Jemena Gas Networks (NSW) Ltd

Installation of Secondary Isolation Valves

Options Analysis

BAB-RAK-000064

Public

29 November 2019

Authorisation

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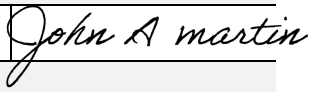
John Martin	Engineering Support Manager – Gas Distribution	07/01/2020	
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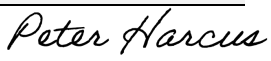
Peter Harcus	General Manger – Asset Management Gas Distribution	07/01/2020	

History

Rev No	Date	Description of changes	Author
A	21/01/2019	Draft for review	Andrew Walker
B	29/11/2019	2nd draft for review	Andrew Walker
C	18/12/2019	3rd draft for review	Andrew Walker
0	07/01/2020	Final	Andrew Walker

Owning Functional Area

Business Function Owner:	Asset Strategy Gas

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1. EXECUTIVE SUMMARY

1.1 KEY DRIVERS AND PROJECT SCOPE

The Sydney Secondary Network was first constructed in the 1970s and operates at a pressure of 1050kPa. Over the last 40 years, extensive urban development has led to changes in the ground levels, resulting in reduced depths of cover over the Secondary mains, making them more susceptible to third party hits.

In July 2018 an incident occurred at corner of Castlereagh St and Martin Place, Sydney CBD, where a third party rock breaker punctured a Secondary gas main, causing a large gas escape, which resulted in the evacuation of a large area of the CBD. Due to the specific location of the hit, any attempt to isolate the section of main using existing isolation valves would have resulted in the loss of supply of gas to approximately 4000 customers. As a result, gas was vented for almost 24 hours until the repair of the damaged main was completed, requiring the maintenance of large exclusion zone and a significant disruption to the activities in the CBD. Had the incident occurred during the week rather than the weekend, the implication of venting gas for 24 hours would not have been acceptable and would have resulted in the outage of over 4000 customers and major hotels.

An investigation into the Martin Place incident found an issue around the number of secondary line valves in High Density Community Use (HDCU) areas. As such, the following key drivers shall be met in order to mitigate this risk:

1. Minimise the hazards posed by uncontrolled gas escapes resulting from third party damage to an underground gas main, by rapidly isolating damaged sections of mains.
2. Limit supply disruption to the community arising from isolation of damaged mains.

The project is proposed to be executed in two stages:

- Stage 1: Identification of areas without sufficient means of isolation. Data received from the Shallow Secondary Mains project will contribute towards this investigation.
- Stage 2: Installation of secondary line valves

1.2 CREDIBLE OPTIONS

The following options were evaluated for the Installation of Secondary Line Valves in HDCU in

Table 1 below:

Table 1: Options Summary

Option	Option Name	Description	Cost
1	Maintain Status Quo	The risk to public safety, nearby properties and Jemena reputation will remain Significant as per Jemena Risk matrix.	NIL – Capex (Existing O & M cost[1])
2	Secondary Line Valves Investigation and Installation project – Sydney CBD	This option provides aims to reduce the risk of a gas escape and loss of supply within the Sydney CBD only.	$1.125M
3	Secondary Line Valves Investigation and Installation project – Secondary Network	This option provides aims to reduce the risk of a gas escape and loss of supply for the whole Secondary Network.	$3.825M

1.3 RECOMMENDATION

Option 2: Secondary Line Valves Investigation and Installation – HDCU Areas project is the recommended solution costing A$1.125 M for implementation over a four year period. Implementing this option will reduce the risk of a gas escape igniting and reduce the risk of loss of supply from third party damage. This option is also economically prudent. With the implementation of this project, the overall threat will be reduced from Significant to Moderate.

1.4 CONSUMER ENGAGEMENT

Customers have told us they expect no compromise on safety.[2] Customers do not want us to do anything that could jeopardise their or our staff's safety and well-being.

This project is a cost effective solution to improve the safety of our secondary gas network by identifying the areas where a loss of supply would be a significant risk, and installing secondary line valves. This project will reduce the risk and potential harm to our customers, the public and our employees.

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 Jemena Customer Engagement Report, Straight Talk, October 2018, p.24

1.5 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 subrule (2).

(2) Capital expenditure is justifiable as:

(c) the capital expenditure is necessary:

i. to maintain and improve the safety of services;

ii. to maintain the integrity of services;

2. PROJECT BACKGROUND AND KEY DRIVERS

2.1 PROJECT BACKGROUND

The Sydney Secondary Mains Network is a vital Jemena Gas Networks (JGN) asset that directly or indirectly provides gas to more than 900,000 customers across Sydney. The maximum allowable operating pressure of the Secondary Main is 1,050 kPa and it is operated in compliance with Gas Supply (Safety and Network Management) Regulation (2013) and by the extension the suite of Australian Standards AS/NZS4645 including AS/NZS4645.2.

