Evoenergy

Inlet Piping Rectification - Belconnen Westfield

Options Analysis

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1. EXECUTIVE SUMMARY

1.1 KEY DRIVERS AND PROJECT SCOPE

Westfield Belconnen currently operates a 150kPa internal ring main through part of it's building. This high internal pressure was captured under the Jemena and Evoenergy risk assessment process and it was originally proposed to reduce the ring main pressure to 7kPa and replace the regulators on the internal meter sets. This proposal clashed with the Gas Service and Installation Rules (**GS&I** Rules) introduced by the Utilities Technical Regulator (**UTR**) as any modification to an internal meter set would result in relocating the meter set to an external location.

In order to come to an agreement, Jemena performed a compliance and safety assessment of the boundary regulators and all existing gas meters within Westfield Belconnen. The assessment was accompanied by a list of recommendations. Both the Utilities Technical Regulator (UTR) and Westfield now have agreed to the following changes:

1. Removing the internal secondary boundary regulator (located in the loading dock breezeway - not within an enclosure) in the original section of the building.
2. Removing all internal meter sets.
3. Installing external meter sets and an external secondary boundary regulator. Majority of the external meter sets to be installed on the rooftop.
4. Limit the pressure inside the building to 7kPa.

Based on the above discussion, the following are the principal drivers for undertaking this risk mitigation.

A. Compliance requirements from the Utilities Technical Regulator.

B. Improve the level of safety at Westfield Belconnen to personnel and the public.

1.2 CREDIBLE OPTIONS

The following options were evaluated for the Inlet Piping Rectification at Westfield Belconnen in Table 1 below:

Table 1: Options Summary

Option	Option Name	Description	CAPEX ($000's, Real 2020)
1	Maintain Status Quo	The risk to public safety and Jemena reputation will remain 'High' as per Jemena risk matrix.	NIL – Capex (Existing O & M costs[1])
2	Upgrade secondary boundary regulator (new section of shopping complex) **(Recommended Option)**	This option aims to reduce the risk to the public and satisfies the requirements of the UTR.	$622
3	Relocate secondary boundary regulator (original section of shopping complex)	This option aims to reduce the risk to the public and satisfies the requirements of the UTR.	$602

1.3 RECOMMENDATION

Option 2: Upgrade secondary boundary regulator (within the new section) is the recommended solution with a forecast cost of $622K (Real 2020). This option includes the removal of the boundary regulator in the old section and the connection of all meters within the shopping centre to the one boundary regulator. Implementing this option will achieve compliance and reduce the level of risk associated with an internal gas escape. With the implementation of this project, the overall threat of loss of supply will be reduced from 'High' to 'Low' (Refer to Appendix A Risk Assessment).

1.4 NATIONAL GAS RULES

This project conforms with The National Gas Rules (**NGR**) (r. 79) which sets out the new capital expenditure criteria:

(1) Conforming capital expenditure is capital expenditure that conforms with the following criteria:

(a) the proposed project is in accordance with accepted good industry practice, to achieve the lowest sustainable cost of providing protection to the asset and public safety;

(b) the capital expenditure is justifiable on grounds of safety as stated in following sub rule (2).

(2) Capital expenditure is justifiable as:

(a) the capital expenditure is necessary:

i. to maintain and improve the safety of services;

ii. to maintain the integrity of services;

iii. to comply with a regulatory obligation or requirement

[1] O & M cost includes the current cost of patrolling, maintenance of marker signage, and cost of ad-hoc repairs, if an incident occurs.

2. PROJECT BACKGROUND AND KEY DRIVERS

2.1 PROJECT BACKGROUND

The Westfield Belconnen Shopping Centre, located Benjamin Way, Belconnen ACT, houses approximately 270 specialty stores.

The centre has been developed in two stages. The first stage, constructed in 1978, is referred to in this document as the original section. The second stage, constructed in 2011, is referred to as the new section (Refer Figure 1).

