

Evoenergy

SDRS Integrity and Safety Replacement

Options Analysis

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Authorisation

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1. EXECUTIVE SUMMARY

1.1 KEY DRIVERS AND PROJECT SCOPE

A Secondary District Regulator Set (**SDRS**) is an integral part of the Evoenergy gas distribution network, receiving gas from the upstream secondary network (1050kPa) and delivering gas into the downstream medium pressure network (210kPa) at various locations. There are currently ninety five SDRSs within the gas distribution network, generally constructed in a pit below ground, supplying the gas mains that supply most of the commercial and domestic customers in Canberra.

A Formal Safety Assessment¹ (**FSA**) was carried out in December 2018 as per Australian Standard (**AS**) 2885.1 to identify, review and determine the level of controls required to reduce risk or remove threats to the pressure control system (SDRSs) that supplies the medium pressure network. The FSA concluded that two SDRSs (SDRS 26 & SDRS 51) were identified as having an unacceptable level of risk that requires action, which is to relocate these underground regulator sets to suitable locations within the network.

The principal driver for undertaking this risk mitigation, is the safety to Jemena field personnel and it's contractors during routine maintenance of these particular SDRSs. Maintenance is carried out at six monthly intervals on any SDRS to ensure that regulator performance is maintained to supply gas to customers without interruptions.

By relocating these two SDRSs to suitable locations, this will reduce the overall risk rating on field personnel safety from SIGNIFICANT to LOW².

1.2 CREDIBLE OPTIONS

The following options were evaluated for the SDRS Integrity and Safety Replacement in Table 1 below:

Table 1: Options Summary

Option	Option Name	Description	CAPEX (\$000's, Real 2020)
1	Maintain Status Quo	The SDRSs will remain in there unsuitable locations and the risk to Jemena field personnel and it's contractors will remain 'Significant' as per the Jemena Group Risk Manual ³ .	NIL – Capex (Existing O & M costs ⁴)
2	Relocate SDRS26 & SDRS51 to suitable locations. (Recommended Option)	This option will reduce the risk to Jemena field personnel and it's contractors when carrying out maintenance activities on both regulator sets.	\$1,159

¹ Formal Safety Assessment on Network Pressure Control required as per AS2885.1 Section 2 : Network Safety.

² See Appendix A for the Risk Assessment Summary.

³ Refer JAA MA 0050 – Jemena Group Risk Manual [<http://ecms/otcs/cs.exe/link/295482907>]

⁴ O & M cost includes the current cost of maintenance on SDRS, ad-hoc repairs, or if an incident occurs.

1.3 RECOMMENDATION

Option 2: Relocate SDRS26 and SDRS51 to suitable locations is the recommended solution with a forecast cost of \$1.159M (Real 2020). This option includes the removal of both SDRS26 and SDRS51 from their current locations along major arterial roads and installed in quiet side streets within the vicinity of their current locations to maintain current network capacity. With the implementation of this recommendation, the overall threat to risk of injury to field personnel will be reduced from 'Significant' to 'Low' (Refer to Appendix A Risk Assessment).

1.4 NATIONAL GAS RULES

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

Prudent – The expenditure is required to maintain gas reliability, safety, and to comply with regulatory obligations.

Efficient – The cost estimates for this project were developed from actual costs of a similar project that underwent a competitive tender process.

Consistent with accepted and good industry practice – Ensuring the safety of a company's personnel is paramount when unacceptable risks are identified.

Necessary to achieve the lowest sustainable cost of delivering pipeline services – The proposed project balances the risk of personnel safety, reliability and cost to customers to provide the lowest sustainable cost.

The project solution complies with the new capital expenditure criteria rules 79(2)(c)(i)(ii), due to the following reasons:

79(2)(i-ii) Maintain and improve the safety and integrity of services: The safety and integrity of SDRSs provide the required pressure control to the downstream gas network that supplies our customers. This avoids over pressure in the network that can cause risk of gas escape and explosion both in the mains and services.

2. PROJECT BACKGROUND AND KEY DRIVERS

2.1 PROJECT BACKGROUND

A Secondary District Regulator Set (**SDRS**) is an integral part of the Evoenergy gas distribution network, receiving gas from the upstream secondary network (1050kPa) and delivering gas into the downstream medium pressure network (210kPa) at various locations. There are currently ninety five SDRSs within the gas distribution network, generally constructed in a pit below ground, supplying the gas mains that supply most of the commercial and domestic customers in Canberra.

