Delphi Risk Management Consulting

Greater Avalon Employment Precinct, Vic

AS 2885.6 Safety Management Study Workshop & Report

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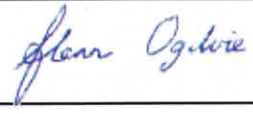
Reviewed & Approved By:	Glenn Ogilvie Senior Risk Engineer – APA Group	Signature:	
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Revision History

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A	2/1/2025	Issued for Review by VPA	MAH	OY		
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1. ABBREVIATIONS

ALARP	As Low As Reasonably Practicable
APA	APA Group (Pipeline licensee in Australia)
AS	Australian Standard
CIC	Common Infrastructure Corridor
CDL	Critical Defect Length (mm) is a hole size where a pipeline is likely to rupture
CMP	Construction Management Plan
CoGG	Council of Greater Geelong
CTE	Coal Tar Enamel
DRMC	Delphi Risk Management Consulting – SMS Reviewer & Facilitator
DA	Development Application
DN	Diameter nominal
EPC	Engineering Procurement Construction
FEED	Front end engineering design
FJC	Field Joint Coating
GIS	Geographical Information System
GJ/s	Gigajoules per Second (energy release rate)
GPT	General Purpose Teeth (used on excavator buckets)
HDD	Horizontal Directional Drill (used for installation of utilities under existing assets)
km	Kilometre(s)
KP	Kilometre Point along pipeline length
kPag	kiloPascals (gauge)
kW/m^2	Kilowatts per metre squared (heat radiation flux)
LC	Location Class
LOPA	Layers of Protection Analysis
m	Metre(s)
MAOP	Maximum Allowable Operating Pressure
ML	Measurement Length (4.7 kW/m2 radiation contour in the event of a full-bore rupture of the pipeline, results in 2nd degree burns within 30 sec of exposure at this distance)
MLV	Main Line Valve
O&M	Operations and Maintenance
PIMP	Pipeline Integrity Management Plan
PL	Pipeline License
PLC	Primary Location Class
PPV	Peak Particle Velocity, related to degree of ground movement or vibration
ROW	Right of Way
R1	Rural location classification
R2	Rural Residential location classification
ROW	Right of Way/Easement
RTP	Resistance to Penetration
S	Sensitive Use location classification
SAOP	Safety and Operating Plan
SLC	Secondary Location Class
SMS	Safety Management Study
SMYS	Specified Minimum Yield Stress
SPC	Secondary pressure Control
T1	Residential location classification
T2	High Density location classification
TOR	Terms of Reference
TP	Transmission Pipeline
VPA	Victorian Planning Authority
w.r.t.	With Respect To
WT	Wall Thickness

2. EXECUTIVE SUMMARY

2.1 Background

Delphi Risk Management Consulting Pty Ltd (DRMC) is pleased to support the Victorian Planning Authority (VPA) (Proponent) in facilitating a Safety Management Study (SMS) for the proposed Greater Avalon Employment Precinct (GAEP) located in the City of Greater Geelong Council area and 55 km from the Melbourne Central Business District . The precinct is currently used for farming purposes.

The proposed precinct is positioned over two existing APA Group High Pressure Gas Pipelines and adjacent to several Viva Energy High Pressure Oil Pipelines which, under the Australian Standard for HP Gas Pipelines (AS2885) requires the risks associated with construction of the GAEP and future operation and maintenance of the pipelines be assessed and suitably mitigated before the development proceeds. Note that this Report will only address the APA gas pipelines, the Viva pipelines will be subject to an independent review.

The first stage of this activity is to undertake a review of documentation and information produced by the VPA and made available to the VPA by third parties (APA Group), who own and operate the High Pressure Gas Pipelines and associated above ground gas facilities on the northwestern edge of the development along the Princes Freeway.

To comply with Australian Standard AS/NZS 2885.6:2018, any significant and/or “Sensitive” change in land use (such as a new or expanded place of worship), within the defined consequence distance of a Transmission Pressure Gas Pipeline licensed under AS2885 in Australia must be subjected to a Safety Management Study (SMS). The SMS reviews all possible threats to the safe operation and maintenance of the pipeline and ensure that any threats that cannot be mitigated by design or procedures are risk assessed and confirmed to be As Low As Reasonably Practical.

Mark Harris from Delphi Risk Management Consulting was engaged by the Proponent to facilitate an SMS Workshop for this Development.

This SMS Report captures the findings of the “Land Use Change” (AS2885.6 Table 5.1) SMS Workshop held on the 7th of November 2024. The Development provided for review at the SMS Workshop was sufficient to allow the Workshop to assess all likely risks. The findings from this SMS Report will provide direction to the Proponent and future Contractors as part of the tendering and construction of the Development.

2.2 Key Findings

Given the proposed precinct plan does intend to include Sensitive Land Use, it was agreed at the SMS Workshop that a Buffer Area should be applied to the precinct plan, over the two APA pipelines (85m of T112 pipeline or 57m of T24 pipeline) to ensure Sensitive Land Use is not developed within these areas. If Sensitive Land Use must be positioned within these Buffer Area, then the sensitive use developer will need to pay for concrete or HDPE Slabbing over the APA pipelines (to APA requirements) where the land use is within 85m of T112 pipeline or 57m of T24 pipeline.

The results of the 44 Threats specifically considered can be summarised as follows:

Table 1, Risk Assessment Summary

Pipeline	No. Threats	Threats		Threats requiring Risk Assessment	Risk Assessment		
		Non Credible	Credible		Negligible	Low	Intermediate
Brooklyn to Lara Pipeline (T112)	44	9	35	4	2	2	-
Brooklyn to Corio Pipeline (T24)	44	8	36	4	2	2	-

The workshop found that based on the known and anticipated threats considered, APA will be able to continue to operate and maintain the PL266 and PL81 TP Gas Pipelines in compliance with AS2885 subject to satisfactorily closing out the Actions raised during the SMS Workshop.

The workshop results were recorded in the minutes, provided in Appendix F.

2.3 Actions

A total of 23 Actions were identified during the SMS Workshop and listed in Section 12 below. The Actions identify specific timelines upon which each Action needs to be closed out. Both the Proponent, their contractors, and APA will need to work together to ensure the Actions are closed out in a timely and complete manner. The documents and drawings produced as part of the close out will need to be recorded for future reference.

2.4 Outcomes

The SMS undertaken is considered to be a Land Use Change SMS. All actions raised at the SMS will need to be closed out to the satisfaction of APA prior to any works commencing.

Continued liaison between the Proponent and APA should ensure that design, construction activities and post construction activities pose no significant increase in the operational and maintenance risk to the transmission pipelines effected by the Development.

Upon satisfactory close out of the actions raised from this SMS Workshop and completion of the relevant Project Lifecycle SMS studies (e.g. Pre-Construction) required under AS2885.6-5.6, it can be confirmed that the requirements of AS2885.6-2018 are met and that the APA assets under review will continue to be in compliance with the SMS requirements of AS2885.6-2018 in the Development area.

3. INTRODUCTION

The Victorian Planning Authority (VPA) is currently preparing a planning scheme amendment for the Greater Avalon Employment Precinct (GAEP) located in the City of Greater Geelong Council area and 55 km from the Melbourne Central Business District . The precinct is currently used for farming purposes.

The VPA has commenced planning for the GAEP (Figure 1 below). The VPA plans to prepare a Framework Plan for the GAEP and a Development Plan Overlay for GAEP West (noting that at the time of the SMS Workshop, a Precinct Structure Plan (PSP) and a Development Contributions Plan (DCP) was proposed).

The GAEP is located in Avalon around and including the Avalon Airport. It is located 20 km from the City of Geelong and 55 km from the Melbourne Central Business District. The Avalon Airport area is subject to a separate strategic planning process.

The PSP area is defined in the Avalon Corridor Strategy (ACS). This document provides strategic planning direction for the corridor between the Geelong and Werribee settlements. It identifies the GAEP as a strategic opportunity to leverage from planned expansion of the Avalon Airport. The ACS acknowledges the land has land capability considerations.

The GAEP PSP is estimated to provide for 18,000 jobs within the study area (i.e. excluding Avalon Airport).

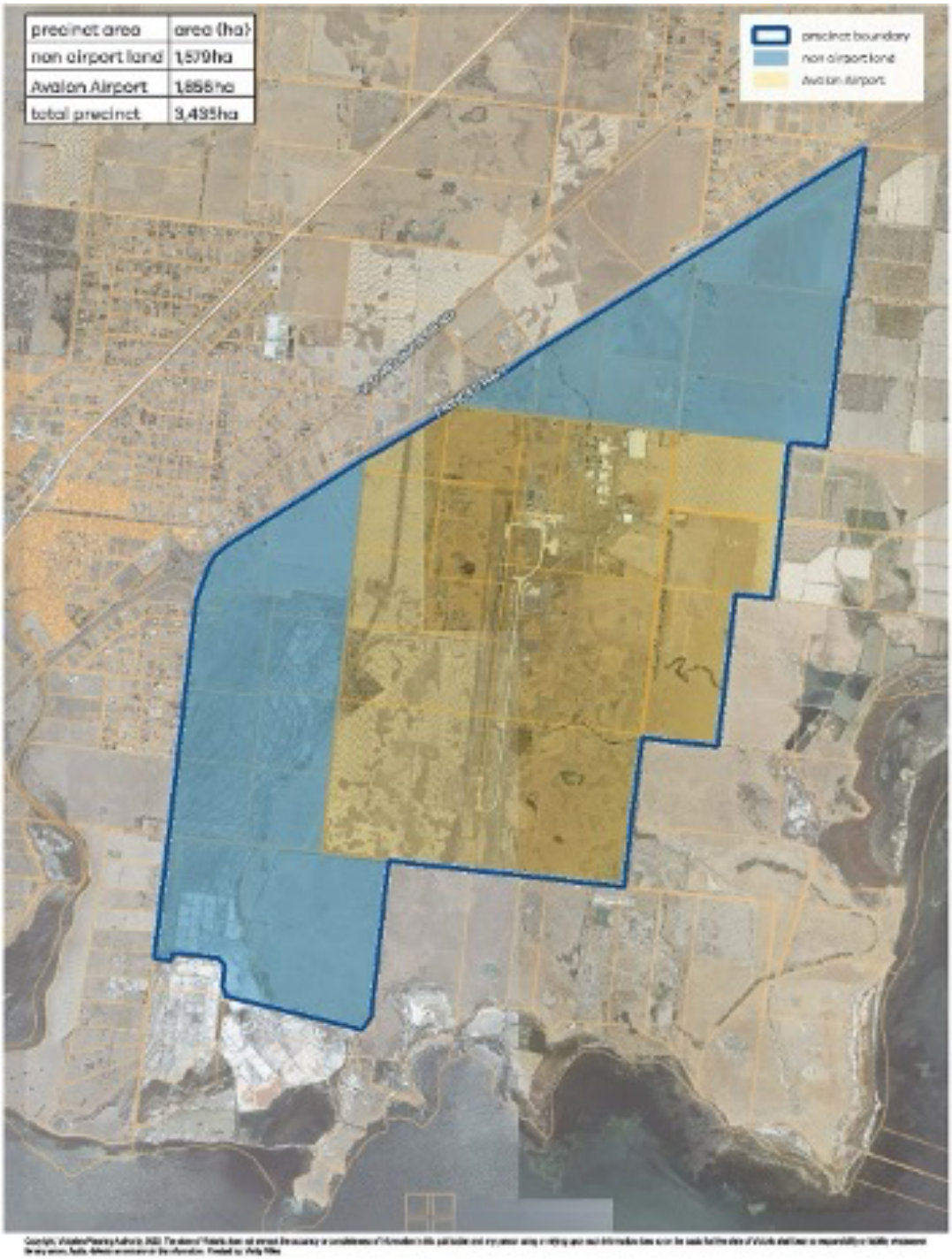
The study area land is currently used for farming purposes and most of the west area forms part of the former Cheetham Saltworks. Surrounding uses are mostly farming or reserves, as well as pocket of rural residential land.

Potential PSP Implications

In relation to gas infrastructure, the future urban structure for Greater Avalon Employment Precinct provides the following:

- Industrial land uses
- Passive open space (including linear open space along the easements)
- Worker Service Hubs and a Visitor Economy Precinct, all of which are being considered for the inclusion of private childcare uses
- Proposed roads that cross the easement at right angles to the pipelines.