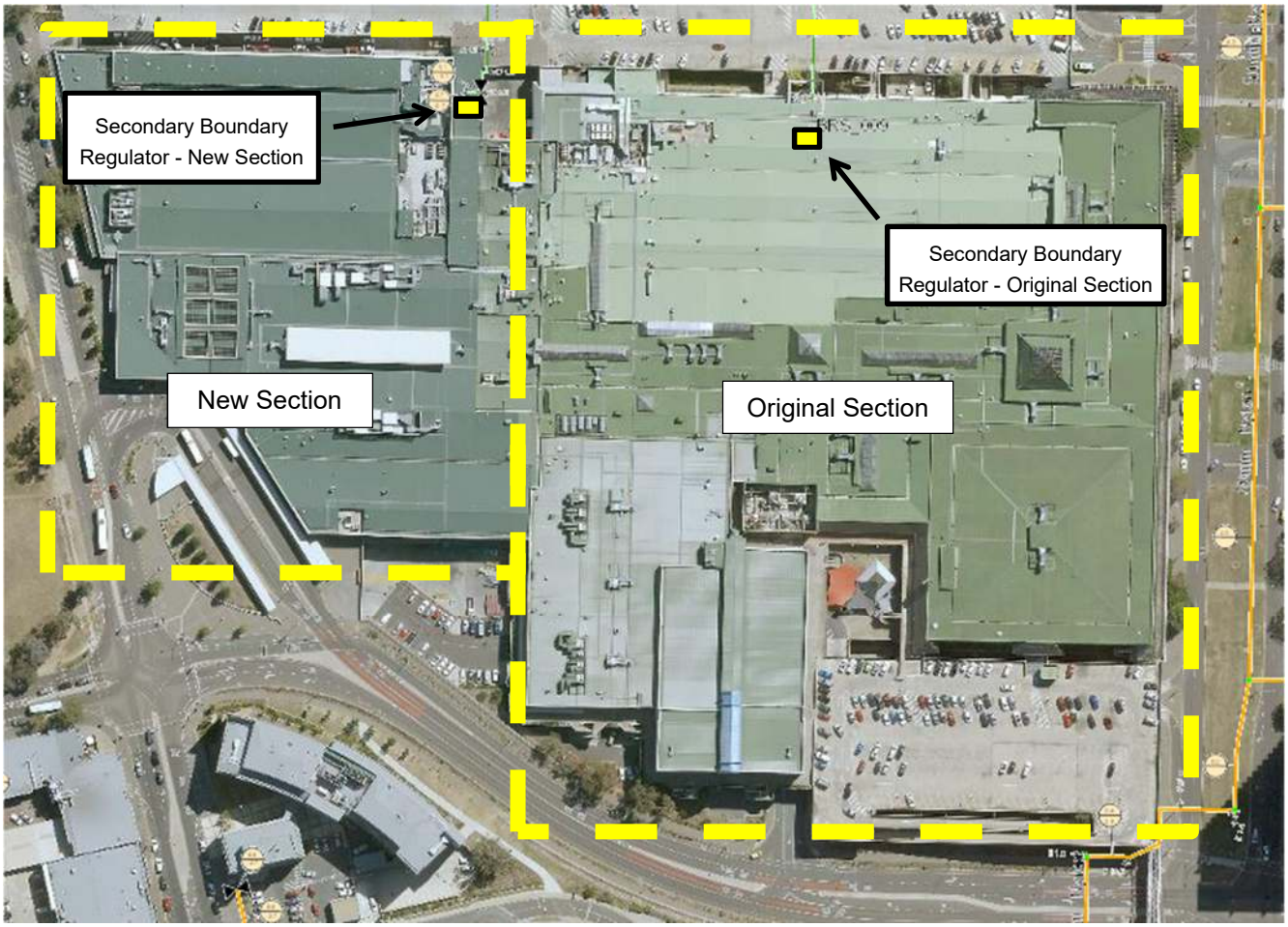
Each section has a separate source of gas supply, through a dedicated boundary regulator:

1. Original section - Gas is supplied at Secondary pressure (1050kPa) to three internal meter sets and an internal boundary regulator. The boundary regulator supplies an internal ring main (copper main) operating at 150kPa. Meter sets fed from the ring main are located in various areas of the building.
2. New section - Gas is supplied at Secondary pressure (1050kPa) to an external boundary regulator. The boundary regulator supplies an external ring main (copper main) operating at 100kPa. Gas is supplied to quantity five (5) meter set enclosures.

