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Project:	Gurner Avenue, A	Austral	
Document:	Jemena Licence 1 Land Use Change	and Eastern Gas Pipeline Safety Management Study	
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1 Introduction

1.1 General

Landcom and the Office of Strategic Land (OSL) are partner developers for the 48.77 hectare site located at Gurner Avenue, Austral, within the Liverpool City Council Local Government Area. The area is undergoing a transformation from market gardens and agriculture to small lot housing.

Two high pressure gas pipelines, Licence 1 Central Trunk (Lic 1) and Eastern Gas Pipeline (EGP), traverse through the development site towards the eastern boundary. Gas facilities within the development site also include main line isolation valves and vents.

A Safety Management Study (SMS) for this change in land use is required according to AS/NZS 2885.6-2018. This SMS has included a facilitated validation workshop, as required by the Australian Standard AS/NZS 2885.6-2018.

The scope of this SMS has been to review the proposed development in the context of Land Use Change and to identify any additional protection measures or controls required on the pipeline or associated facilities or restrictions on the development to meet AS2885 safety requirements.

Asset Engineering Solutions (AES) has been contracted by Landcom to carry out a Land Use Change Safety Management Study.

1.2 Purpose and Objectives

The purpose and objectives of a Land Use Change SMS as according to AS/NZS 2885.6-2018 Clause 5.5.2 are:

- To inform the stakeholders of the requirements of the AS 2885 suite of standards.
- Identify additional protective measures or facility modifications, if any, that might be required, so risk remains as low as reasonably practicable (ALARP) with changed surroundings
- Review proposed development plans to determine whether they can be optimised to mitigate risks to ALARP, if required
- Manage construction activities near the pipeline.

1.3 Document Scope

This document presents the initial outcomes of the Safety Management Study (SMS) which has addressed all aspects of the Gurner Avenue Austral Development with the potential to impact on the JGN Licence 1 Central Trunk and Eastern Gas Pipelines (EGP).

This SMS is not complete until all actions identified from this SMS (Section 6.6) have been completed to the satisfaction of Landcom and Jemena and it has been documented that all residual risks have been reduced to an acceptable level in accordance with AS/NZS 2885.6-2018.



2 Austral Development Description

The following information is a summary of the information provided by workshop participants and presented in the workshop. Only the information considered relevant to the pipelines is reported in this section. The full information provided for the workshop is attached in the Appendix 1.

2.1 Location

The Site comprises of land owned by OSL located at 75 Gurner Avenue, Austral in the Liverpool Local Government Area. The site is an irregular shape with a long access handle to Gurner Avenue and comprises an area of approximately 48.77 hectares. The Site is located on the northern side of Gurner Avenue, and part of the Site on the southern boundary has direct frontage to Gurner Avenue.

Austral is split into two developable areas – east and west - divided by Kemps Creek in the center of the Site.

The site is bounded to the south by a developed residential area; to the north by land zoned for urban development and Kemps Creek Nature Reserve, which is part of the Western Sydney Parkland; and to the east by Western Sydney Parkland with the potential for the development of a sporting precinct.

The site location is shown below in Figure 1.



Figure 1: Site Location

2.2 Land Use Description

The plan provides for 339 new dwellings in a range of formats. Typical lot sizes are in the order of 300-500m², with larger lots in the order of 2000m² located on the eastern side of the site overlaying the gas pipeline easement. The layout is shown in Figure 2.



Figure 2: Masterplan Overview



In accordance with AS/NZS 2885.6, this land use corresponds to a T1 - Residential category.

There are no Sensitive land use areas, as defined by AS/NZS 2885.6, directly associated with the development although the plans incorporate a large lot with the possibility of a child care centre located in the western development, approximately 520m from the pipelines. While this would be subject to a future Development Application, it was concluded that this centre at this offset this would likely not invoke a land use change to "Sensitive" due to the offset distance.

