



**Report for  
APA Group**

# **Pipeline Safety Management Study Review - Victorian Transmission Pipelines**

**Revision A  
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## 1 SUMMARY

This report presents the results of a 5-year review of the safety management study for the Victorian transmission pipeline network. The previous study had been comprehensive and this review mainly looked for changes to land use that might have invalidated findings from the earlier work. Few such changes were found and none were substantial.

The opportunity was taken to review and revalidate assessment of generic threats to the pipelines, and to reassess previous risk evaluations. No material changes were necessary as a result of these reviews.

The review confirmed compliance of the Victorian transmission pipeline network with the safety requirements of AS 2885.

## 2 INTRODUCTION

The objective of this study was to review and update the safety management study (SMS) for the Victorian transmission pipeline network operated by APA. The previous SMS was done in mid 2007. AS 2885.3-2001 requires that each SMS be reviewed at intervals of not more than 5 years, and the current review fulfils that requirement. The SMS was conducted in compliance with the process specified in AS 2885.1-2007.

Because this study is a review, and there is no evidence that the previous SMS was seriously deficient, the approach adopted was that the findings of the previous study would generally be accepted (without detailed re-examination or amendment) provided that there had been no change in the pipeline surroundings. Hence the main focus of the current study was to reassess the land use around each pipeline. More attention was given to the few cases where there had been a change since 2007.

Items from the previous SMS that had actions or were subject to risk evaluation were reviewed in more detail than others. Generally those with actions required no further attention since APA have closed out all actions from the previous SMS (except those relating to cased crossings which recur in this SMS anyway). Those with risk evaluations were reviewed in detail.

This report assumes that readers are familiar with the AS 2885 process.

## 3 SCOPE AND PROCESS

This study covers all transmission pipelines operated by APA in Victoria (including the line from Barnawartha that extends into NSW as far as Culcairn). Appendix 1 contains a database report listing all pipelines (with some technical parameters), sorted by TP number.

Prior to reviewing the route of each pipeline a workshop examined all the generic threats from the previous SMS, plus a few new items that were identified in the course of discussion. Generic threats included both those that are repetitive (eg. typical road crossing) and those that are non-location-specific (eg. most corrosion issues). Generic threats and their mitigation are documented in the database.

This study has not included pipeline facilities as they will be the topic of a separate SMS and report.

The SMS review took place through a series of workshops held in the APA Dandenong offices between late May and early August 2011. Workshop participants are listed in Appendix 2.

The previous SMS was largely recorded in a GIS-linked database, at least for all location-specific items. However APA found that database difficult to use. This SMS has used a simpler database that is not GIS-linked but is more usable. Data was transferred from the old to the new database and retained all significant information (data on feature locations and descriptions, threat mitigation data, risk evaluation data).

The old data contained various minor errors and inconsistencies (eg. KPs, feature names, feature descriptions, spelling errors, etc), some of which have been removed but many may remain. In particular the KPs of pipeline features are often only a general indication of location rather than a precise definition. The legacy errors and inconsistencies are not material to the conclusions of this study.

The database contains over 3100 records and this report makes no attempt to present all of that detail. The database is provided to APA and should be interrogated directly if detailed data is required.

(A portion of the T74 pipeline between Wollert and Euroa was not reviewed through the workshops for this study because it had only recently been reviewed in detail as part of the MAOP upgrade study for that pipeline. However the location classification and the few location-specific threats from that local study have been added to the database.)

## 4 GENERIC THREATS

Generic threats were reviewed in detail, unlike location-specific issues, because they are the foundation of the SMS. The previous SMS had recorded the generic threats in a spreadsheet but for this study they were entered into the database. There are 44 repetitive threats and 26 that are non-location-specific.

For eight of the generic threats the workshop was not confident that they are fully controlled by the mitigation measures so these were carried forward to risk evaluation; most were for general metropolitan installation where the potential consequences of a failure are higher than for rural pipelines. Three of these threats were found to have a risk rank of Intermediate (but ALARP) and the remainder were Low or Negligible. (There is further discussion of risk evaluation in Section 6 below.)

Of the risks ranked Intermediate, two involved corrosion and the other related to auger damage to pipe in the metropolitan area (expected to be a growing threat as use of mini-HDD rigs increases for utility installation and particularly for the forthcoming National Broadband Network). In all three cases the worst case failure is a small-medium leak with limited consequences. The workshop judged that none of the evaluated generic threats would lead to a full bore rupture.

No generic threats presented an intolerable risk.

Details of the workshop deliberations on generic threats are contained in appendices:

- Appendix 3 All generic threats
- Appendix 4 External interference protection (generic threats)
- Appendix 5 Design or procedural measures (generic threats)
- Appendix 6 Risk evaluation (generic threats)

## 5 LOCATION CLASSIFICATION REVIEW

Land use around each pipeline was reviewed in detail with the aid of aerial imagery from the GIS and other sources (Google Earth, NearMap) and with the input of the pipeline operator responsible for the area. The GIS showed not only the pipeline centreline but also the extent of the "measurement length" defined by AS 2885.1-2007 (the 4.7 kW/m<sup>2</sup> radiation contour within which unprotected people are at risk of serious injury from an ignited full bore rupture). The focus of the workshop was on land use within this measurement length.

In making the assessment of current location classification no reference was made to previous assessments; this was a fresh and independent review. Nevertheless because a major objective of this SMS was to identify changes in location class some attention was subsequently given to the previous location classification in places where land use had changed.

The pipeline operators are intimately familiar with their areas and were able to advise where a change in land use had occurred in the last few years. Evidence of change was also available from aerial photography taken at different times. Changes were rare and generally limited to areas where urban growth is occurring on the outskirts of Melbourne and larger towns. In a few places additional isolated houses had been built but rarely if ever in sufficient number to alter the location classification.

Where changes were identified the pipeline protection measures in the area were briefly reviewed. This review led to only a very small number of minor recommendations such as increased patrol frequency in a couple of locations. Recommended actions are discussed further in Section 7 below. There was no suggestion from the workshops that any additional physical protection should be considered at any location.

Location classes were assigned solely on the basis of existing land use, or in rare instances an imminent future land use such as urban development that is currently in progress. However potential future uses, such as may be permitted by an existing planning scheme, were ignored for the purpose of this SMS. If those future uses occur they can be assessed at the time the development is proposed and appropriate adjustments can be made to the SMS on the basis of the information then available; to address them now would only be speculative.

The classification tended to be conservative. Demarcations between classes R1-R2, R2-T1 and T2-T1 are often not clear since house and building density is spread on a continuous spectrum. There may be minor inconsistencies across this SMS because it took place over a period of many weeks and involved different participants in the workshops. But because classes were always assigned quite conservatively any minor discrepancies are not material.

Each pipeline section of a single location class was recorded in the Sections part of the database. The data recorded includes the start and end KPs (and length), the primary and secondary location classes and a brief description of the land use. Appendix 7 presents the same information. (The data is also provided as an Excel spreadsheet for more convenient manipulation if required.)

The location classification in the SMS database should be regarded as the definitive record of the pipeline location classes as at the time of this SMS. The current classification is likely to differ from that shown on the route plans or other pipeline records for various reasons, including the fact that location classification for pipeline design purposes must include potential future land uses while the classification arising from these workshops reflects only the current land use as noted previously.

## 6 RISK EVALUATIONS

A total of 28 threats were judged to require risk evaluation. Eight of these were generic threats as discussed earlier in Section 4. Of the remainder, fifteen were "All Controls Fail" scenarios at specific locations, three concerned corrosion in cased crossings at specific locations and two addressed aircraft impact adjacent to a landing ground (in fact only a single threat but it spanned two pipeline sections so needed two entries).

Details of all risk evaluations are in Appendix 8.

Some evaluations were done for the first time as part of this SMS, others were originally from the 2007 SMS but were reviewed in the recent workshops. As noted elsewhere, there may be some minor inconsistencies between evaluations done by different groups at different times but that is inherent in the AS 2885 SMS process; all assessments appear conservative and the overall outcomes remain valid.

Of the twenty location-specific risk evaluations, three resulted in risk ranks of Intermediate (but ALARP), thirteen Low and four Negligible.

The Intermediate risks comprised two "All Controls Fail" cases involving pipe puncture by large excavators in highly populated areas and one case of corrosion in a cased crossing supplying Newport power station (hence substantial supply consequences). All three were shown to be ALARP and hence tolerable.

Given the extent of the Victorian transmission pipeline network, including large sections of high population density, the low number of risk evaluations and the resulting generally low risk ranks demonstrate a level of pipeline safety that is well within the required standard.

## 7 ALARP

Risks that are ranked Intermediate must be shown to be As Low As Reasonably Practicable (ALARP) in order to be accepted at tolerable. ALARP should be demonstrated through a cost benefit analysis, but inverting that process to calculate a maximum justifiable spend (MJS) is an equally valid but simpler approach. Mitigation measures that cost more than the MJS do not need to be considered, and if there are no mitigation measures less than MJS then ALARP has been demonstrated. MJS is given by (cost of failure) x (probability of failure) x (proportionality factor), the latter representing the "grossly disproportionate" term in the AS 2885 definition of ALARP.

For the six Intermediate risks in this study an MJS was calculated for three; for the other three it was unnecessary because there is simply no further mitigation available with current

technology, short of abandoning or rebuilding the affected pipelines (clearly unjustifiably costly).

ALARP details from the database (including MJS) are presented in Appendix 9.

## **8 ACTIONS**

Most safety management studies generate moderately long lists of actions. Because this SMS is a review of an existing SMS the number of actions generated was very small - only five. They are presented in Appendix 10.

The 2007 SMS had a much longer list of actions. APA advised that all previous actions had been closed and they were not reviewed further in this SMS.

## **9 CONCLUSIONS**

Review of the safety management study for the Victorian transmission pipeline network has confirmed that it meets the safety requirements of AS 2885.

## **APPENDIX 1**

### **PIPELINES**

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**PIPELINES**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

ID	Pipeline	Size	Length	MAOP	WT	Steel Grade	Toughness	Critical Defect	Excavator to penetrate B = 0.75	B = 1.3
42	<b>Generic pipeline for repetitive and NLS threats</b>						J	mm	t	<b>T</b>
		<b>DN</b>	<b>km</b>	<b>MPa</b>	mm					t
	Radiation distance for	12.6 kW/m <sup>2</sup> :	m							
		4.7 kW/m <sup>2</sup> :	m							
1	<b>Morwell to Dandenong</b>						J			<b>T 1</b>
		<b>DN 450</b>	<b>127 km</b>	<b>2.76 MPa</b>	7.9 mm	A		270 mm	28 t	10 t
					9.9	A		400	-	12
	Radiation distance for	12.6 kW/m <sup>2</sup> :	150 m							
		4.7 kW/m <sup>2</sup> :	240 m							
2	<b>Princes Hwy to Regent St</b>						J	na mm	18 t	<b>T 15</b>
		<b>DN 200</b>	<b>0.82 km</b>	<b>2.76 MPa</b>	6.4 mm	A				8 t
	Radiation distance for	12.6 kW/m <sup>2</sup> :	56 m							
		4.7 kW/m <sup>2</sup> :	108 m							
3	<b>Dandenong to West Melbourne</b>						J	350 mm	- t	<b>T 16</b>
		<b>DN 750</b>	<b>36.2 km</b>	<b>2.76 MPa</b>	9.5 mm	X42				16 t
	Radiation distance for	12.6 kW/m <sup>2</sup> :	290 m							
		4.7 kW/m <sup>2</sup> :	450 m							
4	<b>Keon Park East to Keon Park West</b>						J	266 mm	28 t	<b>T 18</b>
		<b>DN 450</b>	<b>0.6 km</b>	<b>2.76 MPa</b>	7.9 mm	A				10 t
	Radiation distance for	12.6 kW/m <sup>2</sup> :	152 m							
		4.7 kW/m <sup>2</sup> :	243 m							
5	<b>Brooklyn to Corio</b>						J	100 mm	20 t	<b>T 24</b>
		<b>DN 350</b>	<b>50.7 km</b>	<b>7.39 MPa</b>	5.6 mm	B				10 t
					6.4	B		130	28	10
	Radiation distance for	12.6 kW/m <sup>2</sup> :	180 m							
		4.7 kW/m <sup>2</sup> :	300 m							
6	<b>Pound Rd to Tuckers Rd</b>						J	- mm	18 t	<b>T 32</b>
		<b>DN 100</b>	<b>2 km</b>	<b>2.76 MPa</b>	6.0 mm	B				8 t
	Radiation distance for	12.6 kW/m <sup>2</sup> :	20 m							
		4.7 kW/m <sup>2</sup> :	33 m							

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ID	Pipeline		MAOP	WT	Steel Grade	Toughness	Critical Defect	Excavator to penetrate	
	Size	Length						B = 0.75	B = 1.3
7	<b>South Melbourne to Brooklyn</b>								<b>T 33</b>
	<b>DN 750</b>	<b>12.8 km</b>	<b>2.76 MPa</b>	9.5 mm	X42	J	350 mm	- t	16 t
	Radiation distance for 12.6 kW/m <sup>2</sup> : 290 m								
	4.7 kW/m <sup>2</sup> : 450 m								
8	<b>Supply to APM Maryvale</b>								<b>T 37</b>
	<b>DN 150</b>	<b>5.4 km</b>	<b>6.89 MPa</b>	6.35 mm	B	J	140 mm	22 t	10 t
	Radiation distance for 12.6 kW/m <sup>2</sup> : 70 m								
	4.7 kW/m <sup>2</sup> : 110 m								
9	<b>Healesville to Koo-Wee-Rup Road</b>								<b>T 38</b>
	<b>DN 150</b>	<b>1.2 km</b>	<b>2.76 MPa</b>	7.1 mm	X42	J	mm	28 t	10 t
	Radiation distance for 12.6 kW/m <sup>2</sup> : 47 m								
	4.7 kW/m <sup>2</sup> : 77 m								
This is a loop line. Also original DN 80 line parallel.									
10	<b>Supply to Anderson St, Warragul</b>								<b>T 44</b>
	<b>DN 100</b>	<b>4.8 km</b>	<b>2.76 MPa</b>	6.0 mm	B	J	- mm	18 t	8 t
	Radiation distance for 12.6 kW/m <sup>2</sup> : 20 m								
	4.7 kW/m <sup>2</sup> : 33 m								
11	<b>Brooklyn to Ballan</b>								<b>T 56</b>
	<b>DN 200</b>	<b>66.6 km</b>	<b>7.39 MPa</b>	6.35 mm	B	J	105 mm	22 t	10 t
				7.04	B		125	28	10
	Radiation distance for 12.6 kW/m <sup>2</sup> : 100 m								
	4.7 kW/m <sup>2</sup> : 160 m								
12	<b>Ballan to Ballarat (including loop line)</b>								<b>T 57</b>
	<b>DN 300</b>	<b>22.8 km</b>	<b>7.39 MPa</b>	6.35 mm	X46	J	100 mm	22 t	10 t
				7.6	X46		140	45	12
	Radiation distance for 12.6 kW/m <sup>2</sup> : 160 m			4.8	B		80	12	6
	4.7 kW/m <sup>2</sup> : 260 m			6.35	B		130	22	10
Above parameters are for loop line. Also original line DN 150, 4.8 and 6.4 mm Grade B.									
13	<b>Euroa to Shepparton</b>								<b>T 59</b>
	<b>DN 200</b>	<b>34.5 km</b>	<b>7.4 MPa</b>	5.6 mm	X42	J	100 mm	16 t	6 t
	Radiation distance for 12.6 kW/m <sup>2</sup> : 100 m								
	4.7 kW/m <sup>2</sup> : 160 m								

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

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5 Year Review safety mgt. study

ID	Pipeline		MAOP	WT	Steel Grade	Toughness	Critical Defect	Excavator to penetrate	
	Size	Length						B = 0.75	B = 1.3
14	<b>Longford to Dandenong, including loop lines</b>								<b>T 60</b>
	<b>DN 750</b>	<b>174.2 km</b>	<b>6.89 MPa</b>	10.3 mm	X60	J	180 mm	- t	22 t
				12.7	X60		260	-	50
	Radiation distance for 12.6 kW/m <sup>2</sup> : 430 m								
	4.7 kW/m <sup>2</sup> : 700 m								
15	<b>Packenham to Wollert</b>								<b>T 61</b>
	<b>DN 750</b>	<b>93.1 km</b>	<b>6.89 MPa</b>	10.6 mm	X60	J	190 mm	- t	22 t
				12.7	X60		270	-	50
	Radiation distance for 12.6 kW/m <sup>2</sup> : 430 m								
	4.7 kW/m <sup>2</sup> : 700 m								
16	<b>Derrimut to Sunbury</b>								<b>T 62</b>
	<b>DN 150</b>	<b>24 km</b>	<b>7.39 MPa</b>	6.35 mm	B	J	130 mm	22 t	10 t
	Radiation distance for 12.6 kW/m <sup>2</sup> : 72 m								
	4.7 kW/m <sup>2</sup> : 113 m								
17	<b>Tyers to Morwell looping</b>								<b>T 63</b>
	<b>DN 500</b>	<b>15.7 km</b>	<b>7.07 MPa</b>	8.7 mm	X60	J	180 mm	- t	16 t
				10.6	X60		255	-	22
	Radiation distance for 12.6 kW/m <sup>2</sup> : 265 m								
	4.7 kW/m <sup>2</sup> : 450 m								
18	<b>Supply to Newport Power Station</b>								<b>T 64</b>
	<b>DN 450</b>	<b>1 km</b>	<b>2.76 MPa</b>	7.9 mm	X42	J	- mm	45 t	12 t
				9.7	X42			-	16
	Radiation distance for 12.6 kW/m <sup>2</sup> : 150 m								
	4.7 kW/m <sup>2</sup> : 245 m								
19	<b>Dandenong to Princes Highway &amp; Henty Street</b>								<b>T 65</b>
	<b>DN 750</b>	<b>5 km</b>	<b>2.76 MPa</b>	9.5 mm	X42	J	350 mm	- t	16 t
	Radiation distance for 12.6 kW/m <sup>2</sup> : 290 m								
	4.7 kW/m <sup>2</sup> : 440 m								
	Includes 200 m of DN 500, 7.9 mm Gr B from Princes Hwy and Henty St								
20	<b>Mt Franklin to Kyneton</b>								<b>T 66</b>
	<b>DN 300</b>	<b>24.5 km</b>	<b>7.39 MPa</b>	6.45 mm	X46	J	100 mm	22 t	10 t
				7.55	X46		140	45	12
	Radiation distance for 12.6 kW/m <sup>2</sup> : 160 m								
	4.7 kW/m <sup>2</sup> : 260 m								

