Jemena Asset Management Pty Ltd

Options Analysis

Auburn PRS- Facilities Obsolescence

GAS-1460-RP-FA-001

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1. Executive Summary

1.1 Project and Key Drivers

This document provides options for the refurbishment of the Auburn Primary Regulating Station (**PRS**) and associated Automatic Line Break Valve **(ALBV).** Identifying the prudent option to address the obsolescence of crucial equipment in the Auburn PRS will mitigate key operational and safety issues, ensuring compliance with regulatory obligations are met and optimises long-run operational costs.

Auburn PRS is a high-pressure gas facility owned and operated by the Jemena Gas Network (JGN). It is located on Everley Street, a cul-de-sac street in a local business area, Auburn, NSW. The function of this facility is to reduce the pressure of natural gas received from the Sydney Primary Main (MAOP 3,500kPag) and distribute it to the surrounding secondary networks (MAOP 1,050kPag). Auburn PRS supplies to approximately 80,000 customers in the Auburn area, being a critical high pressure facility of the JGN.

This document provides options for addressing the obsolescence issues at Auburn PRS, identifying the most prudent option to address the key issues required to maintain facility operations and ensure compliance with regulatory obligations.

The key problem statement associated with the Auburn PRS facility is the obsolescence of pressure control configuration:

- The assets associated with pneumatic pressure control at Auburn PRS are obsolete and are operating well beyond their design lives making it challenging to find spare parts and perform maintenance. The pressure control valve regulators have been in operation for 49 years and have had their lives extended through periodic refurbishment (machining to specification) to ensure valves operate in accordance with functional specifications. These valves can no longer be machined back into specification as the valves will no longer hold gas and will functionally fail.

In conjunction with the above problem statement, is the opportunity to address further issues and risks associated with the facility, those being:

- Safety - Operating a pneumatic control valve with instrument natural gas as power supply creates a safety risk in the operation of the facility.

- Compliance – Auburn high-pressure facility was installed and commissioned 49 years ago, and adhered to the standards at the time of installation. Current Australian Standards, Regulations and Acts, in particular, with regard to electrical equipment in hazardous areas and electrical earthing have evolved. The current configuration of the station does not align with respect to these evolved standards. This has implications for personnel safety by not addressing these risks.

- Integrity and Reliability – a significant portion of the E&I equipment and its systems at Auburn PRS facility are past their design life, obsolete and difficult to maintain. This includes the instrumentations, remote telemetry units, communication equipment, panels, wiring and distribution boards.

Three options have been assessed in this document to address the issues and risks thus ensuring the most effective solution is selected to maintain safe operation, compliance and reliability of the asset. Without an adequate solution, there is an untreated risk rating of “HIGH”, which is above Jemena’s risk threshold in accordance with the Group Risk Management Manual[1],.

[1] JAA MA 0050 Group Risk Management Manual Risk - Group RM Manual JAA MA0050.pdf

1.2 Credible Options and Recommendations

The credible options and associated estimated costs for this project are presented below.

Table 1-1: Option for the Project

Option	Option Name	Description	CAPEX ($000's, Real 2023)
1	Maintain Status Quo	No mechanical or E&I equipment is replaced, as a result all risks continue to increase.	$0.00M
2	Replace Like for Like	Replace pneumatic control valves, instrument gas power system, earthing and E&I equipment maintaining Like-for-like configuration.	$5.97M
3	Simplify facility operating configuration	This option simplifies and modernises facility operation by replacing the existing pneumatic control valves with Gorter-type slam-shut valves and regulators. All electrical and instrumentation systems, wiring, earthing, and all associated systems are replaced bringing the facility to international industry convention.	$5.35M

Option 3 is the recommended option.

- This option addresses the key problem statement of obsolescence and delivers additional opportunities for improvement, by simplifying the facility operating configuration. Removing the pneumatic control valves and bringing E&I equipment to current-day standards, addresses the integrity, reliability, safety and compliance secondary drivers of this project.

The estimated Gate 1 cost of undertaking the works identified in Option 3 is $5.35M and is planned for practical delivery in CY32. There can be slight variations of the options, but these will be addressed following the project management methodology lifecycle through the next Gates.

2. Introduction

2.1 Purpose

The purpose of this document is to describe credible options and identify the prudent option to address obsolescence issues at the Auburn high pressure facility.