Figure 1, Greater Avalon Employment Precinct Development Overview



Note Blue Areas shows GAEP areas
Orange Area is the Avalon Airport Zone

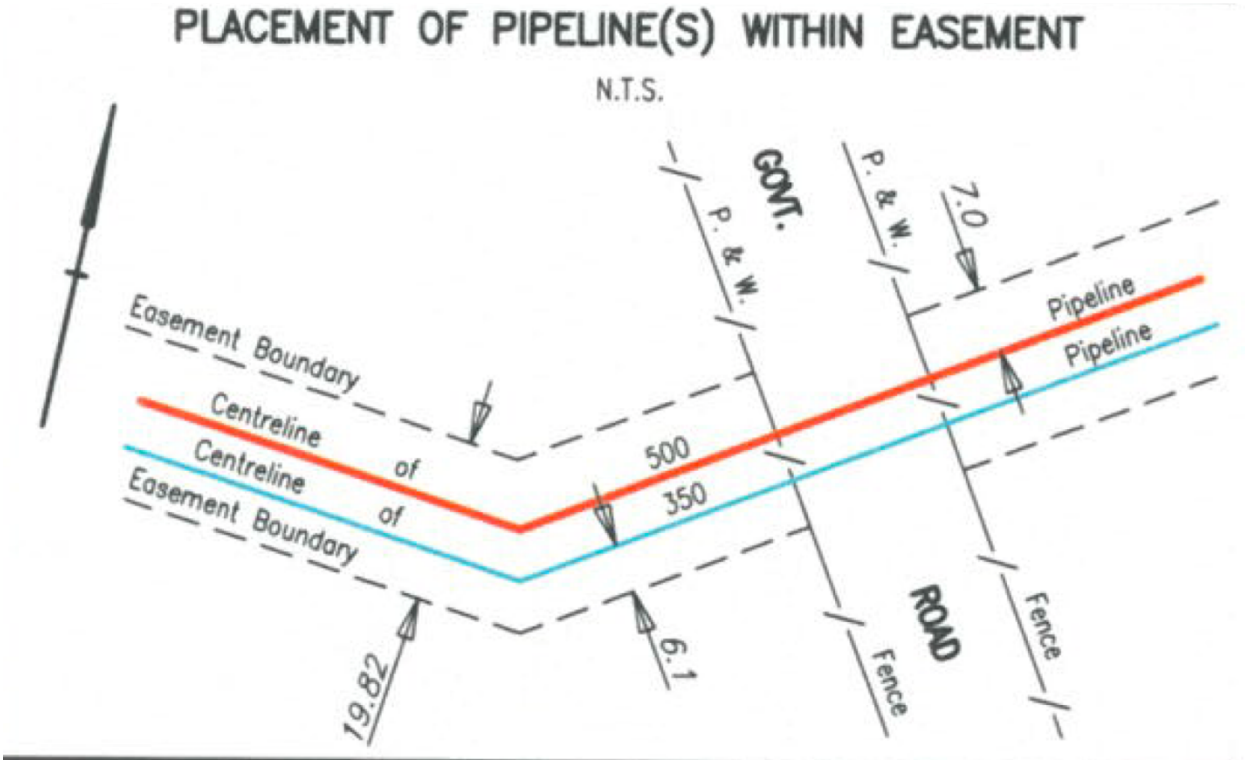
4. GAS TRANSMISSION INFRASTRUCTURE

The existing pipeline infrastructure within the GAEP is as follows.

Table 2, Pipeline Infrastructure Impacted by GAEP

Pipeline	Pipeline Licence	Easement Width (m)	Diameter (mm)
Brooklyn - Lara	PL266 (T112)	20m	500
Brooklyn - Corio	PL81 (T24)	20m	350

Figure 2, Pipeline Positioning within Easement



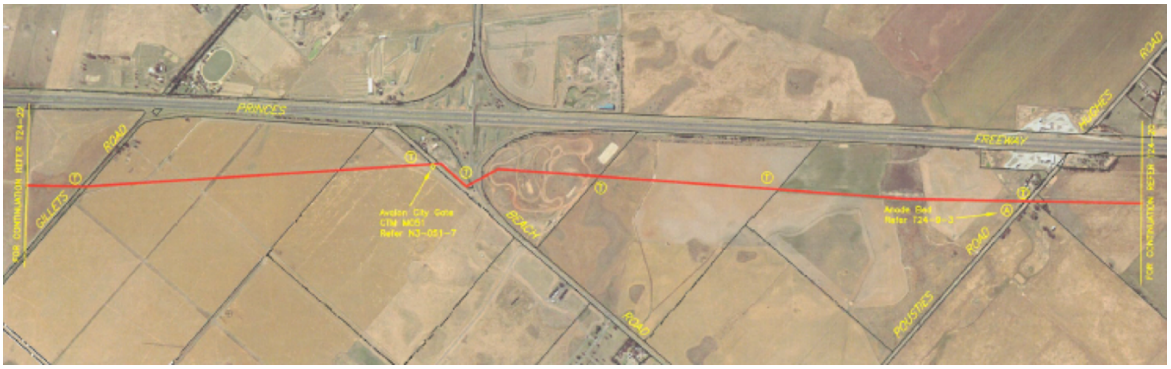
T112 is the Red line, T24 is the Blue line, positions aren't expected to change when pipeline diverge. Note that this image is indicative only, any crossings of the pipeline easement will require the pipeline(s) to be positively located under the supervision of APA before any works can commence.

Existing gas distribution assets in the form of transmission pressure (TP) gas pipelines are located along the northern edge of the GAEP.

The T24 pipeline has a coal tar enamel coating which is a relatively old coating technology and is well known to be brittle in nature making these pipelines sensitive to vibration leading to coating damage and ultimately corrosion and loss of containment without proper management of vibration during construction works.

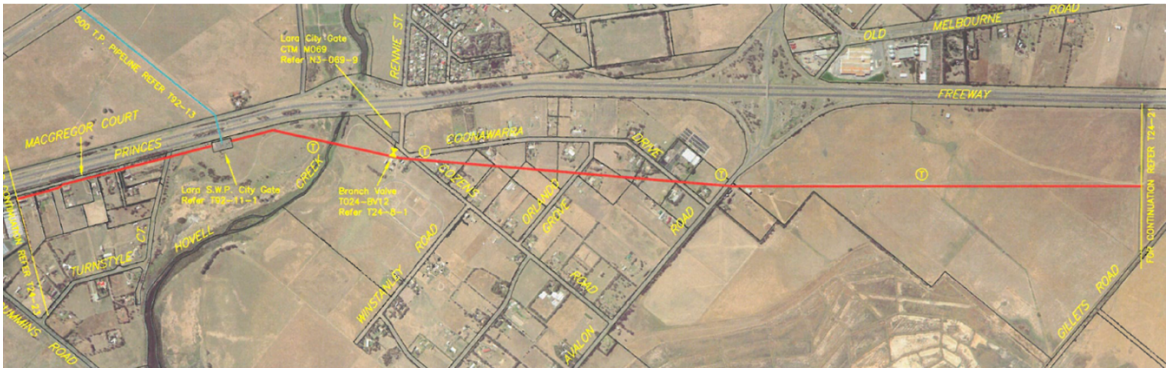
The APA pipelines have a series of Cathodic Protect Test Points (identified as post in the ground) which allows APA to test that the electrical current being applied to the pipelines to prevent them from corroding is actually working. In addition to these test posts, the T24 pipeline also has a local buried Anode Bed (at the northeast corner of the GAEP) which is helping to apply an electric current to the pipeline. All of these assets will need to be identified and protected during the design phase and the construction phase of the development.

Figure 3, T24 Pipeline (East)



Note (T = Cathodic Protection Test Point, A = Cathodic Protection Anode Bed)

Figure 4, T24 Pipeline (West)

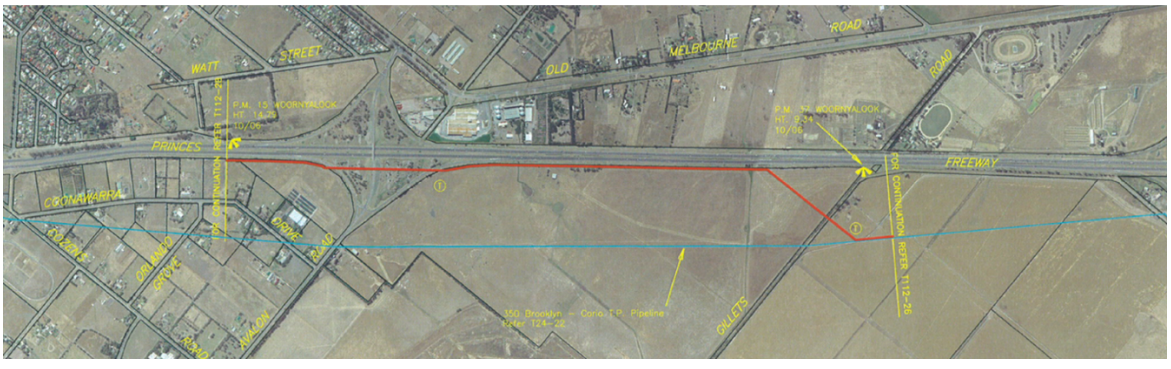


Note (T = Cathodic Protection Test Point)

Figure 5, T112 Pipeline (East)

Note (T = Cathodic Protection Test Point)

Figure 6, T112 Pipeline (West)



Note (T = Cathodic Protection Test Point)

5. PIPELINE LOCATION CLASS ASSESSMENT

AS 2885.6 2018 is the Australian Standard that governs the management of safety & risk around and associated with petroleum pipelines, including transmission pressure (>1050kPag) natural gas pipelines. Within the Standard there are four Primary zones discussed, ranging from R1 – relatively remote, undeveloped land, through R2 (rural residential), and T1 (typical suburban development) to T2, which is intense multi-storey or CBD areas. There are also Secondary zones defined that categorise land use into heavy industrial (HI) or light industrial (I), common infrastructure corridor (CIC), crowds (C), or Sensitive (S) use.

A copy of Section 2 of AS 2885.6 is included in Appendix A of this document for reference.

Table 3, Pipeline Location Class Assessment

		Current Location Class		Proposed Location Class			
Pipeline	**Pipeline Licence**	**Primary Location Class**	**Secondary Location Class**	**Primary Location Class**	**Secondary Location Class**	**KP point (km)**	**Reason for change**
Brooklyn - Lara	PL266 (T112)	R1/R2	S (Near Service Centre) / C (Motorsport track) / I (Riordan Grain Services)	T1	I, Industrial C Motorsport track S (Near Service Stn and Childcare)	KP49255 to KP55285	New Industrial estate with service hubs (incl Childcare)
Brooklyn - Corio	PL81 (T24)	R1/R2	S (Near Service Centre) C (Motorsport track)	T1	I, Industrial C (Motorsport track) S (Near Service Stn and Childcare)	KP38320 to KP44690	New Industrial estate with service hubs (incl Childcare)

A fundamental principle of AS 2885.6 is that pipeline safety management and safe operation are on-going imperatives during the life of the pipeline and must be actively supported and documented by the pipeline licensee. This places on-going obligations on a pipeline licensee to operate and maintain robust systems, plans and procedures during the pipeline's operational phase.

A review of any high pressure gas pipeline is undertaken as a minimum every 5 years under AS 2885 but is also triggered under the standard if there is a change in the design or operation of the pipeline or a change in land use within the Measurement Length of the pipeline that increases the likelihood or consequences of a failure event.

6. MEASUREMENT LENGTH

The concept of Measurement Length (ML) is a key parameter in assessments of land use changes such as the GAEP.

The measurement length of a pipeline is defined in AS 2885.6 Appendix B1 as the radius of the 4.7 kW/m2 radiation contour for a full-bore rupture. At this distance it is expected that an able bodied and clothed person are likely to sustain 2nd degree burns within 30 seconds if they were to remain in the area.

This is derived from calculations of the heat radiation intensity if a full-bore rupture of the pipeline is ignited.

A related parameter is the radiation contour for a heat radiation intensity of 12.6 kW/m2. At this distance it is expected that an able bodied and clothed person would sustain 3rd degree burns and life-threatening injuries within 30 seconds if they were to remain in the area.