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**PIPELINES**

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ID	Pipeline		MAOP	WT	Steel Grade	Toughness	Critical Defect	Excavator to penetrate	
	Size	Length						B = 0.75	B = 1.3
21	<b><i>Guildford to Maryborough</i></b>								<b>T 67</b>
	<b>DN 150</b>	<b>31.4 km</b>	<b>7.39 MPa</b>	6.35 mm	B	J	130 mm	22 t	10 t
	Radiation distance for 12.6 kW/m <sup>2</sup> :		75 m						
	4.7 kW/m <sup>2</sup> :		115 m						
22	<b><i>Ballan to Bendigo (incl. looping)</i></b>								<b>T 70</b>
	<b>DN 300</b>	<b>90.8 km</b>	<b>7.39 MPa</b>	6.35 mm	X46	J	100 mm	22 t	10 t
				7.55	X46		140	45	10
	Radiation distance for 12.6 kW/m <sup>2</sup> :		160 m	4.8	B		80	12	6
	4.7 kW/m <sup>2</sup> :		260 m	6.35	B		130	22	10
DN 300 line is loop line, only from Mt Franklin to Bendigo, 50.8 km. Original line is DN 150, 4.8 & 6.35 mm Gr B.									
23	<b><i>Shepparton to Tatura to Kyabram</i></b>								<b>T 71</b>
	<b>DN 200</b>	<b>16.2 km</b>	<b>7.39 MPa</b>	6.35 mm	B	J	105 mm	22 t	10 t
				7.0	B		125	28	10
	Radiation distance for 12.6 kW/m <sup>2</sup> :		100 m						
	4.7 kW/m <sup>2</sup> :		160 m						
24	<b><i>Keon Park to Wollert</i></b>								<b>T 74.1</b>
	<b>DN 600</b>	<b>14.1 km</b>	<b>2.76 MPa</b>	7.92 mm	X42	J	300 mm	45 t	12 t
	Radiation distance for 12.6 kW/m <sup>2</sup> :		230 m						
	4.7 kW/m <sup>2</sup> :		370 m						
25	<b><i>Wollert to Wodonga</i></b>								<b>T 74.2</b>
	<b>DN 300</b>	<b>270 km</b>	<b>7.4 MPa</b>	6.35 mm	X46	J	100 mm	22 t	10 t
				7.55	X46		140	45	12
	Radiation distance for 12.6 kW/m <sup>2</sup> :		160 m						
	4.7 kW/m <sup>2</sup> :		260 m						
26	<b><i>Wandong to Kyneton</i></b>								<b>T 75</b>
	<b>DN 300</b>	<b>59.5 km</b>	<b>7.39 MPa</b>	6.45 mm	X46	J	100 mm	22 t	10 t
				7.6	X46		140	45	12
	Radiation distance for 12.6 kW/m <sup>2</sup> :		160 m						
	4.7 kW/m <sup>2</sup> :		260 m						
27	<b><i>Paaratte to Allansford</i></b>								<b>T 81</b>
	<b>DN 150</b>	<b>33.3 km</b>	<b>9.89 MPa</b>	6.35 mm	B	J	90 mm	22 t	10 t
	Radiation distance for 12.6 kW/m <sup>2</sup> :		85 m						
	4.7 kW/m <sup>2</sup> :		130 m						

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**PIPELINES**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

ID	Pipeline		MAOP	WT	Steel Grade	Toughness	Critical Defect	Excavator to penetrate	
	Size	Length						B = 0.75	B = 1.3
28	<b><i>Kyabram to Echuca</i></b>								<b>T 85</b>
	<b>DN 150</b>	<b>30.7 km</b>	<b>7.39 MPa</b>	4.8 mm 6.35	B B	J	80 mm 130	12 t 22	6 t 10
	Radiation distance for 12.6 kW/m <sup>2</sup> : 75 m 4.7 kW/m <sup>2</sup> : 115 m								
43	<b><i>Allansford to Portland</i></b>								<b>T 86</b>
	<b>DN 150</b>	<b>100.4 km</b>	<b>9.89 MPa</b>	4.8 mm 6.35	X42	J	65 mm 105	12 t 22	6 t 10
	Radiation distance for 12.6 kW/m <sup>2</sup> : 85 m 4.7 kW/m <sup>2</sup> : 130 m								
29	<b><i>Laverton to BHP</i></b>								<b>T 88</b>
	<b>DN 150</b>	<b>1.6 km</b>	<b>2.76 MPa</b>	6.35 mm	X42	J	- mm	22 t	10 t
	Radiation distance for 12.6 kW/m <sup>2</sup> : 47 m 4.7 kW/m <sup>2</sup> : 77 m								
30	<b><i>Supply to Unichema, Bay St</i></b>								<b>T 89</b>
	<b>DN 150</b>	<b>0.4 km</b>	<b>2.76 MPa</b>	6.35 mm	X42	J	- mm	22 t	10 t
	Radiation distance for 12.6 kW/m <sup>2</sup> : 47 m 4.7 kW/m <sup>2</sup> : 77 m								
31	<b><i>Curdievale to Cobden</i></b>								<b>T 91</b>
	<b>DN 150</b>	<b>27.7 km</b>	<b>9.89 MPa</b>	4.8 mm 6.35	X42 X42	J	65 mm 105	12 t 22	6 t 10
	Radiation distance for 12.6 kW/m <sup>2</sup> : 85 m 4.7 kW/m <sup>2</sup> : 135 m								
32	<b><i>Iona to Lara</i></b>								<b>T 92</b>
	<b>DN 500</b>	<b>143.9 km</b>	<b>10.2 MPa</b>	9 mm 12.7	X60 X60	J	115 mm 220	- t -	18 t 50
	Radiation distance for 12.6 kW/m <sup>2</sup> : 320 m 4.7 kW/m <sup>2</sup> : 550 m								
33	<b><i>Codrington to Hamilton</i></b>								<b>T 93</b>
	<b>DN 150</b>	<b>54.6 km</b>	<b>9.89 MPa</b>	4.8 mm 6.35	X42 X42	J	65 mm 105	12 t 22	6 t 10
	Radiation distance for 12.6 kW/m <sup>2</sup> : 85 m 4.7 kW/m <sup>2</sup> : 135 m								

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**PIPELINES**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

ID	Pipeline		MAOP	WT	Steel Grade	Toughness	Critical Defect	Excavator to penetrate	
	Size	Length						B = 0.75	B = 1.3
34	<b>Chiltern Valley to Rutherglen</b>								<b>T 96</b>
	<b>DN 200</b>	<b>14.7 km</b>	<b>7.4 MPa</b>	4 mm 4.8	X60	J	80 mm 110	12 t 16	6 t 6
	Radiation distance for 12.6 kW/m <sup>2</sup> : 100 m 4.7 kW/m <sup>2</sup> : 160 m								
35	<b>Rutherglen to Koonoomoo</b>								<b>T 98</b>
	<b>DN 200</b>	<b>88.8 km</b>	<b>7.4 MPa</b>	4.3 mm 5.2	X52 X52	J	80 mm 110	12 t 16	6 t 6
	Radiation distance for 12.6 kW/m <sup>2</sup> : 100 m 4.7 kW/m <sup>2</sup> : 160 m								
36	<b>Culcairn to Barnawartha</b>								<b>T 99</b>
	<b>DN 450</b>	<b>62.5 km</b>	<b>10.2 MPa</b>	6.8 mm 9.7	X70 X70	J	90 mm 175	50 t -	12 t 22
	Radiation distance for 12.6 kW/m <sup>2</sup> : 280 m 4.7 kW/m <sup>2</sup> : 460 m								
37	<b>Iona to Paaratte</b>								<b>T 100</b>
	<b>DN 150</b>	<b>7.8 km</b>	<b>7.4 MPa</b>	7.1 mm	X52	J	- mm	32 t	10 t
	Radiation distance for 12.6 kW/m <sup>2</sup> : 75 m 4.7 kW/m <sup>2</sup> : 115 m								
38	<b>Somerton Pipeline</b>								<b>T 102</b>
	<b>DN 250</b>	<b>3.4 km</b>	<b>2.76 MPa</b>	6.4 mm	X42	J	- mm	22 t	10 t
	Radiation distance for 12.6 kW/m <sup>2</sup> : 75 m 4.7 kW/m <sup>2</sup> : 135 m								
39	<b>Supply to Iluka, Hamilton</b>								<b>T 109</b>
	<b>DN 100</b>	<b>1.1 km</b>	<b>9.89 MPa</b>	6 mm 8.6	B B	J	125 mm 220	18 t -	8 t 12
	Radiation distance for 12.6 kW/m <sup>2</sup> : 60 m 4.7 kW/m <sup>2</sup> : 100 m								
40	<b>Supply to Snowy Hydro, Laverton North</b>								<b>T 110</b>
	<b>DN 350</b>	<b>1.6 km</b>	<b>10.2 MPa</b>	9.5 mm	X56	J	140 mm	- t	18 t
	Radiation distance for 12.6 kW/m <sup>2</sup> : 210 m 4.7 kW/m <sup>2</sup> : 350 m								

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**PIPELINES**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

ID	Pipeline		MAOP	WT	Steel Grade	Toughness	Critical Defect	Excavator to penetrate	
	Size	Length						B = 0.75	B = 1.3
41	<b>Brooklyn to Lara</b>								<b>T 112</b>
	<b>DN 500</b>	<b>58 km</b>	<b>10.2 MPa</b>	7.9 mm	X70	J	90 mm	- t	16 t
				12.7	X70		180	-	-
	Radiation distance for 12.6 kW/m <sup>2</sup> : 300 m								
	4.7 kW/m <sup>2</sup> : 500 m								

## **APPENDIX 2**

### **WORKSHOP DETAILS**

# Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

## WORKSHOP DETAILS

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

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**Workshop No 1**            30 May - 31 May  
                                  APA offices, Dandenong

**Purpose** Review APA Vic SMS, covering GENERIC THREATS and NORTHERN region

**Comments** Not all attendees were present at all times

<b>Attendees</b>	<u>Name</u>	<u>Affiliation</u>	<u>Role</u>
	Craig Bonar	APA	Manager, AM&E
	Peter Dawson	APA	Operations Support Officer
	Alan Bryson	APA	Corrosion Manager
	Ian Johnson	APA	Eastern Manager
	Shane Matthews	APA	Western Manager
	Rob Dickie	APA	Pipeline Engineer
	Raymond Tan	APA	Operations Support Manager
	Ian Boyd	APA	Pipeline Operator
	Michael Knobloch	APA	Pipeline Operator
	Michael Harries	APA	Senior Draftsperson/GIS
	Peter Tuft	PT&A	Pipeline Engineer; Facilitator

**Workshop No 2**            14 Jun 2011 - 15 Jun 2011  
                                  APA offices, Dandenong

**Purpose** Review APA Vic SMS, covering EASTERN region

**Comments** Not all attendees were present at all times

<b>Attendees</b>	<u>Name</u>	<u>Affiliation</u>	<u>Role</u>
	Craig Bonar	APA	Manager, AM&E
	Peter Dawson	APA	Operations Support Officer
	Michael Harries	APA	Senior Draftsperson/GIS
	Ian Johnson	APA	Eastern Manager
	Robert Mielice	APA	Senior Technical Officer
	Nick van der Zweep	APA	Senior Technical Officer
	Rob Dickie	APA	Pipeline Engineer
	Don Allen	APA	Pipeline Operator
	Peter Tuft	PT&A	Pipeline Engineer; Facilitator

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**WORKSHOP DETAILS**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

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**Workshop No 3**            20 Jun 2011 -  
                                  APA offices, Dandenong

**Purpose**    Review APA Vic SMS, covering CENTRAL region

**Comments**    Not all attendees were present at all times

<b>Attendees</b>	<u>Name</u>	<u>Affiliation</u>	<u>Role</u>
	Craig Bonar	APA	Manager, AM&E
	Peter Dawson	APA	Operations Support Officer
	Michael Harries	APA	Senior Draftsperson/GIS
	Chris Knobloch	APA	Pipeline Operator
	Terry Hourigan	APA	Pipeline Operator
	Robert Fuller	APA	Pipeline Operator
	John Rodrigues	APA	Engineer, Operations
	Rob Dickie	APA	Pipeline Engineer
	Peter Tuft	PT&A	Pipeline Engineer; Facilitator

**Workshop No 4**            4 Aug 2011 -  
                                  APA offices, Dandenong

**Purpose**    Review APA Vic SMS, covering WESTERN region

**Comments**    Not all attendees were present at all times

<b>Attendees</b>	<u>Name</u>	<u>Affiliation</u>	<u>Role</u>
	Craig Bonar	APA	Manager, AM&E
	Peter Dawson	APA	Operations Support Officer
	Michael Harries	APA	Senior Draftsperson/GIS
	Jamie Storer	APA	Pipeline Operator
	Colin Hewlett	APA	Pipeline Operator
	Peter Tuft	PT&A	Pipeline Engineer; Facilitator

## **APPENDIX 3**

### **ALL GENERIC THREATS**

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**THREATS**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**Pipeline:** 42 **Generic pipeline for repetitive and NLS threats**

**Section:** 1 **Repetitive threats**

ID	<b>3087</b>	<b>Cathodic protection shielding within casing due to annular void</b>	KP
Location	Cased crossing		Corrosion
ID	<b>3054</b>	<b>Excessive stress due to vehicle or machinery loads, on or off pavement</b>	KP
Location	Road crossing		Design defect
ID	<b>3060</b>	<b>Excessive stress due to vehicle or machinery loads, on or off tracks</b>	KP
Location	Rail crossing		Design defect
ID	<b>3038</b>	<b>Heavy vehicle over pipe other than at road crossings</b>	KP
Location	General rural installation		External interference
ID	<b>3039</b>	<b>Heavy vehicle bogged in trench</b>	KP
Location	General rural installation		External interference
ID	<b>3040</b>	<b>Fence post installation (stock fencing etc)</b>	KP
Location	General rural installation		External interference
ID	<b>3041</b>	<b>Vineyard trellis post installation (up to 900 mm deep for end posts)</b>	KP
Location	General rural installation		External interference
ID	<b>3042</b>	<b>Ploughing, up to 500 mm depth</b>	KP
Location	General rural installation		External interference
ID	<b>3043</b>	<b>Deep ripping, agricultural, up to 1000 mm depth</b>	KP
Location	General rural installation		External interference
ID	<b>3044</b>	<b>Cable plough, 1200 mm or perhaps deeper</b>	KP
Location	General rural installation		External interference
ID	<b>3045</b>	<b>Forestry, tree harvesting or planting adjacent to easement</b>	KP
Location	General rural installation		External interference
ID	<b>3046</b>	<b>Dam construction</b>	KP
Location	General rural installation		External interference
ID	<b>3047</b>	<b>Dam maintenance or re-contouring</b>	KP
Location	General rural installation		External interference
ID	<b>3048</b>	<b>Levee or contour bank construction or maintenance; expect ≤600 mm depth</b>	KP
Location	General rural installation		External interference
ID	<b>3049</b>	<b>Water bore installation</b>	KP
Location	General rural installation		External interference

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**THREATS**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

ID	<b>3050</b>	<b>Unplanned or uncontrolled minor construction (tracks, sheds, etc); expect ≤600 m depth</b>	KP
	<i>Location</i>	General rural installation	External interference
ID	<b>3051</b>	<b>Minor buried service maintenance; expect ≤600 mm depth</b>	KP
	<i>Location</i>	General rural installation	External interference
ID	<b>3052</b>	<b>Minor buried service installation; expect ≤600 mm depth</b>	KP
	<i>Location</i>	General rural installation	External interference
ID	<b>3056</b>	<b>Traffic accident, vehicle ploughs into ground over pipe</b>	KP
	<i>Location</i>	Road crossing	External interference
ID	<b>3057</b>	<b>Table drain maintenance</b>	KP
	<i>Location</i>	Road crossing	External interference
ID	<b>3058</b>	<b>Buried service construction or maintenance</b>	KP
	<i>Location</i>	Road crossing	External interference
ID	<b>3059</b>	<b>Table drain maintenance</b>	KP
	<i>Location</i>	Rail crossing	External interference
ID	<b>3061</b>	<b>Rail accident, excessive stress on pipe, or coating or pipe damage</b>	KP
	<i>Location</i>	Rail crossing	External interference
ID	<b>3062</b>	<b>Trackside services maintenance or construction</b>	KP
	<i>Location</i>	Rail crossing	External interference
ID	<b>3063</b>	<b>Trackside fence maintenance or construction</b>	KP
	<i>Location</i>	Rail crossing	External interference
ID	<b>3064</b>	<b>Roadside fence maintenance or construction</b>	KP
	<i>Location</i>	Road crossing	External interference
ID	<b>3068</b>	<b>Drain maintenance</b>	KP
	<i>Location</i>	Drain crossing (manmade)	External interference
ID	<b>3069</b>	<b>Power pole installation or replacement in road reserve</b>	KP
	<i>Location</i>	Road crossing	External interference
ID	<b>3070</b>	<b>Power pole installation or replacement</b>	KP
	<i>Location</i>	Powerline crossing	External interference
ID	<b>3071</b>	<b>Landscaping &amp; tree planting</b>	KP
	<i>Location</i>	Isolated house	External interference
ID	<b>3072</b>	<b>Construction of buried services to house</b>	KP
	<i>Location</i>	Isolated house	External interference
ID	<b>3073</b>	<b>Power pole installation or replacement</b>	KP
	<i>Location</i>	Isolated house	External interference