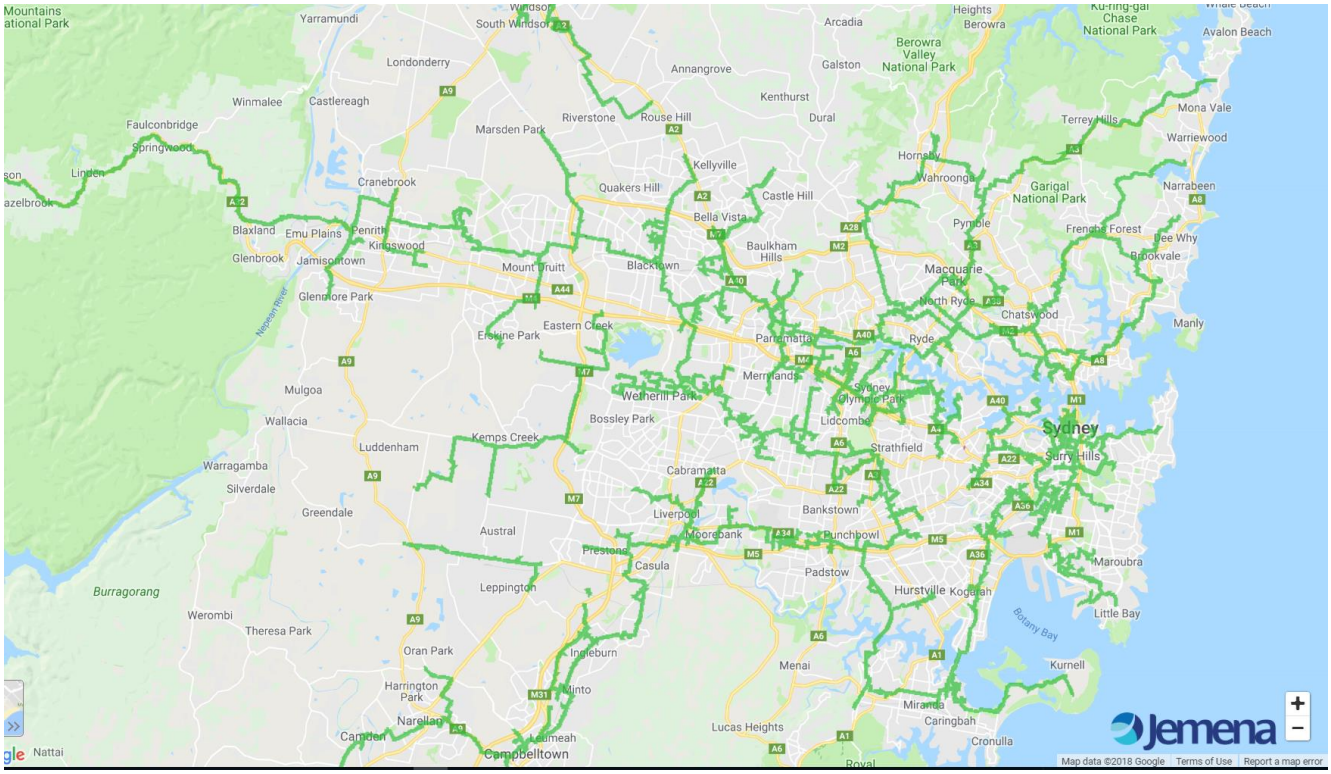

Figure 1: Sydney Secondary Mains Network

The Sydney Secondary Network was constructed between 1970s to present and was designed according to the applicable standards of the time. Since the time of construction, significant development has occurred in the western, northern and southern parts of Sydney where the pipeline traverses. Large portions of the Secondary Network are now located in HDCU areas.

Secondary line valves have been installed throughout the network as a safety mitigation measure. In the event of a third party hit, a section of the Secondary main can be isolated if there is a significant gas escape or a threat to public safety. This threat to public safety is multiplied if the third party hit occurs within a HDCU area or a sensitive area such as a hospital.

In July 2018 an incident occurred at corner of Castlereagh St and Martin Place, Sydney CBD, where a third party rock breaker punctured a Secondary gas main, causing a large gas escape. As a safety precaution, a large area of the CBD was evacuated. Due to the specific location of the hit, any attempt to isolate the section of main using existing isolation valves would have resulted in the loss of supply of gas to approximately 4000 customers.

Following the Martin Place incident, Jemena conducted an incident investigation, which highlighted the need for additional Secondary line valves. In the interest of public safety, the additional valves will provide their greatest benefit if they are installed within HDCU areas and near major hospitals.

2.2 PROJECT DRIVERS

2.2.1 RISK REVIEW

Accidental damage to Secondary gas mains caused by third parties can result in large gas escapes, and a loss of supply to thousands of customers. As the Secondary mains are made from steel, a third party hit is expensive to repair.

In order to minimise the number of customers affected, line valves are installed to enable isolation to sections of the secondary network. The recent incident at Martin Place in Sydney has highlighted the issue that this control method was ineffective due to a lack of secondary valves within the proximity of the incident.