These distances are calculated for each pipeline, and used in the assessment of land uses, both existing and planned for new and operational pipelines.

AS 2885.6 provides that the assessment of an existing pipeline's Location Class is based on land use within the measurement length (Refer Table 1, Section 4 above).

The practical outcomes of the above are that for land use changes around an existing pipeline, such as the GAEP, the SMS Workshop will assess the population density and proposed activities of the land within the measurement length to determine what risks are present. The SMS Workshop will assess the level of existing (and possible new) protections required to protect against interference and other threats necessary to keep the pipeline and the people around the pipeline safe.

Sensitive use activities such as places where people congregate, and/or have limited means of escaping from a pipeline incident and fire (sports stadiums, schools, aged care facilities etc) within the measurement length impose the most stringent protection requirements on the pipeline, to the extent that significant measures are required to ensure that rupture of the pipe is not a credible event.

Table 4, Pipeline Measurement Lengths (Consequence Distances)

Pipeline	**Pipeline Licence**	**Pipeline Max Allowable Operating Pressure (MAOP) (kPag)**	**Measurement Length (4.7kW/m2) for Rupture (m)**	**Credible Hole Size Diameter (mm)**	**Radiation Contour (4.7kW/m2) for Credible Hole (m)**
Brooklyn - Lara	PL266 (T112)	10200	525	50	85
Brooklyn - Corio	PL81 (T24)	7390	297	50	57
Note: Measurement Length is applied to either side of the pipeline *(Note:-the ML distance is the heat radiation contour generated if the pipeline was to rupture and ignite, at this distance a clothed person would expect to receive 2nd degree burns if they were to remain in place for 30 seconds.)*					

7. WORKSHOP PARTICIPANTS

The Safety Management Study Workshop was held on the 7th of November 2024. As the SMS Workshop was undertaken over the internet using Microsoft Teams and as such it was not possible to record a written and signed attendance sheet.

The Workshop was attended by a range of qualified people comprising representatives from the Licensee APA Group (APA) and the Proponent (VPA). The group included sufficient disciplines, knowledge, and experience to provide confidence that the output of the workshop is soundly based.

The nominated attendees for the workshop are listed below.

Table 5, Participants

Name	Position	Organisation
Mark Harris	Facilitator	DRMC
Glenn Ogilvie	Senior Risk Engineer	APA
Michael Mielczarek	Senior Urban Planner	APA
Nathan Guttmann	Senior Strategic Planner	VPA
Chris Dafter	Water and Infrastructure Engineer	VPA
Clancy Phillippe	Infrastructure Engineer	VPA
Sarah Ancell	Strategic Planning Manager	VPA
Alison Fong	Strategic Planner	VPA
Geoff Taylor	Manager of Flood Plains	Corangamite Catchment Management Authority
Claire McVilly	Strategic Planner	Greater Geelong City Council
Nana Oppong-Yeboah	Strategic Planner	Greater Geelong City Council

8. APPROACH AND METHODOLOGY

8.1 Approach

The Australian Standard AS 2885.1–2018 & AS 2885.6-2018 describes the requirements for pipeline SMS including:

- Threat identification.
- Application of physical, procedural and design controls for each credible threat.
- Review of threat control; and
- Assessment of residual risk from failure threats.

The SMS process focuses on eliminating threats to pipeline integrity from location specific and non-location specific activities, present and future, and conditions foreseeable, including likely land use, during the pipeline operational phase. Where failures are assessed as possible after the application of control measures, risk assessment is undertaken for the relevant threat, and it must be demonstrated that the risks are 'as low as reasonably practicable' (ALARP).

8.2 Methodology

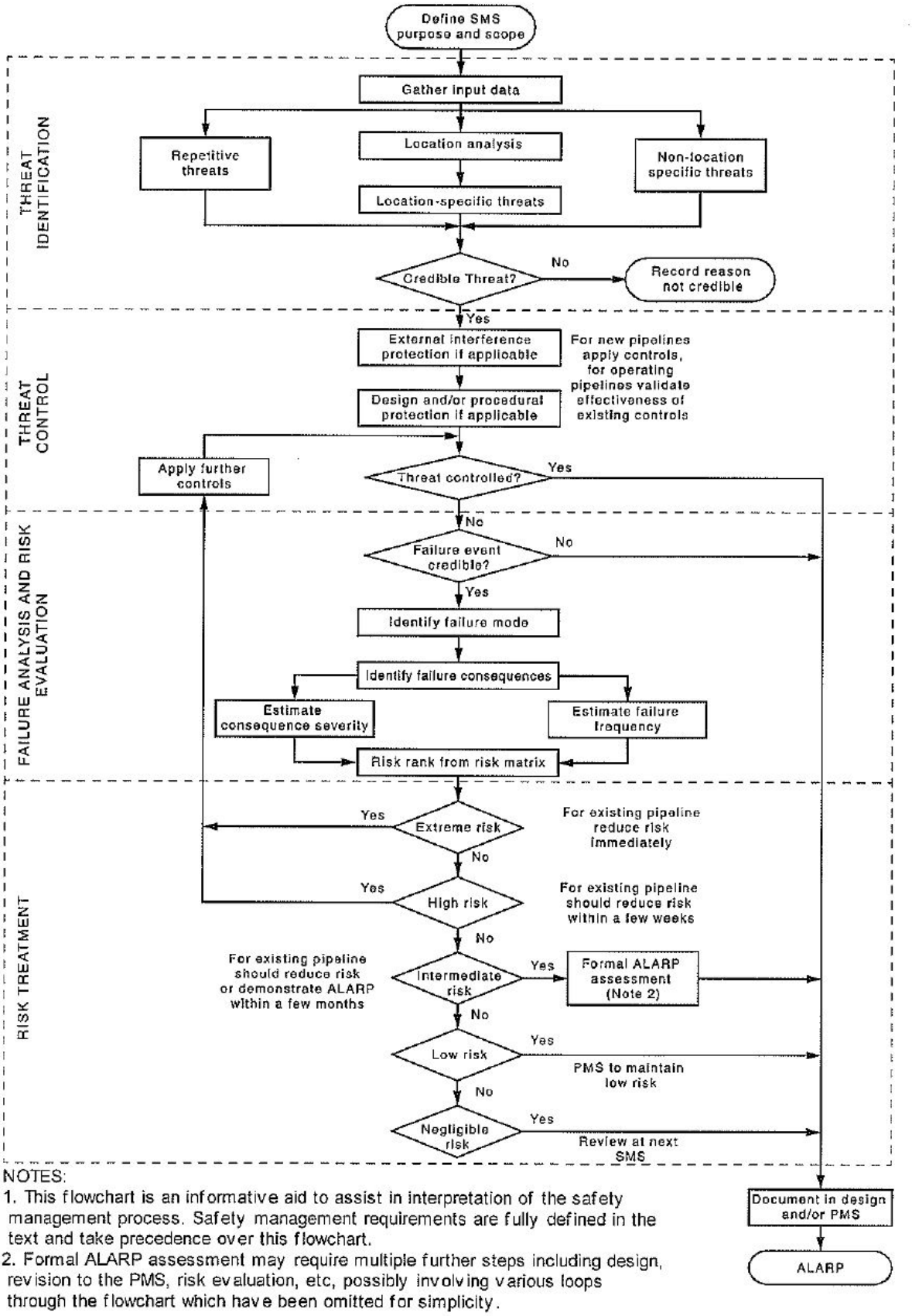
Prior to the SMS workshop being convened, the pipeline licensee and the proponent prepared a range of relevant information to be presented to the workshop.

All threats developed prior to the SMS workshop were documented in a spreadsheet. Changes or additions to the threats and risk mitigations were recorded directly into the spreadsheet. Additional actions not related to particular threats were also recorded.

A copy of the Development was available to the workshop electronically as were all other documents referenced in Appendix D.

The SMS study is based on the risk assessment process defined in AS 2885.6–2018 and in particular the Flowchart presented in the Standard is referenced below.

Figure 7, - AS2885.6 Risk Assessment Process



NOTES:

1. This flowchart is an informative aid to assist in interpretation of the safety management process. Safety management requirements are fully defined in the text and take precedence over this flowchart.
2. Formal ALARP assessment may require multiple further steps including design, revision to the PMS, risk evaluation, etc, possibly involving various loops through the flowchart which have been omitted for simplicity.

8.3 Location Classification

The AS 2885.6 – 2018 definition of Location Class is “The classification of an area according to its general geographic and demographic characteristics, reflecting both the threats to the pipeline from the land usage and the consequences for the population, should the pipeline suffer a loss of containment”. For the selection of location class, the area along the pipeline route and the surrounding land uses are considered.

Classification of locations is defined in AS 2885.6-2018, Section 2.2.

The primary location class reflects the population density of the area. It is defined based on an analysis of the predominant land use in the broad area traversed by the pipeline/s. There are four primary location classes to select from, as described in, Appendix A. One or more secondary location classes, reflecting special uses, may also apply to an area, as described in, Appendix A. Changes in location class occur when there are changes in land use planning along the route of existing pipelines.

Where this occurs a safety assessment (SMS) shall be undertaken, and additional control measures implemented until it is demonstrated that the risk from loss of containment involving a rupture is As Low As Reasonably Practical “ALARP”.

The assessment shall include analysis of at least the alternatives of the following:

a) MAOP reduction.
b) Pipe replacement (with no rupture pipe).
c) Pipeline relocation.
d) Modification of land use; and
e) Implementing physical and procedural protection measures that are effective in controlling threats capable of causing rupture of the pipeline.

8.4 Threat Identification

The threat identification process seeks to list all location specific and non-location specific threats with the potential to:

- Damage any of the pipelines.
- Cause interruption to service for any of the pipelines.
- Cause release of fluid from any of the pipelines; or
- Cause harm to pipeline operators, the public or the environment.

Prompts are used to aid the team, drawn from the Standard, and include the most commonly identified threats for gas and liquid petroleum pipelines. The threat prompts are provided in Appendix B.

Threats determined to be non-credible are documented, along with the reasoning.

8.5 Threat Control

For each credible threat identified in the previous step, effective controls are listed. Controls are considered effective when failure as a result of that threat has been removed for all practical purposes.

For external interference threats, physical and procedural controls are required, and the minimum number of effective controls required for a threat depends on the location class, as shown in, Appendix B. The categories of physical and procedural are also displayed in Appendix B.

For all other threats, design and/or procedures are required.

To assist in the analysis and in determining if controls are effective (e.g., pipeline wall thickness), pipeline calculations can be completed.

The pipeline calculations establish:

- The maximum excavator size and teeth that can be used during construction to ensure the pipelines are not compromised; and
- Radiation contours (distances) of interest for full bore rupture incidents

A radiation of 4.7 kW/m2 will cause injury (at least second-degree burns) after 30 seconds exposure. Therefore, for example, it is preferred that there are no sensitive groups located within range of a pipeline's 4.7 kW/m2 measurement length as these population groups may be unable to be evacuated or to seek shelter.

8.6 Residual Threats Risk Assessment

For threats where failure is still possible despite the control measures, and no further threat controls can be applied, an assessment of the residual risk is undertaken. This is completed by:

- Assessment of the severity of the consequence of a failure event
- Analysis of the frequency of occurrence of the failure event and
- Risk ranking

The results of the risk ranking determine the required treatment action for the threat. Refer to the Risk Matrix in Appendix C.

If the risk of a particular threat cannot be considered to be low or negligible according to recognised industry risk matrix then further investigation of the threat will take place to confirm that the risk is "As Low As Reasonably Practical" (ALARP).

Actions minuted during the course of the SMS workshop will fall into three general categories: -

- Close out before to equivalent to detailed design
- Close out prior to Construction
- Or a nominated actual date

An SMS Report (this report) is produced following the workshop to capture proceedings of the workshop and highlight key decisions or issues. It will also contain all the threats and their associated mitigations and/or agreed actions.

9. AS 2885 LAND USE REQUIREMENTS

9.1 AS 2885.6 – Pipeline Safety Management

AS 2885.6 2018 is the Australian Standard that governs the management of safety & risk around and associated with petroleum pipelines, including transmission pressure (>1050kPag) natural gas pipelines. Within the Standard there are four Primary zones discussed, ranging from R1 – relatively remote, undeveloped land, through R2 (rural residential), and T1 (typical suburban development) to T2, which is intense multi-storey or CBD areas. There are also Secondary zones defined that categorise land use into heavy industrial (HI) or light industrial (I), common infrastructure corridor (CIC), crowds (C), or Sensitive (S) use. A copy of Section 2 of AS 2885.6 is included in Appendix A of this document for reference.

