Business Case – Capital Expenditure

Actuation of MLV in Dandenong to W. Melbourne Pipeline (T16)

Business Case Number 250

1 Project Approvals

TABLE 1: BUSINESS CASE – PROJECT APPROVALS

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Approved By	Craig Bonar, *Manager East Coast Grid Engineering, APA Group*

2 Project Overview

TABLE 2: BUSINESS CASE – PROJECT OVERVIEW

Description of Issue/Project	The actuation of all main line valves in populated areas There are 16 main line valves on the Dandenong – West Melbourne pipeline that traverses residential areas. This project is to install actuators on these valves to decrease the time to close the valves during an emergency and to reduce the occupational manual handling risks.
Options Considered	The following options have been considered: 1. Option 1: Do Nothing Option 2. Option 2: Installation of Local Actuators 3. Option 3: Installation of Remotely Controlled Actuators
Proposed Solution	Option 4: Installation of Remote Actuators at Selected Valves
Estimated Cost	$1,913,421
Consistency with the National Gas Rules (NGR)	The upgrade of these assets complies with the new capital expenditure criteria in Rule 79 of the NGR because: • it is necessary to maintain and improve the safety of services and maintain the integrity of services (Rules 79(2)(c)(i) and (ii)); and • it is such as would be incurred by a prudent service provider acting efficiently, in accordance with accepted good industry practice, to achieve the lowest sustainable cost of providing services (Rule 79(1)(a)).
Stakeholder Engagement	The stakeholders whom benefit are: • Gas Market, from faster reaction to supply events • Landowners from reduced safety risk • Personnel from reduced occupational health and safety risk

3 Background

The 16 mainline valves on the Dandenong to West Melbourne Pipeline (T16) are buried, and located under the carriageway. The area is broadly categorized as Residential (T1) in AS 2885.1, and involves higher risks for both the pipeline and landowners in the vicinity to the pipeline due to the built up nature of the area. The valves are manually operated and are mostly located in the roadway, requiring APA staff to enter the 'confined space' pits through heavy Gatic vehicle strength covers to operate them. All of these factors increase the time taken to operate the valve in an emergency.

A significant pipeline leak or a rupture in a Residential (T1) area has the potential to destroy property and involve multiple fatalities. The pipeline is segregated into small sections of a few kilometers (three to five kilometers) using the valves, however due to the compressible nature of the gas even with valves shut decompression can be a lengthy process typically taking hours, throughout which gas continues to escape at the point of failure and burn if ignited.

The San Bruno pipeline failure in California generated criticism of Pacific Gas & Electric (PG&E). Their system also had manual line valves; these took 95 minutes for staff to turn off in response to the rupture. Due to traffic and travel distances this would appear to be comparable with APA's best efforts for the parts of the pipeline closer to the Melbourne area.

As evidenced at San Bruno, manually operated gas valves are not immediate shut-down opportunities, similar to water valves. Gas continued burning hours after the rupture and initial fireball.

The importance of quicker response times is shown by PG&E who since the event have embarked on an aggressive safety improvement program including:

- The automation and remote control of 161 main line valves to reduce the consequences of a loss of containment

PG&E are now leading the industry on best practice for their replacement and upgrade program of pipelines in high consequence areas.

The Dandenong to West Melbourne Pipeline is similarly located in a heavily populated area and requires only one tenth of the valves to be isolated than the PG&E transmission network.

4 Risk Assessment

The primary untreated risks are:

- Operator injury from closure of valves in emergency and maintenance activities
- Escalation of consequences from a loss of containment event

TABLE 3: RISK RATING

Risk Area	Risk Level
Health and Safety	**Moderate**
Environment	**Low**
Operational	**Low**
Customers	**Low**
Reputation	**Moderate**
Compliance	**Low**
Financial	**Moderate**
Final Untreated Risk Rating	**Moderate**

The mainline valves are manual and are normally only operated during maintenance activities. They are though primarily installed to provide smaller sections for emergency shut-downs, greatly reducing the loss of inventory and the blow-down time. They need to be readily accessible, which isn't always the case with their location being in carriageway pits, and they need to be fully operable at that time.

Access to all of the underground valves involves the removal of large heavy Gatic pit covers and confined spaces processes. Some are located in the parking lane which can create access difficulties, especially if a vehicle is parked on top of the access cover. The physical operation of the valves is laborious with approximately 300 turns of the hand wheel under awkward conditions to move the valve from the fully open to the fully closed position. This work is physically difficult and presents the potential risk of strain injury under normal circumstances and during the

urgency and commotion of a pipeline rupture there is a potential for a staff member to be badly injured either whilst entering the pit or whilst operating the valve.