The following risk review is based on the Jemena Group Risk Management Manual (Rev 8). This manual lists the frequency and consequence definitions, The lack of secondary line valves poses the following risks:

Safety & Environment: Being unable to isolate the hit on the main because of the loss of supply to customers results in an uncontrolled release of gas. There is also a potential that the gas could ignite, causing injury and property damage.

Operational : Depending on the location of the loss of containment event, a third party damage leading to a gas leak may result in loss of supply to greater than 1,100 customers (as per the operational consequence definition from the Jemena Group Risk Management Manual).

The typical threats considered for Category 1 in the Risk Assessment are as follows:

- The gas escape ignites, resulting in injuries to the public and third party property damage.
- A secondary main feeding two SRSs with no isolation valve in between. A hit on the secondary main may result in both SRSs losing supply, affecting over 1000 customers.
- A back-fed Secondary main supplying a single feed medium/low pressure network via an SRS. A hit on the secondary main near the SRS may result in a loss of supply to over 1000 customers.

The untreated risk level of the identified threats for Category 1 locations are:

Table 2: Category 1 Risk Score (As per Jemena Group Risk Management Manual)

Consequence	Likelihood	Risk Score
Severe	Possible	Significant

The typical threats considered for Category 2 in the Risk Assessment are as follows:

- Secondary mains that have a depth of cover less than 600mm have a higher chance of being hit than mains with a deeper depth of cover. A hit on the main could result in a loss of supply of over 1000 customers. A separate project has already been created to identify all shallow Secondary mains within HDCU areas and have them relocated to a deeper depth. Any shallow Secondary mains that are unable to be relocated will be captured in this risk assessment.
- Road crossings are susceptible to roadworks and other forms of construction, increasing the likelihood of a hit. This could result in a loss of supply of over 1000 customers.
- Roadworks hitting a shallow main, causing a gas escape and igniting.
- A line valve that is a significant distance away from an SRS does not offer protection to the SRS if there is a hit in between the two assets. This could result in a loss of supply to up to 1000 customers.

The untreated risk level of the identified threats for Category 2 locations are:

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

Consequence	Likelihood	Risk Score
Severe	Possible	Significant

The typical threats considered for Category 3 in the Risk Assessment are as follows:

- A hit on the secondary main results in the loss of supply to an SRS, however the network is well backfed such that the number of customers that lose supply is less than 1000.

The untreated risk level of the identified threats for Category 3 locations are:

Table 4: Category 3 Risk Score (As per Jemena Group Risk Management Manual)

Consequence	Likelihood	Risk Score
Minor	Likely	Moderate

2.2.2 REVIEW OF RISK MITIGATION MEASURES

Jemena is required to demonstrate that the Secondary Mains Network integrity is monitored, assessed and maintained in accordance with AS/NZS4645.1 and AS/NZS4645.2 to ensure continuous safe operation. This project was identified to achieve compliance with the above Australian Standards and Gas Supply (Safety and Network Management) Regulation 2013.

Procedural Measures:

Several procedural measures have been established to control the threats to asset integrity and public safety.

Jemena has registered with the One Call provider “Dial Before You Dig”. The Occupation Health and Safety legislation requires all parties working on or near the networks to make contact with the “Dial Before You Dig” service prior to commencing work. Advice is then returned to the parties if any network infrastructure is in the

vicinity of where they will be working. The service also arranges a Jemena representative to carry out pipe location and supervision as required.

Pipeline patrol officers exercise 'duty of care' for underground gas assets and are empowered to stop work near underground gas assets if he/she believes there is credible threat to safety of the public and threat to asset by invoking the Work Health and Safety Act 2011 (section 19) and Work Cover Guideline - Work Near Underground Assets 2007 and also provisions under Gas Supply (Safety and Network Management) Regulations 2013. They can also issue, where necessary under the Gas Supply Act 1996 section 50A a written notice to modify work where the network operator has reasonable cause to believe that the carrying out or proposed carrying out of excavation work in, on or near its gas works:

- could destroy, damage or interfere with those works, or
- could make those works become a potential risk to public safety

In addition to the above, a "Stand-By" service is provided where a third party has notified Jemena of a proposed activity in the vicinity of the Jemena Secondary Mains Network. A Jemena stand-by officer attends the third party construction site and monitors the construction activities near the Jemena assets to ensure the works do not cause a interfere or damage the assets.

Gas Main marking is maintained along the Secondary Mains Network route so that the gas mains can be properly located and identified from the air, ground or both as appropriate to each particular situation. The markers conform to the requirements of AS/NZS4645.1 and AS/NZS4645.2.

Jemena maintains emergency services engagement (where applicable) at the district and local levels through attendance of emergency management committee meetings in accordance with Emergency Management Australia Guidelines.

Persons responsible for promoting consumer education and awareness may include but is not limited to the relevant Field Managers, Dial Before You Dig Co-ordinator, Pipeline Patrol Officer and/or Land Services representatives. Relevant responsibilities include ensuring that relevant stakeholders are made aware of the dangers associated with a gas network.