A fundamental principle of AS 2885.6 is that pipeline safety management and safe operation are on-going imperatives during the life of the pipeline and must be actively supported and documented by the pipeline licensee. This places on-going obligations on a pipeline licensee to operate and maintain robust systems, plans and procedures during the pipeline's operational phase.

A review of any transmission pressure gas pipeline is undertaken as a minimum every 5 years under AS 2885 but is also triggered under the standard if there is a change in the design or operation of the pipeline or a change in land use within the Measurement Length of the pipeline that increases the likelihood or consequences of a FAILURE EVENT.

9.2 Measurement Length

The concept of Measurement Length (ML) is a key parameter in assessments of land use changes by new developments around Transmission Gas Pipelines.

The measurement length of a pipeline is defined in AS 2885.6 Appendix B1 as the radius of the 4.7 kW/m2 radiation contour for a full-bore rupture. At this distance it is expected that an able bodied and clothed person are likely to sustain 2nd degree burns within 30 seconds if they were to remain in the area. This is derived from calculations of the heat radiation intensity if a full-bore rupture of the pipeline is ignited.

A related parameter is the radiation contour for a heat radiation intensity of 12.6 kW/m2. At this distance it is expected that an able bodied and clothed person would sustain 3rd degree burns and life-threatening injuries within 30 seconds if they were to remain in the area.

These distances are calculated for each pipeline, and used in the assessment of land uses, both existing and planned for new and operational pipelines. AS 2885.6 provides that the assessment of an existing pipeline's Location Class is based on land use within the measurement length.

The practical outcomes of the above are that for land use changes around an existing pipeline, such as the Development, the SMS Workshop assesses the population density and proposed activities of the land within the measurement length to determine what risks are present. The SMS Workshop assesses the level of existing (and possible new) protections required to protect against interference and other threats necessary to keep the pipeline and the people around the pipeline safe.

Sensitive use activities such as places where people congregate, and/or have limited means of escaping from a pipeline incident and fire (shopping centres, sports stadiums, schools, childcare, aged care facilities etc) within the measurement length impose the most stringent

protection requirements on the pipeline, to the extent that significant measures are required to ensure that rupture of the pipe is not a credible event.

10. PHYSICAL AND PROCEDURAL PROTECTION MEASURES

10.1 AS 2885 Requirements

For pipeline Location Class T1, T1/S or T2 the design requirements against External Interference Threats within AS 2885 seek to have a minimum of two physical protection measures and two procedural measures wherever possible with any residual risk assessments found to be ALARP.

10.1.1 Physical Protection

Physical protection measures comprise:

- Separation of external interference activities from the pipeline – exclusion of activities which may damage the pipeline. Typically, these are excavation activities by third parties but can also include intensive vibration such as might be employed during the construction of roads and other infrastructure. Typical separation measures include burial, exclusion of the public or third parties from the pipeline alignment or barriers.
- Resistance to penetration, such as adequate wall thickness to resist the identified excavation equipment threats, or again a barrier to penetration.
- Concrete slabbing directly above pipelines is one barrier method that is accepted to provide adequate exclusion as a second physical barrier, particularly where a pipeline is at risk of holing or rupture due to the known threats. The concrete slab usually has a minimum width of the nominal pipeline diameter plus 600 mm either side and shall be placed a minimum of 300 mm above the pipeline. This solution is usually paired with marker tape installed above the concrete slab to warn of what is underneath the slab.
- A Concrete footpath or bike path over the pipeline or buried HDPE slabs can be acceptable forms of physical protection when a pipeline is within a linear open space or under roadways where penetration resistance is required but a structural concrete slab for loading purposes is not.

10.1.2 Procedural Measures

Procedural mitigation measures which are recognised by AS 2885 comprise:

- Pipeline Awareness activities, such as marker signs, before-you dig service (BYDA), third party liaison programs to inform other parties of the presence of the pipeline and consequences of damage, and activity agreements with other entities.
- External interference detection measures such as pipeline patrolling, planning notification zones and remote intrusion detection. The most common for existing pipelines are the first two. Remote intrusion detection is usually only implemented at pipeline facilities such as valve or city gate stations.

11. PIPELINE TECHNICAL DETAILS

The SMS focused on the sections of pipelines adjacent to the Development. The pipeline's technical details and resistance to penetration data in the area can be summarised as follows:

Table 6, BROOKLYN to LARA Pipeline PL266 - Technical Details

Substance conveyed	**Natural Gas**
Measurement Length (ML)	525m (4.7 kW/m2 Heat Radiation Zone)
	321 (12.6 kW/m2 Heat Radiation Zone)
Length of pipeline affected	~8160 m + 2 x 525m (Total 9210m approx.)
Pipeline section under review within GAEP	~KP47125 to KP55285 (plus ML each end)
Outside Diameter	500 mm
Easement	20m
Wall Thickness	11.1mm WT
Depth Of Cover	1.05m to 1.8m
Pipe specification	GR.5L-X70 (coating FBE)
Max. Allowable Operating Pressure	10200 kPa (MAOP)
Location Class - Primary	R1/R2 (Existing) T1 (New)
Location Class – Secondary	C (KP50626-52320 - Dirt Track), S, I (New due GAEP proposed uses)
CDL	195.73 mm (@ 11.1mm WT) (2/3rds 130mm)
Credible Excavator Size in the area	20T with General Purpose Teeth & (Penetration/Tiger Teeth in Dev Areas)
Credible Hole Size from Excavator	50mm for an excavator 20T
Credible Hole Size from Auger	50mm
Hole size & ML based on 10GJ/s release rate	121mm and 206m
Hole size & ML based on 1GJ/s release rate	38mm and 65m
50mm Hole size & ML	85m (>10 GJ/s)
Credible hole (50mm) ML	85m for an Excavator

The pipeline excavator risk can be summarised as follows:

Table 7, Excavator Risk PL266

Credible Excavator Size	**20T typically with Std General Purpose Teeth or possibly Penetration or Tiger Teeth during major developments**
Max equipment sizes without risk of a leak(B Factor 1.3, 10.8mm WT)	
- Excavator with General Purpose Teeth	>55T
- Excavator with Tiger Teeth (Single Point Penetration)	25T
- Excavator with Twin Tiger Teeth (both Points Penetration)	>55T
- Excavator with Penetration Teeth	25T
Max equipment sizes without risk of a Rupture (B Factor 1.3, 10.8mm WT)	
- Excavator with General Purpose Teeth	>55T
- Excavator with Tiger Teeth (Single Point Penetration)	>55T
- Excavator with Twin Tiger Teeth (both Points Penetration)	>55T
- Excavator with Penetration Teeth	35T

Table 8, BROOKLYN to CORIO Pipeline PL81 - Technical Details

Substance conveyed	Natural Gas
Measurement Length (ML)	248m (4.7 kW/m2 Heat Radiation Zone) (Based on MOP)
	~152 (12.6 kW/m2 Heat Radiation Zone)
Length of pipeline affected	~8590m + 2 x 248m (Total ~9086m)
Pipeline section under review within PSP	~KP36100 to KP44690 (plus ML each end)
Outside Diameter	350 mm
Easement	20m
Wall Thickness	5.56mm WT
Depth Of Cover	0.9m to 1.2m
Pipe specification	GR.5L-X60 (coating Coal Tar Enamel)
Max. Allowable Operating Pressure	7390 kPa (MAOP) 5150 kPa (MOP)
Location Class - Primary	T1 (Was R1/R2)
Location Class – Secondary	I,C (existing) S (New)
CDL	154.20 mm (@ std 5.56mm WT) (2/3rds 102mm)
Credible Excavator Size in the area	20T with General Purpose Teeth & (Penetration/Tiger Teeth in Dev Areas)
Credible Hole Size from Excavator	50mm for an excavator 20T
Credible Hole Size from Auger	50mm
Hole size & ML based on 10GJ/s release rate	180mm and 125m
Hole size & ML based on 1GJ/s release rate	57mm and 57m
50mm Hole size & ML	57m (>10 GJ/s)
Credible hole (50mm) ML	57m for an Excavator

The pipeline excavator risk can be summarised as follows:

Table 9, Excavator Risk PL81

Credible Excavator Size	**20T typically with Std General Purpose Teeth or possibly Penetration or Tiger Teeth during major developments (Based on MOP)**
Max equipment sizes without risk of a leak(B Factor 1.3, 10.8mm WT)	
- Excavator with General Purpose Teeth	>55T
- Excavator with Tiger Teeth (Single Point Penetration)	5T
- Excavator with Twin Tiger Teeth (both Points Penetration)	15T
- Excavator with Penetration Teeth	5T
Max equipment sizes without risk of a Rupture (B Factor 1.3, 10.8mm WT)	
- Excavator with General Purpose Teeth	>55T
- Excavator with Tiger Teeth (Single Point Penetration)	>55T
- Excavator with Twin Tiger Teeth (both Points Penetration)	25T
- Excavator with Penetration Teeth	25T

12. ACTIONS REQUIRED UNDER AS2885 SPECIFIC TO GAEP SITE

With the introduction of the GAEP within the ML of the APA pipelines, APA would need to undertake the following actions as part of a formal SMS process under AS 2885: -

- Under AS 2885.6.4.2 (ii) APA would need to confirm firstly whether the pipeline can be considered "No-Rupture" in the section of the pipeline affected by the GAEP with further reference to AS 2885.1.4.9.2 and 4.9.3.
    - If the pipeline cannot be considered "No-Rupture", then under AS 2885.6.4.2 a formal "As Low As Reasonably Practicable" (ALARP) assessment is required.
    - For in-service pipelines where formal ALARP assessment is required by AS 2885.6.4.2 (ii), the risk controls listed below shall be considered as part of formal ALARP assessment:

      (A) Imposition of RESTRICTED OPERATING PRESSURE or reduction of MAOP (to a level where RUPTURE is non-credible).
      (B) Pipe replacement (with NO-RUPTURE pipe).
      (C) Pipeline relocation (to a location where the consequence is eliminated).
      (D) Modification of land use (to separate the people from the pipeline).
      (E) Implementing controls that are effective in controlling THREATS capable of causing RUPTURE of the pipeline.

A quick inspection of the options would realise the following outcomes:-

- Option A would result in the gas pipeline not being able to operate at its required delivery parameters and unable to operate at a level to supply the communities relying on the gas and so this is not a feasible option.
- Options B & C would be very expensive and are typically found not justifiable as there are other less costly options in most instances. Note that costs would need to be borne by the VPA and/or the Developer(s).
- Option D simply put, would require the GAEP sensitive uses to be relocated outside the ML of the pipeline which presumably is not an option for the VPA however, if APA confirms that Rupture is not credible then you may be able to locate the childcare centres outside the 57m to 85m radiation contours from the pipelines.
- Option E is almost always what is considered when assessing an existing pipeline in service such as the APA pipeline, Section 14 below investigates Option E in more detail.

13. INTERPRETATION OF AS 2885

The actions identified under Section 12 above, initiated by the proposal to introduce the GAEP within the ML of the APA pipelines, would be completed by APA, or their representatives, prior to or during the SMS Workshop.

The actions identified above fundamentally rely upon two key factors: -

- the ability of the pipeline wall thickness and material selection to resist penetration by an excavator with either general purpose teeth (GPT), penetration teeth or tiger teeth (TT) as defined in AS 2885.1.E4 and Table E5.
- what could be considered the largest "credible" excavator size that may be used on the pipelines in the GAEP area.

Whilst AS 2885.6.4.2 (ii) asks whether the pipeline can be theoretically considered “No-Rupture” or whether an ALARP assessment is required, it is the actual penetration calculations of the pipeline that will confirm what size excavator can actually penetrate the pipeline.

In many instances it is not possible for the “credible” excavator size (with various teeth) to put a hole in the pipe that can reach a hole size 2/3rds of the Critical Defect Length (CDL) and thus not capable of rupturing the pipeline. Note that AS 2885.1 Table E5 confirms that the maximum hole length from a 20T excavator with penetration teeth is 95mm which is less than 2/3rds CDL for both pipelines (PL266 CDL 195mm & PL81 CDL 154mm) confirming that both pipelines are considered “No Rupture” under AS2885.