2.2 Objectives

The objectives of this investment are to:

(i) Remove obsolete assets associated with pneumatic pressure control.

(ii) Maintain the safe operation of the high pressure facility.

(iii) Maintain technical compliance of the facility E&I and earthing systems to Standards, Codes and Regulations

(iv) Maintain the integrity and reliability of the high pressure facility equipment.

(v) Align to international industry convention for high pressure facilities, as stated in the Asset Class Strategy, to optimise maintenance and other operational activities.

(vi) Prudent expenditure of TOTEX.

3. Project Description

3.1 Project Background

Auburn PRS, commissioned in 1975, is a high pressure gas facility owned and operated by JGN. It is located on Everley Road, a cul-de-sac street in a local business area, Auburn, NSW(see Figure 1). The site is bordered by Everley Road and Everley Park with a pedestrian walkway. The function of the PRS is to reduce the pressure of natural gas received from the Sydney Primary Main (MAOP 3,500kPag) and distribute it to surrounding secondary networks (MAOP 1,050kPag). Auburn PRS supplies approximately 80,000 customers.

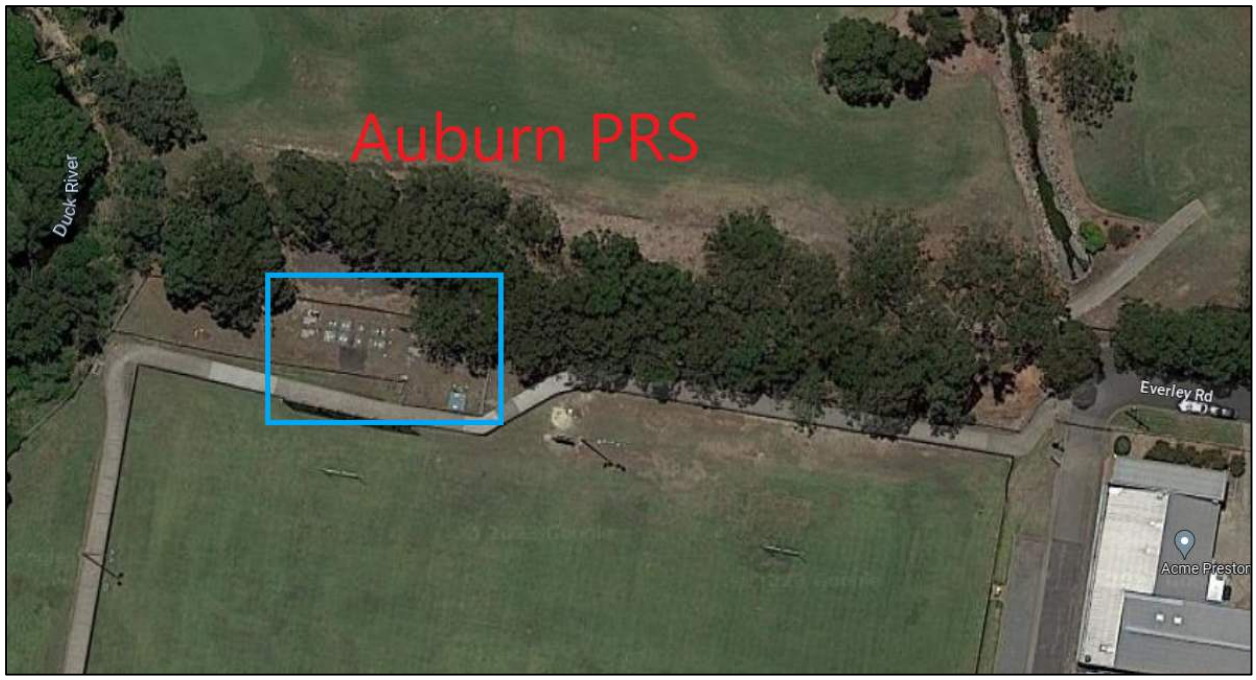

Figure 3-1: Auburn PRS Site Location

Auburn PRS is fitted with two operating runs, a duty and standby. The equipment configuration in each operating run is Meter – Passive Monitor – Active control valves. Power Gas is taken from the downstream side of each run. Safety override and shutdown sequence are as follows:

- Active fail – Pressure rise to monitor setting – Monitor override takes over
- Monitor fail – Pressure rise to **PSH (Pressure Switch High)** setting – Shut Active valve
- Further pressure rise to **PSHH (Pressure Switch High High)** – Shut Monitor valve

Jemena Asset Management has identified Auburn PRS a high-pressure facility that requires obsolescence of crucial equipment to be addressed.