Physical Measures:

These measures originate from the Jemena design basis manual and they are designed to protect the gas main against physical damage.

Pipe wall thickness is sufficient to protect against external damage. A further protection for the pipe is the HDPE coating and a cathodic protection system, which are seen as the last line of defence when all procedural measures fail. This protection measure is adequate.

Depth of cover is another physical measure which aims to create a separation distance between construction activities and the gas main. However if a gas main is at shallow depth, as demonstrated with the Martin Place incident, damage to the main and consequent gas escape is a significant risk to public safety and can result in a loss of supply. The proposed project is to minimise the loss of supply in the event of a similar incident.

2.3 PROJECT SCOPE

To address and accurately quantify the identified threats, a Secondary Line Valves Investigation is proposed as Stage 1 of this Risk Mitigation Project. The purpose of this project is to articulate good asset management planning, improving public safety, and minimising loss of supply. Therefore, instead of taking a blanket approach Jemena has considered seeking more information regarding HDCU areas within the Secondary Mains Network and identifying existing secondary line valves to make a more prudent and informed decision.

The Shallow Secondary Mains project will investigate and confirm the location of all Secondary mains and valves within HDCU areas, as well as their existing depth of cover. The Secondary Line Valves project will be able to use this data to help determine suitable locations for additional valves.

As part of the Stage 1 following activities will be undertaken:

Table 5: Stage 1 Summary

	Data Source	Action	Outcome
1.	SRS locations within HDCU areas	Simulate a hit on the secondary main near each SRS.	Identify secondary mains where a hit could be a significant safety risk, or cause a loss of supply to over 1000 customers but could have been avoided.
2.	Shallow mains and road crossings in HDCU areas	Using data from the Shallow Mains Investigation, simulate hits on a shallow main and road crossings.	Identify secondary mains where a hit could be a significant safety risk, or cause a loss of supply to over 1000 customers but could have been avoided.

2.3.1 CATEGORY 1 LOCATIONS

The assessment utilising the depth of cover survey data listed above in Table 5 will identify the locations where the gas main is located in a High Density Community Use Area (HDCU) and supplying an SRS, with a potential loss of supply to over 1000 customers. The locations will be reviewed to determine if the loss of supply could be minimised or avoided.

The proposed rectification for Category 1 is to install secondary line valves if it is possible to minimise a loss of supply.

2.3.2 CATEGORY 2 LOCATIONS

The assessment around shallow mains and road crossings will identify the locations where the gas main is located in a HDCU Area with the potential for a loss of supply to over 1000 customers. Majority of these locations will be covered under the Shallow Secondary Mains project.

The proposed rectification for the Category 2 is to secondary line valves if it is possible to minimise a loss of supply.

2.3.3 CATEGORY 3 LOCATIONS

The assessment will also identify the locations where the gas main is located in HDCU areas but the potential loss of supply is less than 1000 customers.

This scenario does not require further rectification.

2.4 ASSUMPTIONS

The following are the list of assumptions taken into consideration while undertaking the options analysis.

Table 6: List of Assumptions and Constraints

#	Assumption / Constraint	Description	Applicable to Category
1.	Constraint	All valves are to be installed in the footpath, not in the road.	All Categories
2.	Assumption	All isolation valves are in good working order.	All Categories
3.	Assumption	There is adequate space to install the additional valves.	All Categories
4.	Assumption	The average cost to install a valve is $75k.	All Categories
5.	Assumption	The GIS and Synergi data is correct	All Categories
6.	Assumption	There will be no objections from other utilities and local councils, and all approvals will be granted in a timely manner.	All Categories

3. CREDIBLE OPTIONS

The following credible options were identified:

- Option 1: Maintain Status Quo – retain the existing unacceptable risk level
- Option 2: Implement Secondary Line Valves Investigation and Rectification Project – Sydney CBD
- Option 3: Implement Secondary Line Valves Investigation and Rectification Project – Secondary Network

The credible options are explained in detail below.

3.1 OPTIONS ANALYSIS

The following feasible options could be used to address the business need, problem or opportunity.

3.1.1 OPTION 1: MAINTAIN STATUS QUO

This option does not account for further action and considers to continue operating the Secondary Mains Network in its existing risk profile. Emergency crews shall continue to depend on existing valves to throttle the main in the event of a gas escape.

Benefits

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

Drawbacks

The main drawback is that the risk profile for this option is rated as Significant. The Martin Place incident has demonstrated a weakness in the current control effectiveness.

The Secondary Network at locations, where a hit cold result in the loss of supply of over 1000 customers, would not be in conformance with AS/NZS4645.1 in terms of the number of customers that may be affected by a shutdown. The total cost relating to a hit on the main could be in the millions of dollars.

3.1.2 OPTION 2: SECONDARY LINE VALVES INVESTIGATION AND INSTALLATION PROJECT – SYDNEY CBD

This option will use the data from the Shallow Secondary Mains project and other sources to help identify key locations within the Sydney CBD for the installation of secondary valves.