APA have provided the penetration calculations for their pipelines and will be able to confirm if rupture is credible for the credible excavator size in the area at the SMS Workshop.

Inspection of the data provided by APA, shows that the pipelines PL266 and PL81 should be considered “No-Rupture” under AS 2885.6.4.2 (ii) and that focus should be turned to the consequence distance from the maximum credible hole size.

14. WORKSHOP RESULTS

The SMS workshop team reviewed the Development proposed and confirmed that the existing T1 Primary Location Class (PLC) for the PL226 pipeline is appropriate given the presence of the majority industrial development proposed. For PL81, the PLC will be updated to T1 from R2 for the same reason as applied to PL266.

There are “Industrial (I)” assets proposed as part of the development, so the existing Secondary Location Classes (SLC) will need to be updated to include “Industrial (I)” for both pipelines.

The VPA is also proposing the potential for childcare centres within the ML of the pipelines. The VPA could not confirm exactly where they may be placed. The two APA pipelines were both confirmed to be “No Rupture” for the known risks in the area (Section 11), as such the only credible maximum loss of containment is from a 50mm hole. The relevant 4.7kW/m2 consequence distance for a 50mm hole in each pipeline is, 85m for PL266 and 57m for PL81.

The VPA has agreed to apply Buffer Areas over the pipelines in the GAEP Plan to ensure Sensitive Land Use is not developed within these areas. If Sensitive Land Use must be positioned within these Buffer Areas, then the sensitive use developer will need to pay for concrete or HDPE slabbing over the APA pipelines (to APA design requirements and under APA permit to work process) where the Sensitive Land Use is proposed within 85m of PL266 pipeline or 57m of PL81 pipeline.

The SMS Workshop did not specifically apply an additional “Sensitive (S)” Secondary Location Class generally across the GAEP Plan because the actual location of a sensitive development is not known, consideration of Sensitive Use will be developed on a case by case basis when the land use is designed in the future.

Table 10, Pipeline Location Class Details

		Current Location Class		Proposed Location Class			
Pipeline	**Pipeline Licence**	**Primary Location Class**	**Secondary Location Class**	**Primary Location Class**	**Secondary Location Class**	**KP point (km)**	**Reason for change**
Brooklyn - Lara	PL266 (T112)	R1/R2	S (Near Service Centre) / C (Motorsport track) / I (Riordan Grain Services)	T1	I, Industrial C Motorsport track S (Near Service Stn and Childcare)	KP49255 to KP55285	New Industrial estate with service hubs (incl Childcare)
Brooklyn - Corio	PL81 (T24)	R1/R2	S (Near Service Centre) C (Motorsport track)	T1	I, Industrial C (Motorsport track) S (Near Service Stn and Childcare)	KP38320 to KP44690	New Industrial estate with service hubs (incl Childcare)

The workshop facilitator pre-populated an SMS Risk Register prior to the workshop using the threats listed in Appendix B as a guide when considering the Development. Forty Four (44) Threats were considered on the day of the Workshop.

The other Threats listed in Appendix B were either unaffected or irrelevant to the Development and not expected to change the frequency of these threats occurring.

The results of the Threats specifically considered can be summarised as follows: -

Table 11, Risk Assessment Summary

Pipeline	No. Threats	Threats		Threats requiring Risk Assessment	Risk Assessment		
		Non Credible	Credible		Negligible	Low	Intermediate
Brooklyn to Lara Pipeline	44	9	35	4	2	2	-
Brooklyn to Corio Pipeline	44	8	36	4	2	2	-

The workshop results were recorded in the minutes, provided in Appendix F.

14.1 Negligible Threats

14.1.1 Pipeline Dent or Gouge or Coating Damage

The threats leading to a dent or gouge, or coating damage were: -

- an excavator (Threat ID1) (PL266 & PL81),
- an Auger (Threat ID7) (PL266 & PL81)

The workshop considered Supply consequences only as it was not considered possible for people to be injured with this threat:

For coating damage or a gouge in the pipeline

- Loss of Supply consideration only: -
  - Consequence – Minor for the pipelines as it was agreed there would be an Interruption or restriction of supply, but shortfall met from other sources.
  - Likelihood - Remote, as pipeline impact is not anticipated because of procedures and highly controlled environment during works.

The risk was deemed NEGLIGIBLE.

14.2 Low Threats

The LOW risk assessments were related to two (2) threats.

14.2.1 Hole in the pipeline up to 50mm

The threat leading to a hole in the pipeline were: -

- an excavator (Threat ID2) (PL266 & PL81),
- an Auger (Threat ID8) (PL266 & PL81)

These threats could lead to a 50mm hole with an ML of up to 85m (PL266) and 57m (PL81), This threat is specifically for works post construction when the Development is populated.

The workshop considered both Safety and Supply considerations when making the assessment on the following basis:

- Loss of Supply consideration: -
  - Consequence - Severe - Localised societal impact or short-term supply interruption (hours).
- Safety consideration: -
  - Consequence – Major - potential work crew and public could be seriously injured or 1-2 fatalities.
- Likelihood of Failure: -
  - Likelihood - Hypothetical

The risk was found to be LOW and will continue to be monitored as a credible threat throughout the construction of the Development and the life of the pipeline.

14.3 Intermediate Threats

There were no Intermediate Threats identified at the SMS Workshop.

15. ALARP ASSESSMENTS

The SMS Workshop confirmed that no formal ALARP assessments were required given the current proposed change in land use.

As discussed in Sections 10, 11 and 12 above, the SMS Workshop has already identified that additional physical protection of the pipelines will be justified if any Sensitive Use is proposed within the consequence distances identified in Section 12.

16. DISCUSSION

The main issue raised at the SMS Workshop was associated with the potential introduction of any Sensitive Uses within the ML of the pipelines under review.

The VPA could not confirm exactly where the Sensitive uses may be placed. The two APA pipelines were both confirmed to be “No Rupture” for the known risks in the area, as such the only credible maximum loss of containment is from a 50mm hole. The relevant 4.7kW/m2 consequence distance for a 50mm hole in each pipeline is, 85m for PL266 and 57m for PL81.

The SMS Workshop did not specifically apply an additional “Sensitive (S)” Secondary Location Class generally across the GAEP Plan because the actual location of a sensitive development is not known, consideration of Sensitive Use will be developed on a case by case basis when the land use is designed in the future. If Sensitive Land Use must be positioned within these buffer areas, then the sensitive use developer will need to pay for concrete or HDPE slabbing over the APA pipelines (to APA design requirements and under APA permit to work process) where the Sensitive land use is proposed within 85m of PL266 pipeline or 57m of PL81 pipeline.

Post the SMS Workshop, the VPA agreed to apply buffers to the pipelines in the GAEP Plan (refer Fig 8, 9 & 10 below) to ensure Sensitive Land Use is not developed within these areas. Whilst these buffers are still in Draft form, they recognise the findings from the SMS Workshop (provided to the SMS Facilitator post the SMS Workshop) and have been included in the SMS Report to reflect the VPA’s intent to influence future Sensitive Land Use near the APA Pipelines as a result of the SMS process.

IMPORTANT NOTE

The following Plans are what were presented and assessed at the SMS Workshop. It is acknowledged that these plans were and continue to be under development by the VPA and will change over time whilst incorporating the requirements of the SMS Report. The plans shown are not to be relied upon for any future Development Applications. Future Development Applications will need to take account of the findings of the SMS Report and will need to present any future proposals to APA for their specific application