2.3 Associated Infrastructure

New infrastructure crossing the gas pipelines will be limited to two new roads with possible associated utilities (power, communications, sewer, stormwater drainage lines). No other new infrastructure will be located within the pipeline easement.



3 Pipeline Description

3.1 Pipeline Details

The following information regarding the Licence 1 and EGP were made available for this SMS.

Table 1: Pipeline Parameters

Parameter	Licence 1	EGP
Diameter	854mm	457mm
WT	13.3mm	11.8mm
Grade	X65	X70
МАОР	6.895MPa Note: Limited to MOP 5MPa	14.895MPa
Hoop stress @ MAOP	162MPa (36% SMYS)	288MPa (60% SMYS)
Critical Defect Length	270mm	140mm
Radiation Zones:		
Rupture - 4.7kW/m ²	570m (measurement length)	540m (measurement length)
Rupture - 12.6kW/m ²	350m	330m
50mm Hole - 4.7W/m ²	35m	60m
50mm Hole - 12.6kW/m²	20m	40m
Location Class	T1 (south of ALBV) R2 (north of ALBV)	T1 (south of MLV) R1 (north of MLV)

3.2 Facility Details

The following pipeline facilities are located within the development site:

- Licence 1 Cecil Park ALBV and vent
- EGP Austral MLV and vent

The purpose of these facilities is to provide isolation and blowdown (venting) capability in the event if either planned or unplanned (i.e. emergency) works. These are uncommon events but are possible during the pipeline lifetime, with the possibility that emergency operations could occur at any time. The isolation and venting capacity is a safety requirement according to AS/NZS 2885.1.

Periodic maintenance (approx. 4 time / year) is carried out on the Lic 1 ALBV and vent which includes valve stroking and opening of the vents (Refer to Action 2.8 in Section 6.6.)

3.2.1 Gas Dispersion

A gas dispersion study has been commissioned by Jemena, Ref [5] to determine the extent of the hazardous zones around the vents. The criteria for the hazardous zone has been defined by the 50% LEL contour associated with the 95% wind conditions i.e. 1 in 20 event. This criteria has been based on an emergency situation which cannot be planned in advance and could occur in any environmental conditions.

The overlay of the 50% LEL hazardous zones for each vent and the proposed development plan is shown in Figure 3.



Figure 3: 50% LEL Hazardous Zones



It is noted this Figure 3 has been corrected since the workshop and slightly differs form that shown in the workshop. The figure shows that six (6) house pads currently lie within or intersect with the hazardous zone, reduced from nine (9) identified in the workshop. The presence of the house pads within the hazardous zone was subject to the risk assessment.

3.2.2 Noise Levels

Venting can result in very high noise levels, sufficient to cause hearing damage if within proximity beyond allowable exposure periods. An indication of the noise level from venting operations is provided in Ref [6], which is shown in Figure 4



Figure 4: Noise Level Predictions

The allowable exposure time for various noise levels to cause hearing damage is defined in Ref [7] and shown below in Table 2.



Table 2: Exposure Times for Noise Levels

Noise level dB(A)	Exposure time
80	16 hours ¹
82	12 hours ¹
85	8 hours
88	4 hours
91	2 hours
94	1 hour
97	30 minutes
100	15 minutes
103	7.5 minutes
106	3.8 minutes
109	1.9 minutes
112	57 seconds
115	28.8 seconds
118	14.4 seconds
121	7.2 seconds
124	3.6 seconds
127	1.8 seconds
130	0.9 seconds

For reference, the expected venting time to blowdown from MAOP to approx. 2MPa for either pipeline is in the order of 30-60min.



4 AS/NZS AS2885.1 HCA Requirements

The following section outlines the implications of the change in Location Classification from R1 / R2 to T1 on the High Consequence Area (HCA) requirements as defined in AS/NZS 2885.1. A T1-Residential zone for both pipelines currently exists up to the line break valves, due to the existing development in this area. Therefore, the HCA assessment was only required for the section to the immediate north of the line break valves.