3.2 Principal Needs

The key problem statement associated with the Auburn PRS facility is obsolescence of the instrument air/gas power system and the inability to further maintain the pressure control valves, crucial equipment that allows the facility to regulate the gas pressure to the downstream network. As a result, JGN's ability to maintain facility operation is at risk.

3.2.1 Pressure control functionality

The pressure control valves at Auburn PRS were installed in 1975 and are obsolete, operating well beyond their design lives making it challenging to find spare parts and perform maintenance. Over their 49 years of operation, these pressure control valve regulators have had their lives extended through periodic refurbishment (machining to specification) to ensure valves operate in accordance with functional specifications.

The pressure control valves can no longer be machined back into specification, and thus the valves will functionally fail, as they will not be able to regulate the pressure within the required limits.

3.3 Secondary Considerations

In addition to the above there is a requirement to address further issues and risks associated with the facility, those being:

3.3.1 Integrity

A significant portion of the E&I equipment and systems at Auburn PRS facility are past their design life and are also obsolete. This includes the instrumentations, remote telemetry units, communication systems, panels, wiring, distribution boards and system earthing.

3.3.2 Compliance & Safety

Australian Standards, Regulations and Acts, have evolved since the facility was commissioned. Specifically, Australian Standards for Hazardous Areas (**HZ**) - AS60079:2022 and the Electrical wiring rules - AS3000:2018. While the current configuration of the facility is compliant to the standard that was applicable at the time it was built, the replacement control valves project will require adherence to the current editions of standards to maintain compliance. This has implications for personnel safety:

- Current electrical switch boards do not have a Residual Current Device (**RCD**) to switch off the supply of electricity immediately when electricity is leaking to earth, which potentially could harm personnel.

- The earthing systems installed on-site pose a safety risk to personnel and equipment. For example, the ALBV has no Insulating Joint (**IJ**) between the pipe and valve, therefore, to achieve Cathodic Protection (**CP**), the earthing has been removed. To date, administrative controls are being relied upon to prevent technicians from being exposed the safety risk of an electric shock.

3.4 Assumptions

Assumptions that apply to this project are outlined in Table 3-1. All assumptions where possible are to be verified before proceeding with the works described in this options analysis.

Table 3-1: Assumptions and Implications

No.	Description	Implication	Criticality
1	The Auburn PRS Facility does not require shutdown for any period to perform the works.	If the recommendation is to shut down Auburn PRS to enable this project, this would cause a constraint in the supply of gas to the downstream secondary networks and would require an alternative implementation strategy potentially incurring in additional costs.	High
2	The capital program has funds available for the scope of this project's preferred option.	If there is not sufficient funds for this project, the status quo facility operating configuration and its associated risks will remain in the business.	High
3	The Project will utilise competent resources.	The availability of competent resources would impact the project timeline, and/or cost to acquire competent resources.	High
4	All estimated costs including Opex and Capex are at the desktop level using historical costs with other similar projects as the basis.	Costs can vary depending on the detailed scope of works, resourcing, and contractor costs until financial investment decision costs are available.	Medium

4. Credible Options

The following options were identified:

- Option 1: Maintain Status Quo
- Option 2: Replace Like for Like
- Option 3: Simplify facility operating configuration

All options are explained in detail below.

4.1 Option 1: Maintain Status Quo

4.1.1 Scope

Retains the 49 year old operating configuration. No mechanical or E&I equipment are replaced, and as a result all risks continue to increase.

4.1.2 Benefits

This option incurs no additional CAPEX.

4.1.3 Limitations

This option does not address any of the project drivers:

- Control valve obsolescence poses facility performance and reliability issues, and inhibits maintenance.
- Continued degradation of earthing poses worker safety risk as electrical system faults will not be diverted to ground.
- Use of natural gas as power system to control valves is dated technology that was available at the time of station construction. It results in continuous emissions of methane to atmosphere, which in turn increases the risk of ignition. The system is an archaic design and is no longer keeping in line with Jemena's emissions reduction strategy.
- E&I equipment obsolescence increasing maintenance difficulty.
- Long-run operating costs will increase through escalating corrective maintenance.