There is approximately 27km of Secondary mains within the Sydney CBD, supplying around 26,000 customers. Initial investigations have identified 14 sections of Secondary main which require a Secondary line valve. The approximate locations for these valves are shown in red in the figure below.

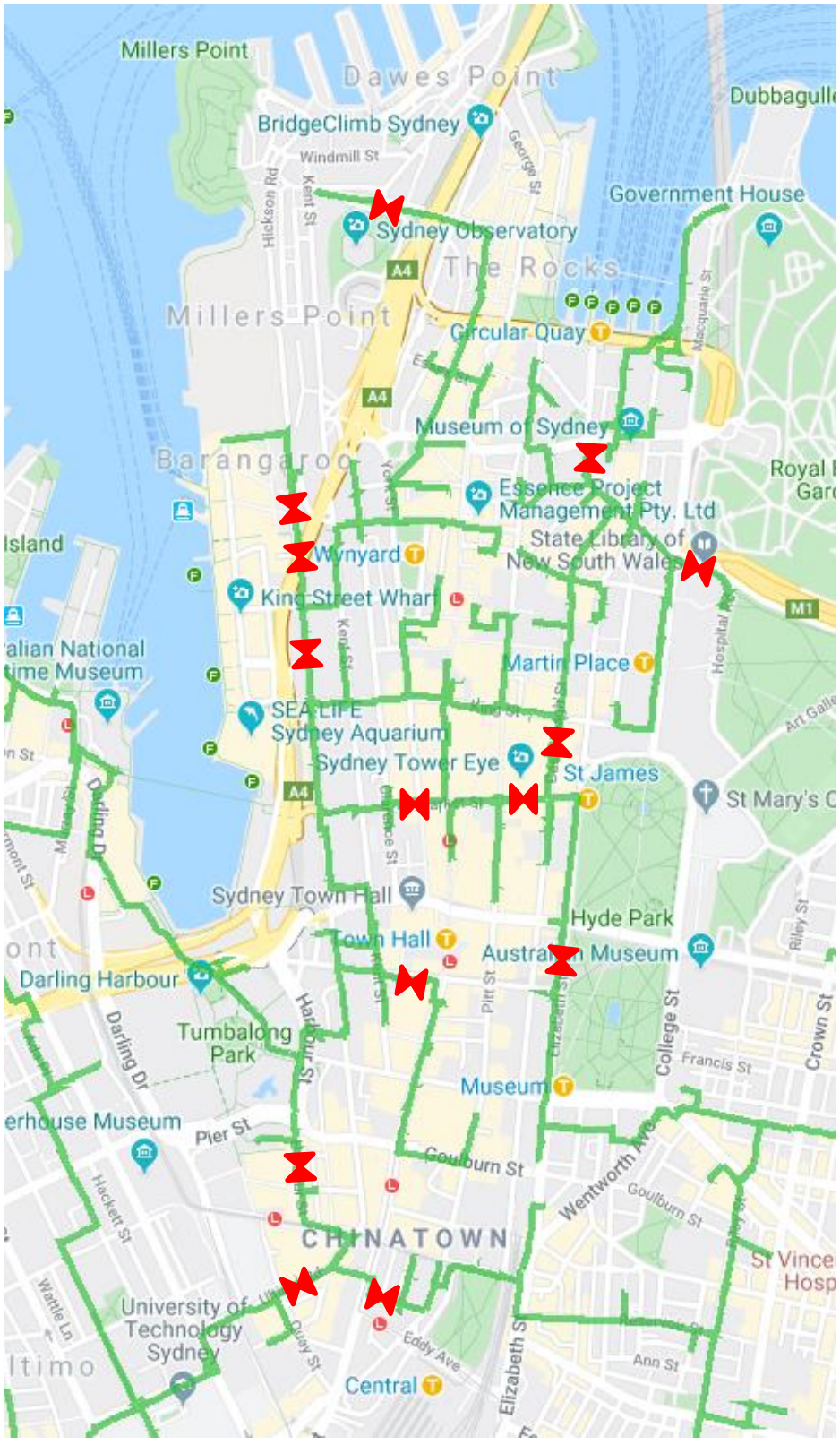

Figure 2: Proposed additional Secondary valves in the Sydney CBD

Benefits

The installation of secondary line valves will reduce the safety risk of a uncontrolled gas escape igniting and reduce the loss of supply in the event of a hit on a secondary main. Hence by adopting this option, the likelihood of the risk to the public, loss of supply, and Jemena reputation will be reduced and the overall risk rating will be reduced from Significant to Moderate.

Drawbacks

Expected drawbacks of this option are:

- Significant execution difficulty – multiple buried services around all the affected locations. Space may be restricted for valve installation.
- Delays to construction due to other utilities, council and RMS approvals.
- Disturbance to community and environment during construction.
- Significant capital expenditure will be required to execute the works.
- The expected cost of implementation is approximately $1.125M (total cost for Stages 1 and 2) based on recent secondary valve installation costs across the Sydney metropolitan areas.