Figure 8, - Updated Overall GAEP Plan Showing Buffer Areas

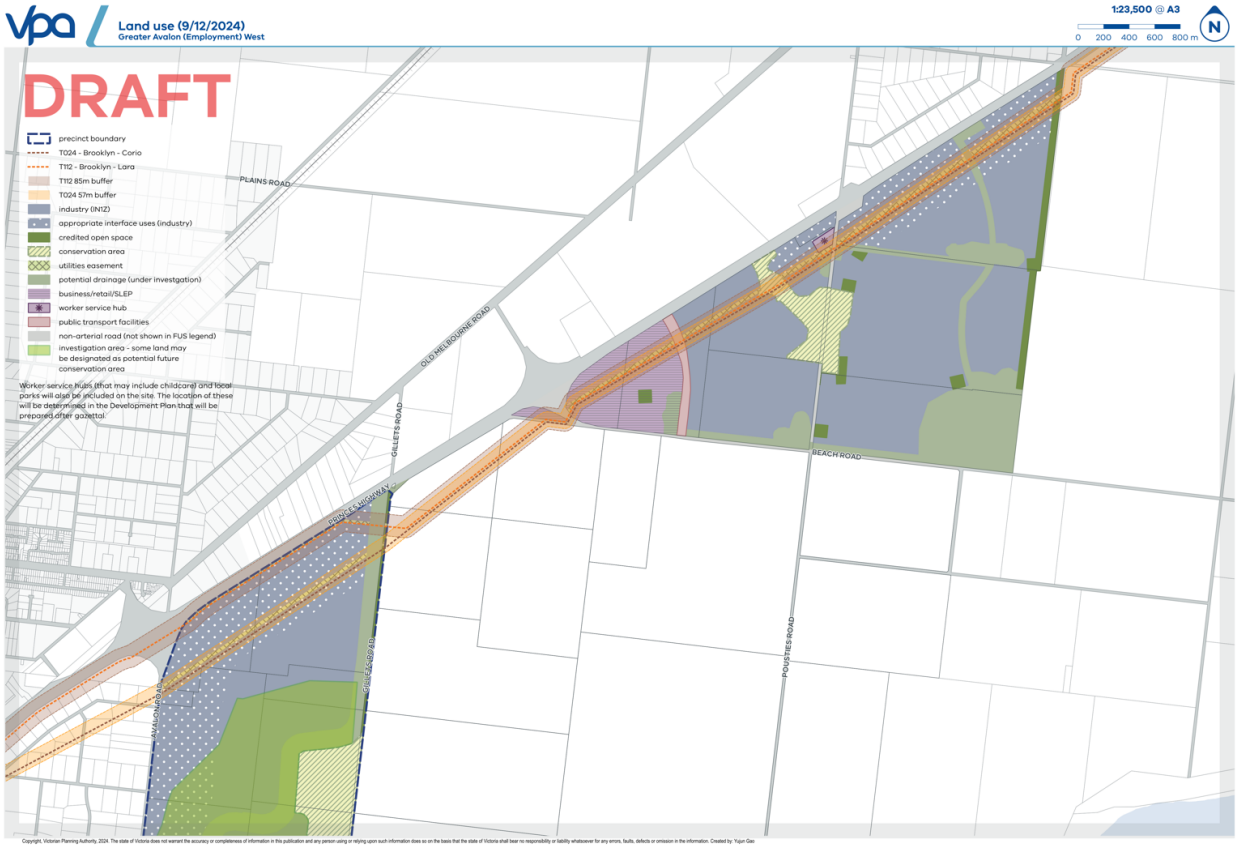


Figure 9, - Updated GAEP Plan West Showing Buffer Areas

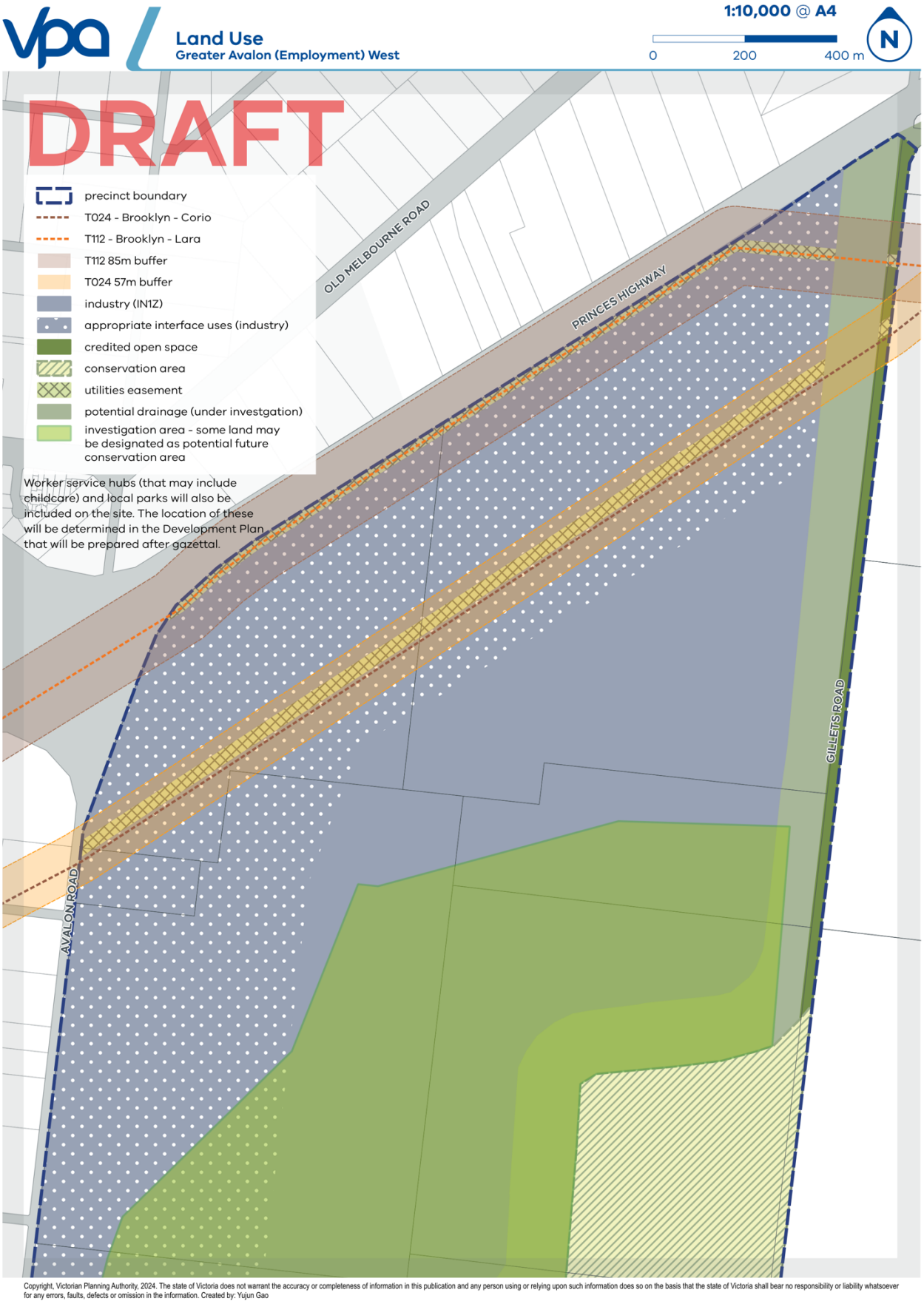
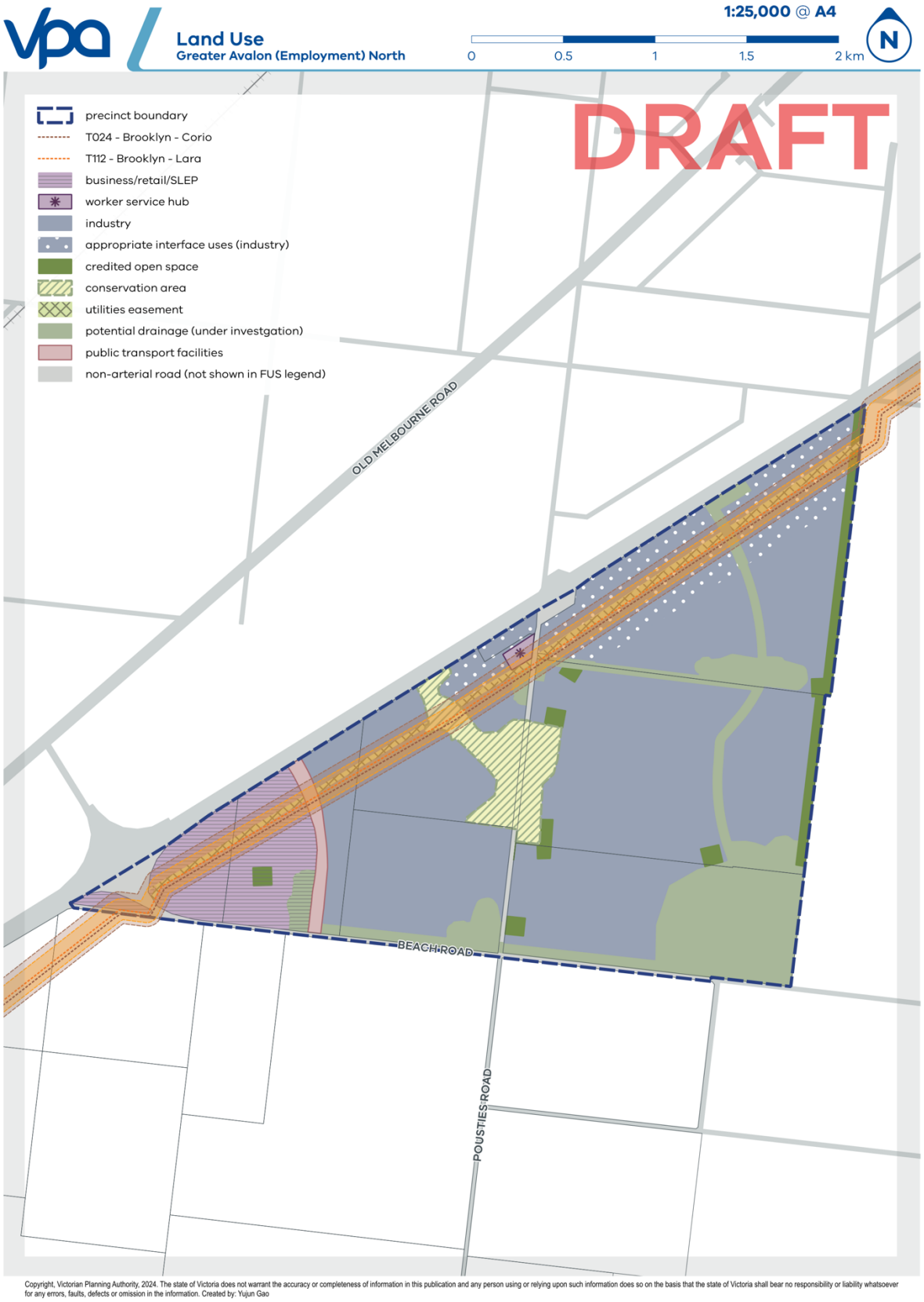


Figure 10, - Updated GAEP Plan North Showing Buffer Areas



17. ACTIONS

A total of 23 Actions were identified during the SMS Workshop and listed below. The Actions identify specific timelines upon which each Action needs to be closed out. The VPA, COGG, future Developers, their contractors, and APA will need to work together to ensure the Actions are closed out in a timely and complete manner.

APA will require all actions to be documented as they are closed out with a description of what actions were taken and any documented supporting evidence being a Plan, Calculation Updated Drawing etc. All close out material provided by the Actionee's are to be provided to APA's representative for review and acceptance as required.

Table 12, Miscellaneous Action List

Miscellaneous Actions				
No.	**Issue**	**Action**	**By**	**Due Date**
A1	Water joints over pipelines and easements could leak leading to loss of pipeline integrity.	Consider use of welded PE pipe over the easement as part of detailed design of relevant crossings	Developer	Prior to completion of Detailed Design
A2	Sensitive developments like schools, supermarkets, aged care, childcare could be positioned with the ML	VPA to seek to exclude Sensitive uses within 85m of the PL266 pipeline easement and 57m of PL81 pipeline easement. If this cannot be achieved, then seek APA approval.	Developer/ CoGG/ Responsible Authority for issuing planning permit	Prior to final development plan overlay (DPO) and Precinct Structure Plan (PSP)
A3	SMS Report does not inform Construction tender	VPA to ensure SMS Report and Minutes are included in planning scheme	VPA/COGG	Prior to final development plan overlay (DPO) and Precinct Structure Plan (PSP)
A4	Construction of the Development could damage the pipeline	Principal Contractor to prepare a Construction Management Plan, for review and acceptance by APA prior to any third party works. COGG to include as a condition of the Planning Permit	Developer/ APA/ COGG	Prior to construction
A5	Construction of the Development could damage the pipeline	Development design drawings need to be presented to APA for review and acceptance prior to any construction works.	Construction Contractor/ APA	Prior to construction
A6	Construction teams unaware of the risks of working around transmission pressure pipelines.	APA to arrange pipeline awareness session(s) with Construction Contractor (include in Contractor site induction, APA use a CodeSafe app for awareness videos)	Developer/ APA	Prior to Construction

Table 13, Threat Specific Action List

Threat Specific Actions					
No.	**Issue**	**Action**	**By**	**Due Date**	**Pipeline**
4	Pipe Damage resulting in a hole greater than 2/3rds critical defect length leading to rupture	Construction Management Plan (CMP) to clearly define pipeline easement exclusion zone (temporary fencing). APA is to be provided the CMP prior to works to confirm their risk of impact is addressed satisfactorily. Risk considered credible and controlled with existing and new mitigations. Excavators to only use General Purpose Teeth over the pipeline easement unless specifically agreed by APA. All works over the pipeline easement must be permitted and supervised by APA.	Developer/ APA	Prior to commencement of any works	PL266/ PL81
7	Auger impacts pipeline damaging the coating and denting or gouging the pipeline which could require reducing the MAOP or replacement of a section. Potential loss of supply.	1. Lighting design to be reviewed by APA. 2. If lighting needs to be included on the easement, then use of concrete slab footings for light poles (rather than augered footings) within the pipeline easement to mitigate need for Augering in these areas. APA to approve proposed lighting construction method in these areas. Developer to refer to "APA Site Planning + Landscape Guidelines" (refer APA Website).	Developer/ APA	Prior to completion of Detailed Design	PL266/ PL81
10	Damage to coating & or gouge to pipe requiring dig up and repair and temporary loss of supply.	All proposed DRAFT crossing designs of the pipeline easement are to be provided to APA for their review prior finalisation of design.	Developer/ APA	Prior to completion of Detailed Design	PL266/ PL81
16	Pipe impacted during utility installation resulting in damage or a hole causing loss of containment. Hole is less than critical defect length or max credible hole size (whichever is the smaller) Maximum credible hole size for a 20T excavator 50mm hole leading to a ML 57 to 85m.	1. Standard crossing designs to be applied to all new crossings including use of slabbing and marker tape to separate or protect the pipeline from third parties accessing their utilities. Developer to engage directly with APA to receive a copy of the relevant Standard Utility Crossing Dwgs. 2. Undertake coating inspection if utility is installed below pipeline and repair coating if necessary. Once likely crossing areas are known, Developer to engage with APA to undertake potholling to confirm pipeline Depth of Cover (DOC).	Developer/ APA	Prior to completion of Detailed Design	PL266/ PL81
20	Over stressing the pipe resulting in pipe deformation (out of round), which could require reducing the MAOP or replacement of a section to allow for future integrity works. Potential loss of supply.	1. Standard crossing designs to be applied to all new road crossings including use of concrete slabbing and marker tape to separate or protect the pipeline from third parties accessing their utilities. Developer to engage directly with APA to receive a copy of the relevant Standard Road Crossing Dwgs. 2. Undertake coating assessment on PL266 to determine if there are any coating defect and repair coating if necessary. 3. Once likely crossing areas are known, Developer to engage with APA to undertake potholling to confirm pipeline Depth of Cover (DOC). 4. Undertake re-coating of PL81 where pipeline is within the road reserve.	Developer/ APA	1/2/3 Prior to completion of Detailed Design 4. Prior to Construction	PL266/ PL81
21	Over stressing the pipe resulting in pipe deformation (out of round), which could require reducing the MAOP or replacement of a section to allow for future integrity works. Potential loss of supply.	Once likely crossing areas are known, Developer to engage with APA to undertake potholling to confirm pipeline Depth of Cover (DOC). Confirm DOC suitable for vehicle movement without damage to pipe or coating (refer API1104).	Developer/ APA	Prior to completion of Detailed Design	PL266/ PL81