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**THREATS**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

ID	<b>3074</b>	<b>Well sinking (bore)</b>	KP
Location	Isolated house		External interference
ID	<b>3075</b>	<b>Sewage system construction, including septic tank</b>	KP
Location	Isolated house		External interference
ID	<b>3077</b>	<b>Swimming pool construction</b>	KP
Location	Isolated house		External interference
ID	<b>3104</b>	<b>Buried service construction (open cut)</b>	KP
Location	General metro installation		External interference
ID	<b>3105</b>	<b>Power pole installation or replacement</b>	KP
Location	General metro installation		External interference
ID	<b>3106</b>	<b>HDD for buried service installation</b>	KP
Location	General metro installation		External interference
ID	<b>3107</b>	<b>Road reconstruction or major maintenance</b>	KP
Location	General metro installation		External interference
ID	<b>3108</b>	<b>Core drilling for geotech investigation</b>	KP
Location	General metro installation		External interference
ID	<b>3111</b>	<b>Buried service maintenance</b>	KP
Location	General metro installation		External interference
ID	<b>3065</b>	<b>Erosion or loss of cover, leading to flotation</b>	KP
Location	Watercourse crossing		Natural events
ID	<b>3066</b>	<b>Erosion and exposure of pipe, possible damage from waterborne debris</b>	KP
Location	Watercourse crossing		Natural events
ID	<b>3067</b>	<b>Erosion and exposure of pipe, possible damage from waterborne debris</b>	KP
Location	Drain crossing (manmade)		Natural events

**Section: 2 Non-location-specific**

ID	<b>3078</b>	<b>Undetected or unreported construction defect</b>	KP
Location	Non-location-specific		Construction defect
ID	<b>3079</b>	<b>Stress corrosion cracking</b>	KP
Location	Non-location-specific		Corrosion
ID	<b>3080</b>	<b>Internal corrosion</b>	KP
Location	Non-location-specific		Corrosion
ID	<b>3081</b>	<b>Loss of cathodic protection due to failure of a CPU or loss of electrical isolation</b>	KP
Location	Non-location-specific		Corrosion

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**THREATS**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

ID	<b>3082</b>	<b>CP testing performed incorrectly</b>	KP
<i>Location</i>	Non-location-specific		Corrosion
ID	<b>3083</b>	<b>Stray current corrosion</b>	KP
<i>Location</i>	Non-location-specific		Corrosion
ID	<b>3084</b>	<b>Interference from other authority structure or CP unit</b>	KP
<i>Location</i>	Non-location-specific		Corrosion
ID	<b>3085</b>	<b>Telluric effects</b>	KP
<i>Location</i>	Non-location-specific		Corrosion
ID	<b>3086</b>	<b>Cathodic protection shielding (disbonded coating)</b>	KP
<i>Location</i>	Non-location-specific		Corrosion
ID	<b>3088</b>	<b>Microbiological corrosion or aggressive soils</b>	KP
<i>Location</i>	Non-location-specific		Corrosion
ID	<b>3089</b>	<b>Unidentified or unreported design shortcoming</b>	KP
<i>Location</i>	Non-location-specific		Design defect
ID	<b>3110</b>	<b>Fracture control plan inadequate</b>	KP
<i>Location</i>	Non-location-specific		Design defect
ID	<b>3090</b>	<b>Sabotage or unauthorised operation</b>	KP
<i>Location</i>	Non-location-specific		Intentional damage
ID	<b>3091</b>	<b>Undetected or unreported material defect</b>	KP
<i>Location</i>	Non-location-specific		Material defect
ID	<b>3092</b>	<b>Earthquake</b>	KP
<i>Location</i>	Non-location-specific		Natural events
ID	<b>3053</b>	<b>Incident due to inaccurate or misinterpreted pipeline location information</b>	KP
<i>Location</i>	Non-location-specific		Operation & maintenance
ID	<b>3093</b>	<b>Loss of supply due to pigging operations</b>	KP
<i>Location</i>	Non-location-specific		Operation & maintenance
ID	<b>3094</b>	<b>Maintenance procedures inadequate or incomplete</b>	KP
<i>Location</i>	Non-location-specific		Operation & maintenance
ID	<b>3095</b>	<b>Maintenance contrary to procedures</b>	KP
<i>Location</i>	Non-location-specific		Operation & maintenance
ID	<b>3096</b>	<b>Project records, as-built records and material records lost, ignored or not maintained</b>	KP
<i>Location</i>	Non-location-specific		Operation & maintenance
ID	<b>3097</b>	<b>Changes to assets not managed, implemented or recorded properly</b>	KP
<i>Location</i>	Non-location-specific		Operation & maintenance

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**THREATS**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

ID	<b>3098</b>	<b>Operators not adequately trained or lacking specific competence</b>	KP
<i>Location</i>	Non-location-specific		Operation & maintenance
ID	<b>3100</b>	<b>Escalation of incident due to inadequate or ineffective emergency management</b>	KP
<i>Location</i>	Non-location-specific		Operation & maintenance
ID	<b>3101</b>	<b>In-service welding</b>	KP
<i>Location</i>	Non-location-specific		Operation & maintenance
ID	<b>3102</b>	<b>High voltages induced from parallel powerlines</b>	KP
<i>Location</i>	Non-location-specific		Other
ID	<b>3103</b>	<b>Earth potential rise due to earthing fault or lightning strike on powerline</b>	KP
<i>Location</i>	Non-location-specific		Other

## **APPENDIX 4**

### **EXTERNAL INTERFERENCE PROTECTION (Generic Threats)**

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**EXTERNAL INTERFERENCE PROTECTION**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**Pipeline:** 42 **Generic pipeline for repetitive and NLS threats**

**Section:** 1 **Repetitive threats**

**THREAT DETAILS**

ID **3038** **Heavy vehicle over pipe other than at road crossings** KP  
**Location** General rural installation External interference  
**INITIAL EIP** **Physical protection:** Burial **Procedural protection:** Landowner liaison  
 Wall thickness Third party liaison  
 Warning signs  
**Phys notes:** Calculations under AP-RP 1102 demonstrate loading acceptable. Patrolling  
 Cover at most locations is greater than 750 mm, and 1200 mm One-call system  
**Proc notes:**  
**Cover:** 750 mm **Wall thickness:** mm **Sign spacing:** m  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID Action Contin-  
 uing

**THREAT DETAILS**

ID **3039** **Heavy vehicle bogged in trench** KP  
**Location** General rural installation External interference  
**INITIAL EIP** **Physical protection:** Burial **Procedural protection:**  
 Wall thickness  
**Phys notes:** Weight distribution of vehicle spreading load. Cover at most  
 locations is greater than 750 mm, and 1200 mm on older  
**Proc notes:** Patrols note wheel ruts and manage appropriately  
**Cover:** 750 mm **Wall thickness:** mm **Sign spacing:** m  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID Action Contin-  
 uing

**THREAT DETAILS**

ID **3040** **Fence post installation (stock fencing etc)** KP  
**Location** General rural installation External interference  
**INITIAL EIP** **Physical protection:** Burial **Procedural protection:** Landowner liaison  
 Wall thickness Warning signs  
 Patrolling  
**Phys notes:** Cover at most locations is greater than 750 mm, and 1200 mm Third party liaison  
 on older pipelines. One-call system  
 Marker tape  
**Proc notes:** Patrols review signage and fence line changes.  
**Cover:** 750 mm **Wall thickness:** mm **Sign spacing:** m  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID Action Contin-  
 uing

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**EXTERNAL INTERFERENCE PROTECTION**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**THREAT DETAILS**

ID **3041** **Vineyard trellis post installation (up to 900 mm deep for end posts)** KP  
**Location** General rural installation External interference  
**INITIAL EIP** **Physical protection:** Burial **Procedural protection:** Landowner liaison  
 Wall thickness Warning signs  
 Patrolling  
**Phys notes:** Cover at most locations is greater than 750 mm, and 1200 mm on older pipelines. One-call system  
 Third party liaison  
 Marker tape  
**Proc notes:**  
**Cover: 750 mm Wall thickness: mm Sign spacing: m**  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID Action Contin-  
 uing

**THREAT DETAILS**

ID **3042** **Ploughing, up to 500 mm depth** KP  
**Location** General rural installation External interference  
**INITIAL EIP** **Physical protection:** Burial **Procedural protection:** Landowner liaison  
 Wall thickness Warning signs  
 Patrolling  
**Phys notes:** Cover at most locations is greater than 750 mm, and 1200 mm on older pipelines. One-call system  
 Third party liaison  
 Marker tape  
**Proc notes:**  
**Cover: 750 mm Wall thickness: mm Sign spacing: m**  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID Action Contin-  
 uing

**THREAT DETAILS**

ID **3043** **Deep ripping, agricultural, up to 1000 mm depth** KP  
**Location** General rural installation External interference  
**INITIAL EIP** **Physical protection:** Burial **Procedural protection:** Landowner liaison  
 Wall thickness Warning signs  
 Patrolling  
**Phys notes:** Cover at most locations is greater than 750 mm, and 1200 mm on older pipelines. Third party liaison  
 One-call system  
 Marker tape  
**Proc notes:**  
**Cover: 750 mm Wall thickness: mm Sign spacing: m**  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID Action Contin-  
 uing

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**EXTERNAL INTERFERENCE PROTECTION**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**THREAT DETAILS**

ID **3044** **Cable plough, 1200 mm or perhaps deeper** KP  
**Location** General rural installation External interference  
**INITIAL EIP** **Physical protection:** Burial **Procedural protection:** Landowner liaison  
 Wall thickness Warning signs  
 Patrolling  
**Phys notes:** Cover at most locations is greater than 750 mm, and 1200 mm Third party liaison  
 on older pipelines. One-call system  
**Proc notes:**  
**Cover: 750 mm Wall thickness: mm Sign spacing: m**  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID **Action** Contin-  
 uing

**THREAT DETAILS**

ID **3045** **Forestry, tree harvesting or planting adjacent to easement** KP  
**Location** General rural installation External interference  
**INITIAL EIP** **Physical protection:** Burial **Procedural protection:** Landowner liaison  
 Wall thickness Warning signs  
 Patrolling  
**Phys notes:** Cover at most locations is greater than 750 mm, and 1200 mm Third party liaison  
 on older pipelines. One-call system  
**Proc notes:** Marker tape  
**Cover: 750 mm Wall thickness: mm Sign spacing: m**  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID **Action** Contin-  
 uing

**THREAT DETAILS**

ID **3046** **Dam construction** KP  
**Location** General rural installation External interference  
**INITIAL EIP** **Physical protection:** Burial **Procedural protection:** Landowner liaison  
 Wall thickness Warning signs  
 Patrolling  
**Phys notes:** Cover at most locations is greater than 750 mm, and 1200 mm Third party liaison  
 on older pipelines. However cover may not be adequate One-call system  
**Proc notes:** Marker tape  
**Cover: 750 mm Wall thickness: mm Sign spacing: m**  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID **Action** Contin-  
 uing

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**EXTERNAL INTERFERENCE PROTECTION**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**THREAT DETAILS**

ID **3047** ***Dam maintenance or re-contouring*** KP  
**Location** General rural installation External interference  
**INITIAL EIP** **Physical protection:** Burial **Procedural protection:** Landowner liaison  
 Wall thickness Warning signs  
 Patrolling  
**Phys notes:** Cover at most locations is greater than 750 mm, and 1200 mm Third party liaison  
 on older pipelines. However cover may not be adequate One-call system  
 Marker tape  
**Proc notes:**  
**Cover: 750 mm Wall thickness: mm Sign spacing: m**  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID **Action** Contin-  
 uing

**THREAT DETAILS**

ID **3048** ***Levee or contour bank construction or maintenance; expect ≤600 mm depth*** KP  
**Location** General rural installation External interference  
**INITIAL EIP** **Physical protection:** Burial **Procedural protection:** Landowner liaison  
 Wall thickness Warning signs  
 Patrolling  
**Phys notes:** Cover at most locations is greater than 750 mm, and 1200 mm One-call system  
 on older pipelines. Third party liaison  
 Marker tape  
**Proc notes:**  
**Cover: 750 mm Wall thickness: mm Sign spacing: m**  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID **Action** Contin-  
 uing

**THREAT DETAILS**

ID **3049** ***Water bore installation*** KP  
**Location** General rural installation External interference  
**INITIAL EIP** **Physical protection:** Wall thickness **Procedural protection:** Landowner liaison  
 Warning signs  
 Patrolling  
**Phys notes:** One-call system  
 Third party liaison  
 Marker tape  
**Proc notes:**  
**Cover: mm Wall thickness: mm Sign spacing: m**  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID **Action** Contin-  
 uing

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**EXTERNAL INTERFERENCE PROTECTION**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**THREAT DETAILS**

ID **3050** **Unplanned or uncontrolled minor construction (tracks, sheds, etc); expect ≤600 m depth** KP

**Location** General rural installation External interference

**INITIAL EIP** **Physical protection:** Burial **Procedural protection:** Landowner liaison  
Wall thickness Warning signs  
Patrolling  
**Phys notes:** Cover at most locations is greater than 750 mm, and 1200 mm on older pipelines. One-call system  
Third party liaison  
Marker tape

**Proc notes:**

**Cover: 750 mm Wall thickness: mm Sign spacing: m**

**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID Action Contin-  
uing

**THREAT DETAILS**

ID **3051** **Minor buried service maintenance; expect ≤600 mm depth** KP

**Location** General rural installation External interference

**INITIAL EIP** **Physical protection:** Burial **Procedural protection:** Landowner liaison  
Wall thickness Warning signs  
Patrolling  
**Phys notes:** Cover at most locations is greater than 750 mm, and 1200 mm on older pipelines. One-call system  
Third party liaison  
Marker tape

**Proc notes:**

**Cover: 750 mm Wall thickness: mm Sign spacing: m**

**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID Action Contin-  
uing

**THREAT DETAILS**

ID **3052** **Minor buried service installation; expect ≤600 mm depth** KP

**Location** General rural installation External interference

**INITIAL EIP** **Physical protection:** Burial **Procedural protection:** Landowner liaison  
Wall thickness Warning signs  
Patrolling  
**Phys notes:** One-call system  
Third party liaison  
Marker tape

**Proc notes:**

**Cover: 900 mm Wall thickness: mm Sign spacing: m**

**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID Action Contin-  
uing

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**EXTERNAL INTERFERENCE PROTECTION**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**THREAT DETAILS**

ID **3056** **Traffic accident, vehicle ploughs into ground over pipe** KP  
**Location** Road crossing External interference  
**INITIAL EIP** **Physical protection:** Burial **Procedural protection:**  
 Wall thickness  
**Phys notes:**  
**Proc notes:** Procedural measure not applicable to accidental events.  
**Cover: 1200 mm Wall thickness: mm Sign spacing: m**  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No  
**AMENDED EIP (corrective actions)** Contin-  
 ID **Action** uing

**THREAT DETAILS**

ID **3057** **Table drain maintenance** KP  
**Location** Road crossing External interference  
**INITIAL EIP** **Physical protection:** Burial **Procedural protection:** Third party liaison  
 Wall thickness Warning signs  
 Penetration barrier Landowner liaison  
 One-call system  
 Marker tape  
 Patrolling  
**Phys notes:** Concrete slabs at road crossings (except bored portion)  
**Proc notes:**  
**Cover: 1200 mm Wall thickness: mm Sign spacing: m**  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No  
**AMENDED EIP (corrective actions)** Contin-  
 ID **Action** uing

**THREAT DETAILS**

ID **3058** **Buried service construction or maintenance** KP  
**Location** Road crossing External interference  
**INITIAL EIP** **Physical protection:** Burial **Procedural protection:** Landowner liaison  
 Wall thickness Third party liaison  
 Penetration barrier Warning signs  
 Marker tape  
 One-call system  
 Patrolling  
**Phys notes:** Concrete slabs at road crossings (except bored portion)  
**Proc notes:**  
**Cover: 1200 mm Wall thickness: mm Sign spacing: m**  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No  
**AMENDED EIP (corrective actions)** Contin-  
 ID **Action** uing

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**EXTERNAL INTERFERENCE PROTECTION**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**THREAT DETAILS**

ID **3059** **Table drain maintenance** KP  
**Location** Rail crossing External interference  
**INITIAL EIP** **Physical protection:** Burial **Procedural protection:** Landowner liaison  
 Wall thickness Third party liaison  
 Penetration barrier Warning signs  
 Patrolling  
**Phys notes:** Casing (steel) and concrete slabs outside bored portion One-call system  
**Proc notes:** Marker tape  
**Cover:** mm **Wall thickness:** mm **Sign spacing:** m  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID Action Contin-  
 uing