3.1.3 OPTION 3: SECONDARY LINE VALVES INVESTIGATION AND INSTALLATION PROJECT – SECONDARY NETWORK

This option will use the data from the Shallow Secondary Mains project and other sources to help identify key locations in HDCU and sensitive areas across the entire Sydney Secondary network for the installation of secondary valves.

There is approximately 1,500km of Secondary mains within the Greater Sydney area. It is proposed to install 50 Secondary line valves across the Sydney Secondary network (averaging 1 additional valve for every 30km of Secondary main). The majority of the locations where the additional valves would be installed include:

1. CBD areas (eg. Sydney, North Sydney, Chatswood, Parramatta, Macquarie Park)
2. High density residential areas (eg. Zetland, Alexandria, Sydenham, Auburn, Wolli Creek, Westmead)
3. Near sensitive locations (eg. hospitals, schools, sporting venues, train stations)

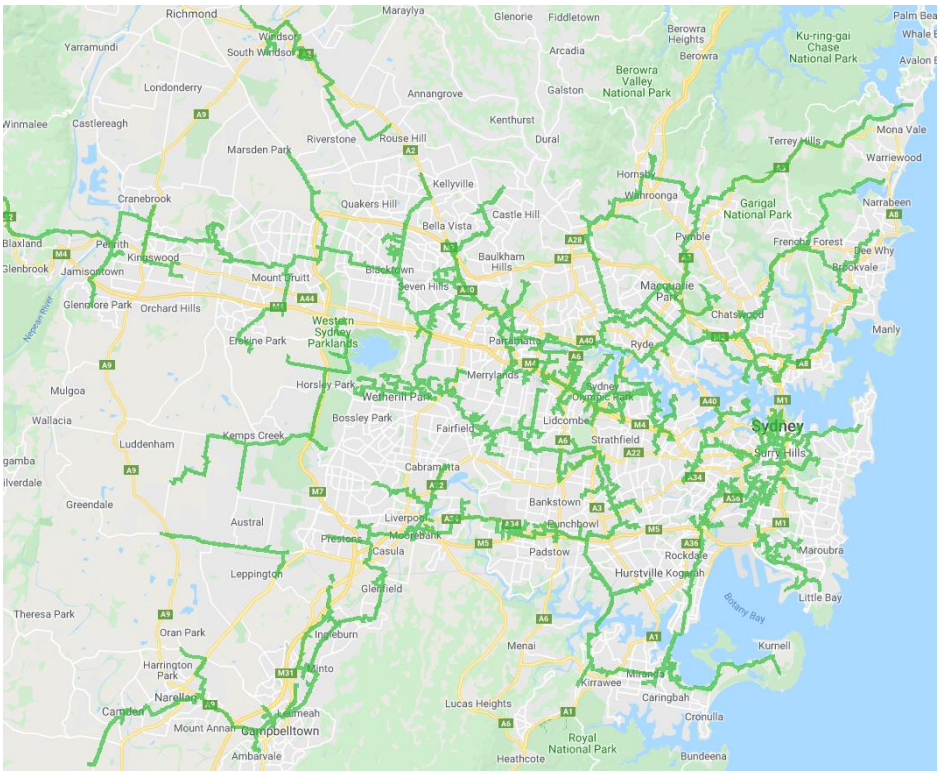

Figure 3: The Greater Sydney Secondary Network

Benefits

The installation of secondary line valves will reduce the safety risk of a uncontrolled gas escape igniting and reduce the loss of supply to customers in the event of a hit on a secondary main. Hence by adopting this option, the likelihood of the risk to the public, loss of supply, and Jemena reputation will be reduced, and the overall risk rating will be reduced from Significant to Low.

Drawbacks

Expected drawbacks of this option are:

- Significant execution difficulty – multiple buried services around all the affected locations. Space may be restricted for valve installation.
- Delays to construction due to other utilities, council and RMS approvals.
- Disturbance to community and environment during construction.
- High capital expenditure will be required to execute the works.
- The project will be resource intensive.
- The expected cost of implementation is approximately $3.825M (total cost for Stages 1 and 2) based on recent secondary valve installation costs across the Sydney metropolitan areas.

3.2 RISK ASSESSMENT

A summary of the risk assessment outcome based on the options discussed in Section 3 is provided in Table 7 below:

Table 7: Risk Assessment Mitigation Summary

#	Options	Third Party construction works damage risk score	Comments
1	Maintain Status Quo	Significant	With existing controls
2	Investigation and Installation – Sydney CBD	Moderate	Reduces the risk within HDCU areas
3	Investigation and Installation – Secondary Network	Low	Reduces the risk across the Secondary Network