Jemena and Evoenergy originally reviewed the 150kPa internal ring main under its risk assessment process and proposed to reduce the pressure to 7kPa. The regulators on all internal meter sets would need to be replaced in order to continue operating under the reduced pressure. As this not meet the requirements set out by the UTR's GS&I Rules, the proposal was rejected.

A safety and compliance assessment was subsequently performed which reviewed the gas installations for the entire shopping centre. The results showed that the gas installation in the new section needed some minor modifications to the ventilation but was otherwise acceptable. The gas installation in the original section was reported deemed to be inadequate, requiring significant changes to reduce the level of risk.

Figure 1: Original and New Sections of Westfield Belconnen



2.2 PROJECT DRIVERS

2.2.1 RISK REVIEW

Westfield Belconnen is a shopping centre where large numbers of the public can gather. In the event of a high pressure gas escape leading to fire or explosion, members of the public may not be aware of their nearest emergency exit, which could result in a significant number of casualties. In order to minimise the risk to the public, shopping centres are now required to limit the internal gas pressure to 7kPa.

The following risk review is based on the Jemena Group Risk Management Manual[2]. This manual lists the frequency and consequence definitions. The current internal pressure of 150kPa poses the following risks:

a. **Safety & Environment:** Evoenergy is required to maintain the gas network up until the outlet of the gas meter set. Due to Westfield's internal pipework throughout the building, inspections of the pipework between the boundary regulator and meter sets are not possible.

[2] JAA MA 0050 Group Risk Management Manual [http://ecms/otcs/cs.exe/link/295482907]

An uncontrolled release of gas at 150kPa would escape at a rate 4.5 times faster than if the source of release was at 7kPa. A gas leak could build up over time and ignite, causing injury and property damage.

b. **Regulatory:** The concerns and the rectification around Westfield Belconnen's 150kPa internal ring rain have been in negotiation for some time now. Any further delay in rectifying the issues could result in fines due to installation non-compliance.

The untreated risk level of the identified threats listed below are:

Table 2: Category Risk Score (As per Jemena Group Risk Management Manual[3])

Category	Consequence	Likelihood	Risk Score
Safety and Environment	Severe	Unlikely	Moderate
Regulatory	Severe	Likely	High

2.3 PROJECT SCOPE

The purpose of this project is to limit the internal gas pressure of Westfield Belconnen to 7kPa in order to achieve compliance, and increase the level of safety to the public. Westfield have agreed to relocate all their meter sets to external locations. Evoenergy shall be responsible for the removal of the secondary boundary regulator inside the original section, and the supply of gas to the new meter set locations.

2.4 ASSUMPTIONS AND CONSTRAINTS

Table 3: Assumptions

Description	Implication	Criticality
The gas flow requirements Westfield have provided are correct.	If the gas flow requirements provided are lower than actual requirements, then the secondary boundary regulator may be undersized.	High

Table 4: Constraints

Description	Implication	Criticality
The secondary service gas lines are existing.	The secondary boundary regulator will need to be installed in close proximity to the existing service.	Low
Changing from existing internal meter sets to new external meter sets could interrupt supply.	Changeover may need to occur at night to prevent any interruption.	Moderate

[3] JAA MA 0050 Group Risk Management Manual [http://ecms/otcs/cs.exe/link/295482907]

3. CREDIBLE OPTIONS

The following options were identified:

- Option 1: Maintain Status Quo - reduce the pressure of the internal ring main – minimise the level of risk to the public but the installation will be non-compliant.
- Option 2: Upgrade Secondary Boundary Regulator - achieve compliance and minimise level of risk
- Option 3: Relocate Secondary Boundary Regulator- achieve compliance and reduce level of risk

The credible options are explained in detail below.