A Formal Safety Assessment⁵ (**FSA**) was carried out in December 2018 as per Australian Standard (**AS**) 2885.1 to identify, review and determine the level of controls required to reduce risk or remove threats to the pressure control system (SDRSs) that supplies the medium pressure network. The FSA concluded that two SDRSs (SDRS 26 & SDRS 51) were identified as having an unacceptable level of risk that requires action, which is to relocate these underground regulator sets to suitable locations within the network.

The principal driver for undertaking this risk mitigation, is the safety to Jemena field personnel and it's contractors during routine maintenance of these particular SDRSs. Maintenance is carried out at six monthly intervals on any SDRS to ensure that regulator performance is maintained to supply gas to customers without interruptions.

Firstly, SDRS 26 is located in a median strip of Hindmarsh Dr (see Figure 1), constructed in 1989, and supplies gas to the suburbs of Lyons and Chifley. Hindmarsh Dr is a major arterial road with a speed limit of 80km/hr. When field personnel are carrying out maintenance activities on the SDRS, traffic control is required to close at least one lane in each direction so that the SDRS can be accessed, this places the field personnel at risk of injury from passing vehicles.

Figure 1: Location of SDR26 in Lyons, ACT.



⁵ Formal Safety Assessment on Network Pressure Control required as per AS2885.1 Section 2 : Network Safety.

Secondly, SDRS 51 is located in a median strip of Lanyon Dr (see Figure 2), constructed in 1990, and supplies gas to the suburb of Hume which is an industrial area with many industrial and commercial customers. Lanyon Dr is a major arterial road with a speed limit of 80km/hr. When field personnel are carrying out maintenance activities on the SDRS, even with the concrete barrier in place on the southern side, the field personnel are still at risk of injury from passing vehicles.

Figure 2: Location of SDRS 51 in Hume, ACT.



Finally, in conjunction with the location issues of SDRS 26 and SDRS 51, both exhibit additional safety and integrity issues such as corrosion, water ingress, pits with no steps or ladder access and heavy steel lids that need to be manually removed (no hinged lids with hydraulic lift). Figure 3 and 4 shows the internal configuration of the SDRS's when opened.

Figure 3 : SDRS 26 with open lids



Figure 4 : SDRS 51 with open lids



2.2 PROJECT DRIVERS

Listed below are the project drivers for carrying out this project:

- a. Safety:
 - i. Field personnel safety is paramount while carrying out their daily maintenance routines. It is Jemena’s and Evoenergy’s obligation to provide a safe workplace.
 - ii. The current location of both SDRS’s is unacceptable due to high vehicle speeds in the area.
 - iii. The current access of both SDRS’s due to ergonomic issues such as steps within the pit and heavy lid covers is unacceptable.
- b. Operational: Vehicle impact on the SDRS vent and cathodic protection posts will require the regulator to be offline during repair, causing a loss of supply to nearby domestic customers.

Without an adequate solution, there is a untreated risk rating of ‘Significant’ which is above Jemena’s risk threshold and needs to be addressed. The risk assessment can be found in Appendix A.

2.3 ASSUMPTIONS AND CONSTRAINTS

Table 2: Assumptions

Description	Implication	Criticality
The Secondary main has a depth of cover of 1.2m	A shallow main may cause issues when installing a three-way tee on the Secondary main.	High
The suitable location will be free of obstacles such as other infrastructure.	As the SDRS’s cannot be installed in the road, there may be other infrastructure that will need to be navigated. Surveys of the area will locate existing infrastructure.	Low

Table 3: Constraints

Description	Implication	Criticality
The Secondary main will need to cross an arterial road.	Road permits and traffic control will be required to cross the road. This is a normal occurrence for our gas network.	Low

3. CREDIBLE OPTIONS

The following options were identified:

- Option 1: Maintain Status Quo – SDRS26 and SDRS51 remain in current locations.
- Option 2: Relocate SDRS26 and SDRS51 to suitable locations.

The credible options are explained in detail below.

3.1 OPTIONS ANALYSIS

3.1.1 OPTION 1: MAINTAIN STATUS QUO – SDRS 26 & SDRS 51 REMAIN IN CURRENT LOCATIONS

This option does not account for further action and considers maintaining the SDRS's in their existing locations.