5 Options Considered

5.1 Option 1 – Do Nothing

The 'Do Nothing' option is not considered appropriate. The risk of injury operating the valves under normal and emergency conditions and the perceived delays involved with manually operations make the do nothing option unsatisfactory.

5.1.1 Cost/Benefit Analysis

The only benefits to the Do Nothing option are the deferred capital. No risk reduction would be achieved.

5.2 Option 2 – Installation of Remote Actuators

The installation of a remote actuator would eliminate the manual aspects of the valve handing and also will eliminate the need of APA personnel attending site to operate the valve. As mentioned before, the Safety Management studies concluded that remote actuation of Main Line Valves (MLV) whilst being desirable does not greatly reduce the risk or improve the outcomes of a pipeline catastrophe.

5.2.1 Cost/Benefit Analysis

Option 2 achieves the desired reduction in Occupational Health and Safety (OH&S) risks for the staff. This is a significant improvement; however the following are the reasons for rejecting this option

- The benefit of having Remote Actuation is not significant in case of a Pipeline Catastrophe.
- Adding remote actuation would mean adding of an RTU Cabinet; this would mean installing the Cabinet in an open Area as the Pits are not large enough to accommodate an RTU Cabinet. This would also mean procuring Power and communications.
- Adding RTU cabinet requires conduits and above ground housing. This is grossly expensive in various cases due to the valves being located in a road which will cause the conduits, power supplies and cabinet construction to be located separate to the valve pit.

The costs of this option are at least 120% of the preferred option and the benefit is not increased significantly in comparison.

5.3 Option 3- Installation of Local Actuators

The installation of a local actuator would eliminate the manual aspects of the valve handing. Properly engineered solution will eliminate the need of the personnel to go in the pit and the valve shall be able to operate without taking out the Gatic cover as well. This will significantly reduce personnel effort and also reduce other outcomes emerging out of a pipeline rupture.

5.3.1 Cost/Benefit Analysis

Option 3 achieves an optimum reduction in OH&S risks for the staff and a significant benefit to the general public as well. Following are the reasons to accept this option:

- The addition of actuators shall not affect the present physical structure of the valve pits or the valves except addition of an actuator
- The actuators shall use gas as the motive power for actuation reducing the risk of loss of motive power

- The main line valve shall be able to operate without any physical effort and manual operation shall still be available in case of actuator failure
- The ability to operate valves in an emergency should a vehicle be parked over the valve pit

5.4 Summary of Cost/Benefit Analysis

TABLE 4: SUMMARY OF COST/BENEFIT ANALYSIS

Option	Description	Costs
Option 1	Nil	$0
Option 2	Installation of remote actuators	$3,341,488
Option 3	Installation of local actuators only	$1,900,000
Option 4	Installation of remote actuators at select valves	$1,913,421

5.5 Proposed Solution – Actuate one in four MLV

5.5.1 What is the Proposed Solution?

The proposed solution is to install remotely operable actuators to one in four existing MLV. This will rapidly reduce the time during emergency. This will reduce the consequences of a rupture event and eliminate the OH&S risks during an emergency and maintenance.

PG&E after its disastrous incident have adopted a similar strategy effectively establishing a best practice and have installed over 160 actuated valves since their incident.