4.1 No-Rupture Requirements

A "No Rupture" Condition is achieved by one of the following:

- 1. The Hoop Stress at MAOP shall not exceed 30% of SMYS.
- 2. The axial length of the largest hole produced by any credible threat at this location is less than 2/3 the critical defect length (CDL).

The land use change to the north of the line break valves does not result in any HCA compliance issues regarding "No-Rupture" since the pipeline conditions (threat types, protection measures) are identical to the T1 zone to the south of the valves. Hence compliance is maintained.

4.2 Energy Release Limits

The energy release limitations for T1 areas are defined below in Table 3.

Table 3: T1- Residential Energy Release Limits

Pipeline	Allowable Hole Diameter (T1 = 10GJ/s)
Licence 1	170mm
EGP	60mm

The land use change to the north of the line break valves does not result in any HCA compliance issues regarding energy release since the pipeline conditions (threat types, protection measures) are identical to the T1 zone to the south of the valves. Hence compliance is maintained.

4.3 Isolation Requirements

AS 2885 requires pipeline isolation valves to be provided to isolate the pipeline system in segments in accordance with the pipeline isolation plan. For T1 location classification, AS2885.1 recommends a maximum spacing of approximately 15 km.

The current maximum segment lengths in this area for both pipelines are in the order of 12km, hence compliance is maintained.

4.4 Signposting

AS 2885 requires pipeline markers to be installed along the route so that the pipeline can be properly located and identified. The recommended sign spacing for T1 areas is 100m, with intervisibity maintained between sign posts.

A marker sign survey will be required along this section to confirm the actual marker post spacing. Additional marker posts may need to be installed by Jemena to satisfy the 100m spacing limit for this new T1 section and provide adequate intervisibility.



5 SMS Review Workshop

5.1 Objectives

The Land Use Change SMS workshop was conducted in accordance with AS/NZS 2885.6 with the objectives as defined in Section 1.2.

In addition, any actions required to mitigate project risks or to clarify requirements were also noted and recorded.

5.2 Attendees

The workshop was held in Landcom Office, Level 14 60 Station St, Parramatta and also via Microsoft Teams on Tuesday 21st June 2022. The workshop attendees, both in person and remote, are listed in Appendix 2.

The participants were considered sufficient to adequately represent the interests of all the stakeholders and provide a robust basis for the threat and risk assessment.

5.3 Methodology

The Workshop commenced by reviewing the following:

- Overview of the Austral development and associated infrastructure works;
- Overview of Licence 1 Trunk and EGP and associated facilities including the vent gas dispersion and acoustic assessments;
- Review of existing and revised Location Classification;
- Review of threats and associated risks associated with the pipelines and proposed Austral development.

Where there were "High" or "Intermediate" risks identified as defined by AS/NZS 2885.6, a review of possible mitigation measures was carried out in the workshop and recorded.



6 Workshop Findings

6.1 General

The SMS Assessment worksheet reviewed and recorded at the Workshop is presented in Appendix 3.

6.2 Location Classification

Workshop participants agreed that the appropriate Location Classification for this development within the measurement length of the Licence 1 Trunk and EGP shall be T1, based on the data provided and as discussed in Sections 2 and 3.

6.3 AS/NZS 2885 High Consequence Area

The participants agreed that the pipelines remain compliant to the HCA requirements based on the current protection control for the land use change to T1 north of the line break valves to a distance equivalent to the measurement lengths.

6.4 Threat and Risk Assessment Results

The threat and risk assessment carried out in the workshop concluded that there was one (1) "High" risk and one (1) "Intermediate" risk associated with the current layout, as defined in Table 4.