**THREAT DETAILS**

ID **3061** **Rail accident, excessive stress on pipe, or coating or pipe damage** KP  
**Location** Rail crossing External interference  
**INITIAL EIP** **Physical protection:** Burial **Procedural protection:**  
 Wall thickness  
 Penetration barrier  
**Phys notes:** Casing (steel)  
**Proc notes:** Procedural measure not applicable to accidental events.  
**Cover:** 1200 mm **Wall thickness:** mm **Sign spacing:** m  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID Action Contin-  
 uing

**THREAT DETAILS**

ID **3062** **Trackside services maintenance or construction** KP  
**Location** Rail crossing External interference  
**INITIAL EIP** **Physical protection:** Burial **Procedural protection:** Landowner liaison  
 Wall thickness Third party liaison  
 Penetration barrier Warning signs  
 Patrolling  
**Phys notes:** Casing (steel) One-call system  
**Proc notes:** Marker tape  
**Cover:** 1200 mm **Wall thickness:** mm **Sign spacing:** m  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID Action Contin-  
 uing

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**EXTERNAL INTERFERENCE PROTECTION**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**THREAT DETAILS**

ID **3063** **Trackside fence maintenance or construction** KP  
**Location** Rail crossing External interference  
**INITIAL EIP** **Physical protection:** Burial **Procedural protection:** Landowner liaison  
 Wall thickness Third party liaison  
 Penetration barrier Warning signs  
 Patrolling  
**Phys notes:** Casing (steel) One-call system  
 Marker tape  
**Proc notes:**  
**Cover: 1200 mm Wall thickness: mm Sign spacing: m**  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID Action Contin-  
 uing

**THREAT DETAILS**

ID **3064** **Roadside fence maintenance or construction** KP  
**Location** Road crossing External interference  
**INITIAL EIP** **Physical protection:** Burial **Procedural protection:** Third party liaison  
 Wall thickness Warning signs  
 Penetration barrier Landowner liaison  
 One-call system  
**Phys notes:** Concrete slabs at road crossings (except bored portion) Marker tape  
 Patrolling  
**Proc notes:**  
**Cover: 1200 mm Wall thickness: mm Sign spacing: m**  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID Action Contin-  
 uing

**THREAT DETAILS**

ID **3068** **Drain maintenance** KP  
**Location** Drain crossing (manmade) External interference  
**INITIAL EIP** **Physical protection:** Burial **Procedural protection:** One-call system  
 Wall thickness Landowner liaison  
 Third party liaison  
**Phys notes:** Cover of 2000 mm or more at major drains and irrigation channels Warning signs  
 Marker tape  
 Patrolling  
**Proc notes:**  
**Cover: 1200 mm Wall thickness: mm Sign spacing: m**  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID Action Contin-  
 uing

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**EXTERNAL INTERFERENCE PROTECTION**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**THREAT DETAILS**

ID **3069** **Power pole installation or replacement in road reserve** KP  
**Location** Road crossing External interference  
**INITIAL EIP** **Physical protection:** Wall thickness Penetration barrier **Procedural protection:** Landowner liaison  
 Third party liaison  
 One-call system  
**Phys notes:** Concrete slabs at road crossings (except bored portion) Warning signs  
**Proc notes:** Special signs on existing poles within 4 m of pipeline. Power company control rooms aware of pipeline location near poles. Marker tape  
 Patrolling  
**Cover:** mm **Wall thickness:** mm **Sign spacing:** m  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID Action Contin-  
 uing

**THREAT DETAILS**

ID **3070** **Power pole installation or replacement** KP  
**Location** Powerline crossing External interference  
**INITIAL EIP** **Physical protection:** Wall thickness **Procedural protection:** Landowner liaison  
 Third party liaison  
 One-call system  
**Phys notes:** Warning signs  
**Proc notes:** Marker tape  
 Patrolling  
**Cover:** mm **Wall thickness:** mm **Sign spacing:** m  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID Action Contin-  
 uing

**THREAT DETAILS**

ID **3071** **Landscaping & tree planting** KP  
**Location** Isolated house External interference  
**INITIAL EIP** **Physical protection:** Burial Wall thickness **Procedural protection:** Landowner liaison  
 One-call system  
 Warning signs  
**Phys notes:** Cover at most locations is greater than 750 mm, and 1200 mm on older pipelines. Third party liaison  
 Marker tape  
 Patrolling  
**Proc notes:**  
**Cover:** 750 mm **Wall thickness:** mm **Sign spacing:** m  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID Action Contin-  
 uing



Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**EXTERNAL INTERFERENCE PROTECTION**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**THREAT DETAILS**

ID **3075** *Sewage system construction, including septic tank* KP  
**Location** Isolated house External interference  
**INITIAL EIP** **Physical protection:** Wall thickness **Procedural protection:** Landowner liaison  
 One-call system  
**Phys notes:** Warning signs  
**Proc notes:** Third party liaison  
 Marker tape  
 Patrolling  
**Cover:** mm **Wall thickness:** mm **Sign spacing:** m  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID **Action** Contin-  
 uing

**THREAT DETAILS**

ID **3077** *Swimming pool construction* KP  
**Location** Isolated house External interference  
**INITIAL EIP** **Physical protection:** Wall thickness **Procedural protection:** Landowner liaison  
 One-call system  
**Phys notes:** Warning signs  
**Proc notes:** Third party liaison  
 Marker tape  
 Patrolling  
**Cover:** mm **Wall thickness:** mm **Sign spacing:** m  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID **Action** Contin-  
 uing

**THREAT DETAILS**

ID **3104** *Buried service construction (open cut)* KP  
**Location** General metro installation External interference  
**INITIAL EIP** **Physical protection:** Burial **Procedural protection:** Landowner liaison  
 Wall thickness Third party liaison  
**Phys notes:** One-call system  
**Proc notes:** Warning signs  
 Marker tape  
 Patrolling  
**Cover:** 1200 mm **Wall thickness:** mm **Sign spacing:** m  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID **Action** Contin-  
 uing

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**EXTERNAL INTERFERENCE PROTECTION**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**THREAT DETAILS**

ID **3105** **Power pole installation or replacement** KP  
**Location** General metro installation External interference  
**INITIAL EIP** **Physical protection:** Wall thickness **Procedural protection:** Landowner liaison  
 Third party liaison  
**Phys notes:** One-call system  
 Warning signs  
**Proc notes:** Special signs on existing poles within 4 m of pipeline. Power company control rooms aware of pipeline location near poles. Marker tape  
 Patrolling  
**Cover:** mm **Wall thickness:** mm **Sign spacing:** m  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID **Action** Contin-  
 uing

**THREAT DETAILS**

ID **3106** **HDD for buried service installation** KP  
**Location** General metro installation External interference  
**INITIAL EIP** **Physical protection:** Wall thickness **Procedural protection:** Landowner liaison  
 Third party liaison  
**Phys notes:** One-call system  
 Warning signs  
**Proc notes:** Patrolling  
**Cover:** mm **Wall thickness:** mm **Sign spacing:** m  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID **Action** Contin-  
 uing

**THREAT DETAILS**

ID **3107** **Road reconstruction or major maintenance** KP  
**Location** General metro installation External interference  
**INITIAL EIP** **Physical protection:** Burial Wall thickness **Procedural protection:** Landowner liaison  
 Third party liaison  
**Phys notes:** One-call system  
 Warning signs  
**Proc notes:** Marker tape  
 Patrolling  
**Cover:** 1200 mm **Wall thickness:** mm **Sign spacing:** m  
**Initial EIP acceptable?**  Yes  No **Amended EIP acceptable?**  Yes  No

**AMENDED EIP (corrective actions)**

ID **Action** Contin-  
 uing



## **APPENDIX 5**

### **DESIGN OR PROCEDURAL PROTECTION (Generic Threats)**

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**PROTECTION BY DESIGN OR PROCEDURES**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**Pipeline:** 42 **Generic pipeline for repetitive and NLS threats**

**Section:** 1 **Repetitive threats**

**THREAT DETAILS**

ID **3087** **Cathodic protection shielding within casing due to annular void** KP  
**Location** Cased crossing Corrosion

**INITIAL DESIGN**

Linepipe coating; in-line inspection; check for electrical isolation between pipe and casing (6 monthly)

**Initial design acceptable?**  Yes  No

**Amended design acceptable?**  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action** Contin-  
uing

**THREAT DETAILS**

ID **3054** **Excessive stress due to vehicle or machinery loads, on or off pavement** KP  
**Location** Road crossing Design defect

**INITIAL DESIGN**

Ample cover and wall thickness. Concrete slabs at road crossings (except bored portion).

**Initial design acceptable?**  Yes  No

**Amended design acceptable?**  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action** Contin-  
uing

**THREAT DETAILS**

ID **3060** **Excessive stress due to vehicle or machinery loads, on or off tracks** KP  
**Location** Rail crossing Design defect

**INITIAL DESIGN**

Ample cover and wall thickness. Casing pipe (steel).

**Initial design acceptable?**  Yes  No

**Amended design acceptable?**  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action** Contin-  
uing

**THREAT DETAILS**

ID **3065** **Erosion or loss of cover, leading to flotation** KP  
**Location** Watercourse crossing Natural events

**INITIAL DESIGN**

1200 mm depth of cover, regular patrol to detect erosion. Major river crossings have ample cover. NO history of erosion at river crossing. Occasional washouts at minor gullies, identified through patrol and rectified. Patrol to inspect for erosion after major flood events.

**Initial design acceptable?**  Yes  No

**Amended design acceptable?**  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action** Contin-  
uing

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**PROTECTION BY DESIGN OR PROCEDURES**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**THREAT DETAILS**

ID **3066**    ***Erosion and exposure of pipe, possible damage from waterborne debris***    KP

**Location**    Watercourse crossing    Natural events

**INITIAL DESIGN**

1200 mm depth of cover, regular patrol to detect erosion. Major river crossings have ample cover. NO history of erosion at river crossing. Occasional washouts at minor gullies, identified through patrol and rectified. Patrol to inspect for erosion after major flood events.

**Initial design acceptable?**     Yes     No

**Amended design acceptable?**     Yes     No

**AMENDED DESIGN (corrective actions)**

ID    Action    Contin-  
uing

**THREAT DETAILS**

ID **3067**    ***Erosion and exposure of pipe, possible damage from waterborne debris***    KP

**Location**    Drain crossing (manmade)    Natural events

**INITIAL DESIGN**

1200 mm depth of cover, regular patrol to detect erosion. Drains not wide enough, or of strong enough current, to cause flotation or overstressing of exposed pipe.

**Initial design acceptable?**     Yes     No

**Amended design acceptable?**     Yes     No

**AMENDED DESIGN (corrective actions)**

ID    Action    Contin-  
uing

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**PROTECTION BY DESIGN OR PROCEDURES**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

Section: **2 Non-location-specific**

**THREAT DETAILS**

ID **3078** **Undetected or unreported construction defect**

KP

Location Non-location-specific

Construction defect

**INITIAL DESIGN**

Pipelines operating successfully for many years, all hydrotested except Lurgi line which has now had MFL ILI.

Initial design acceptable?  Yes  No

Amended design acceptable?  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action**

Continuing

**2** Lurgi line - consider reviewing the possibility of latent construction defects, given the year in which it was built and the lack of hydrotest  Yes

**THREAT DETAILS**

ID **3079** **Stress corrosion cracking**

KP

Location Non-location-specific

Corrosion

**INITIAL DESIGN**

Assessment of SCC likelihood done on all pipelines, based on PRCI criteria, and shows results of low or low-moderate likelihood. Blast cleaned surface preparation. CP will take pipe potential more negative than SCC range. All coating factory applied (except at weld margins). Each direct assessment includes magnetic particle inspection to check for cracking.

Initial design acceptable?  Yes  No

Amended design acceptable?  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action**

Continuing

**THREAT DETAILS**

ID **3080** **Internal corrosion**

KP

Location Non-location-specific

Corrosion

**INITIAL DESIGN**

In-line Inspection. Dry gas. Gas constituents non corrosive. Dewatering and drying procedures following hydrostatic testing. No prolonged retention of hydrostatic test water. Additional wall thickness to that required for pressure containment.

Initial design acceptable?  Yes  No

Amended design acceptable?  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action**

Continuing

**THREAT DETAILS**

ID **3081** **Loss of cathodic protection due to failure of a CPU or loss of electrical isolation**

KP

Location Non-location-specific

Corrosion

**INITIAL DESIGN**

In-line Inspection. CPU monthly check. 6 monthly potential surveys. 6 monthly surge protection checks. Additional wall thickness to that required for pressure containment.

Initial design acceptable?  Yes  No

Amended design acceptable?  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action**

Continuing

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**PROTECTION BY DESIGN OR PROCEDURES**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

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**THREAT DETAILS**

ID **3082** **CP testing performed incorrectly** KP  
**Location** Non-location-specific Corrosion

**INITIAL DESIGN**

In-line Inspection. Logging of representative sample of TPs. Staff competency assessments. Review of field results by supervisor. Additional wall thickness to that required for pressure containment. NATA certified annual calibration checks of all test equipment.

**Initial design acceptable?**  Yes  No

**Amended design acceptable?**  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action** Contin-  
uing

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**THREAT DETAILS**

ID **3083** **Stray current corrosion** KP  
**Location** Non-location-specific Corrosion

**INITIAL DESIGN**

In-line Inspection. Stray current drainage bonds 6 monthly potential surveys. Regular inspection and testing of drainage equipment by Victorian Electrolysis Committee (VEC) Operations Group - 10 times per year. 5 yearly combined authority area test on stray current mitigation. (Most pipelines also have auto controlled CP units and these units are checked monthly.)

**Initial design acceptable?**  Yes  No

**Amended design acceptable?**  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action** Contin-  
uing

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**THREAT DETAILS**

ID **3084** **Interference from other authority structure or CP unit** KP  
**Location** Non-location-specific Corrosion

**INITIAL DESIGN**

In-line Inspection. Legislated requirement for approval of new CPUs. Review of CP permit applications by Technical Sub- committee (TSC) of VEC representative. Checks during area testing by VEC in metro area. 6 month potential surveys.

**Initial design acceptable?**  Yes  No

**Amended design acceptable?**  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action** Contin-  
uing

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**THREAT DETAILS**

ID **3085** **Telluric effects** KP  
**Location** Non-location-specific Corrosion

**INITIAL DESIGN**

In-line Inspection. CPU monthly check 6 monthly potential surveys. Coating defect surveys (Most pipelines also have auto controlled CP units and these units are checked monthly.)

**Initial design acceptable?**  Yes  No

**Amended design acceptable?**  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action** Contin-  
uing

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Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**PROTECTION BY DESIGN OR PROCEDURES**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**THREAT DETAILS**

ID **3086** ***Cathodic protection shielding (disbonded coating)*** KP  
**Location** Non-location-specific Corrosion

**INITIAL DESIGN**

In-line inspection. Coating defect surveys are done but have limited effectiveness for shielded defects. Some disbondment known on PE coated lines, but no corrosion.

**Initial design acceptable?**  Yes  No **Amended design acceptable?**  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action** Contin-  
**1** Unpiggable pipelines - review means of identifying corrosion defects, particularly due to shielding  Yes  
by either disbonded coating or casings

**THREAT DETAILS**

ID **3088** ***Microbiological corrosion or aggressive soils*** KP  
**Location** Non-location-specific Corrosion

**INITIAL DESIGN**

In-line inspection. Coating. DCVG coating inspection. Cathodic protection usually renders pH too alkaline at coating defects for microbiological agents to be active.

**Initial design acceptable?**  Yes  No **Amended design acceptable?**  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action** Contin-  
uing

**THREAT DETAILS**

ID **3089** ***Unidentified or unreported design shortcoming*** KP  
**Location** Non-location-specific Design defect

**INITIAL DESIGN**

Hydrostatic Testing (except Lurgi line). High design standards and supervision by GFC/APA. Most pipelines operating successfully for many years. Latent design defects would have appeared by now.

**Initial design acceptable?**  Yes  No **Amended design acceptable?**  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action** Contin-  
uing

**THREAT DETAILS**

ID **3110** ***Fracture control plan inadequate*** KP  
**Location** Non-location-specific Design defect

**INITIAL DESIGN**

Many lines were built before fracture controls plans were required. Review in ~2000 showed worst case was arrest within three pipes (Longford to Dandenong). Outcome informed decisions on quantity of spare pipe.

**Initial design acceptable?**  Yes  No **Amended design acceptable?**  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action** Contin-  
uing

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**PROTECTION BY DESIGN OR PROCEDURES**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**THREAT DETAILS**

ID **3090** ***Sabotage or unauthorised operation*** KP  
**Location** Non-location-specific Intentional damage

**INITIAL DESIGN**

Maintain relationships with landowners, MFB, CFA, Police, community. Lockable enclosures, valves, etc. with key registration. Patrols. Emergency procedure/training.

**Initial design acceptable?**  Yes  No **Amended design acceptable?**  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action** Contin-  
uing

**THREAT DETAILS**

ID **3091** ***Undetected or unreported material defect*** KP  
**Location** Non-location-specific Material defect

**INITIAL DESIGN**

Manufacturer's QA procedures. Receipt inspection procedures. Procedures for site testing and commissioning. Life-cycle management procedures. On-shelf service / testing of spares procedures. Manufacturers and Suppliers Q.A. Monitoring to be practiced. Hydrostatic Testing. Most pipelines operating successfully for many years. Latent defects would have appeared by now.