Benefits

This option incurs no additional capex costs. It will continue to incur normal operations and maintenance (O & M) costs.

Limitations

Even with traffic control in place, the safety risk to field staff is significant, which is considered to be unacceptable. The risk to the above ground component of the SDRS such as the vent post and cathodic protection post remains and at risk of damage from high speed vehicles.

Summary

It is therefore considered to be unacceptable and hence not recommended.

3.1.2 OPTION 2: RELOCATE SDRS 26 AND SDRS 51 TO SUITABLE LOCATIONS

This option will relocate both SDRS 26 and SDRS 51 to side streets, off arterial roads. The existing SDRS's will then be decommissioned.

Benefits

By relocating both SDRS's off arterials roads and into side streets, the vehicle speed is greatly reduced, reducing the risk to both field personnel carrying out maintenance and the above ground components of the SDRS's not being damaged and causing gas escape.

The integrity issues within the pit of the SDRS's is also mitigated during construction to the new locations with the installation of steps and hydraulic lids to assist field personnel.

Limitations

Expected limitations of this option are that capital expenditure will be required to execute the works. This option would have a capital cost of \$1.159M (Real, \$2020) to relocate both SDRS 26 and SDRS 51. As there is no secondary network in the nearby side streets, an extension of the high pressure secondary main is required to supply the SDRS’s.

Summary

This is considered to be acceptable and the recommended option as the overall risk rating will be dramatically reduced from ‘Significant’ to ‘Low’ for field personnel during maintenance and integrity of the SDRS’s within the pit. Refer to Appendix C for proposed suitable locations.

3.2 RISK REDUCTION

A summary of the risk assessment outcome based on the options discussed is provided in Table 4Table below:

Table 4 : Risk Assessment Mitigation Summary⁶

Identified Risk	Option 1 : Maintain Status Quo – SDRS’s remain in current locations.	Option 2 : Relocate SDRS 26 and SDRS 51 to suitable locations
Significant injury to field personnel performing maintenance on the SDRS’s on an arterial road.	Significant	Low
Serious injury to field personnel performing maintenance on the SDRS’s with internal integrity issues.	Moderate	Low

⁶ For details refer to Appendix A : Risk Assessment Summary

3.3 COMPARISON OF OPTIONS

Table 5 : Options Summary Including Risk, Benefits and Cost

Criteria	Option 1	Option 2
Option description	Maintain Status Quo	Relocate SDRS26 and SDRS51 to suitable locations.
Drivers	Low cost	<ul style="list-style-type: none"> Field personnel safety during maintenance due to high speed of vehicles. SDRS operations due to high speed of vehicles. Field personnel safety due to pit with limited access and heavy lids requiring mechanical assistance.
Complies with NGR	No	Yes
Treated Risk Ranking	Significant	Low
Cost Estimate (Capex, \$000's, Real 2020)	0	1,159 ⁷
Net Present Value (NPV, \$000's, Real 2020)	0	-1,069 ⁸
Option Analysis	○ Does not address the issue	● Fully addresses the issue
Recommendation	Unacceptable	Recommended

⁷ Cost estimate from Project Estimation Models (PEM).

⁸ See Appendix B for NPV model extract.

4. RECOMMENDATION

4.1 RECOMMENDED SOLUTION

The recommended solution is Option 2 : Relocated SDRS 26 and SDRS 51 to suitable locations. This option will provide the greatest safety and integrity benefits, with the risks being mitigated to Low via the following :

- Reduce the risk of field personnel being struck by a vehicle travelling on an arterial road by installing the SDRS's in side streets to reduced vehicle speed;
- Reduce the risk of vehicle impact on the SDRS vent and cathodic protection posts;
- Reduce the risk of field personnel getting injured within the pit when the SDRS's are relocated, and integrity issues addressed with the installation of steps and hydraulic lids.

Refer Appendix C for Proposed Scope Details.