Threat Description	Frequency	Severity	Risk
Emergency blowdown of pipeline causing gas dispersion hazardous zone around vents. Hazardous zone based on 50% LEL zone = approx. 50m from vent Threat to public since houses located with hazardous zone could accumulate gas within explosive limits with potential for ignition	Unlikely Since possible within lifetime of pipeline	Major Possible fatality if ignition of gas accumulation within house	High
Emergency blowdown of pipeline causing noise levels with potential to cause injury to residents in proximity of vents.	Unlikely Since possible within lifetime of pipeline	Severe Possible injury / hearing damage	Intermediate

Table 4: Threat and Risk Assessment Results

Risk mitigation options to reduce these risk levels to acceptable levels were reviewed in the Vent Options Review, discussed in Section 6.5

All other threats were deemed controlled as per AS2885.6, subject to future Encroachment SMS confirmation for construction works.

6.5 Review of Vent Options

A review of the viable options to reduce the risk to people due to emergency venting operations was carried out in the workshop. The summary of the finding is shown in Appendix 4.

The results of the review identified a number of options which could be carried forward for further assessment to determine an optimum solution which meets AS/NZS 2885 safety requirements while also acceptable to Landcom and Jemena.

6.6 Summary of Actions

Table 5 and 6 presents the summary of the actions identified in the Workshop.



Table 5: Summary of Actions from Risk Assessment

Action No	Threat No	Threat	Action	Туре	Responsibility
1.1	2	Possible sensitive land use (possible child care centre in West Development) resulting in unacceptable risks or HCA non-compliance with current controls	A possibility raised for Landcom and Jemena to discuss the inclusion of development restrictions to be imposed within the pipeline measurement lengths.	Opportunity / Recommendation	Jemena / Landcom
1.2	12	Damage to valve stations/vent due to vandalism or public activities	Additional security will need to be installed at sites e.g. improved security fencing. To be addressed by Jemena Security.	Risk Reduction	Jemena



Table 6: Summary of Actions Vent Options Review

Action No	Option No	Option Description	Action	Responsibility
2.1	6	Planning adjustments around vents	Jemena to provide 50% LEL hazardous zones plots to Landcom	Jemena
2.2	6	Planning adjustments around vents	Landcom to review possible adjustments to blocks based on removing houses from current 50% LEL Hazardous zone and define impact on yield	Landcom
2.3	3	Vent modifications - vent height increase	Jemena to review impact of vent stack on 50% LEL hazardous zones at house level	Jemena
2.4	3	Vent modifications - vent height increase	DPE to check impact of increased vent height on development (visual impact). Define vent height limitations	DPE
2.5	4	Vent relocation beyond development area - approx. 500m north	Jemena to assess relocation of vent approx. 500m north outside of development (to Western Sydney Parkland) if viable	Jemena
2.6	7	Vent relocation within development area: 1) both vents to north side within block 543 2) JGN Lic 1 vent to adjacent to EGP	Jemena to assess viability of relocating vents to north side of development (block 543) or JGN Lic 1 vent to adjacent to EGP	Jemena
2.7	7	Vent relocation within development area: 1) both vents to north side within block 543 2) JGN Lic 1 vent to adjacent to EGP	Landcom to assess impact of revised vent locations on yield	Landcom
2.8	General (Post Workshop)	ALBV Maintenance activities - General information	Jemena to provide to Landcom information regarding the ALBV and vent maintenance activities and procedures. This is to include the following: - Duration and intensity of noise levels during maintenance activities - Any applicable standard Jemena prior notification of neighbours procedures for maintenance works and planned works	Jemena



7 Conclusions

The SMS workshop review and conclusions have been based on the development plans and pipeline facilities as described in this document. On this basis, participants reviewed the findings and agreed that:

- The appropriate Location Classification associated with the development is T1;
- This section of the Licence 1 and EGP remains in compliance with AS 2885.1 Requirements for High Consequence Areas with the revised Location Classification of T1;
- The threat identification was thorough and adequate in recognising all credible threats, associated controls and consequences associated with the Austral Development;
- The assessed risk levels for the credible threats were agreed and appropriately reflected the associated likelihoods and consequences;
- A "High" residual risk was defined associated with gas dispersion from emergency venting from either pipeline with the current development plan. An "Intermediate" residual risk was defined due to noise levels resulting from emergency venting. These risks must be reduced to an acceptable level as per AS/NZS 2885.6 through modifications to the facilities and/or development plans. follow up between Landcom and Jemena is required to determine an appropriate solution.
- Vent modifications options were reviewed and a number of options were identified to be carried forward for further assessment
- All other threats have been assessed to be Controlled and are therefore acceptable and in compliance with AS 2885.6 risk levels for this revised Location Classification;

This SMS is not complete until all actions identified from this SMS (Section 6.6) have been completed to the satisfaction of Landcom and Jemena and it has been documented that all residual risks have been reduced to an acceptable level in accordance with AS/NZS 2885.6-2018.

8 Reference Documentation

The following information was provided for the SMS workshop.

Ref	Document Title	Date / Version
1	Gurner Avenue Austral Master Plan and Urban Design Report	20 Jan 2022
2	Plan of proposed subdivision of Lot 184 in DP 1237400, DO4494-PROP-SB	25 Oct 2021
3	Licence 1 5 Yearly Safety Management Study	2019
4	EGP Safety Management Study	
5	GHD, Gas Dispersion Study of Blowdown Venting, CFD Assessment Report 3 June 2022	3 June 2022
6	EPCRC, Managing Noise, Gas Dispersion and Ignitions Hazards when Venting Natural Gas Transmission Pipelines	-
7	SafeWork NSW, Managing noise and preventing hearing loss at work code of practice	April 2016

9 Terms and Definitions

As Low as Reasonably Practicable
Automated Line Break Valve
Critical Defect Length
Eastern Gas Pipeline
High Consequence Area
Lower Explosive Limit
Maximum Allowable Operating Pressure
Main Line valve
Maximum Operating Pressure
Safety Management Study



Appendix 1 Workshop Presentations





























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Noise Considerations from Venting · Maximum noise from venting is at the start and decays as pressure reduces (depends on volume being vented and vent size) 140 120 distance for 110 dB(A) 100 80 60 - - 13 km, 15MPa Horizontal 13km, 4MPa 40 20 0 10 15 25 0 20 30 5 Time (minutes) Figure 9 Examples of reduction in horizontal distance from a vent with time at which noise is 110dB(A) for a 13km, DN450 pipeline being vented through a DN150 vent at starting pressures of 15MPa and 4MPa. Jemena

•22/06/2022





Appendix 2 Workshop Attendees



SMS: Landcom Austral Land Use Change SMS - Lic 1 Trunk and EGP Pipelines

Location: Landcom Office, Parramatta + Virtual

Date: 21 June 2022

Name	Organisation	Position	Signature
Chris Carter	AES	Facilitator	Cat
Carren WoodHouse	clingte Change	Sor Tech Advisor (Cas Networks & Pipelines)	w. intral thorse
RexWightley	DAE 0	Chief Engineer	Alland
Stephen Dewick	OSL	SAR MOR THANYACTIONS	
IAIN S MILLIAN	npc,	Lion support.	
Steven Boukatos	Landcom	Development Manager	
Part Co Leman	landiom	Developut Drutor	P.
		1	



SMS: Landcom Austral Land Use Change SMS - Lic 1 Trunk and EGP Pipelines

Location: Landcom Office, Parramatta (Virtual Attendees)