3.1 OPTIONS ANALYSIS

3.1.1 OPTION 1: MAINTAIN STATUS QUO - REDUCE THE PRESSURE OF THE INTERNAL RING MAIN

This option will reduce the outlet pressure of the secondary boundary regulator and the secondary meter sets in the original section to 7kPa. All internal meter sets shall remain in their current locations but have their regulators replaced to accommodate for the 7kPa inlet pressure.

Benefits

This option incurs minimal capex costs and continue to incur normal operations and maintenance (O & M) costs. The likelihood of the risk to the public is reduced from 'High' to 'Low'.

Limitations

The GS&I Rules state that any alteration to the configuration of an existing internal gas meter set will require the relocation of the gas meter set to an external location. Therefore this option does not meet the compliance requirements set by the UTR, which would result in fines and disciplinary action.

Summary

This option has already been rejected by the UTR. It is therefore considered to be unacceptable and hence not recommended.

3.1.2 OPTION 2: UPGRADE SECONDARY BOUNDARY REGULATOR

This option will upgrade the capacity of the Secondary Boundary Regulator in the new section and extend the 100kPa external ring main so that it supplies all the meter sets in Westfield Belconnen. The other Secondary Boundary Regulator in the original section shall be decommissioned.

Benefits

Currently there are two boundary regulators supplying Westfield Belconnen. This option limits the isolation of the building's gas supply to a single point, improving the level of safety in the event of a gas incident. As there will be one secondary boundary regulator instead of two, operations and maintenance (O & M) costs will reduce.

By adopting this option, the likelihood of the risk to the public and Evoenergy's reputation will be reduced and the overall risk rating will be dramatically reduced from 'High' to 'Low'.

Limitations

Expected limitations of this option are:

1. Capital expenditure will be required to execute the works.
2. Changeover from existing meter sets to new meter sets will need to occur outside of shopping centre operating hours.
3. Some works are to be carried out within loading dock areas.

Summary

This is considered to be acceptable and the recommended option.

3.1.3 OPTION 3: RELOCATE SECONDARY BOUNDARY REGULATOR

This option will relocate the secondary boundary regulator in the original section to a location external to the building and have a 100kPa outlet. The existing secondary meter sets will be relocated outside of the building and have their outlet pressures reduced to 7kPa. The remaining meter sets will be relocated to the roof and will supplied by an external 100kPa main from the relocated boundary regulator.

Benefits

By relocating the Secondary Boundary Regulator, the existing Secondary meter sets can be installed adjacent to the new boundary regulator. The 100kPa external main to the roof will only need to be DN50 instead of DN100, and the total length will reduce by around 100m. It will continue to incur normal operations and maintenance (O & M) costs.

By adopting this option, the likelihood of the risk to the public and Evoenergy's reputation will be reduced and the overall risk rating will be dramatically reduced from 'High' to 'Low'.

Limitations

Expected limitations of this option are:

1. Capital expenditure will be required to execute the works.
2. Changeover from existing meter sets to new meter sets will need to occur outside of shopping centre operating hours.
3. Some works are to be carried out within loading dock areas.
4. The shopping centre will be supplied by two boundary regulators. In the event of an incident, both boundary regulators will need to be turned off instead of just one.

Summary

This is considered to be acceptable but not the preferred option.