4.2 COST DETAILS

4.2.1 COST METHODOLOGY

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

4.2.2 SUMMARY OF COSTS

Table 6: Project Cost Estimation

Item	Project Estimate (\$000's, 2020)
Materials	181
Contractor Costs	700
Jemena Internal Labour	69
Total Direct Costs	950
Risk Allocation	209
Total Project Estimate	1,159

5. REFERENCES

5.1 INTERNAL

1. Jemena Group Risk Management Manual – Revision 8 (JAA MA 0050)
[\[http://ecms/otcs/cs.exe/link/295482907\]](http://ecms/otcs/cs.exe/link/295482907)
2. Jemena Operations Field Manual (GAS-999-OM-GD-001)
[\[http://ecms/otcs/cs.exe/link/308238200\]](http://ecms/otcs/cs.exe/link/308238200)
3. Evoenergy SDRS FSA Action Assignment Report (GAS-4220-RP-RM-003)
[\[http://ecms/otcs/cs.exe/link/316718573\]](http://ecms/otcs/cs.exe/link/316718573)

5.2 EXTERNAL

1. Australian Standard AS/NZS4645.1:2018 : Gas Distribution Networks – Network Management
2. Australian Standard AS/NZS4645.2:2018 : Gas Distribution Networks – Steel Pipe Systems
3. Australian Standard AS/NZS4645.3:2018 : Gas Distribution Networks – Plastic Pipe Systems
4. Australian Standard AS/NZS5601.1:2013 : Gas Installations
5. Utilities Act 2000 No.65
6. National Gas Rules No.38

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 Manual⁹.

UNTREATED IMPACT/CONSEQUENCES								UNTREATED RISK SUMMARY		
Contributing Factors/ Scenario	Strategic	Financial	Safety	Operational	Regulatory & Compliance	Reputation	Comments	Consequence (Highest Impact)	Likelihood	Risk Level
Field personnel performing maintenance on the SDRS's on an arterial road.	Minor	Minor	Severe	Serious	Minor	Minor	<ul style="list-style-type: none"> ○ Safety – Vehicles can impact field personnel during routine maintenance, resulting in serious injury. ○ Operational – With the SDRSs located on an arterial road with an 80km/hr speed limit, the vents and cathodic protection post being above ground are susceptible to vehicle impact. 	Severe	Possible	Significant
Field personnel performing maintenance on the SDRS's with internal integrity issues	Minor	Minor	Serious	Minor	Minor	Minor	<ul style="list-style-type: none"> ○ Safety – Heavy steel lids and deep pits with no ladder or steps for access can result in injuries to field personnel during maintenance. 	Serious	Possible	Moderate
PREFERRED OPTION – Risk assessment summary								TREATED RISK SUMMARY		
Preferred Option/Treated risk	Cost	Benefit					Key Mitigations	Consequence	Likelihood	Risk Level
Option 2 – Relocate SDRS 26 and SDRS 51 to suitable locations.	\$1,159M	This option will: <ul style="list-style-type: none"> - Reduce the risk of field personnel being stuck by vehicle on an arterial road. - Reduce the risk of field personnel getting injured within the pit. 					<ul style="list-style-type: none"> ○ By relocating the SDRS's off arterial roads onto side streets, vehicle speed is greatly reduced. ○ When relocated, integrity issues within the pit are also mitigated during construction with the installation of steps and hydraulic lids. 	Minor	Unlikely	Low

⁹ Refer Jemena Group Risk Manual Revision 8 (JAA MA 0050) - [<http://ecms/otcs/cs.exe/link/295482907>]