Date: 21 June 2022

Name	Organisation	Position	Signature
Tim Colless	OSL		
Nigel Macdonald	NPC	Project Manager	
Renee McCall	Jemena	Land Manager	
Philip Clifford	OSL	Transaction Manager	
David Tasker	Zinfra	Team Leader	
Raj Jeyarajah	Jemena	Principal Pipeline Engineer	
Robert Campbell	Jemena	Lands	
Nikhil Maharaj	Technical Regulator	Manager Pipelines/Gas Networks	
Dario Stella	Jemena	Snr Pipeline Engineer	
Danny Guerrera	Jemena	EGP Land Officer	
Martin Richards	Zinfra	Field Operations EGP	
Maryanne Tarawa	Jemena	Lands Manager JGN	
Gail Ervine	Jemena	Lands	
Kashif Rahman	Jemena	Licence 1 Pipeline Engineer	
Joe Rowling			



Appendix 3 Safety Management Study Worksheet

(See Also Excel Worksheet)



No	Activity	Threat Type	Threat Description	Comment	is the threat credible	Cont	Controls		Controls Mit	Additional Controls?		Residual F			Residual Risk Assessment		Actions Required	Comments	
					Yes/No	Physical Protection	Procedural	Yes/No	If Yes, why?	If No, Failure Mode	Additional Controls?	Threat Controlled?	Severity Class	Severity Comments	Frequency Class	Frequency Comments	Risk Matrix Resul		
Land Use Change																			
1	NA	Land use change	Land use change to T1 from current location classification increasing risk to unacceptable level (per A52885) or HCA non-compliance with current controls	Increase severity class - Compliance for HCA - 11 LC for both pipelines run to Valve sites. No change to pipeline protection upstream of valves	Yes	- As per current SMS	- As per current SMS	Yes	No change required to current pipeline protection. Pipelines are in compliance with HCA with current controls as per 5 y yearly SMS.								NA		
2	NA	Land use change	Possible sensitive land use (possible child care centre in West Development) resulting in unacceptable risks or HCA non-compliance with current controls	Possible child care centre located 520m from pipelines Increase severity class Compliance for HCA	Yes	- As per current SMS	- As per current SMS	Yes	Possible child care centre located at 520m from pipelines will have no impac on HCA compliance	c							NA	It was noted by Landoom in the workshop that any development in this area would need to run through the DA process. A possibility raised for Landoom and Jemena to discuss the inclusion of development restrictions to be imposed within the pipeline measurement lengths.	
3	Blowdown	Land use change	Emergency blowdown of pipeline causing gas dispersion hazardous area (LEL) around vents and threat to residents	- Ref to GHD 50% LEL zone = approx. 50m from vent - Threat to public since houses located with hazardous zone	Yes	- None	- Jemena Emergency venting procedures	No		Possible explosive gas mixture accumulating in houses within the 50% LEL radius. Potential for explosion and fatalities			Major	Possible for explosion/fatality within a house	Unlikely	Emergency venting could occur during the lifetime of the pipeline and cannot be discounted. High likelihood of gas accumulation in houses adjacent to vents in current development layout.	High	Risk unacceptable and must be reduced. Mitigation options review carried out in workshop (see separate sheet).	
4	Blowdown	Land use change	Emergency blowdown of pipeline causing unacceptable acoustic levels to residents causing injury	 Unacceptable levels as defined by SafeWork NSW (Managing noise and preventing hearing loss at work code of practice) will occur within vicinity of vents up. 	Yes	None	- Jemena Emergency venting procedures	No		Very high accusate levels in vicinity of vent exceeding allowable levels are per Safe/Work NSW (Managing noise and preventing hearing loss at work code of practice). Causing injury and hospitalisation.			Severe	Possibility of hearing damage/injury	Unlikely	Emergency venting could occur during the illetime of the pipeline and cannot be discounted. High likelihood of damaging noise levels in houses adjacent to vents in current development layout.	Intermediate	Risk kevels to be further assessed and reduced or confirmed to be ALARP. Mitigation options review carried out in workshop (see separate sheet).	