**Initial design acceptable?**  Yes  No **Amended design acceptable?**  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action** Contin-  
uing  
**2** Lurgi line - consider reviewing the possibility of latent construction defects, given the year in which it was built and the lack of hydrotest  Yes

**THREAT DETAILS**

ID **3092** ***Earthquake*** KP  
**Location** Non-location-specific Natural events

**INITIAL DESIGN**

In the previous 100 years the maximum strength of earthquake measured in the vicinity of the pipeline was ML 5.3 on 20/6/1969 over 15 km away from the pipeline route. No damage to the pipeline was recorded.

**Initial design acceptable?**  Yes  No **Amended design acceptable?**  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action** Contin-  
uing

**THREAT DETAILS**

ID **3053** ***Incident due to inaccurate or misinterpreted pipeline location information*** KP  
**Location** Non-location-specific Operation & maintenance

**INITIAL DESIGN**

Pipeline physically located by Pipeline Operator prior to works. Pipeline supervised during work in vicinity. As-built data updated and checked against physical locations - updated as required on an ongoing basis.

**Initial design acceptable?**  Yes  No **Amended design acceptable?**  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action** Contin-  
uing

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**PROTECTION BY DESIGN OR PROCEDURES**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

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**THREAT DETAILS**

ID **3093** **Loss of supply due to pigging operations**

KP

**Location** Non-location-specific

Operation & maintenance

**INITIAL DESIGN**

Pigging and facilities procedures.

**Initial design acceptable?**  Yes  No

**Amended design acceptable?**  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action**

Contin-  
uing

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**THREAT DETAILS**

ID **3094** **Maintenance procedures inadequate or incomplete**

KP

**Location** Non-location-specific

Operation & maintenance

**INITIAL DESIGN**

Preventative maintenance based on APA programme. Procedures generated in-house by maintenance personnel - includes review process (defined authorisation and revision control). Completion of maintenance tasks monitored within Maintenance Connection. Formal document review and approval process throughout asset lifecycle. Service level agreements with AEMO. Operating and maintenance procedures.

**Initial design acceptable?**  Yes  No

**Amended design acceptable?**  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action**

Contin-  
uing

---

**THREAT DETAILS**

ID **3095** **Maintenance contrary to procedures**

KP

**Location** Non-location-specific

Operation & maintenance

**INITIAL DESIGN**

Competent and experienced personnel adequately trained. Comprehensive procedures in place prior to execution of works.

**Initial design acceptable?**  Yes  No

**Amended design acceptable?**  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action**

Contin-  
uing

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**THREAT DETAILS**

ID **3096** **Project records, as-built records and material records lost, ignored or not maintained**

KP

**Location** Non-location-specific

Operation & maintenance

**INITIAL DESIGN**

Policy and procedures for accurate information management. Policy and procedures for pre-maintenance task analysis (e.g. JHA). Policy to maintain stability in specification for equipment installed.

**Initial design acceptable?**  Yes  No

**Amended design acceptable?**  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action**

Contin-  
uing

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**PROTECTION BY DESIGN OR PROCEDURES**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

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**THREAT DETAILS**

ID **3097** ***Changes to assets not managed, implemented or recorded properly*** KP  
**Location** Non-location-specific Operation & maintenance

**INITIAL DESIGN**

Structured change management procedures. Collaboration of operations and engineering in all phases, especially commissioning and handover. Policy for pre-commissioning document requirements.

**Initial design acceptable?**  Yes  No

**Amended design acceptable?**  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action** Contin-  
uing

---

**THREAT DETAILS**

ID **3098** ***Operators not adequately trained or lacking specific competence*** KP  
**Location** Non-location-specific Operation & maintenance

**INITIAL DESIGN**

Established training/competency programme. Certification for task competencies. Specific work instructions. Task analysis/JHA. Work crew feedback & communications. Mentoring programmes. Selective job assignment by supervisors.

**Initial design acceptable?**  Yes  No

**Amended design acceptable?**  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action** Contin-  
uing

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**THREAT DETAILS**

ID **3100** ***Escalation of incident due to inadequate or ineffective emergency management*** KP  
**Location** Non-location-specific Operation & maintenance

**INITIAL DESIGN**

Emergency procedures. Programme of training and exercises. Industry mutual aid agreements. Accurate and updated reference material. Isolation, curtailment, and/or load shedding. Liaison with AEMO/DB's/suppliers.

**Initial design acceptable?**  Yes  No

**Amended design acceptable?**  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action** Contin-  
uing

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**THREAT DETAILS**

ID **3101** ***In-service welding*** KP  
**Location** Non-location-specific Operation & maintenance

**INITIAL DESIGN**

Use of Qualified Welders and Welding procedures. Use of Qualified Supervision and Checklists. NDT. Selection of Materials in compliance with accepted codes and standards.

**Initial design acceptable?**  Yes  No

**Amended design acceptable?**  Yes  No

**AMENDED DESIGN (corrective actions)**

ID **Action** Contin-  
uing

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Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**PROTECTION BY DESIGN OR PROCEDURES**

Pipeline Licensee: APA GasNet

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**THREAT DETAILS**

ID **3102**    **High voltages induced from parallel powerlines**    KP  
**Location** Non-location-specific    Other

**INITIAL DESIGN**

Induced voltage calculated for individual locations. Earthing beds. Surge protection equipment. Lockable test point heads and equipotential grids where required. Procedure discussed with Corrosion Manager and considered adequate. Procedures: CPS-2308. Compliance with AS 4853 Electrical Hazards on Metallic Pipelines.

**Initial design acceptable?**     Yes     No

**Amended design acceptable?**     Yes     No

**AMENDED DESIGN (corrective actions)**

ID    **Action**    Contin-  
uing

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**THREAT DETAILS**

ID **3103**    **Earth potential rise due to earthing fault or lightning strike on powerline**    KP  
**Location** Non-location-specific    Other

**INITIAL DESIGN**

Earth potential voltage calculated for individual locations. Earthing beds. Surge protection equipment. Lockable test point heads and equipotential grids where required. Procedure discussed with Corrosion Manager and considered adequate. Procedures: CPS-2308. Compliance with AS 4853 Electrical Hazards on Metallic Pipelines. (Note that for new utility installations the pipeline is kept clear by 3 m min.)

**Initial design acceptable?**     Yes     No

**Amended design acceptable?**     Yes     No

**AMENDED DESIGN (corrective actions)**

ID    **Action**    Contin-  
uing

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## **APPENDIX 6**

### **RISK EVALUATION (Generic Threats)**

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**RISK EVALUATION & MANAGEMENT**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**Pipeline:** 42 **Generic pipeline for repetitive and NLS threats**

**Section:** 1 **Repetitive threats**

**THREAT DETAILS** *(assuming no additional mitigation)*

**ID** 3087 **Cathodic protection shielding within casing due to annular void** KP  
**Location** Cased crossing Corrosion  
**Existing design** Linepipe coating; in-line inspection; check for electrical isolation between pipe and casing (6 monthly)

**CONSEQUENCES** *(assuming no additional mitigation)*

**Failure mode** Worst case would be pitting corrosion, say 10 mm hole max  
**Effects** Radiation distances are only a few metres, fatalities highly unlikely. Supply interruption or restriction (depending on location) for 2-4 weeks pending installation of stopples and bypass. (Interruption to towns with single supply, but back feed possible if the failure is in metro area.)  
**Severity notes** Conservatively adopt Major for interruption of supply to a town; would be only Severe if location was metro  
**Freq. notes** About 10 unpiggable casings out of about 150 total, no evidence of corrosion in casings that can be inspected. Estimate Remote, at upper end of range (ie. around 0.1% likelihood in pipeline life)  
**Frequency** Remote **Severity** Major **Rank** **INTERMEDIATE**

**MITIGATION** *(and revised risk evaluation & ranking)*

ID	Action	By	Due	Continuing
<b>New Frequency</b>				
	<b>New Severity</b>			
		<b>New Rank</b>		

**THREAT DETAILS** *(assuming no additional mitigation)*

**ID** 3104 **Buried service construction (open cut)** KP  
**Location** General metro installation External interference

**Existing design**

**CONSEQUENCES** *(assuming no additional mitigation)*

**Failure mode** Not evaluated in detail. Very similar to Threat ID 3111 "Buried service maintenance" but lower likelihood.  
**Effects**  
**Severity notes**  
**Freq. notes**  
**Frequency** Remote **Severity** Severe **Rank** **Low**

**MITIGATION** *(and revised risk evaluation & ranking)*

ID	Action	By	Due	Continuing
<b>New Frequency</b>				
	<b>New Severity</b>			
		<b>New Rank</b>		

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**RISK EVALUATION & MANAGEMENT**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**THREAT DETAILS** *(assuming no additional mitigation)*

ID **3105** **Power pole installation or replacement**

KP

**Location** General metro installation

External interference

**Existing design**

**CONSEQUENCES** *(assuming no additional mitigation)*

- Failure mode**
1. Coating and steel damage (dent and/or gouge)
  2. Penetration by pilot bit of auger, max hole say 50 mm

- Effects**
1. No safety or supply consequences, repair required
  2. Penetration, no fatality, supply interruption pending repair, 2 days max
  3. Fatality to rig operator

- Severity notes**
1. Trivial
  2. Severe, for short term interruption
  3. Major, for fatality

- Freq. notes**
1. Occasional, towards upper end of range (already a couple of incidents)
  2. Remote, upper end of range, given warning signs on poles near pipeline and low likelihood that pole will be relocated by more than a metre or so from existing position
  3. Hypothetical, given 2% ignition likelihood and low conditional probability of fatality

**Frequency** Remote

**Severity** Severe

**Rank** Low

**MITIGATION** *(and revised risk evaluation & ranking)*

ID **Action**

**By**

**Due**

Contin-  
uing

**New Frequency**

**New Severity**

**New Rank**

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**RISK EVALUATION & MANAGEMENT**

Pipeline Licensee: APA GasNet

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**THREAT DETAILS** *(assuming no additional mitigation)*

ID **3106** **HDD for buried service installation** KP  
**Location** General metro installation External interference

**Existing design**

**CONSEQUENCES** *(assuming no additional mitigation)*

- Failure mode**
1. Coating damage and superficial steel damage, identified by patrol
  2. As above, unidentified
  3. Penetration, hole say 25 mm max (even if drill is larger drilling will stop when gas released)

- Effects**
1. No safety or supply consequences, repair required
  2. Potential for corrosion, expect control by CP; eventually found by ILI
  3. No fatality; supply interruption pending repair (2 days max)
  4. Fatality to rig operator

- Severity notes**
1. Trivial
  2. Trivial
  3. Severe, short term interruption
  4. Major, for fatality

- Freq. notes**
- 1 & 2. Occasional
  3. Expect penetration by small HDD rigs to be very unusual, say 1% of hits, Unlikely
  4. 2% ignition probability, not all ignitions will cause fatality, say bottom end of Remote

**Frequency** Remote **Severity** Major **Rank** **INTERMEDIATE**

**MITIGATION** *(and revised risk evaluation & ranking)*

ID	Action	By	Due	Continuing
<b>New Frequency</b>	<b>New Severity</b>	<b>New Rank</b>		

**THREAT DETAILS** *(assuming no additional mitigation)*

ID **3107** **Road reconstruction or major maintenance** KP  
**Location** General metro installation External interference

**Existing design**

**CONSEQUENCES** *(assuming no additional mitigation)*

**Failure mode** Not evaluated in detail. Similar in some ways to Threat ID 3111 "Buried service maintenance" but lower likelihood because of the planned nature of the work and hence close supervision.

**Effects**

**Severity notes**

**Freq. notes**

**Frequency** Hypothetical **Severity** Major **Rank** **Low**

**MITIGATION** *(and revised risk evaluation & ranking)*

ID	Action	By	Due	Continuing
<b>New Frequency</b>	<b>New Severity</b>	<b>New Rank</b>		

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**RISK EVALUATION & MANAGEMENT**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**THREAT DETAILS** *(assuming no additional mitigation)*

ID **3108**      **Core drilling for geotech investigation** KP  
**Location** General metro installation External interference

**Existing design**

**CONSEQUENCES** *(assuming no additional mitigation)*

**Failure mode** Not evaluated in detail. Similar in some ways to Threat ID 3106 "HDD for buried service installation" but lower likelihood and lower consequences.

**Effects**

**Severity notes**

**Freq. notes**

**Frequency** Hypothetical      **Severity** Severe      **Rank** Negligible

**MITIGATION** *(and revised risk evaluation & ranking)*

ID	Action	By	Due	Continuing
<b>New Frequency</b>	<b>New Severity</b>	<b>New Rank</b>		

**THREAT DETAILS** *(assuming no additional mitigation)*

ID **3111**      **Buried service maintenance** KP  
**Location** General metro installation External interference

**Existing design**

**CONSEQUENCES** *(assuming no additional mitigation)*

**Failure mode** 1. Coating and steel damage (dent and/or gouge)  
 2. Penetration by tiger tooth, max hole say 30 mm  
 (Expect generally "gentle" digging by a utility excavating to repair an existing service.)

**Effects**

1. No safety or supply consequences, repair required
2. Penetration, no fatality, supply interruption pending repair, 2 days max
3. Fatality to rig operator

**Severity notes**

1. Trivial
2. Severe, for short term interruption
3. Major, for fatality

**Freq. notes**

1. Occasional
2. Remote, upper end of range, given careful digging and absence of tiger teeth except in west
3. Hypothetical, given 2% ignition likelihood and low conditional probability of fatality

**Frequency** Remote      **Severity** Severe      **Rank** Low

**MITIGATION** *(and revised risk evaluation & ranking)*

ID	Action	By	Due	Continuing
<b>New Frequency</b>	<b>New Severity</b>	<b>New Rank</b>		

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**RISK EVALUATION & MANAGEMENT**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**Section:** 2 **Non-location-specific**

**THREAT DETAILS** *(assuming no additional mitigation)*

ID **3086** **Cathodic protection shielding (disbonded coating)** KP  
**Location** Non-location-specific Corrosion  
**Existing design** In-line inspection. Coating defect surveys are done but have limited effectiveness for shielded defects. Some disbondment known on PE coated lines, but no corrosion.

**CONSEQUENCES** *(assuming no additional mitigation)*

**Failure mode** Pinhole leak, max size few mm  
**Effects** Safety consequences highly unlikely. Short term interruption pending repair, a day or so.  
**Severity notes** Severe, for short term interruption  
**Freq. notes** For non-pigged lines: Occasional, at least 10% chance of leak somewhere in the system over next few decades. (Effectively eliminated from pigged lines by ILI.)

**Frequency** Occasional **Severity** Severe **Rank** **INTERMEDIATE**

**MITIGATION** *(and revised risk evaluation & ranking)*

ID	<b>Action</b>	<b>By</b>	<b>Due</b>	Continuing
1	Unpiggable pipelines - review means of identifying corrosion defects, particularly due to shielding by either disbonded coating or casings	A. Bryson		<input type="radio"/> Yes

**New Frequency**

**New Severity**

**New Rank**

## **APPENDIX 7**

### **LOCATION CLASSIFICATION (Pipeline Sections)**

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**RISK ASSESSMENT SECTIONS**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**Pipeline: 42 T Generic pipeline for repetitive and NLS threats**

Section:	1 <b>Repetitive threats</b> All land uses	Location classes	-	KP to	Length km
Section:	2 <b>Non-location-specific</b> All land uses	Location classes	-	KP to	Length km

**Pipeline: 1 T1 Morwell to Dandenong**

Section:	51 <b>Dandenong - Cranbourne North</b> Urban outskirts, extensive suburban and industrial areas with occasional rural land	Location classes	<b>T1</b> -	KP to	<b>0</b> <b>13</b>	Length <b>13</b> km
Section:	50 <b>Cranbourne North - Officer</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>13</b> <b>16.5</b>	Length <b>3.5</b> km
Section:	49 <b>Hillcrest Christian College</b> Isolated school	Location classes	<b>R1</b> <b>S</b>	KP to	<b>16.5</b> <b>17.5</b>	Length <b>1</b> km
Section:	48 <b>Officer - Pakenham</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>17.5</b> <b>24.5</b>	Length <b>7</b> km
Section:	47 <b>Pakenham</b> Town edge and light industrial; freeway	Location classes	<b>T1</b> -	KP to	<b>24.5</b> <b>29.5</b>	Length <b>5</b> km
Section:	42 <b>Pakenham - Yarragon</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>29.5</b> <b>81</b>	Length <b>51.5</b> km
Section:	41 <b>Yarragon</b> Town edge	Location classes	<b>T1</b> -	KP to	<b>81</b> <b>82.7</b>	Length <b>1.7</b> km
Section:	40 <b>Yarragon - Trafalgar</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>82.7</b> <b>89.7</b>	Length <b>7</b> km
Section:	39 <b>Trafalgar</b> Town edge	Location classes	<b>T1</b> -	KP to	<b>89.7</b> <b>91.5</b>	Length <b>1.8</b> km
Section:	38 <b>Trafalgar - Trafalgar East</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>91.5</b> <b>94</b>	Length <b>2.5</b> km
Section:	37 <b>Trafalgar East</b> Rural residential	Location classes	<b>R2</b> -	KP to	<b>94</b> <b>95.8</b>	Length <b>1.8</b> km
Section:	36 <b>Trafalgar - Moe</b> Forestry, some grazing	Location classes	<b>R1</b> -	KP to	<b>95.8</b> <b>98.8</b>	Length <b>3</b> km
Section:	35 <b>Moe South</b> Rural residential	Location classes	<b>R2</b> -	KP to	<b>98.8</b> <b>107.2</b>	Length <b>8.4</b> km
Section:	34 <b>Moe South - Morwell</b> Grazing and agriculture, some forestry	Location classes	<b>R1</b> -	KP to	<b>107.2</b> <b>127</b>	Length <b>19.8</b> km