APPENDIX B – NPV MODEL EXTRACT

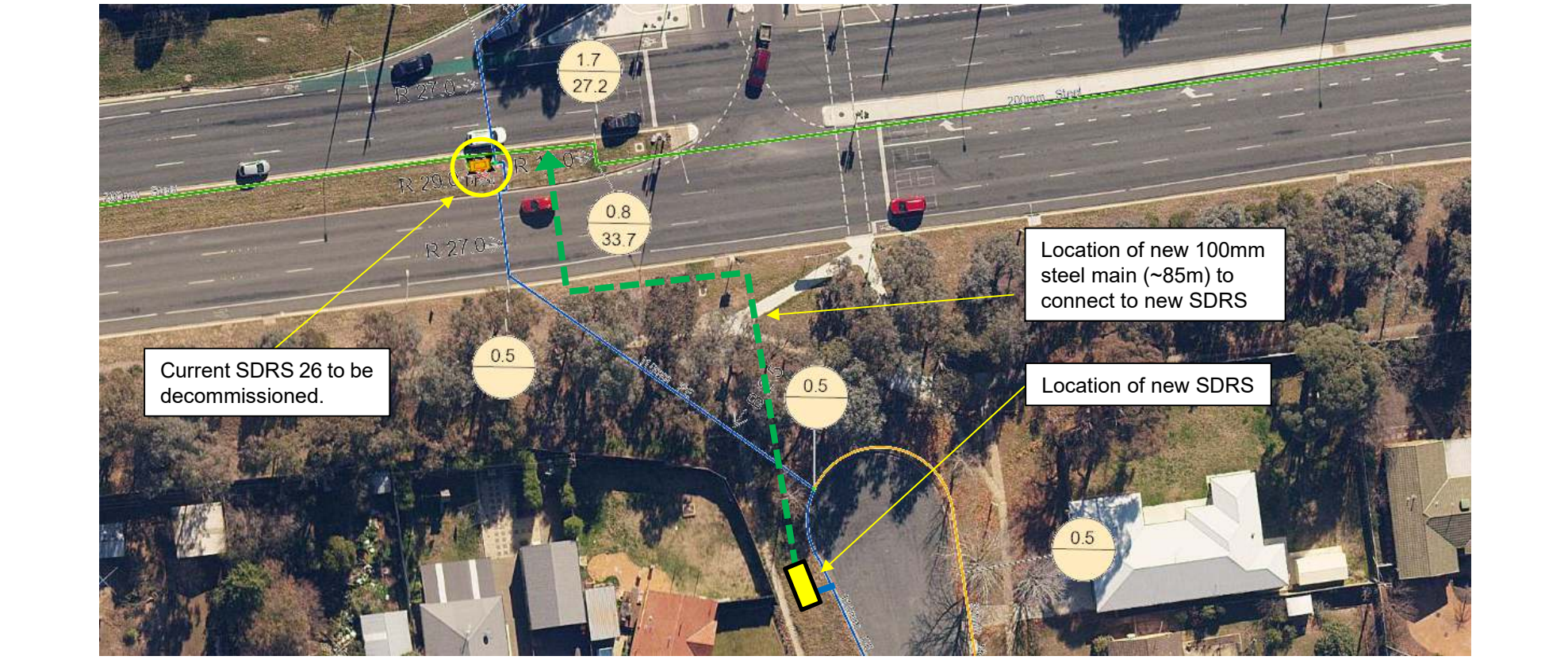
Below is the screenshot of the 'Options Comparison' tab of the NPV model : Evoenergy – NPV Model – SDRS Integrity and Safety Replacement.xlsx

SDRS Integrity and Safety Replacement						Legend: Input External link Internal link Drop-down								
Option Comparison						Year	2,021	2,022	2,023	2,024	2,025	2,026		
Copyright Jemena Limited. All rights reserved. Jemena is not liable for any loss caused by reliance on this document.						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	NPV Calc Option-1	dollars	Real 2020	n/a	-	-	-	-	-	-	-			
Relocate SDRS26 and SDRS51 to suitable locations	NPV Calc Option-2	dollars	Real 2020	n/a	-	1,069,090	-	-	118,463	-	268,567	-	682,060	-
Selected Option	Relocate SDRS26 and SDRS51 to suitable locations				-	1,069,090								
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	Calculated	dollars	Real 2020	n/a	-									
Relocate SDRS26 and SDRS51 to suitable locations	Calculated	dollars	Real 2020	n/a	-	1,069,090								

APPENDIX C – SCOPE DETAILS

C.1 SDRS 26 PROPOSED RELOCATION SCOPE

Install new SDRS in Mcdonald St, Lyons, connecting to the 150mm secondary steel (1050kPa) main in Hindmarsh Dr and laying approximately 85m of 100mm secondary steel main. This location is a side street off from an arterial road. New SDRS to be installed with hydraulic lids and access via steps within the pit. To not affect supply, once the new SDRS is installed and commissioned, SDRS 26 is to be decommissioned and pit backfilled.



C2. SDRS 51 PROPOSED RELOCATION SCOPE

1. Install new SDRS along Tralee St, Hume, connecting to the 150mm secondary steel (1050kPa) main and 110mm medium pressure (201kPa) polyethylene main. This location is a side street off Hume away from an arterial road. SDRS to be installed with hydraulic lids and access via steps within the pit.



2. To not affect supply, once the new SDRS is installed and commissioned, SDRS 51 is to be decommissioned and pit backfilled.