3.2 RISK ASSESSMENT

A summary of the risk assessment outcome based on the options discussed in Section **Error! Reference source not found.** is provided in Table 1 below:

Table 1: Risk Assessment Mitigation Summary

#	Options	Treated Risk of the regulator imposing fines due to non-compliance	Treated Risk of an internal gas escape igniting, resulting in injuries	Comments
1	Maintain Status Quo	High	Moderate	Does not achieve regulatory compliance but reduces risk of safety to the public.
2	Upgrade Secondary Boundary Regulator	Low	Low	Achieves regulatory compliance and reduces risk of safety to the public.
3	Relocate Secondary Boundary Regulator	Low	Moderate	Achieves regulatory compliance and reduces risk of safety to the public.

3.3 COMPARISON OF OPTIONS

Table 2: Options Summary Including Risk, Benefits and Cost

Criteria	Option 1	Option 2	Option 3
Option description	**Maintain Status Quo**	**Upgrade Secondary Boundary Regulator**	**Relocate Secondary Boundary Regulator**
Heath, Safety and Environment	Secondary pressure entering the loading dock ,then reduces to 7kPa. 100kPa external ring main.	7kPa entering the building and 100kPa external ring main	7kPa entering the building and 100kPa external ring main
Operational	Two separate isolation points in the event of an incident.	One isolation point in the event of an incident.	Two separate isolation points in the event of an incident.
Regulatory and Compliance	Non-Compliant to ACT Gas Service and Installation Rules	Compliant to ACT Gas Service and Installation Rules	Compliant to ACT Gas Service and Installation Rules
Control Effectiveness	By reducing the internal pressure, the risk would be reduced.	By reducing the internal pressure, the risk would be reduced.	By reducing the internal pressure, the risk would be reduced.
Strategic benefits	Impact on Evoenergy not being compliant.	Provides permanent solution for compliance.	Provides permanent solution for compliance.

Criteria	Option 1	Option 2	Option 3
Delivery constraints	Changing of regulators to occur outside of shopping centre operating hours.	Working within loading dock areas and on the roof. Changeover to occur outside of shopping centre operating hours.	Working within loading dock areas and on the roof. Changeover to occur outside of shopping centre operating hours.
Treated Risk Ranking	High	Low	Low
Cost Estimate (Capex, $000's, Real 2020)	0	622 [4]	602
Net Present Value (NPV [5], $000's, Real 2020)	0	-621	-601
Option Analysis	◑ Partially addresses the issue	● Fully addresses the issue	● Fully addresses the issue
Recommendation	Unacceptable	Recommended	Not Recommended

[4] Cost estimate from Project Estimation Model (**PEM**).

[5] See Appendix B for NPV model extract.

4. RECOMMENDATION

4.1 RECOMMENDED SOLUTION

4.1.1 UPGRADE SECONDARY BOUNDARY REGULATOR

The recommended solution is Option 2 in order to provide a single point of isolation to Westfield Belconnen, upgrading the secondary boundary regulator in the new section and decommissioning the secondary boundary regulator in the original section. Having one point of isolation is a better mitigation measure in the event of a gas escape as opposed to two points of isolation. This option also complies with the GS&I Rules.

4.2 SCOPE

The scope can be divided up into three stages:

1. Upgrade the secondary boundary regulator.
2. Install pipework and meter sets.
3. Changeover from existing meter sets and decommission.

4.2.1 STAGE 1

Stage 1 of the project will be the upgrading of secondary boundary regulator in the new section of Westfield Belconnen. The modification to the existing Secondary boundary regulator has been designed such that it can be installed with no welding required and no loss of supply to customers. The new boundary regulator will have enough capacity to supply the whole shopping centre and allow for future expansion.