External in	todesease Ad	dianal Threats															NA		
5	New works	Direct Impact	Construction of new roads over pipelines resulting in direct impact due to construction equipment and pipeline loss of containment	Construction phase only -2 new roads crossing pipelines	Yes	WT Depth of Cover	- Works to be carried out as per Jemena Guideline GAS-960-GL-PL-001	Yes	Controls mitigate. No change from current SMS								NA		
6	New works	Overloading	Construction of new roads over pipelines resulting in overloading/overstress due to construction equipment and pipeline loss of supply	Construction phase only - 2 new roads crossing pipelines	Yes	- WT - Depth of Cover	- Works to be carried out as per Jemena Guideline GAS-960-GL-PL-001	Yes	Controls mitigate. No change from current SMS								NA		
7	New works	Direct Impact	Installation of new services (water/drainage) crossing over or under pipelines resulting in direct impact due to construction equipment and pipeline loss of containment	Construction phase only - Service crossings (water) located at Proposed Rd 14 only	Yes	- WT	- Works to be carried out as per Jemena Guideline GAS-960-GL-PL-001	Yes	Controls mitigate. No change from current SMS								NA		
8	New works	Direct Impact	Installation of new services (water/drainage) parallel to pipelines resulting in direct impact due to construction equipment and pipeline loss of construction equipment.	 No services to be installed parallel to pipelines within easement. Outside easement only. 	No				Controls mitigate. No change from current SMS								NA		
																	NA		
9	Maintenance	Impact	Ongoing maintenance of utilities within residential area resulting in direct impact due to construction equipment and pipeline loss of containment	Post development service maintenance Exsement within private property	Yes	- WT	- Works to be carried out as per Jemena Guideline GAS-960-GL-PL-001	Yes	Controls mitigate. No change from current SMS								NA		
C		1		1	L	1		L									NA		l
10	Ali	Corrosion	Development has no apparent impact on CP system or corrosion issues. No HV electrical systems to be installed which could cause CP interference, electrical hazards etc.	5	No												NA		
Matural To-	ante	-		L	I			I	1								NA		
manufal Ev		1	1	- I and com stated in workshop that finws wit easement	r —	1		r —	-			-							1
11			Change in flows causing erosion/flooding on pipeline easement	Kely to be improved due improved drainage control. Drainage strategy/design being developed	Yes	- Improved drainage system	- Drainage design	Yes	Controls mitigate								NA		
Intentional / Public								1											
12	Security	Intentional Damag	Damage to valve stations/vent due to vandalism or public activities	 Valve stations will be surrounded by residential area with much greater activity/visibility, although they will be located within private property 	Yes	- Fencing (not security fencing)	- Patrois	No		Public ingress and possible vandalism (not risk assessed, but action defined)							NA	Additional security will need to be installed at sites e.g. improved security fencing. To be addressed by Jemena Security.	
					1											NA		I	
13	Maintenance	Lack of access	Inadequate access to pipeline for maintenance/emergency management activities	-Current layout has easement split between two private landowners (+road crossings) - Gate access to easement.	Yes	- NA	- NA	Yes	Current layout is acceptable for Jemen access	•							NA		
			1											NA		1			



