engineered Solutions

Since the initial construction of Macarthur wind farm in 2013, the only engineered solution relating to bushfire mitigation and overhead lines and easements has been the replacement of 132kV polymer line insulators damaged by fauna. An engineering design was completed on all 140 line insulators resulting in 18 insulators being replaced in 2016, and a further 27 insulators being replaced in 2019.



14.7. Emergency Response Plan

The ‘Emergency Response Plan’ (ERP) is designed to provide guidance on how to manage the occurrence of specific emergencies that may occur including Bushfire, and is supported through training and undertaking of drills and exercises with local Emergency Services to ensure all parties are suitably skilled and ensure the ongoing review and improvement of the plans content.

ASP-PACIFIC-HB-0141
- Emergency Respons

14.8. Works and Verification Schedule

The following images are extracts from the Macarthur overhead line routine works and verification inspection schedule.

132kV TRSS to MWSS overhead line inspection

Vestas

Displayed: *Fri Feb 1, 2019 @ 8:00 AM*

Deadline: *Mon Mar 4, 2019 @ 8:00 AM*

Completed: *Thu Feb 28, 2019 @ 11:22 AM*

- Vestas Australia

Item Prompt	Item Result	Completed By	Completed On
Check MWF 1 Tower structure	10 of 10	Hemi Prasad	2/20/20, 7:17 AM
Check MWF 1 Jumper Connectors	10 of 10	Hemi Prasad	2/20/19, 7:17 AM
Check MWF 1 Conductor	10 of 10	Hemi Prasad	2/20/19, 7:17 AM
Check MWF 1 Foundation	10 of 10	Hemi Prasad	2/20/19, 7:17 AM
Check MWF 1 Vibration Dampers	10 of 10	Hemi Prasad	2/20/19, 7:17 AM
Check MWF 1 Hardware	10 of 10	Hemi Prasad	2/20/19, 7:17 AM
Check MWF 1 Post Insulator	10 of 10	Hemi Prasad	2/20/19, 7:17 AM
Check MWF 1 Insulator	10 of 10	Hemi Prasad	2/20/19, 7:17 AM
Check MWF 1 Earth Bond Pole top	10 of 10	Hemi Prasad	2/20/19, 7:18 AM

Check MWF 1 Earth Bond Pole Bottom	10 of 10	Hemi Prasad	2/20/19, 7:18 AM
Check MWF 1 Duplex conductor spacer	10 of 10	Hemi Prasad	2/20/19, 7:18 AM
Check MWF 1 Earth Wire Conductor	10 of 10	Hemi Prasad	2/20/19, 7:18 AM
Check MWF 1 Line Sag	10 of 10	Hemi Prasad	2/20/19, 7:18 AM
Check MWF 1 Trees	10 of 10	Hemi Prasad	2/20/19, 7:18 AM
Check MWF 1 Road Crossing	10 of 10	Hemi Prasad	2/20/19, 7:18 AM
Check MWF 1 I D Tag	10 of 10	Hemi Prasad	2/20/19, 7:18 AM
Check MWF 1 Danger Tag	10 of 10	Hemi Prasad	2/20/19, 7:18 AM
Check MWF 1 Fenced	10 of 10	Hemi Prasad	2/20/19, 7:18 AM

15. Referenced Documents / Procedures

Document Number	Document Title
AP MO AD 032	Controlled Document Update Procedure
AQ AG PE 02	Personal Details Update
CF MO AD 01	Maintenance Notification - Corrective Action Request
HI AL SF 02	Emergency Management Plan
HP AL AD 01	Consultation, communication, and dispute resolution
HP AL SF 08	Contractors - Selection, Pre-Qualifcation and Management
HQ AL SF 09	Use of Personal Protective Equipment (PPE)
HP AL SF 11	Excavations Earthworks and Intrusion
HQ AL SF 01	AGL Electrical Safety Policy
ML AL FI 02	Bushfire Mitigation Plan
ML AL FI 03	Line Clearance Plan
SP AL PE 02	AGL HSE Induction and Authorisation
SP AL SA 50	AGL Safe Access Procedures
AGL-HSE-SDM-004.1	HSE Risk Management Methodology
AGL-HSE-PRO-012.1	HSE Incident, Near Miss and Hazard Management Procedure
Vestas High Voltage Electricity Safety Procedures	
Vestas Lockout Tagout and Permit to Work Procedures	
Vestas Electricity Safety Management Scheme	
Vestas HSE Induction and Authorisation Procedures	