5.5.2 Why are we proposing this solution?

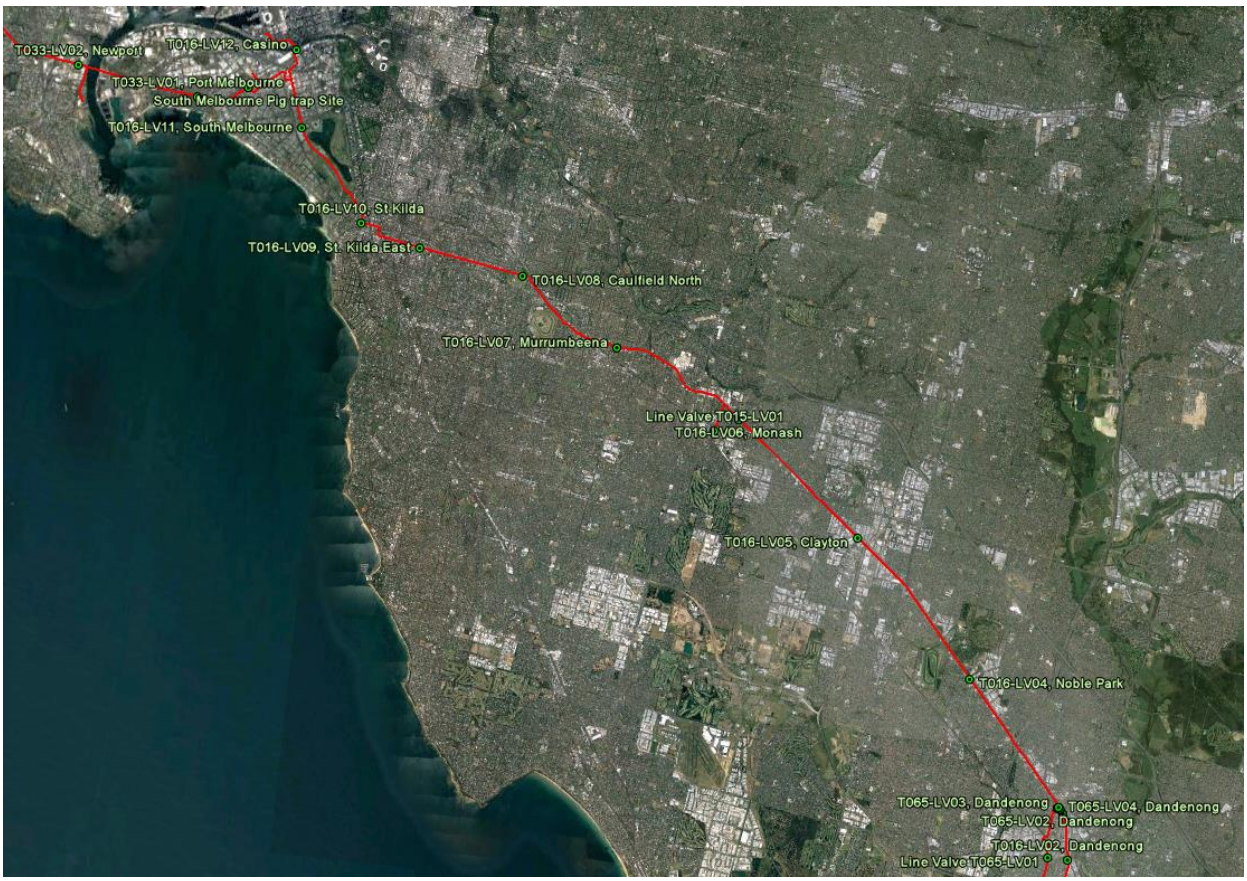
Whilst a rupture on the T16 pipeline is hypothetical, the event is possible. This solution will deliver fast and effective response to an incident occurring on the pipeline whilst limiting the other consequences such as loss of supply.

The PG&E actions following the incident at San Bruno have demonstrated that installing actuators on MLV is good industry practice.

The benefits are:

- the elimination of OH&S risks from manual handling during maintenance and emergency for the selected valves
- the reduction in consequence of a catastrophic incident by reducing the amount of time the ignited gas burns. The consequence reduction would be mainly property damage reduction.
- Reduces the likelihood and severity of litigation post incident

The Dandenong to West Melbourne pipeline is shown in the below aerial photography. The route mainly follows the Princes Hwy, one of Melbourne's most important arterial roads and passes through almost entirely high consequence areas including Chadstone Shopping Centre, Albert Park, Docklands and the Casino precinct.



5.5.3 Consistency with the National Gas Rules

Consistent with the requirements of Rule 79 of the National Gas Rules, APA considers that the capital expenditure is:

- Prudent – The expenditure is necessary in order to maintain and improve the safety of services and personnel and is of a nature that a prudent service provider would incur.
- Efficient – The installation of actuators and associated equipment is a common occurrence and is designed and operated for this purpose
- Consistent with accepted and good industry practice – Addressing the risks associated with a catastrophic event and to eliminate certain occupational health and safety risks.

5.5.4 Forecast Cost Breakdown

Assumptions

The following are the assumption for this Business Case:

- The cost of labour is steady for the duration of the project
- APA shall receive scheduled shutdowns to do the installation
- APA shall be able to source the required actuators within reasonable time to do the project
- Cost of hardware remains steady for the duration of the project

TABLE 5: PROJECT COST ESTIMATE,

	Total
Internal Labour	**$399,360**
Materials	**$1,194,608**
Contracted Labour	**$307,520**
Other Costs	**$11,933**
Total	**$1,913,421**