Appendix 4 Vent Options Review

asset engineering solutions

Vent Options Review

Option No	1	2	3	4	5	6	7	8	9
Option	Venting Procedures	Decommission vents	Vent modifications	Vent line relocation outside of development area (Valves remain)	Valves and vents relocated outside of development area	Planning adjustments around current vents	Move vents to north side of development	Jemena acquisition of land around vents	Greenspace around vents
Owner of Option	Jemena	Jemena	Jemena	Jemena	Jemena	Landcom	Jemena / Landcom	Jemena	Landcom
Option Description	Change of venting procedures to reduce 50% LEL hazardous gas dispersion and high acoustics zones e.g. use of burner trailer		Modify vents to reduce gas dispersion and acoustics. E.g. 1) Increased height of vent stacks to approx. 8-12m approx. to reduce hazardous zore (50% LEL) at house level 2) Include acoustic attenuation on vents.	Nove the vent stacks only outside of development area to a location with no planned development. 1) Only option is to move approx. 500n north on existing easement to Western Sydney Parkand 2) Cannot move east since future sporting precinct planned for adjacent area to east	Relocate valves and vents approx. 500m north to Western Sydney Parkland.	Adjust plans to move house sites outside of 50% LEL hazardous zone. 1) Nine (9) houses are currently impacted by 50% LEL hazardous zone 2) Two house pads can be move outside of hazardous zone within current blocks. Seven (7) other blocks will need to be re-assessed.	Move vents to north side of development (i.e. within block 543). Reduces impact of hazardous zone to approx. 2-3 house pads. Alternatively, could move only JGN Lic 1 vent to adjacent to EGP vent. May reduce impact of hazardous zone to approx. 2 house pads.	Jemana purchases land around vents to provide adequate zone to houses, based or 50% LEL hazardoos zone	Area around vents converted to greenspace to provide adequate zone to house based to 50% LEL hazardous zone
Technical (Design) Safety	NA	Not viable since vents required at this location for safety reasons.	Change to 50% LEL Hazardous zone needs to be confirmed to re-assess risk	Reduces severity since no houses in 50% LEL hazardous zones. Acceptable risk leve	Reduces severity since no houses in 50% LEL hazardous zones. Acceptable risk level	If all houses relocated outside of 50% LEL hazardous zone, risk will be acceptable	nouses relocated outside of 50% LEL. Does not reduce risk to acceptable level in isolation, but can be acceptable if done in conjunction with Option 6		Reduces severity since no houses in hazardous zones. Acceptable risk level
Operational Safety / Reliability	No viable change in procedures could reduce the risk levels	NA	NA	To be addressed	To be addressed	No change to current procedures	No change to current procedures Need to address venting near transmission lines if move to north of development area		No change to current procedures
Indicative Costs	NA	NA	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Indicative Schedule	NA	NA	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Interdependencies:	NA	NA	 Vent modification requires acoustic attenuation (ongoing research) Could consider in conjunction with development adjustments to move house outside of revised hazardous zone (Option 6) 	None	None	This option could be considered in combination with Option 3 (Vent modifications) i.e. if vent modification can reduce hazardous zone by 10m, overall impact reduced to 4 house pade	Needs to be considered in conjunction with Option 6.	None	None
Constraints	Burner would take significant time to reduce pressure i.e. days hence is not acceptable option	Not viable since vents required at this location for safety reasons.	 Increase in vent heights needs to consider possible other gas dispersion impacts i.e. power lines Also need to consider visual impact on development for tail vent stacks. 	 Needs to be assessed to define the maximum viable vent line length from the valves to confirm if viable. Also needs confirmation that vents can be installed at alternative location with no impact on public or venting operations. 	vids to be assessed to define the vives to confirm if viable. 1) While technical viable, involves modification major works unvest be confirm if viable. 1) While technical viable, involves modification major works o needs confirmation that vents is installed at alternative location to impact on public or venting operations. 2) Also needs on public or venting operations.		Moving to north increases proximity to HV transmission lines to north of development area. Increases risks associated with venting.	Jemena noted this is not a preferred option.	Landcom noted not a preferred option since there is a land ownership constraint associated with greenspace land. Council will not accept ownership, Landcom cannot own.
Viable Option to Carry Forward?	No	No	Yes	Yes	Technically viable but other options to be considered first	Yes	Yes	No	No
Actions			1) Jemena to assess impact of vent height on 50% LEL hazardous zone 2) DPE to advise on limitations to vent height due to visual impacts.	1) Jemena to assess viability of relocating vents outside of developmen area	t	1) Jemena to provide 50% LEL Hazardous zones to Landcom 2) Landom to review possible adjustments and define impact on yield.	 Jemena to assess viability of relocating vents to north side of development (block 543) or JGN Lic 1 vent to adjacent to EGP. Landcom to assess impact of new vent location(s) on yield 		