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**RISK ASSESSMENT SECTIONS**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**Pipeline: 2 T15 Princes Hwy to Regent St**

Section: 65	<b>Princes Hwy - Regent St</b> Suburban	Location classes	<b>T1</b> -	KP to	<b>0</b> <b>1.5</b>	Length	<b>1.5</b> km
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**Pipeline: 3 T16 Dandenong to West Melbourne**

Section: 59	<b>Dandenong South</b> Suburban - industrial and residential	Location classes	<b>T1</b> <b>I</b>	KP to	<b>0</b> <b>2</b>	Length	<b>2</b> km
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Section: 60	<b>Dandenong</b> Major shopping centre and offices	Location classes	<b>T2</b> -	KP to	<b>2</b> <b>4</b>	Length	<b>2</b> km
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Section: 61	<b>Dandenong - Clayton</b> Suburban - industrial and residential	Location classes	<b>T1</b> -	KP to	<b>4</b> <b>14.1</b>	Length	<b>10.1</b> km
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Section: 66	<b>Clayton North primary school</b> Suburban, school immediately adjacent	Location classes	<b>T1</b> <b>S</b>	KP to	<b>14.1</b> <b>15.3</b>	Length	<b>1.2</b> km
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Section: 67	<b>Clayton - Chadstone</b> Suburban - industrial and residential	Location classes	<b>T1</b> -	KP to	<b>15.3</b> <b>18.8</b>	Length	<b>3.5</b> km
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Section: 62	<b>Chadstone shopping centre</b> Major shopping centre	Location classes	<b>T2</b> -	KP to	<b>18.8</b> <b>20.2</b>	Length	<b>1.4</b> km
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Section: 63	<b>Chadstone - Caulfield</b> Suburban	Location classes	<b>T1</b> -	KP to	<b>20.2</b> <b>22.5</b>	Length	<b>2.3</b> km
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Section: 64	<b>Caulfield - Docklands</b> Inner Melbourne, including dense housing, racetrack, Albert Park, CBD fringe, etc	Location classes	<b>T2</b> -	KP to	<b>22.5</b> <b>35.65</b>	Length	<b>13.15</b> km
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**Pipeline: 4 T18 Keon Park East to Keon Park West**

Section: 93	<b>Keon Park east to west</b> Suburban	Location classes	<b>T1</b> -	KP to	<b>0</b> <b>0.61</b>	Length	<b>0.61</b> km
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**Pipeline: 5 T24 Brooklyn to Corio**

Section: 99	<b>Brooklyn - Williams Landing</b> Industrial	Location classes	<b>R2</b> <b>I</b>	KP to	<b>0</b> <b>8.2</b>	Length	<b>8.2</b> km
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Section: 100	<b>Williams Landing - Hoppers Crossing</b> Suburban, some light industrial;	Location classes	<b>T1</b> -	KP to	<b>8.2</b> <b>14</b>	Length	<b>5.8</b> km
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Section: 101	<b>Hoppers Crossing - Werribee</b> Agricultural	Location classes	<b>R1</b> -	KP to	<b>14</b> <b>17</b>	Length	<b>3</b> km
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Section: 102	<b>Werribee</b> Suburban	Location classes	<b>T1</b> -	KP to	<b>17</b> <b>21</b>	Length	<b>4</b> km
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Section: 103	<b>Werribee - Pousties Road</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>21</b> <b>37.8</b>	Length	<b>16.8</b> km
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Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**RISK ASSESSMENT SECTIONS**

Pipeline Licensee: APA GasNet

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Section: 114	<b>Pousties Road</b> Large roadhouse adjacent	Location classes	<b>T1</b> -	KP to	<b>37.8</b> <b>38.6</b>	Length	<b>0.8</b> km
Section: 115	<b>Pousties Road - Lara</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>38.6</b> <b>44.2</b>	Length	<b>5.6</b> km
Section: 104	<b>Lara - Corio</b> Rural residential	Location classes	<b>R2</b> -	KP to	<b>44.2</b> <b>48.5</b>	Length	<b>4.3</b> km
Section: 105	<b>Corio</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>48.5</b> <b>50</b>	Length	<b>1.5</b> km
Section: 106	<b>Corio retail</b> Large retail complex adjacent	Location classes	<b>T1</b> -	KP to	<b>50</b> <b>50.65</b>	Length	<b>0.65</b> km

**Pipeline: 6 T32 Pound Rd to Tuckers Rd**

Section: 53	<b>Pound Rd - Tuckers Rd</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>0</b> <b>2</b>	Length	<b>2</b> km
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**Pipeline: 7 T33 South Melbourne to Brooklyn**

Section: 97	<b>Cecil St - Todd Rd</b> Inner Melbourne, including dense housing and industrial uses	Location classes	<b>T2</b> -	KP to	<b>0</b> <b>5</b>	Length	<b>5</b> km
Section: 98	<b>Todd Rd - Brooklyn</b> Mixed industrial and inner urban residential areas	Location classes	<b>T1</b> <b>I</b>	KP to	<b>5</b> <b>12.8</b>	Length	<b>7.8</b> km

**Pipeline: 8 T37 Supply to APM Maryvale**

Section: 29	<b>APM Maryvale</b> Grazing and agriculture, major industry at southern end	Location classes	<b>R1</b> <b>HI</b>	KP to	<b>0</b> <b>5.5</b>	Length	<b>5.5</b> km
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**Pipeline: 9 T38 Healesville to Koo-Wee-Rup Road**

Section: 52	<b>Pakenham offtake</b> Town edge and light industrial; freeway	Location classes	<b>T1</b> -	KP to	<b>0</b> <b>1.2</b>	Length	<b>1.2</b> km
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**Pipeline: 10 T44 Supply to Anderson St, Warragul**

Section: 43	<b>Warragul offtake - Wills St</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>0</b> <b>4.25</b>	Length	<b>4.25</b> km
Section: 44	<b>Wills St - Anderson St</b> Leisure centre, parkland, industrial	Location classes	<b>T1</b> -	KP to	<b>4.25</b> <b>5</b>	Length	<b>0.75</b> km

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**RISK ASSESSMENT SECTIONS**

Pipeline Licensee: APA GasNet

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**Pipeline: 11 T56 Brooklyn to Ballan**

Section:	81 <b>Brooklyn - Derrimut</b> Industrial, including some grassland reserve and golf course, freeway adjacent	Location classes	<b>R2</b> <b>I</b>	KP to	<b>0</b> <b>7.25</b>	Length	<b>7.25</b> km
Section:	82 <b>Derrimut</b> Residential to north, industrial development to south, freeway between	Location classes	<b>T1</b> -	KP to	<b>7.25</b> <b>9.3</b>	Length	<b>2.05</b> km
Section:	83 <b>Derrimut - Ballan</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>9.3</b> <b>66.7</b>	Length	<b>57.4</b> km

**Pipeline: 12 T57 Ballan to Ballarat (including loop line)**

Section:	84 <b>Ballan - Gordon</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>0</b> <b>6</b>	Length	<b>6</b> km
Section:	85 <b>Gordon</b> Rural residential	Location classes	<b>R2</b> -	KP to	<b>6</b> <b>8.8</b>	Length	<b>2.8</b> km
Section:	86 <b>Gordon - Ballarat</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>8.8</b> <b>22.2</b>	Length	<b>13.4</b> km
Section:	87 <b>Ballarat city gate vicinity</b> Town edge and light industrial	Location classes	<b>R2</b> -	KP to	<b>22.2</b> <b>22.75</b>	Length	<b>0.55</b> km

**Pipeline: 13 T59 Euroa to Shepparton**

Section:	9 <b>Euroa to Shepparton</b> Grazing and irrigated agriculture	Location classes	<b>R1</b> -	KP to	<b>0</b> <b>34.6</b>	Length	<b>34.6</b> km
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**Pipeline: 14 T60 Longford to Dandenong, including loop lines**

Section:	21 <b>Longford gas plant - Giffards Rd</b> Market gardens, frequent large numbers of workers, several houses	Location classes	<b>R2</b> -	KP to	<b>0</b> <b>6</b>	Length	<b>6</b> km
Section:	22 <b>Giffards Road - Lime Quarry Road</b> Forestry	Location classes	<b>R1</b> -	KP to	<b>6</b> <b>31.5</b>	Length	<b>25.5</b> km
Section:	23 <b>Lime Quarry Road - Tyers</b> Grazing	Location classes	<b>R1</b> -	KP to	<b>31.5</b> <b>58.5</b>	Length	<b>27</b> km
Section:	24 <b>Tyers</b> Scattered rural residential, with low-density suburban in Tyers	Location classes	<b>T1</b> -	KP to	<b>58.5</b> <b>62</b>	Length	<b>3.5</b> km
Section:	25 <b>Tyers - Drouin</b> Grazing and agriculture, numerous widely scattered houses	Location classes	<b>R1</b> -	KP to	<b>62</b> <b>115</b>	Length	<b>53</b> km
Section:	26 <b>Drouin</b> Low density residential	Location classes	<b>T1</b> -	KP to	<b>115</b> <b>118.5</b>	Length	<b>3.5</b> km

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Section: 27	<b>Drouin - Longwarry</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>118.5</b> <b>121.5</b>	Length <b>3</b> km
Section: 28	<b>Longwarry, Bunyip, Tynong</b> Several small towns (Bunyip etc) interspersed with rural land; two large roadhouses	Location classes	<b>T1</b> -	KP to	<b>121.5</b> <b>137</b>	Length <b>15.5</b> km
Section: 45	<b>Tynong to Pakenham (LV9)</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>137</b> <b>145</b>	Length <b>8</b> km
Section: 46	<b>Pakenham (LV9) to Dandenong</b> Urban outskirts, extensive suburban and industrial areas with occasional rural land	Location classes	<b>T1</b> -	KP to	<b>145</b> <b>173</b>	Length <b>28</b> km

**Pipeline: 15 T61 Pakenham to Wollert**

Section: 54	<b>Pakenham</b> Urban development adjacent to west, otherwise grazing	Location classes	<b>T1</b> -	KP to	<b>0</b> <b>1.5</b>	Length <b>1.5</b> km
Section: 55	<b>Pakenham - Yellingbo</b> Grazing and agriculture, numerous widely scattered houses	Location classes	<b>R1</b> -	KP to	<b>1.5</b> <b>28</b>	Length <b>26.5</b> km
Section: 56	<b>Yellingbo</b> Small township, intensive horticulture with large numbers of workers	Location classes	<b>R2</b> -	KP to	<b>28</b> <b>32.5</b>	Length <b>4.5</b> km
Section: 57	<b>Yellingbo - St Andrews</b> Grazing and agriculture, some forestry, some vineyards	Location classes	<b>R1</b> -	KP to	<b>32.5</b> <b>66.5</b>	Length <b>34</b> km
Section: 68	<b>St Andrews - Lorimer Park</b> Rural residential	Location classes	<b>R2</b> -	KP to	<b>66.5</b> <b>79</b>	Length <b>12.5</b> km
Section: 69	<b>Lorimer Park</b> Suburban	Location classes	<b>T1</b> -	KP to	<b>79</b> <b>82.5</b>	Length <b>3.5</b> km
Section: 70	<b>Lorimer Park - Wollert</b> Grazing and agriculture, a couple of locations with small groups of houses	Location classes	<b>R1</b> -	KP to	<b>82.5</b> <b>93</b>	Length <b>10.5</b> km

**Pipeline: 16 T62 Derrimut to Sunbury**

Section: 88	<b>Derrimut - Sunbury</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>0</b> <b>22.5</b>	Length <b>22.5</b> km
Section: 89	<b>Sunbury</b> Suburban	Location classes	<b>T1</b> -	KP to	<b>22.5</b> <b>24.2</b>	Length <b>1.7</b> km

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<b>Pipeline: 17 T63 Tyers to Morwell looping</b>						
Section:	30	<b>Tyers - crematorium</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>0</b> <b>2.5</b> <b>2.5</b> km
Section:	31	<b>Traralgon outskirts</b> Rural residential, forestry	Location classes	<b>R2</b> -	KP to	<b>2.5</b> <b>6.5</b> <b>4</b> km
Section:	32	<b>Traralgon - Morwell</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>6.5</b> <b>11</b> <b>4.5</b> km
Section:	33	<b>Morwell</b> Scattered industrial uses and vacant land; abandoned Lurgi plant	Location classes	<b>R1</b> <b>I</b>	KP to	<b>11</b> <b>15.7</b> <b>4.7</b> km
<b>Pipeline: 18 T64 Supply to Newport Power Station</b>						
Section:	90	<b>Supply to Newport</b> Industrial	Location classes	<b>T1</b> <b>I</b>	KP to	<b>0</b> <b>1.0</b> <b>1</b> km
<b>Pipeline: 19 T65 Dandenong to Princes Highway &amp; Henty Street</b>						
Section:	58	<b>Dandenong to Princes Hwy &amp; Henty St</b> Suburban Dandenong - industrial and residential	Location classes	<b>T1</b> -	KP to	<b>0</b> <b>5.2</b> <b>5.2</b> km
<b>Pipeline: 20 T66 Mt Franklin to Kyneton</b>						
Section:	74	<b>Mt Franklin - Kyneton</b> Grazing and agriculture, numerous widely scattered houses	Location classes	<b>R1</b> -	KP to	<b>0</b> <b>24.55</b> <b>24.55</b> km
<b>Pipeline: 21 T67 Guildford to Maryborough</b>						
Section:	75	<b>Guildford - Maryborough</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>0</b> <b>31.5</b> <b>31.5</b> km
<b>Pipeline: 22 T70 Ballan to Bendigo (incl. looping)</b>						
Section:	76	<b>Ballan - Castlemaine</b> Grazing and agriculture, some forestry	Location classes	<b>R1</b> -	KP to	<b>0</b> <b>62.3</b> <b>62.3</b> km
Section:	77	<b>Castlemaine outskirts</b> Rural residential	Location classes	<b>R2</b> -	KP to	<b>62.3</b> <b>65.3</b> <b>3</b> km
Section:	78	<b>Castlemaine - Belvoir Park Rd</b> Grazing and agriculture, numerous widely scattered houses	Location classes	<b>R1</b> -	KP to	<b>65.3</b> <b>87</b> <b>21.7</b> km
Section:	79	<b>Belvoir Park Rd</b> Rural residential	Location classes	<b>R2</b> -	KP to	<b>87</b> <b>88</b> <b>1</b> km
Section:	80	<b>Belvoir Park Rd - Bendigo</b> Grazing and agriculture, some forestry	Location classes	<b>R1</b> -	KP to	<b>88</b> <b>91</b> <b>3</b> km

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**Pipeline: 23 T71 Shepparton to Tatura to Kyabram**

Section: 10	<b>Shepparton South</b> Grazing and irrigated agriculture	Location classes	<b>R1</b> -	KP to	<b>0</b> <b>3.1</b>	Length	<b>3.1</b> km
Section: 11	<b>Arcadia Downs</b> Town outskirts	Location classes	<b>T1</b> -	KP to	<b>3.1</b> <b>5.56</b>	Length	<b>2.46</b> km
Section: 12	<b>Arcadia Downs to Kyabram</b> Grazing and irrigated agriculture	Location classes	<b>R1</b> -	KP to	<b>5.56</b> <b>37.5</b>	Length	<b>31.94</b> km

**Pipeline: 24 T74.1 Keon Park to Wollert**

Section: 94	<b>Keon Park to O'Herns Rd</b> Mixed use including suburban, industrial and grazing, with ongoing suburban development	Location classes	<b>T1</b> <b>I</b>	KP to	<b>0</b> <b>7</b>	Length	<b>7</b> km
Section: 95	<b>O'Herns Rd - Wollert</b> Grazing	Location classes	<b>R1</b> -	KP to	<b>7</b> <b>13.9</b>	Length	<b>6.9</b> km

**Pipeline: 25 T74.2 Wollert to Wodonga**

Section: 135	<b>Wollert - Heathcote Junction</b> Rural land uses, occasional isolated houses	Location classes	<b>R1</b> -	KP to	<b>0</b> <b>22.5</b>	Length	<b>22.5</b> km
Section: 136	<b>Heathcote Junction</b> Low density residential	Location classes	<b>T1</b> -	KP to	<b>22.5</b> <b>25.1</b>	Length	<b>2.6</b> km
Section: 137	<b>Heathcote Junction - Seymour</b> Rural land uses, occasional isolated houses	Location classes	<b>R1</b> -	KP to	<b>25.1</b> <b>65.0</b>	Length	<b>39.9</b> km
Section: 138	<b>Seymour outskirts</b> Town outskirts with scattered houses, industry, recreation areas	Location classes	<b>R2</b> -	KP to	<b>65.0</b> <b>71.4</b>	Length	<b>6.4</b> km
Section: 139	<b>Seymour - Euroa</b> Rural land uses, occasional isolated houses	Location classes	<b>R1</b> -	KP to	<b>71.4</b> <b>124.1</b>	Length	<b>52.7</b> km
Section: 3	<b>Euroa to Glenrowan</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>124</b> <b>193</b>	Length	<b>69</b> km
Section: 4	<b>Glenrowan</b> Grazing, town outskirts within measurement length	Location classes	<b>R2</b> -	KP to	<b>193</b> <b>196.5</b>	Length	<b>3.5</b> km
Section: 5	<b>Glenrowan to Barnawartha</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>196.5</b> <b>256.3</b>	Length	<b>59.8</b> km
Section: 6	<b>Barnawartha</b> Grazing, town outskirts within measurement length	Location classes	<b>R2</b> -	KP to	<b>256.3</b> <b>260.3</b>	Length	<b>4</b> km
Section: 7	<b>Barnawartha North</b> Grazing, but with large distribution centre adjacent and possible further industrial development	Location classes	<b>R1</b> <b>I</b>	KP to	<b>260.3</b> <b>263.2</b>	Length	<b>2.9</b> km