3.3 COMPARISON OF OPTIONS

Table 8: Options summary including risk, benefits and cost

Criteria	Option 1	Option 2	Option 3
Option description	**Maintain Status Quo**	**Investigation and Installation Project – Sydney CBD**	**Investigation and Installation Project – Secondary Network**
Operational	Loss of supply to over 1000 customers	Minimises the loss of supply to less than 1000 customers	Minimises the loss of supply to less than 1000 customers
Compliance to AS/NZS4645	Non-Compliant to AS/NZS4645 sectional isolation requirement	Meets compliance effectively	Meets compliance effectively
Control Effectiveness	Current controls are not adequate for a potential hit on a main.	By implementing the additional controls (i.e. installation of line valves), risk would be mitigated	By implementing the additional controls (i.e. installation of line valves), risk would be mitigated
Strategic benefits	Impact on Jemena investment & preventing it from achieving its strategic objectives relating to supply & compliance)	Provides long term solution for mitigating risks in HDCU areas	Provides long term solution for mitigating risks across the Secondary Network
Delivery constraints	None	Delays to construction due to approvals from other utilities and council. Disturbance to community and environment during construction. There may be insufficient space to install the valve.	Delays to construction due to approvals from other utilities and council. Disturbance to community and environment during construction. There may be insufficient space to install the valve. Resource availability. High capital expenditure.
Treated Risk Ranking	Significant	Moderate	Low
Cost Estimate	$0	$1.125M	$3.825M
Option Analysis	○ Does not address the issue	● Addresses the issue for the Sydney CBD only	● Fully addresses the issue for the entire Sydney Secondary network
Recommendation	Not Recommended	Recommended	Not Recommended

4. RECOMMENDATION

4.1 RECOMMENDED SOLUTION

4.1.1 SECONDARY LINE VALVES INVESTIGATION AND INSTALLATION PROJECT – SYDNEY CBD

In order to reduce the safety risk of a uncontrolled gas escape igniting and to reduce the loss of supply to customers from a hit on the main, the installation of secondary line valves within the Sydney CBD is recommended. Installing secondary line valves will aid in public safety and the continuity of supply in the event of a hit.

Limiting the project to the Sydney CBD will achieve the requirements of reducing the level of risk in this critical area, while remaining economically prudent.

4.2 SCOPE

4.2.1 STAGE 1

Stage 1 of the project will be the investigation phase, which aims to identify the locations and quantify the extent of the two Categories of assets, which would require secondary line valves.

To be able to achieve the above aim, the following data sources will be used and also the data will be validated.

- Shallow Secondary Mains Investigation: The data gathered from this investigation will identify where the shallow mains exist which help determine if it is a category 2 main.
- GIS: Using the locations of SRSs as a guide, this will help determine the number of customers being supplied from a particular secondary main.
- Synergi: This desktop application can simulate the loss of supply to an SRS due to a hit on the secondary main supplying the SRS. By turning off an SRS, we will be able to see the effect it has on the distribution network.
- SAP Records: Where a secondary service is present, the SAP records will be able to give an indication of the number of customers connected to the service, which would help determine the need for a secondary line valve.

4.2.1.1 Project Delivery Timeline:

CY20:

This will involve the following steps:

- Assign a Project Manager
- Conduct Data collection actions as per above scope

4.2.2 STAGE 2

Stage 2 of the project will be the installation phase, which aims to install secondary line valves at the locations identified in stage 1.

The location for the installation of secondary line valves shall be in the road reserve to enable easy access in the event of an emergency. In most cases, the location for the valve installation will be back-fed, therefore there will be no interruption to the gas supply during installation.

A typical scope for a valve installation would include the following steps:

- DBYD, local authority notifications, traffic control, site preparation
- Excavation
- Welding of two stopple fittings
- Hot-tap and stopple of the gas main, cut existing pipe.
- Place and weld valve into position
- Remove stopples to allow the flow of gas

In some instances, the location of the secondary line valve will be a single feed which means a relocation is required. A typical scope would include the following steps:

- DBYD, local authority notifications, traffic control, site preparation
- Excavation
- Welding of two three-way stopple fittings
- Constructing the relocated part of the main and valve, and tie-in to the three way tees
- Hot-tap and stopple of the gas main at the tie-in locations, cut and cap existing pipe.