4.1.4 Summary

No mechanical or E&I equipment is replaced, as a result all risks continue to increase. A number of critical systems are outdated and no longer readily available in the market, either as OEM (Original Equipment Manufacturer) parts or generic alternatives. Given the difficulty to source replacement parts, it is becoming increasingly challenging to maintain the facility's integrity and reliability.

The overall risk rating will remain at "**HIGH"**.

4.2 Option 2: Replace Like for Like

4.2.1 Scope

This option replaces the pneumatic control valves, instrument air/gas power system, earthing and E&I equipment maintaining the like for like configuration.

The mechanical scope includes the following:

- On each run,
    - Remove the two control valves and all piping components.
    - Replace the two control valves with like for like equipment.
    - Remove the instrument air/gas power system.
    - Replace the instrument air/that is gas power system with like for like equipment.

All E&I equipment are replaced to meet current standards and specifications, including:

- Electrical & Control Cabinets.
- Remote telemetry unit and communication systems.
- Process Instrumentation equipment.
- Electrical Cables and accessories.
- AC & DC systems.
- Replace the earthing system.
- Relevant Facility Dossier and documentation recreated accordingly.
- Replace the instrument gas power system with the same type with 100% duty cycle.
- Replace equipment associated with instrument gas system such as dryer/filters, conditioning system etc.

4.2.2 Benefits

This option addresses all of the project drivers:

- Addresses facility obsolescence and maintains functional operability.
- Employs engineering controls to manage the threat to personnel and public safety as opposed to administrative controls.
- Maintain technical compliance of the facility to the evolved Standards, Codes and Regulations including AS60079:2022, and AS3000:2018 thus compliant with the Electricity (Consumer Safety) Act 2004 and the Electricity (Consumer Safety) Regulation 2006.

- All E&I defects and obsolescence will be mitigated, with no escalation in OPEX to maintain an acceptable risk level.

4.2.3 Limitations

The limitations of this option are:

- Maintains current facility complexity with the existing design and operating configuration.
- Retains current maintenance schedule and costs associated with operating configuration.
- Highest upfront capital cost option.
- Does not align to the current strategic design objectives in simplifying the operation of the facility.

4.2.4 Summary

Although this option addresses most of the project drivers, it is not preferred as facility operations will continue to be complex, whilst being compliant and safe. This option will require the most capital as compared to the other options.

This option reduces the overall risk rating from **HIGH to MODERATE.**

4.3 Option 3 Simplify facility operating configuration

4.3.1 Scope

This option simplifies and modernises facility operation by replacing the existing pneumatic control valves with ‘Gorter’ type slam shut valves and regulators and replaces all electrical and instrumentation systems, including earthing, bringing the facility to international industry convention.

The mechanical scope includes the following:

- On each run,
    - Remove the two control valves and all piping components.
    - Remove all control systems and equipment associated with the control valves, including the instrument air/gas system.
    - Install two Gorter type slam shut valves and a Gorter-type regulator. New pipe spools will be sized accordingly. Sizes of the slam-shut valves, regulator and pipe spools will be determined during detailed design.
    - If existing pipe support is unsuitable for the new installations, new pipe supports will be designed and installed.

The E&I scope includes the following:

- Design and Rebuild A/C and D/C distribution systems.
- Design and Rebuild the whole earthing system.

- Design and rebuild new electrical and control cabinets as per AS3000:2018 and AS60079:2022.
- Replace all remote telemetry units and communication systems.
- Design and build a new Hazardous Area dossier according to the new design.
- All design and build will be in compliance with AS3000:2018 and AS60079:2022.

4.3.2 Benefits

This option addresses all the project drivers:

- Removal of the existing control valves will address pressure control equipment's obsolescence and reduce future non-compliance exposure due to limited E&I equipment.
- Addresses facility obsolescence and maintains functional operability.
- Employs engineering controls to manage the threat to personnel and public safety as opposed to administrative controls
- Maintain technical compliance of the facility to the evolved Standards, Codes and Regulations including AS60079, and AS3000 thus compliant with the Electricity (Consumer Safety) Act 2004 and the Electricity (Consumer Safety) Regulation 2006.
- All E&I defects and obsolescence risks will be mitigated, with no escalation in OPEX to maintain an acceptable risk level.
- The System Used Gas (**SUG**) and gas emissions are reduced by removing the equipment (pneumatically activated controllers and control valves) that continuously vent to the atmosphere as part of its normal operation.
- Meeting all the project objectives and streamlining the facility's operations will elevate it to the current international industry convention. By eliminating the instrument power gas system, this approach significantly simplifies facility management and reduces methane emissions, thereby enhancing safety, optimising long-run operational expenses (OPEX) and improving environment performance in line with Jemena's strategy to meet our emission reduction targets.