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Section:	8	<b>Barnawartha to Wodonga</b>	Location classes	<b>R1</b>	KP	<b>263.2</b>	Length
		Grazing and agriculture		-	to	<b>269.12</b>	<b>5.92 km</b>

**Pipeline: 26 T75 Wandong to Kyneton**

Section:	71	<b>Wandong - O'Gradys Rd</b>	Location classes	<b>R1</b>	KP	<b>0</b>	Length
		Grazing and agriculture		-	to	<b>3.5</b>	<b>3.5 km</b>

Section:	72	<b>O'Gradys Rd - Mathiesons Rd</b>	Location classes	<b>R2</b>	KP	<b>3.5</b>	Length
		Rural residential		-	to	<b>5.8</b>	<b>2.3 km</b>

Section:	73	<b>Mathiesons Rd - Kyneton</b>	Location classes	<b>R1</b>	KP	<b>5.8</b>	Length
		Grazing and agriculture, numerous widely scattered houses		-	to	<b>60</b>	<b>54.2 km</b>

**Pipeline: 27 T81 Paaratte to Allansford**

Section:	129	<b>Paaratte - Allansford</b>	Location classes	<b>R1</b>	KP	<b>0</b>	Length
		Grazing and agriculture		-	to	<b>33.4</b>	<b>33.4 km</b>

**Pipeline: 28 T85 Kyabram to Echuca**

Section:	13	<b>Kyabram to Echuca</b>	Location classes	<b>R1</b>	KP	<b>0</b>	Length
		Grazing and irrigated agriculture		-	to	<b>30.65</b>	<b>30.65 km</b>

**Pipeline: 43 T86 Allansford to Portland**

Section:	130	<b>Allansford - Portland</b>	Location classes	<b>R1</b>	KP	<b>0</b>	Length
		Grazing and agriculture		-	to	<b>100.55</b>	<b>? km</b>

**Pipeline: 29 T88 Laverton to BHP**

Section:	96	<b>Laverton to Coogee</b>	Location classes	<b>R2</b>	KP	<b>0</b>	Length
		Industrial		<b>I</b>	to	<b>1.65</b>	<b>1.65 km</b>

**Pipeline: 30 T89 Supply to Unichema, Bay St**

Section:	91	<b>Supply to Unichema</b>	Location classes	<b>T1</b>	KP	<b>0</b>	Length
		Industrial		<b>I</b>	to	<b>0.45</b>	<b>0.45 km</b>

**Pipeline: 31 T91 Curdievale to Cobden**

Section:	131	<b>Curdievale - Cobden</b>	Location classes	<b>R1</b>	KP	<b>0</b>	Length
		Grazing and agriculture		-	to	<b>27.7</b>	<b>27.7 km</b>

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**Pipeline: 32 T92 Iona to Lara**

Section: 116	<b>Lara offtake - Lara</b> Agricultural	Location classes	<b>R1</b> -	KP to	<b>0</b> <b>3</b>	Length	<b>3</b> km
Section: 117	<b>Lara</b> New medium density suburb plus extensive low density residential	Location classes	<b>T1</b> -	KP to	<b>3</b> <b>8</b>	Length	<b>5</b> km
Section: 118	<b>Lara - Batesford</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>8</b> <b>18.2</b>	Length	<b>10.2</b> km
Section: 119	<b>Batesford</b> Low density residential	Location classes	<b>T1</b> -	KP to	<b>18.2</b> <b>20.0</b>	Length	<b>1.8</b> km
Section: 120	<b>Batesford - Ellimnyt</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>20.0</b> <b>86.5</b>	Length	<b>66.5</b> km
Section: 121	<b>Ellimnyt</b> Scattered rural residential	Location classes	<b>R2</b> -	KP to	<b>86.5</b> <b>89.3</b>	Length	<b>2.8</b> km
Section: 122	<b>Ellimnyt - Simpson</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>89.3</b> <b>125.4</b>	Length	<b>36.1</b> km
Section: 123	<b>Simpson</b> Scattered houses and dairy factory	Location classes	<b>R2</b> -	KP to	<b>125.4</b> <b>126.5</b>	Length	<b>1.1</b> km
Section: 124	<b>Simpson - Iona</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>126.5</b> <b>142.0</b>	Length	<b>15.5</b> km
Section: 125	<b>Iona gas plant vicinity</b> Several gas plants among grazing country	Location classes	<b>R1</b> <b>HI</b>	KP to	<b>142.0</b> <b>143.95</b>	Length	<b>1.95</b> km

**Pipeline: 33 T93 Codrington to Hamilton**

Section: 132	<b>Codrington - Hamilton</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>0</b> <b>54.6</b>	Length	<b>54.6</b> km
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**Pipeline: 34 T96 Chiltern Valley to Rutherglen**

Section: 14	<b>Chiltern Valley to Rutherglen</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>0</b> <b>14.35</b>	Length	<b>14.35</b> km
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**Pipeline: 35 T98 Rutherglen to Koonoomoo**

Section: 15	<b>Rutherglen to Murray Valley Hwy</b> Grazing and irrigated agriculture	Location classes	<b>R1</b> -	KP to	<b>0</b> <b>55.7</b>	Length	<b>55.7</b> km
Section: 16	<b>Murray Valley Hwy parallel</b> Within road reserve	Location classes	<b>R1</b> <b>CI</b>	KP to	<b>55.7</b> <b>69.1</b>	Length	<b>13.4</b> km
Section: 17	<b>Lonergans Road to Koonoomoo</b> Grazing and irrigated agriculture	Location classes	<b>R1</b> -	KP to	<b>69.1</b> <b>83.5</b>	Length	<b>14.4</b> km

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Section: 18	<b>Koonoomoo</b> Town outskirts	Location classes	<b>R2</b> -	KP to	<b>83.5</b> <b>85.2</b>	Length <b>1.7 km</b>
Section: 19	<b>Koonoomoo North</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>85.2</b> <b>89.2</b>	Length <b>4 km</b>

**Pipeline: 36 T99 Culcairn to Barnawartha**

Section: 20	<b>Culcairn to Barnawartha</b> Grazing	Location classes	<b>R1</b> -	KP to	<b>218.9</b> <b>282.1</b>	Length <b>63.2 km</b>
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**Pipeline: 37 T100 Iona to Paaratte**

Section: 126	<b>Iona gas plant vicinity</b> Several gas plants among grazing country	Location classes	<b>R1</b> <b>HI</b>	KP to	<b>0</b> <b>0.5</b>	Length <b>0.5 km</b>
Section: 127	<b>Iona - Paaratte</b> Grazing	Location classes	<b>R1</b> -	KP to	<b>0.5</b> <b>7.2</b>	Length <b>6.7 km</b>
Section: 128	<b>Paaratte gas plant vicinity</b> Several gas plants among grazing country	Location classes	<b>R1</b> <b>HI</b>	KP to	<b>7.2</b> <b>7.9</b>	Length <b>0.7 km</b>

**Pipeline: 38 T102 Somerton Pipeline**

Section: 92	<b>Somerton pipeline</b> Mainly grazing but with industrial uses at each end	Location classes	<b>R1</b> <b>I</b>	KP to	<b>0</b> <b>3.5</b>	Length <b>3.5 km</b>
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**Pipeline: 39 T109 Supply to Iluka, Hamilton**

Section: 133	<b>Hamilton - Iluka</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>0</b> <b>0.9</b>	Length <b>0.9 km</b>
Section: 134	<b>Iluka plant vicinity</b> Periphery of mineral treatment plant	Location classes	<b>R1</b> <b>HI</b>	KP to	<b>0.9</b> <b>1.1</b>	Length <b>0.2 km</b>

**Pipeline: 40 T110 Supply to Snowy Hydro, Laverton North**

Section: 107	<b>James St - Snowy Hydro</b> Industrial, pipe under road pavement	Location classes	<b>T1</b> <b>I</b>	KP to	<b>0</b> <b>1.55</b>	Length <b>1.55 km</b>
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**Pipeline: 41 T112 Brooklyn to Lara**

Section: 108	<b>Brooklyn - Derrimut</b> Industrial, including some grassland reserve and golf course, freeway adjacent	Location classes	<b>T1</b> <b>I</b>	KP to	<b>0</b> <b>8.7</b>	Length <b>8.7 km</b>
Section: 109	<b>Prison (Melbourne Remand Centre)</b> Prison adjacent	Location classes	<b>T1</b> <b>S</b>	KP to	<b>8.7</b> <b>10</b>	Length <b>1.3 km</b>
Section: 110	<b>Derrimut - Pousties Rd</b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>10</b> <b>48.7</b>	Length <b>38.7 km</b>

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Section: 111 <b><i>Pousties Rd (freeway service centre)</i></b> Two large freeway service centres	Location classes	<b>T1</b> -	KP to	<b>48.7</b> <b>49.8</b>	Length <b>1.1</b> km
Section: 112 <b><i>Pousties Rd - Avalon</i></b> Grazing and agriculture	Location classes	<b>R1</b> -	KP to	<b>49.8</b> <b>52.5</b>	Length <b>2.7</b> km
Section: 113 <b><i>Avalon outskirts</i></b> Scattered rural residential, with some industry	Location classes	<b>R2</b> <b>I</b>	KP to	<b>52.5</b> <b>58</b>	Length <b>5.5</b> km

## **APPENDIX 8**

### **RISK EVALUATION (Location-Specific Threats)**

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**RISK EVALUATION & MANAGEMENT**

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**Pipeline:** 1 **Morwell to Dandenong**

**Section:** 49 **Hillcrest Christian College**

**R1 S**

**THREAT DETAILS** *(assuming no additional mitigation)*

ID 7 **All controls fail: 35T Excavator or Auger in vicinity of school.**

KP **16.87**

**Location** Hillcrest Christian College

External Interference

**Existing design**

**CONSEQUENCES** *(assuming no additional mitigation)*

**Failure mode** Auger penetrates pipeline.

**Effects** 30mm hole. Possible fatality to machine operator and assistant.

Note: 4.7kW radiation contour from a 30mm hole is 25m from puncture.

**Severity notes** Few fatalities (rig operators). Because 4.7kW contour is 25m it is considered highly unlikely that students will be affected.

**Freq. notes** Procedural measures fail + auger direct hit + continues drilling to full penetration + ignition.

**Frequency** Hypothetical

**Severity** Major

**Rank** Low

**MITIGATION** *(and revised risk evaluation & ranking)*

ID **Action**

**By**

**Due**

Continuing

**New Frequency**

**New Severity**

**New Rank**

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<b>Pipeline:</b>	2	<b>Princes Hwy to Regent St</b>
<b>Section:</b>	65	<b>Princes Hwy - Regent St</b>
		<b>T1 -</b>

**THREAT DETAILS** *(assuming no additional mitigation)*

ID **187** **All controls fail during maintenance of services by light machinery (no major sewer or drain, no heavy excavation)** KP **0**  
**Location** Clyde St and Regent St External Interference **.819**

**Existing design**

**CONSEQUENCES** *(assuming no additional mitigation)*

**Failure mode** 20mm hole, radiation zone ~15 m

- Effects**
1. No ignition, supply interruption for a day or so pending repair
  2. Ignition, with fatality to rig operator (The 4.7kW radiation zone is only 15m, and residents in the vicinity will most likely be unaffected).

- Severity notes**
1. Severe, for supply interruption
  2. Major, for few fatalities

- Freq. notes**
1. Hypothetical for small excavator to penetrate this pipe (resistant to 8 t machine with B = 1.3); historically, no excavators exceeding 4T have been known to work in this area.
  2. Sub-hypothetical

**Frequency** Hypothetical **Severity** Major **Rank** Low

**MITIGATION** *(and revised risk evaluation & ranking)*

ID	Action	By	Due	Continuing
	<b>New Frequency</b>			
	<b>New Severity</b>			
		<b>New Rank</b>		

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**RISK EVALUATION & MANAGEMENT**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**Pipeline:** 3 **Dandenong to West Melbourne**

**Section:** 66 **Clayton North primary school**

**T1 S**

**THREAT DETAILS** *(assuming no additional mitigation)*

ID **210** **All controls fail near school, auger penetrates pipe**

KP **14.74**

**Location** Clayton North Primary School

Standard design

**Existing design**

**CONSEQUENCES** *(assuming no additional mitigation)*

**Failure mode** Pole or HDD auger penetrates pipeline, max hole ~30 mm

- Effects**
1. No ignition, short term supply interruption pending repair
  2. Ignition, no fatalities
  3. Ignition with fatalities to rig operator(s); school outside radiation zone of ~25 m

- Severity notes**
1. Severe, for short term interruption notwithstanding backfeed available to most delivery points
  2. Severe, as above and also possible injuries
  3. Major, for few fatalities

- Freq. notes**
1. Remote for direct hit AND operator perseveres long enough to penetrate
  2. Hypothetical; only 2% conditional probability of ignition
  3. Hypothetical at worst for fatalities

**Frequency** Hypothetical

**Severity** Major

**Rank** Low

**MITIGATION** *(and revised risk evaluation & ranking)*

ID **Action**

**By**

**Due**

Continuing

**New Frequency**

**New Severity**

**New Rank**

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**RISK EVALUATION & MANAGEMENT**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

<b>Section:</b>	64	<b>Caulfield - Docklands</b>	<b>T2</b>	<b>-</b>
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**THREAT DETAILS** (*assuming no additional mitigation*)

ID **223**      **All controls fail: Puncture by 35T Excavator Resulting in 35mm hole - assumed future impact resulting from development works.**      KP **35.65**

**Location** Collins St, Docklands      External Interference

**Existing design**

**CONSEQUENCES** (*assuming no additional mitigation*)

**Failure mode** Leak leading to ignition and fire.

**Effects** Puncture by 35T Excavator Resulting in 35mm hole, gas leak, ignition. Assume 2 or 3 fatalities (machine operator & fellow workers). Note: 15m to 12.6kW/m2 and 25m to 4.7kW/m2. (Consideration given to possibility of tram passenger fatalities. However, not likely to be in area while heavy excavator works underway).

**Severity notes** Few fatalities.

**Freq. notes** All controls fail + 35T excavator hits + hard and direct enough to put a hole in it + escaping gas ignites + fellow workers in area + death results (i.e. fail to escape). (This evaluation originally done in 2007; in 2011 the area is almost fully developed, heavy construction now even less likely.)

**Frequency** Hypothetical      **Severity** Major      **Rank** Low

**MITIGATION** (*and revised risk evaluation & ranking*)

ID	Action	By	Due	Continuing
<b>New Frequency</b>		<b>New Severity</b>		<b>New Rank</b>



Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**RISK EVALUATION & MANAGEMENT**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**Pipeline:** 7 **South Melbourne to Brooklyn**

**Section:** 97 **Cecil St - Todd Rd**

**T2 -**

**THREAT DETAILS** *(assuming no additional mitigation)*

ID **418** **Undetected corrosion in cased crossing** KP **.211**  
**.25**  
**Location** City Road Crossing **Corrosion**

**Existing design**

**CONSEQUENCES** *(assuming no additional mitigation)*

**Failure mode** Pin hole leak. *(Notes from 2007 SMS: Cased crossing - risk of corrosion + being missed from cased crossing review program. Not piggable. Possible corrosion not detected. Newport Power Station fed by line. Note: Reinforced concrete casing)*

**Effects** 1. Line shutdown and repair - .  
 2. Gas migrates into adjacent pit - ignites and burns worker.

**Severity notes** Significant restriction in supply to Newport Power Station.

**Freq. notes** Corrosion of this type found on other lines - no way of determining if corrosion is occurring at this point. Note: Northern end of casing is below sea level adjacent to river and silty soil.

**Frequency** Remote **Severity** Major **Rank** **INTERMEDIATE**

**MITIGATION** *(and revised risk evaluation & ranking)*

ID	Action	By	Due	Continuing
1	Unpiggable pipelines - review means of identifying corrosion defects, particularly due to shielding by either disbonded coating or casings	A. Bryson		<input type="radio"/> Yes

**New Frequency**

**New Severity**

**New Rank**

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**RISK EVALUATION & MANAGEMENT**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**Pipeline:** 11 **Brooklyn to Ballan**

**Section:** 83 **Derrimut - Ballan**

**R1 -**

**THREAT DETAILS** *(assuming no additional mitigation)*

ID **524** **Undetected corrosion in cased crossing**

KP **37.405**

**Location** Bacchus Marsh - Geelong Road Cased Crossing

Corrosion

**Existing design**

**CONSEQUENCES** *(assuming no additional mitigation)*

**Failure mode** Pin hole leak

**Effects** No

**Severity notes** Worse case: Ingition of gas could result in personal injury.

**Freq. notes** Event not known to be recorded previously in Australia. In-line inspection greatly reduces the likelihood.

**Frequency** Hypothetical

**Severity** Severe

**Rank** **Negligible**

**MITIGATION** *(and revised risk evaluation & ranking)*

ID **Action**

**By**

**Due**

Continuing

**New Frequency**

**New Severity**

**New Rank**

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**RISK EVALUATION & MANAGEMENT**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**Pipeline:** 12 **Ballan to Ballarat (including loop line)**

**Section:** 85 **Gordon**

**R2 -**

**THREAT DETAILS** (*assuming no additional mitigation*)

**ID** 585 **All controls fail. Major road reconstruction, serious damage to DN 150 line within road reserve.** **KP** 6.6  
**8.04**  
**Location** Construction in Nightingale Street affecting Adjacent External Interference

**Existing design**

**CONSEQUENCES** (*assuming no additional mitigation*)

**Failure mode** DN 150 can be penetrated by both points of 35 t excavator, hole size 110 mm. CDL for 4.8 mm WT is 80 mm, so rupture is possible. Radiation distances 75 m and 115 m.