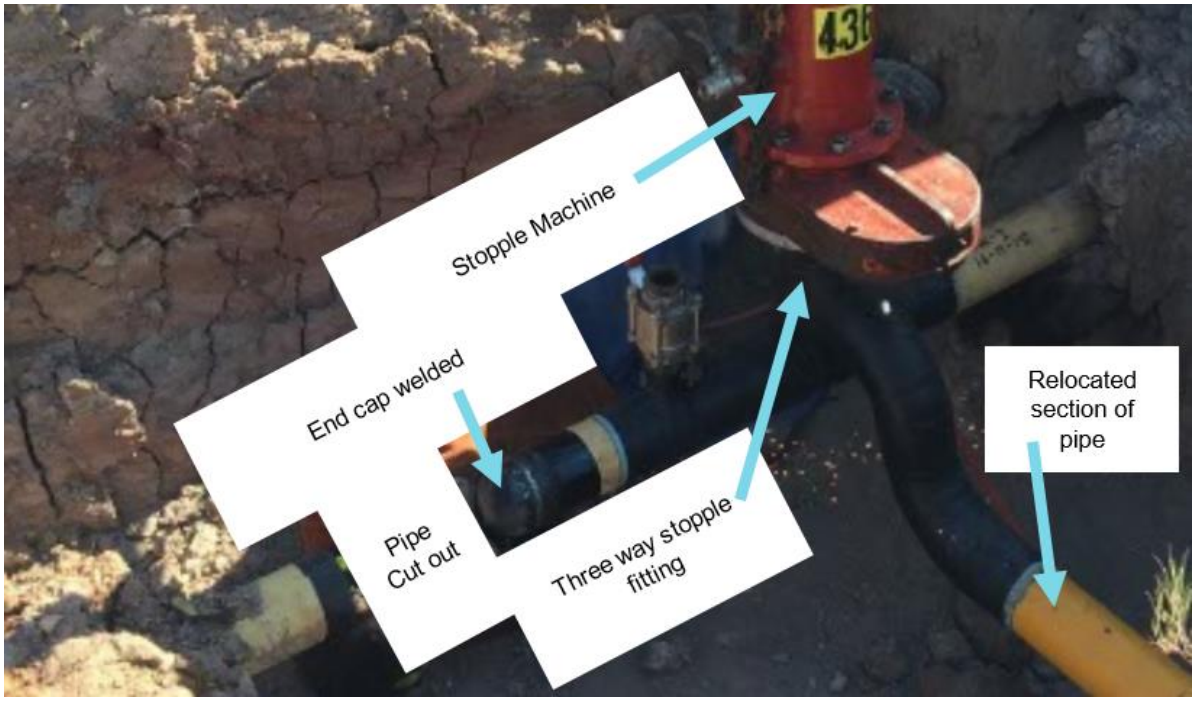

Figure 4: Installation of a three-way stopple

4.2.2.1 Project Delivery Timeline:

CY20 – CY23:

This will involve the following steps:

- Assign a Project Manager
- Initiate valve installation works for Category 1 and 2 Locations
- Record all map adjustments and hand over to GIS team for updating GIS records

4.2.2.2 Constructability

Valve Installation - The installation of valves shall include the installation of gauge points and syphon stones as per the Jemena Secondary Construction Manual

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

4.2.2.3 Approvals

Approval must be obtained for major governing authorities. 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
- RMS - Notification and/or approval of integrity dig works in road corridor
- Transport for New South Wales

4.2.2.4 Other project considerations

The external contractor shall manage the site and stakeholders:

- Traffic Management – Check the setback distances from the worksite to the main road. Determine access to the site so that traffic flow can be managed during the works.
- Pipelines and/or other Utilities – Check if there are any parallel or crossing pipelines and/or utilities in vicinity of the work. Coordinate with other utilities.
- Stakeholder Management – Liaison with the local community, residents, Rail Corporation (Sydney Trains), Transport New South Wales, Council and Roads & Maritime Services.

4.3 COST DETAILS

4.3.1 COST METHODOLOGY

For stage 1, $75k has been allocated to go towards the initial investigation work, preparing the detailed scope of works for each valve installation, planning, and all other associated PM costs.

A cost estimate of $75k for the installation of each secondary line valve is based on similar projects delivered by Jemena in the past. The total cost for stage 2 for the installation of 14 valves is $1.05M.

4.3.2 SUMMARY OF COST ESTIMATION

The summary of the cost estimate is provided below:

Table 9: Cost Estimate ($000)

	2020	2021	2022	2023	TOTAL
Stage 1 - Investigation	**75**				**75**
Stage 2 - Installation		**375**	**450**	**225**	**1,050**
Total Cost	**75**	**375**	**450**	**300**	**1,125**

5. REFERENCES

5.1 INTERNAL

1. Jemena Group Risk Management Manual

5.2 EXTERNAL

1. Australian Standard AS/NZS4645.1
2. Australian Standard AS/NZS4645.2
3. Work Health and Safety Act 2011
4. Work Cover Guideline - Work Near Underground Assets 2007
5. Gas Supply Act 1996
6. Gas Supply (Safety and Network Management) Regulation 2013

6. APPENDICES

APPENDIX A SECONDARY NETWORK 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**
Unauthorised works (rock breaker/vertical auger) causing a gas leak (up to 50mm hole)	N/A	Minor	Severe	Severe	Serious	Serious	○ **Operational** - Loss of supply to over 1100 customers. ○ **Safety –** Medical aid required for members of the public.	Severe	Possible	Significant
PREFERRED OPTION – Risk assessment summary								**TREATED RISK SUMMARY**		
Preferred Option/Treated risk	Cost		Benefit				Key Mitigations	Consequence	Likelihood	Risk Level
Option 2 – Investigation and Installation of Secondary Line Valves – Sydney CBD	$1.125M		This option will: - Reduce the loss of supply to customers. - Reduce the risk to the public and nearby properties.				○ Reduces loss of supply. ○ Best long term risk reduction option.	Serious	Possible	Moderate