4.3.3 Limitations

The limitation of this option is that it also requires material CAPEX investment, although less than Option 2.

4.3.4 Summary

This option will address all project drivers including facility function operation requirements, hazardous area and electrical safety concerns. It also optimises the operation of the facility and maintains the long-run OPEX.

This option reduces the overall risk rating from **HIGH to MODERATE.**

4.4 Comparison of Options

Table 4-1: Options Summary Table

Criteria	Option 1	Option 2	Option 3
Option	Maintain Status Quo	Replace Like for Like	Simplify facility operating configuration
Description	No mechanical or E&I equipment is replaced, as a result all risks continue to increase.	Replace pneumatic control valves, instrument gas power system, earthing and E&I equipment maintaining like for like configuration.	This option simplifies and modernises facility operation by replacing the existing pneumatic control valves with Gorter type slam shut valves and regulators. And replaces all electrical and Instrumentation systems, including Earthing, bringing the facility to JGN standards.
Benefits	Nil CAPEX	• Maintain the safe operation of the high pressure facility. • Maintain the reliability of the high pressure facility. • Maintain technical compliance of the facility to Standards, Codes and Regulations • Maintain ongoing OPEX at historical levels.	• Maintain the safe operation of the high pressure facility. • Maintain the reliability of the high pressure facility. • Maintain technical compliance of the facility to Standards, Codes and Regulations • Align to international industry convention for high pressure facilities to optimise maintenance and other operational activities. • Pneumatic control system removed, reduced complexity. • Maintain ongoing OPEX at historical levels. • Aligns with emissions reduction strategy.
Limitations	• Control valves obsolescence poses facility performance and reliability issues, and inhibits maintenance. • Personnel safety risks maintain with use of natural gas as power system to control valves. • E&I equipment obsolescence increasing maintenance difficulty. • Escalating OPEX • Personnel safety risks remain.	• Maintains current facility complexity with the existing design and operating philosophy. • Retains current maintenance schedule and costs associated with operating philosophy and unavailability of spare parts. • Misalignment with international industry convention for high pressure facilities. • Highest CAPEX	• High CAPEX investment, although less than Option 2.
Treated Risk Rating	HIGH	MODERATE	MODERATE
CAPEX Cost Estimate[2]	$0	$5.97M	$5.35M
OPEX Estimate[3]	Escalating to $142k per year average OPEX	$105k per year OPEX	$96k per year OPEX
TOTEX Estimate (per 10 years)	$1.42M	$7.02M	$6.31M
Recommended Order of Preference	3 Unacceptable (Risk remains high, ongoing safety & reliability issues)	2 Not Recommended	**1** **Recommended/Preferred Option**

2 Gate 1 PEM Estimate for both options. Instrument air/gas power system replacement estimate taken from the Horsley Park project.

3 Actual Opex estimate for the Auburn facility for the year RY23.

5. Recommendation

5.1 Recommended Solution

The recommended solution is Option 3 – Simplify facility operating configuration at a current CAPEX cost of $5.35M at Gate 1.

This option targets all the objectives of the project, primarily through simplifying the facility design and operation by replacing the control valves with Gorter type regulators and removing associated obsolete and redundant equipment including most of the E&I equipment and earthing system.

Practical completion of this project is targeted for CY32.