Figure 2: Secondary Boundary Regulator in the New Section to be Upgraded

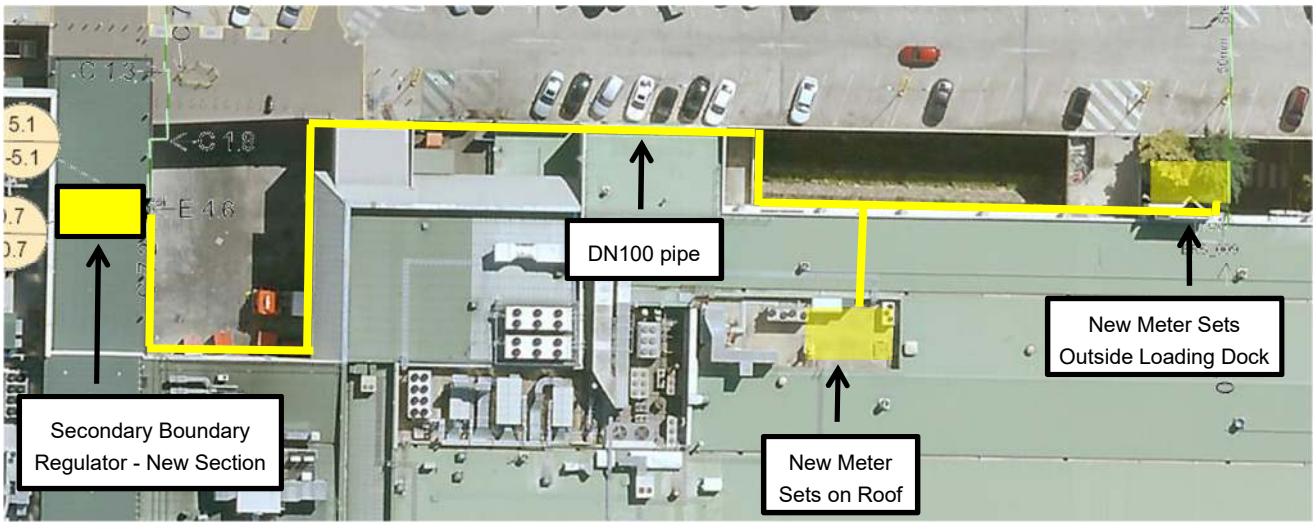
4.2.2 STAGE 2

Stage 2 of the project will be the installation phase, which includes the following:

1. Install an external DN100 copper ring main from the upgraded boundary regulator in the new section to the roof and to the loading dock in the original section. The external ring main will operate at 100kPa.
2. Install 18 meter sets on the roof, and three (3) meter sets outside the loading dock in the original section. The outlet pressure on all meter sets shall be 7kPa.

Scentre Group have agreed to run all pipework from the outlets of the new meter sets.

Figure 3: Proposed External Ring Main



4.2.3 STAGE 3

Stage 3 of the project will be the changeover to the new meter sets and decommissioning the internal meter sets and boundary regulator. As this may cause an interruption to the supply, the changeover to the new meter sets should be scheduled outside of operating hours.

The service supplying the secondary boundary regulator in the original section shall be cut and capped downstream of the path valve on Emu Bank.

4.2.3.1 Constructability

Installation - The installation of meter sets shall include the installation of gauge points and valves as per the Jemena Field Manual. All piping and meter sets shall comply with AS4645.1 and AS4645.2.

Site Restoration – Activities include backfilling, surface restoration, and replacement of gas main markers shall be performed as per the Jemena Secondary Construction Manual.

4.2.3.2 Approvals

Approval must be obtained from Scentre Group to perform works at Westfield Belconnen as well as any other governing bodies relating to working within the road reserve of Emu Bank. Below is a list of third party authorities that may potentially be impacted by the excavation. This list is indicative only; it is the Works Delivery Group's responsibility to identify impacted stakeholders:

- Council – Land access notification, construction access confirmed
- Other Utilities and pipelines – Notification and/or approval of integrity dig works
- Road Authority – Traffic Management

4.2.3.3 Other project considerations

The contractor shall manage the site and stakeholders:

- Traffic Management – Working around Westfield's loading docks, and performing the cut and cap of the secondary service. Determine access availability so that traffic flow can be managed during the works.
- Stakeholder Management – Liaison with Scentre Group, Westfield Belconnen, and the local road authority.

4.3 COST DETAILS

4.3.1 COST METHODOLOGY

The cost estimate for the recommended option was obtained using the Project Estimation Model (**PEM**).