Threat Specific Actions					
No.	**Issue**	**Action**	**By**	**Due Date**	**Pipeline**
22	Over stressing the pipe resulting in pipe deformation (out of round), which could require reducing the MAOP or replacement of a section to allow for future integrity works. Potential loss of supply.	CMP to include a vehicle movement plan and clearly identified temporary vehicle crossings of the easement. Refer APA Heavy Vehicle Crossing dwg.	Developer/ APA	Prior to commencement of any works	PL266/ PL81
24	Over stressing the pipe resulting in pipe deformation (out of round), which could require replacement of a section to allow for future integrity works. Coating could also be damaged. Potential loss of supply for perhaps up to a month.	Ensure the CMP includes the requirement for APA to review and approve any proposed crane lifting plans over the pipeline.	Developer/ APA	Prior to commencement of any works	PL266/ PL81
26	CP is damaged or compromised during works resulting in long term corrosion potential	Developer to work with APA to confirm location of CP infrastructure within the Development. CP infrastructure to be called out and protected in the CMP. Draft Electrical Design to be shared with APA for their review and acceptance. Developer to complete Electrical Hazard Assessment (AS4853) to be reviewed and accepted by APA (Avoid any paralleling of HV cables adjacent to the pipeline).	Developer/ APA	Prior to completion of Detailed Design	PL266/ PL81
28	Stormwater scour as a result of the design of the stormwater harvesting as part of the Development	Stormwater from easement to be able to pass from easement with the changes in topography due to the Development. APA to review design drawings. Catchment plans to be issued to APA for their review and acceptance.	Developer/ APA	Prior to completion of Detailed Design	PL266/ PL81
29	Potential localised corrosion resulting in reduced MAOP due to loss of wall thickness.	CMP to specifically require the use of static rollers only within 3m of the pipeline(s). Refer to APA Guidelines.	Developer/ APA	Prior to commencement of any works	PL266/ PL81
30	Pipe coating damaged if pipe trench left open during open cut crossing works	CMP to include bollarding or fencing to control this risk while pipeline excavation is open.	Developer/ APA	Prior to commencement of any works	PL266/ PL81
32	Pipeline damage leading to a LOC hole without any controls	CMP to specifically require the exclusion of any rock breaking activities over the easement without the express permission of APA.	Developer/ APA	Prior to commencement of any works	PL266/ PL81
33	Damage to pipe coating in process of locating pipe resulting in coating failure and possible corrosion to pipe.	1. Undertake potholing at locations of actual crossing points or earth works prior to completion of crossing designs. 2. Licensee permitting officer must be present during potholing. Licensee to provide potholing procedures.	Developer/ APA	Prior to completion of Detailed Design	PL266/ PL81
34	Ripping of trees where roots are in contact with pipe could damage coating, leading to corrosion damage and requiring repair.	If there is a requirement for removal of trees from the pipeline easement developer must engage with and seek approval from APA prior to any tree removal.	Developer/ APA	Prior to commencement of any works	PL266/ PL81
36	New building footing may present an additional stress to the pipeline, resulting in coating damage and eventual corrosion, leading to a leak.	Developer to consider appropriate physical or procedural controls such that future landowners will not be at risk of being undermined in the event of easement excavation where landholder boundaries are adjacent to the pipeline easement. Developer to engage directly with APA to agree building envelopes immediately adjacent to the pipeline easement.	Developer/ APA	Prior to completion of detailed design	PL266/ PL81
42	Blocking line of site between marker signs or roots damaging pipeline coating.	APA Easement Landscaping Guidelines to be incorporated into planning permit conditions.	VPA / COGG	Prior to issue of a planning permit and commencement of landscaping works	PL266/ PL81

18. CONCLUSION

A Safety Management Study (SMS) was undertaken to review whether the transmission pipelines under review can continue to operate and be maintained during the construction of the proposed Development and for the remaining life of the pipelines. The SMS sort to identify any actions, additional controls or protection measures are required to mitigate the risks associated with the Development as per the requirements of the Australian Standard AS 2885 for Transmission Pressure Gas Pipelines.

This report summarises the following aspects considered at the SMS:

- The nature of the pipeline in question
- The key land uses proposed by the Development that is located near the pipeline
- Review the Location Classification of the pipeline resulting from the Development
- Review AS 2885 requirements for the agreed Location Classification
- Threats requiring a Risk Assessment and the findings of those Assessments
- Actions required to ensure the ongoing safe operation and maintenance of the pipelines in compliance with AS2885
- Implications for preparing the Development for final design and tender.

The review was successfully carried out in accordance with the requirements of AS 2885.6 - 2018. The workshop was attended by key operations, maintenance, and engineering personnel. The study team comprised a broad cross-section of responsibility, knowledge and experience with the proposed Development and the affected Pipelines, and therefore possessed sufficient knowledge and experience to carry out an effective workshop review.

The SMS undertaken is considered to be a Land Use Change SMS.

Continuing liaison between the VPA, CoGG, future Developer and their Contractors along with APA should ensure that construction and post construction activities pose no significant increase in the operational and maintenance risk to the transmission pipeline and associated facilities effected by the Development.

Upon satisfactory close out of the actions raised from this SMS Workshop and completion of any relevant Project Lifecycle SMS studies (e.g. Pre- Construction) required under AS 2885.6-5.6, it can be confirmed that the requirements of AS 2885.6-2018 are met and that the APA assets under review will continue to be in compliance with the SMS requirements of AS 2885.6-2018 in the Development area.

APPENDIX A: Classification of Locations

In order to determine the location class, the Standard AS 2885 requires that the population, activities, and environment be assessed within a distance described as the "measurement length (ML)" from the centre of the pipeline. For gas pipelines in particular, where the most serious outcome is either injury or fatality due to radiation from an ignited gas leak, the measurement length is deliberately and conservatively defined in AS 2885.1, Cls 4.3.2 as the radius of the 4.7 kW/m2 radiation contour for an ignited full-bore rupture calculated in accordance with Clause 4.10. Clause 4.10 states that the calculation is to assume that the pipeline is at Maximum Allowable Operating Pressure (MAOP) at the time of release. A full-bore rupture is a hole which is equivalent to the diameter of the pipeline.

It is important to understand that the measurement length is used to define the corridor around the pipeline that must be considered to determine location classification, regardless of whether a full-bore rupture at MAOP is credible or not.

As is required by the Standard, consideration has been given to future development along the pipeline route both within and outside the pipeline measurement length when assessing the pipeline classification.

For any given location classification, AS 2885 defines minimum compliance requirements. As the consequence of a pipeline failure increases and location classification changes, the requirements of AS 2885 become more stringent. The various Location Classes under the Standard are outlined below.

AS 2885.6-2018 gives four primary location classes:

R1 - Rural - Land that is unused, undeveloped or is used for rural activities such as grazing, agriculture and horticulture. Rural applies where the population is distributed in isolated dwellings. Rural includes areas of land with public infrastructure serving the rural use (e.g. roads, railways, canals, utility easements).

R2 - Rural Residential - Land that meets any of the following criteria:

(i) Defined in a local land planning instrument as rural residential or its equivalent.

(ii) Occupied by single residence blocks typically in the range 1 ha to 5 ha.

(iii) Rural or semi-rural areas for which the number of dwellings within the MEASUREMENT LENGTH radius from any point on the pipeline does not exceed approximately 50.

Land used for other purposes but with similar population density shall be assigned rural residential LOCATION CLASS. Rural Residential includes areas of land with public infrastructure serving the rural residential use (e.g. roads, railways, canals, utility easements).

T1 - Residential - Land that is developed for community living or is defined in a local planning instrument as residential or its equivalent. Residential applies where multiple dwellings exist in proximity to each other and dwellings are served by common public utilities. Residential includes areas of land with public infrastructure serving the residential use, e.g. roads, railways, recreational areas, camping grounds/caravan parks, suburban parks, small strip shopping centres. Residential land use may include isolated higher density areas provided they are not more than 10% of the land use within a radius of one MEASUREMENT LENGTH at any point on the pipeline. Land used for other purposes but with similar population density shall be assigned Residential LOCATION CLASS.

T2 - High Density - Land that is developed for high density community use or is defined in a local planning instrument as high density or its equivalent. High Density applies where multi-storey development predominates or where large numbers of

people congregate in the normal use of the area.
High Density includes major sporting and cultural facilities, major retail and business centres (e.g. town centres, shopping malls, hotels and motels) and areas of public infrastructure serving the high-density use (e.g. roads, railways).
To assist in determining the LOCATION CLASS boundary between TI and T2, the T2 LOCATION CLASS contains more than approximately 50 dwellings per hectare.
NOTE: In Residential and High Density areas, the societal risk associated with loss of containment is a dominant consideration.

In addition, AS 2885.6-2018 gives six secondary location classes:

S – Sensitive Use: The sensitive use LOCATION CLASS identifies land where the consequences of a FAILURE EVENT may be increased because it is developed for use by sectors of the community who may be unable to protect themselves from the consequences of a pipeline FAILURE EVENT. Sensitive uses are specifically defined in some jurisdictions, but include schools, hospitals, aged care facilities and prisons. Sensitive use LOCATION CLASS shall be assigned to any section of the PIPELINE SYSTEM where there is a sensitive development within a MEASUREMENT LENGTH. The design requirements for High Density (T2) shall apply.
NOTE: In sensitive use areas, the societal risk associated with loss of containment is a dominant consideration.

E – Environmental: The Environmental LOCATION CLASS identifies locations of high environmental sensitivity to pipeline failure, including particularly areas where pipeline failure may impact on threatened ecological communities or species or where rectification of environmental damage may be difficult. Areas of high environmental sensitivity may be identified by analysis of government environmental mapping within the pipeline MEASUREMENT LENGTH and, where required, may be validated by field surveys conducted by COMPETENT persons. A consequence assessment shall be undertaken and depending on the assessed environmental severity the requirements of R2, TI or T2 shall be applied.

I – Industrial: The Industrial LOCATION CLASS identifies land that poses a different range of THREATS because it is developed for manufacturing, processing, maintenance, storage or similar activities or is defined in a local land planning instrument as intended for light or general industrial use. Industrial applies where development for factories, warehouses, retail sales of vehicles and plant predominates. Industrial includes areas of land with public infrastructure serving the industrial use.
The design requirements for Residential (TI) shall apply.
NOTE: In industrial use areas, the dominant consideration may be the THREATS associated with the land use, or the societal risk associated with the loss of containment.

HI – Heavy Industrial: Sites developed or zoned for use by heavy industry or for toxic industrial use shall be classified as Heavy Industrial. They shall be assessed individually to assess whether the industry or the surroundings include features that-
(i) contain unusual THREATS to the PIPELINE SYSTEM; or
(ii) contain features that may cause a pipeline FAILURE EVENT to escalate either in terms of fire, or for the potential release of toxic or flammable materials.
A consequence assessment shall be undertaken, and depending on the

assessed severity, the requirements of R2, TI or T2 shall be applied.

NOTE: In heavy industrial use areas, the dominant consideration may be the THREATS associated with the land use, or a range of location specific risks associated with the loss of containment.

CIC – Common Infrastructure Corridor: Land which, because of its function, results in multiple (more than one) parallel infrastructure development within a common easement or reserve, or in easements which partially or fully overlay the pipeline easement.

CIC classification includes pipelines within reserves or easements for roads, railways, powerlines, buried cables, or other pipelines. It does not include crossings, roads or tracks which are not gazetted, or where the pipeline is adjacent to but outside a road reserve.
AS/NZS 2885.1 addresses PROCEDURAL CONTROLS for CIC LOCATION CLASS.

NOTE: In CIC areas, the dominant consideration may be the THREATS associated with the land use by other infrastructure operators or the higher consequences of loss of containment associated with increased transient population (e.g. roads) or other parallel infrastructure.

C – Crowd: The crowd LOCATION CLASS shall be applied to locations where there may be crowds or congestion leading to concentrations of population that are both intermittent and much higher than typical for the prevailing primary LOCATION CLASS. Examples include sports fields, roads subject to serious traffic congestion, and rural community halls.
Where C LOCATION CLASS is assigned, the SMS shall examine risk to the concentration of people with consideration of the number of people, the frequency and duration of assembly, the time of day or week that people are present, and the likelihood that THREATS and the population concentration will occur at the same time. Controls appropriate to the level of risk shall be applied.