**Effects** Assume ignition. Few fatalities at worst, given low number of houses within radiation distance

**Severity notes** Major, for few fatalities

**Freq. notes** Require uncontrolled work over pipe AND 35 t excavator involved AND impact on pipe AND both points penetrate AND ignition

**Frequency** Hypothetical **Severity** Major **Rank** Low

**MITIGATION** (*and revised risk evaluation & ranking*)

**ID** **Action** **By** **Due** Contin-  
 uing

**New Frequency** **New Severity** **New Rank**

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**RISK EVALUATION & MANAGEMENT**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**Pipeline:** 15 **Packenham to Wollert**

**Section:** 69 **Lorimer Park**

**T1 -**

**THREAT DETAILS** *(assuming no additional mitigation)*

ID **1110** **All controls fail: 35 t Excavator Developing Drainage or Sewer** KP **80.8**  
**Location** Mernda, urban development External Interference

**Existing design**

**CONSEQUENCES** *(assuming no additional mitigation)*

**Failure mode** Anticipate excavator to be using a rock breaker in this area rather than a toothed bucket. Dent and gouge - 12.7 mm X60, no penetration.

**Effects** Dent and gouge. No penetration considered possible. Restriction of supply to repair.

**Severity notes** Short term restriction only. External repair required.

**Freq. notes** Remote is a very conservative estimate in this case as all procedural controls need to have failed.

**Frequency** Remote **Severity** Minor **Rank** **Negligible**

**MITIGATION** *(and revised risk evaluation & ranking)*

ID **Action** **By** **Due** Contin-  
 uing

**New Frequency** **New Severity** **New Rank**

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**RISK EVALUATION & MANAGEMENT**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**Pipeline:** 17 **Tyers to Morwell looping**

**Section:** 31 **Traralgon outskirts**

**R2 -**

**THREAT DETAILS** (*assuming no additional mitigation*)

ID **1170** **Airstrip - aircraft impact**

KP **5.5**

**6.5**

**Location** Aircraft Impact Threat

External interference

**Existing design**

**CONSEQUENCES** (*assuming no additional mitigation*)

**Failure mode** Coating damage and minor metal damage

**Effects** Pressure reduction pending repair. Interruption to interruptible costumers.  
Note: Risk occurs during take off or landing - therefore, position = gliding angle.

**Severity notes** Short term inturruption.

**Freq. notes** Frequency of: Plane crashes + fully penetrates 1.2m soil + hits pipeline.

**Frequency** Hypothetical

**Severity** Severe

**Rank** **Negligible**

**MITIGATION** (*and revised risk evaluation & ranking*)

ID **Action**

**By**

**Due**

Contin-  
uing

**New Frequency**

**New Severity**

**New Rank**



Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**RISK EVALUATION & MANAGEMENT**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**Pipeline:** 24 **Keon Park to Wollert**

**Section:** 94 **Keon Park to O'Herns Rd**

**T1 I**

**THREAT DETAILS** *(assuming no additional mitigation)*

ID **1474** **All controls fail: Installation of Utilities Across Main Road by HDD**

KP **.003**

**Location** Anstey Ave, Keon Park

External interference

**Existing design**

**CONSEQUENCES** *(assuming no additional mitigation)*

**Failure mode** Worst case = HDD resulting in a 30mm hole. No-rupture pipe. Gas leak leading to ignition.

**Effects** 30mm hole results in 0.12 GJ/s discharge . 4.7kW radius = 23m. 12.6kW = 14m.

**Severity notes** One house in 4.7kW radius and no houses within 12.6kW zone. At the most 2 fatalities = workers.

**Freq. notes** HDD operating in vicinity + hitting pipe + penetration of pipe + ignition.

**Frequency** Hypothetical

**Severity** Major

**Rank** Low

**MITIGATION** *(and revised risk evaluation & ranking)*

ID **Action**

**By**

**Due**

Continuing

**New Frequency**

**New Severity**

**New Rank**

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**RISK EVALUATION & MANAGEMENT**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**Pipeline:** 29 **Laverton to BHP**

**Section:** 96 **Laverton to Coogee**

**R2 I**

**THREAT DETAILS** *(assuming no additional mitigation)*

ID **2345** **All controls fail - HDD for installation of utilities across road**

KP **0**

**1.606**

**Location** Fitzgerald Road

External Interference

**Existing design**

**CONSEQUENCES** *(assuming no additional mitigation)*

**Failure mode** Hole in pipe causing leak.

**Effects** 25mm hole. Ignition unlikely - leak only case considered.

**Severity notes** Short term interruption to supply.

**Freq. notes** Soil conditions make HDD a non-preferred option (ie. rock)

**Frequency** Remote

**Severity** Severe

**Rank** Low

**MITIGATION** *(and revised risk evaluation & ranking)*

ID **Action**

**By**

**Due**

Contin-  
uing

**New Frequency**

**New Severity**

**New Rank**

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**RISK EVALUATION & MANAGEMENT**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**Pipeline:** 30 **Supply to Unichema, Bay St**

**Section:** 91 **Supply to Unichema**

**T1 I**

**THREAT DETAILS** *(assuming no additional mitigation)*

**ID** 2358 **Undetected corrosion in cased crossing**

KP .314

**Location** Normanby Road - Cased Crossing, Non Piggable Section.

Corrosion

**Existing design**

**CONSEQUENCES** *(assuming no additional mitigation)*

**Failure mode** Pin Hole Leak

**Effects** Interruption to single customer. Short term public disruption - road closed during repair work.

**Severity notes** Interruption to single customer.

**Freq. notes** Crossing 1.5m below sea level therefore almost certainly filled with liquid maintaining CP.

**Frequency** Remote

**Severity** Severe

**Rank** Low

**MITIGATION** *(and revised risk evaluation & ranking)*

**ID** **Action**

**By**

**Due**

Continuing

**New Frequency**

**New Severity**

**New Rank**

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**RISK EVALUATION & MANAGEMENT**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**Pipeline:** 32 **Iona to Lara**

**Section:** 117 **Lara**

**T1 -**

**THREAT DETAILS** *(assuming no additional mitigation)*

ID **3155** **All controls fail - pipe penetrated by auger (pole or HDD)**

KP **4.8**

**Location** Patullos Road

External interference

**Existing design**

**CONSEQUENCES** *(assuming no additional mitigation)*

**Failure mode** Worst case is hole, max equivalent diameter ~50 mm but probably smaller

- Effects**
1. No ignition, supply interruption for a few days pending repair, but shortfall met from other sources either side of failure
  2. Ignition, one or two fatalities to rig operator(s)

- Severity notes**
1. Minor, for minimal supply disruption
  2. Major, for fatalities

**Freq. notes** Hypothetical, for both cases, given 10.8 mm X70 pipe and nature of this location

**Frequency** Hypothetical

**Severity** Major

**Rank** Low

**MITIGATION** *(and revised risk evaluation & ranking)*

ID **Action**

**By**

**Due**

Continuing

**New Frequency**

**New Severity**

**New Rank**

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**RISK EVALUATION & MANAGEMENT**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**Section:** 119 **Batesford**

**T1 -**

**THREAT DETAILS** (*assuming no additional mitigation*)

ID **2426** **All controls fail: Puncture by 35T Excavator Resulting in 35mm hole - assumed future impact resulting from development works.** KP **19.1**

**Location** Bates Court, Batesford

External Interference

**Existing design**

**CONSEQUENCES** (*assuming no additional mitigation*)

**Failure mode** Leak

**Effects** Leak from 30mm hole with ignition. For 30mm hole at 10.2MPa, 4.7kW zone = 45m, 12.6kW zone = 25m.

**Severity notes** Assume machine operator killed but no other casualties. For a single puncture only one house will be affected (just within 4.7kW zone).

**Freq. notes** Frequency of 35T excavator working + hitting pipe + puncturing pipe upon impact + ignition + location within 45m of house with people present in the area.

**Frequency** Hypothetical

**Severity** Major

**Rank** Low

**MITIGATION** (*and revised risk evaluation & ranking*)

ID **Action**

**By**

**Due**

Continuing

**New Frequency**

**New Severity**

**New Rank**

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**RISK EVALUATION & MANAGEMENT**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**Pipeline:** 41 **Brooklyn to Lara**

**Section:** 109 **Prison (Melbourne Remand Centre)**

**T1 S**

**THREAT DETAILS** *(assuming no additional mitigation)*

**ID** 2931 **All controls fail - construction of freeway sound barriers, 40 t excavator for foundations**

KP 9.3

**Location** Adjacent to prison on other side of Middle Rd

External interference

**Existing design**

**CONSEQUENCES** *(assuming no additional mitigation)*

**Failure mode** Penetration of pipe highly unlikely with 40 t machine but is just possible. Resulting hole would not be large, say 40 mm. Radiation zone for 4.7 kW/m2 is 60 m. Prison wall is 180 m from pipeline.

**Effects** No consequences for occupants of prison. Possible fatality to machine operator.

**Severity notes** Fatality is always Major.

**Freq. notes** Likelihood of uncontrolled excavation over pipe AND machine large enough to penetrate AND achieving penetration AND ignition is Hypothetical

**Frequency** Hypothetical

**Severity** Major

**Rank** Low

**MITIGATION** *(and revised risk evaluation & ranking)*

**ID** **Action**

**By**

**Due**

Continuing

**New Frequency**

**New Severity**

**New Rank**

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**RISK EVALUATION & MANAGEMENT**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**Section:** 113 **Avalon outskirts**

**R2 I**

**THREAT DETAILS** (*assuming no additional mitigation*)

ID **3034** **All controls fail - assume HDD drill across freeway penetrates pipe**

KP **57.2**

**Location** Cozens Road

External interference

**Existing design**

**CONSEQUENCES** (*assuming no additional mitigation*)

**Failure mode** Assume hole for DN 500 pipe, heavy duty drill rig with tungsten carbide bit. Full size hole not credible, driller will stop as soon as pipe is penetrated and gas returns up borehole. Assume max 50 mm hole.

**Effects** Extreme worst case is ignition of gas release from 50 mm hole. (Ignition actually unlikely.) Radiation distances ~80 m for 4.7 kW/m<sup>2</sup>, ~50 m for 12.6 kW/ms. Possibly a few fatalities among drill rig operators. No residents affected. If freeway is congested then possible multiple motorist deaths.

**Severity notes** 1. Few fatalities to rig operators - Major. 2. Multiple fatalities to motorists - Catastrophic (but frequency for this case is very much lower - adopt first case).

**Freq. notes** Any hole is Hypothetical. Further consequences (ignition and deaths) are even less likely.

**Frequency** Hypothetical

**Severity** Major

**Rank** Low

**MITIGATION** (*and revised risk evaluation & ranking*)

ID **Action**

**By**

**Due**

Contin-  
uing

**New Frequency**

**New Severity**

**New Rank**

## **APPENDIX 9**

### **ALARP ANALYSIS**

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**ALARP ANALYSIS**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**Pipeline:** 5 **Brooklyn to Corio**

**Section:** ? **Williams Landing - Hoppers Crossing**

**T1 -**

**THREAT DETAILS**

ID **402** **All controls fail: Heavy Excavator punctures pipe during utilities maintenance** KP **9.957**  
**Location** Swamp Hen Drive, Williams Landing External Interference

**ALARP ANALYSIS**

**ALARP confirmed?**  Yes  No

**Cost of failure** \$30,000,000 Say 6 fatalities @ M\$4 = M\$24, plus property damage and other costs, say M\$30  
**Probability of failure** 0.001% Top of Hypothetical range  
**Proportionality factor** 10 Worst case, just to be conservative

**Maximum justified spend to eliminate risk: \$3,000**

**Possible alternative mitigation**

**Reason not adopted**

Slabbing

Highly expensive relative to benefit; likelihood of this threat already very low

No other mitigation possible for any reasonable cost

**THREAT DETAILS**

ID **352** **All controls fail - major infrastructure work, large excavator punctures pipelines** KP **13.505**  
**Location** Old Geelong Road - Utility Installation using excavator External Interference

**ALARP ANALYSIS**

**ALARP confirmed?**  Yes  No

**Cost of failure** \$30,000,000 Say 6 fatalities @ M\$4 = M\$24, plus property damage and other costs, say M\$30  
**Probability of failure** 0.001% Top of Hypothetical range  
**Proportionality factor** 10 Worst case, just to be conservative

**Maximum justified spend to eliminate risk: \$3,000**

**Possible alternative mitigation**

**Reason not adopted**

Slabbing

Highly expensive relative to benefit; likelihood of this threat already very low

No other mitigation possible for any reasonable cost

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**ALARP ANALYSIS**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**Pipeline:** 7 **South Melbourne to Brooklyn**

**Section:** 97 **Cecil St - Todd Rd**

**T2 -**

**THREAT DETAILS**

ID **418** **Undetected corrosion in cased crossing**

KP **.211**  
**.25**

**Location** City Road Crossing

Corrosion

**ALARP ANALYSIS**

**ALARP confirmed?**  Yes  No

**Cost of failure**  
**Probability of failure**  
**Proportionality factor**

**Maximum justified spend to eliminate risk:**

**Possible alternative mitigation**

**Reason not adopted**

No alternative mitigation available. Direct inspection not possible; no remote inspection technology available; awaiting technology developments (research in progress)

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**ALARP ANALYSIS**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**Pipeline:** 42 **Generic pipeline for repetitive and NLS threats**

**Section:** 1 **Repetitive threats**

**THREAT DETAILS**

ID **3087** **Cathodic protection shielding within casing due to annular void** KP  
**Location** Cased crossing Corrosion

**ALARP ANALYSIS**

**ALARP confirmed?**  Yes  No

**Cost of failure**  
**Probability of failure**  
**Proportionality factor**

**Maximum justified spend to eliminate risk:**

**Possible alternative mitigation**

**Reason not adopted**

No alternative mitigation available. Direct inspection not possible; no remote inspection technology available; awaiting technology developments (research in progress)

**THREAT DETAILS**

ID **3106** **HDD for buried service installation** KP  
**Location** General metro installation External interference

**ALARP ANALYSIS**

**ALARP confirmed?**  Yes  No

**Cost of failure** \$4,000,000 Assume one fatality, M\$4, plus repair and disruption costs - insignificant because backfeed possible  
**Probability of failure** 0.01% Conservatively adopt middle of remote range  
**Proportionality factor** 10 Worst case, just to be conservative

**Maximum justified spend to eliminate risk: \$4,000**

**Possible alternative mitigation**

**Reason not adopted**

No further mitigation available within max justified spend

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**ALARP ANALYSIS**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

**Section:**  **Non-location-specific**

**THREAT DETAILS**

ID **3086** **Cathodic protection shielding (disbonded coating)** KP  
Location Non-location-specific Corrosion

**ALARP ANALYSIS**

**ALARP confirmed?**  Yes  No

**Cost of failure**  
**Probability of failure**  
**Proportionality factor**

**Maximum justified spend to eliminate risk:**

<b>Possible alternative mitigation</b>	<b>Reason not adopted</b>
No further mitigation available	

## **APPENDIX 10**

### **RECOMMENDED ACTIONS**

Pipeline Safety Management Study: **Victorian Transmission Pipeline Network**

**ACTIONS**

Pipeline Licensee: APA GasNet

5 Year Review safety mgt. study

<b>ID</b>	<b>Action</b>	<b>By</b>	<b>Due</b>
<b>1</b>	Unpiggable pipelines - review means of identifying corrosion defects, particularly due to shielding by either disbonded coating or casings	A. Bryson	

Associated Threats:

<u>ID</u>	<u>KPs</u>	<u>Location</u>	<u>Threat</u>
3086	-	Non-location-specific	Cathodic protection shielding (disbonded coating)
418	.211 - .25	City Road Crossing	Undetected corrosion in cased crossing

<b>ID</b>	<b>Action</b>	<b>By</b>	<b>Due</b>
<b>2</b>	Lurgi line - consider reviewing the possibility of latent construction defects, given the year in which it was built and the lack of hydrotest	C. Bonar	

Associated Threats:

<u>ID</u>	<u>KPs</u>	<u>Location</u>	<u>Threat</u>
3078	-	Non-location-specific	Undetected or unreported construction defect
3091	-	Non-location-specific	Undetected or unreported material defect

<b>ID</b>	<b>Action</b>	<b>By</b>	<b>Due</b>
<b>3</b>	Tyers - include in weekly patrol	P. Dawson	

Associated Threats:

<u>ID</u>	<u>KPs</u>	<u>Location</u>	<u>Threat</u>
776	60.5 -	Oval	General Installation

<b>ID</b>	<b>Action</b>	<b>By</b>	<b>Due</b>
<b>4</b>	Patrol frequency - review patrols for locations of increased population density	P. Dawson	

Associated Threats:

<u>ID</u>	<u>KPs</u>	<u>Location</u>	<u>Threat</u>
506	4.421 - 4.556	Leisure centre	General Installation
1109	79.82 - 82	Construction Activity at Proposed and Existing Mernda Development	General Installation

<b>ID</b>	<b>Action</b>	<b>By</b>	<b>Due</b>
<b>5</b>	ILI program - consider pigging pipelines DN 150 and larger that are less than 10 km (excluded from ILI to date)	C. Bonar	

Associated Threats:

<u>ID</u>	<u>KPs</u>	<u>Location</u>	<u>Threat</u>
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