4.3.2 SUMMARY OF COSTS

Table 7: Project Cost Estimation

Item	Project Estimate ($000's, 2020)
Materials	128
Contractor Costs	346
Jemena Internal Labour	74
Total Direct Costs	**548**
Risk Allocation	74
Total Project Estimate	**622**

5. REFERENCES

5.1 INTERNAL

1. Jemena Group Risk Management Manual
2. Jemena Field Manual

5.2 EXTERNAL

1. Australian Standard AS/NZS4645.1
2. Australian Standard AS/NZS4645.2
3. Gas Supply Act 1996
4. Gas Supply (Safety and Network Management) Regulation 2013
5. ACT Gas service and Installation Rules (GS&I Rules) 2014
6. The National Gas Rules

APPENDIX A

RISK ASSESSMENT SUMMARY

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 Jemena Group Risk Management Manual Revision 8.

UNTREATED IMPACT/CONSEQUENCES								UNTREATED RISK SUMMARY		
Contributing Factors/ Scenario	**Strategic**	**Financial**	**Safety**	**Operational**	**Regulatory & Compliance**	**Reputation**	**Comments**	**Consequence (Highest Impact)**	**Likelihood**	**Risk Level**
High pressure inside shopping centre	Severe	Minor	Severe	Serious	Severe	Serious	○ **Strategic -** Non-compliance to GS&I Rules ○ **Safety -** Ignition of gas leak leading to fire/explosion, resulting in injuries ○ **Regulatory** - Regulator requires formal explanation and fines issued due to non-compliance.	Severe	Likely	High
PREFERRED OPTION – Risk assessment summary								**TREATED RISK SUMMARY**		
Preferred Option/Treated risk	Cost		Benefit				Key Mitigations	Consequence	Likelihood	Risk Level
Option 2 – Upgrade secondary boundary regulator	$0.622M		This option will: - reduce the pressure inside the building to 7kPa - achieve compliance with the GS&I Rules - provide a single isolation point in the event of an emergency				○ Minimise the impact from a gas leak inside the building	Serious	Unlikely	Low

APPENDIX B

NPV MODEL

Below is the screenshot of the 'Options Comparison' tab of the NPV model : Evoenergy – NPV Model – Inlet Piping Rectification Belconnen Westfields.xlsx

Inlet Piping Rectification - Westfield Belconnen

Option Comparison

Legend: Input | External link | Internal link | Drop-down

Year	2,021	2,022	2,023	2,024	2,025	2,026
Count	1	2	3	4	5	6

Sheet Navigator

Sheet purpose | Option Comparison - Option Comparison

Summary- NPV Calculation

NPV	Source	Unit	Basis	Timing	NPV	RY21	RY22	RY23	RY24	RY25	RY26
Maintain Status Quo - Reduce Pressure of Internal Ring Main	NPV Calc|Option-1	dollars	Real 2020	n/a	-	-	-	-	-	-	-
Upgrade Secondary Boundary Regulator	NPV Calc|Option-2	dollars	Real 2020	n/a	- 621,491	- 612,231	- 9,260	-	-	-	-
Relocate Secondary Boundary Regulator	NPV Calc|Option-3	dollars	Real 2020	n/a	- 601,672	- 590,891	- 10,781	-	-	-	-
Selected Option	**elocate Secondary Boundary Regulator**				- **601,672**						

Incremental NPV for each option in comparison to Option-1 (Maintain Status Quo)

Incremental NPV	Source	Unit	Basis	Timing	Incremental NPV in comparison to base case/maintain status quo option
Maintain Status Quo - Reduce Pressure of Internal Ring Main	Calculated	dollars	Real 2020	n/a	-
Upgrade Secondary Boundary Regulator	Calculated	dollars	Real 2020	n/a	- 621,491
Relocate Secondary Boundary Regulator	Calculated	dollars	Real 2020	n/a	- 601,672