5.2 Overall Benefits of Option 3

This option addresses all the project drivers:

- Removal of the existing control valves will address the obsolescence of pressure control equipment.
- Simplification of the configuration minimises E&I equipment and complexity of the facility.
- This option will eliminate obsolete equipment like instrument air/gas compressor power system, thereby reducing long-run OPEX costs through reduction in maintaining such equipment.
- Reduces complexity to ensure the facility remains compliant with the *Electricity (Consumer Safety) Act 2004* and the *Electricity (Consumer Safety) Regulation 2006.*

This option reduces the overall risk rating from **HIGH** to **MODERATE.**

5.3 Cost Breakdown

Item	Project Estimate ($M)
Labour	$0.25M
Material	$0.31M
Subcontractor	$2.48M
Risk	$0.75M
Overheads	$1.56M
Total	$5.35M

Appendix A – Reference Documents

Document number	Title
GAS-1460-DW-PD-002	AUBURN PRS RUN1 P&ID
GAS-1460-DW-PD-003	AUBURN PRS RUN2 STANDBY P&ID
GAS-1460-DW-PD-004	AUBURN PRS AIR/GAS SYSTEM P&ID
GAS-1460-DW-EL-001	24VDC SINGLE LINE DRAWING
I-PR02-7337	AUBURN PRS-1460- EQU LOCATION AND SLD

Appendix B – Risk Assessment

A risk assessment was conducted to determine the level of risk severity of the untreated risk. The table below shows the summary of results and then the treated risk summary for each option. The risk assessment was undertaken in accordance with the Group Risk Manual JAA MA 0050 Revision 10 (06/06/2023).

UNTREATED IMPACT / CONSEQUENCES						UNTREATED RISK SUMMARY		
Contributing Factors/ Scenario	Financial	Safety	Operational	Regulatory & Compliance	Comments	Consequence (Highest Impact)	Likelihood	Risk Level
• Obsolescence of pressure control configuration could lead to failure of the pressure control and potential over pressurisation downstream. • Using instrument air/gas as power supply to control valves creates a safety risk to personnel. • E&I and earthing systems obsolescence lead to personnel safety risk.	Serious	Severe	Severe	Severe	• The assets are obsolete and operating well beyond their design lives making it challenging to find spare parts and perform maintenance. • The instrument gas power system continues venting gas creating a hazardous area for personnel operating the facility. • Without an adequate solution, there are untreated risks of adequate earthing and bonding; and E&I installations. These may cause personnel concerns.	Severe	Likely	High

PREFERRED OPTION – Risk assessment summary				TREATED RISK SUMMARY		
Preferred Option/Treated risk	**Cost**	**Benefit**	**Key Mitigations**	**Consequence**	**Likelihood**	**Risk Level**
Option 3	**$ 5.35M**	• Maintain the safe operation of the high pressure facility. • Maintain the reliability of the high pressure facility. • Maintain technical compliance of the facility to Standards, Codes and Regulations. • Align to international industry convention for high pressure facilities to optimise maintenance and other operational activities.	• Mitigates over pressurisation risk to downstream of the facility. • Eliminate personnel safety risks due to earthing systems and use of instrument gas for control valve regulators. • Aligns facility configuration to international industry convention. • Maintains compliance of all Electrical and Instrumentation equipment in hazardous areas.	Severe	Rare	Moderate

Appendix C – National Gas Rules

Option 3: “Simplify facility operating configuration” has been chosen as the recommended option to fulfil the objectives of this project.

The implementation of this project complies with the new capital expenditure criteria rules 79 (1) and 79(2)(c)(i)-(iii).

The proposed solution is consistent with rule 79(1) of the National Gas Rules in the following instances:

- Prudent – Three options have been considered and the selected option reduces the overall risk associated with the obsolescence of pneumatic pressure control equipment at the facility to an acceptable level in the long term. This is consistent with what would be expected of a prudent operator.
- Efficient – The cost estimates for this project were developed from actual costs of a similar project that followed the Jemena Procurement Policy.
- Consistent with accepted industry practice – The proposed solution aligns with industry standards and it is required to maintain compliance with regulatory obligations and personnel safety.

The project is also consistent with rule 79 (2)(c), because it is necessary to:

- Maintain the safety of services (79(2)(c)(i)) by mitigating the risk level of obsolete equipment on high pressure facilities from “High” to “Moderate”
- Maintain the integrity of service (79(2)(c)(ii)) by improving the facility functionality and maintaining compliance.
- Maintain compliance with a regulatory obligation (79(2)(c)(iii)) - Jemena is required by the *Electricity (Consumer Safety) Act 2004* – Section 31 and the *Electricity (Consumer Safety) Regulation 2006*, to comply with AS/NZS3000 and AS/NZS60079.