NOTE: In crowd areas, the societal risk associated with loss of containment is a dominant consideration. The risk level may vary considerably. For example, the SMS may conclude that a country playing field, which is only used on occasional Sundays, presents a much lower risk than a motorway that becomes highly congested twice every weekday, because of both the frequency of congestion and the likelihood (or otherwise) of concurrent THREATS.

APPENDIX B: Threats & Controls

Threat Identification Prompts

CATEGORY	THREAT
External Interference	Excavation - related to construction
	Excavation - without consent
	Excavation - private landowners post construction (e.g., ploughing, ripping, or trenching)
	Power augers and drilling
	Cable installation ripping & ploughing
	Pipeline access for maintenance activities
	Installation of posts or poles
	Land use development - pavement works, road surfacing &/or grading
	Land use development - landscaping
	Deep ploughing or drilling around pipeline (horizontal)
	Vehicle or vessel impact - during construction
	Vehicle or vessel impact - during ongoing use of the road
	Vehicle or vessel impact - rail
	Vehicle or vessel impact - aircraft crash
	Damage from bogged vehicles or plant
	External loads from backfill or traffic
	Blasting
	Blasting - seismic survey for mining using explosives
	Anchor dropping & dragging
	Other - soil testing with penetrometer
	Other - methane from contaminated land ignited by site works (e.g., welding)
	Other - creeping movement of slope (geotechnical risk)
	Other - loading from the buildings
	Other - Vibration due to piling
Corrosion	External corrosion or erosion due to environmental factors
	Internal corrosion due to contaminants
	Internal erosion
	Environmentally assisted cracking / stress corrosion cracking
	Bacterial corrosion
	Other - stray current corrosion
	Other - CP testing performed incorrectly and potential for corrosion.
	Other - low frequency induction from parallel HV power lines or earthing bed
Natural Events	Earthquake
	Ground movement - land subsidence, soil expansion / contraction
	Ground movement - land subsidence causing breakage of water
	pipelines in region of gas pipe
	Wind and cyclone
	Bushfires
	Lightning
	Flooding or inundation
	Erosion of cover or support
	Other – tsunami or volcanic eruption

CATEGORY	THREAT
Operations & Maintenance	Exceeding MAOP of pipeline
	Incorrect operation of pigging
	Incorrect valve operating sequence
	Incorrect operation of control & protective equipment
	Bypass of logic, control or protection equipment followed by incorrect manual operation
	Fatigue from pressure cycling
	Inadequate or incomplete maintenance procedures
	Maintenance actions contrary to procedures
	Incident due to inadequate, incorrect, or out of date operating or maintenance procedures
	Inadequate servicing of equipment
	Other - inaccurate test equipment, leading to incorrect settings
	Other - overpressure control system failure
	Other - pipe vibration (e.g., underground due to road works)
	Other - failure to adequately manage and implement changes to assets
	Other - incident caused due to project records, as built records and installed material records being lost, ignored, or not maintained
	Other - inaccurate measurement equipment or equipment not calibrated
	Other - inadequate emergency management
	Other - live welding
Design Defects	Incorrect material, component, and equipment characteristics
	Incorrect design or engineering analysis
	Failure to define correct range of operating conditions
	Failure of design configuration and equipment features to allow for safe operations & maintenance
	Other - design for corrosion
	Other - stresses in places that are not earth anchored areas
Material Defects	Incorrectly identified components
	Incorrect specification, supply, handling, storage, installation, or testing
	Under-strength pipe
	Manufacturing defect
	Lack of adequate inspection & test procedures
Construction Defects	Undetected of unreported damage to the pipe, coating, or equipment
	Undetected or unreported critical weld defects
	Failure to install the specified materials or equipment
	Failure to install equipment using the correct procedures or materials
	Failure to install equipment in accordance with the design
	Failure to install the pipeline in the specified location or manner
	Inadequate testing of materials for defects prior to handover
Intentional Damage	Sabotage / Terrorism / Malicious Damage / Vandalism
Other - environmental	Soil excavation
	Ground water and soil contamination from fuel and other chemicals used

	on site during construction
	Escape of liquid fuel to ground water and soil contamination

External Interference Protection – Physical Controls

CONTROL	METHODS	EXAMPLES
SEPARATION	BURIAL	
	EXCLUSION	FENCING
	BARRIER	BRIDGE CRASH BARRIERS
RESISTANCE TO PENETRATION	WALL THICKNESS -	
	BARRIER TO PENETRATION	CONCRETE SLABS CONCRETE ENCASEMENT CONCRETE COATING

External Interference Protection – Procedural Controls

CONTROL	METHODS	EXAMPLES
PIPELINE AWARENESS -	LANDOWNER	
	THIRD PARTY LIAISON	LIAISON PROGRAM INCLUDING ALL RELEVANT PARTIES
	COMMUNITY AWARENESS PROGRAM	
	ONE-CALL SERVICE	
	MARKING	SIGNAGE
		BURIED MARKER TAPE
	ACTIVITY AGREEMENTS WITH OTHER ENTITIES	
EXTERNAL INTERFERENCE DETECTION	PLANNING NOTIFICATION ZONES	PLANNING NOTIFICATION REQUIRE BY LAW
	PATROLLING	SYSTEMATIC PATROLLING OF THE PIPELINE
	REMOTE INTRUSION MONITORING	DETECTION AND ALARM BEFORE THE PIPELINE IS DAMAGED

APPENDIX C: AS 2885 Part6 Risk Assessment

The AS 2885 Risk Assessment we used to undertake any risk assessments is provided below

TABLE 3.1

SEVERITY CLASSES

Dimension	Severity class				
	Catastrophic	Major	Severe	Minor	Trivial
	Measures of severity				
People	Multiple fatalities result	One or two fatalities; or several people with life-threatening injuries	Injury or illness requiring hospital treatment	Injuries requiring first aid treatment	Minimal impact on health and safety
Supply (see Note)	Widespread or significant societal impact, such as complete loss of supply to a major city for an extended time (more than a few days)	Widespread societal impact such as loss of supply to a major city for a short time (hours to days) or to a localized area for a longer time	Localized societal impact or short-term supply interruption (hours)	Interruption or restriction of supply but shortfall met from other sources	No loss or restriction of pipeline supply
Environment	Impact widespread; viability of ecosystems or species affected; or permanent major changes	Major impact well outside PIPELINE CORRIDOR or site; or long-term severe effects; or rectification difficult	Localized impact, substantially rectified within a year or so	Impact very localized and very short-term (weeks), minimal rectification	No effect; or minor impact rectified rapidly (days) with negligible residual effect

NOTE: Appendix G provides guidance on assessment of consequence severities.

3.5.3 Frequency analysis

A frequency class shall be assigned to each FAILURE SCENARIO. The frequency class shall be selected from Table 3.2.

The contribution of existing controls to the prevention of failure shall be considered in assigning the frequency class.

NOTE: Appendix F provides guidance on estimating frequencies.

TABLE 3.2

FREQUENCY CLASSES

Frequency class	Frequency description
Frequent	Expected to occur once per year or more
Occasional	May occur occasionally in the life of the pipeline
Unlikely	Unlikely to occur within the life of the pipeline, but possible
Remote	Not anticipated for this pipeline at this location
Hypothetical	Theoretically possible but would only occur under extraordinary circumstances

3.5.4 Risk ranking

Table 3.3 shall be used to combine the results of the consequence analysis and the frequency analysis to determine the risk rank.

Use of the risk matrix in Table 3.3 is mandatory for SAFETY MANAGEMENT STUDIES in accordance with this Standard. Other methods such as a corporate risk matrix may be used only in parallel with Table 3.3 or as part of a separate corporate RISK ASSESSMENT.

TABLE 3.3

RISK MATRIX

	Catastrophic	Major	Severe	Minor	Trivial
Frequent	Extreme	Extreme	High	Intermediate	Low
Occasional	Extreme	High	Intermediate	Low	Low
Unlikely	High	High	Intermediate	Low	Negligible
Remote	High	Intermediate	Low	Negligible	Negligible
Hypothetical	Intermediate	Low	Negligible	Negligible	Negligible

NOTE: Comparative studies sponsored by the Energy Pipelines Cooperative Research Centre have shown that for risks ranked as Intermediate, Table 3.3 produces results consistent with both reliability-based analysis (in accordance with Annex O of CSA Z662-07) and quantitative risk assessment. Use of a different risk matrix or method that has not been similarly calibrated may produce invalid results.

3.6 RISK TREATMENT

3.6.1 General

Action to reduce risk shall be taken in accordance with Table 3.4, based on the risk rank determined from Table 3.3.

The action(s) taken and the planned effect on risk shall be documented.

3.6.2 Risk treatment during design

Risk treatment actions at design stage may include the following:

(a) Relocation of the pipeline route.

(b) Modification of the design for any one or more of the following:

  (i) PIPELINE SYSTEM isolation.

  (ii) PHYSICAL CONTROLS for prevention of external interference.

  (iii) PROCEDURAL CONTROLS for prevention of external interference.

  (iv) Corrosion prevention.

  (v) Operational controls.

TABLE 3.4

RISK TREATMENT ACTIONS

Risk rank	Required action
Extreme	Modify the THREAT, the frequency or the consequences so that the risk rank is reduced to Intermediate or lower. For an in-service pipeline, the risk shall be reduced immediately.
High	Modify the THREAT, the frequency or the consequences so that the risk rank is reduced to Intermediate or lower. For an in-service pipeline, the risk shall be reduced as soon as possible. Risk reduction should be completed within a timescale of not more than a few weeks.
Intermediate	Repeat THREAT identification and risk evaluation processes to verify the risk estimation; determine the accuracy and uncertainty of the estimation. Where the risk rank is confirmed to be "intermediate", where reasonably practicable modify the THREAT, the frequency or the consequence to reduce the risk rank to "low" or "negligible". Where it is not reasonably practicable to reduce the risk rank to "low" or "negligible", action shall be taken to— (a) remove THREATS, reduce frequencies and/or reduce severity of consequences to the extent practicable; and (b) formally demonstrate ALARP (see Section 4). For an in-service pipeline, the reduction to "low" or "negligible" or demonstration of ALARP shall be completed as soon as possible. Risk reduction or demonstration of ALARP should be completed within a few months.
Low	Determine the management plan for the THREAT to prevent occurrence and to monitor changes that could affect the classification.
Negligible	Review at the next relevant SMS (for periodic operational review, LAND USE CHANGE, ENCROACHMENT, or change of operating conditions).

3.6.3 Risk treatment during operation and maintenance

Risk treatment actions at operating pipeline stage may include one or more of the following:

(a) Installation of additional or modified PHYSICAL CONTROLS.

(b) Additional or modified PROCEDURAL CONTROLS.

(c) Specific actions in relation to identified activities (e.g. presence of operating personnel during activities on the easement).

(d) Modification to pipeline marking.

(e) Changes to the isolation plan.

(f) Changes to the PIPELINE SYSTEM design or operation to satisfy the requirements of this Standard when there is a change to the LOCATION CLASS of the pipeline.

(g) Specific operational or maintenance procedures.

(h) Repair, remediation or removal of a condition or DEFECT that presents a THREAT.

THREAT treatment for operating PIPELINE SYSTEMS should consider interim control measures (e.g. reduction in operating pressure, access restrictions) to allow time for the implementation of permanent control measures (e.g. repair).

APPENDIX D: Documents and References for Workshop

The documents referenced at the SMS workshop are listed below.

Table 14, Documents & References for Workshop

Document Name	Document Number	Included in Review
Greater Avalon Employment Precinct Plan	RFQ – Non Panel Trim Ref D/24/2080	Presented at SMS Workshop
Heat Radiation Release Calculation T112	N/A	Reviewed by DRMC
Heat Radiation Release Calculation T24	N/A	Reviewed by DRMC
Penetration Resistance Calculation T112(10200kPa)	N/A	Reviewed by DRMC
Penetration Resistance Calculation T24(5150kPa)	N/A	Reviewed by DRMC
Otway SMS Report - 20122021	320-RP-R-0013 Rev 1 signed	Reviewed by DRMC
SMS report VTS - Melbourne 2021	320-RP-AM-0237 Rev 1.0	Reviewed by DRMC
Alignment Plans	T112-26 / 27 / 28	Reviewed by DRMC
Alignment Plans	T24-20 / 21 / 22 / 23	Reviewed by DRMC

The Industry Standards referenced for this Workshop are listed below: -

- AS 2885.0 :2018 Gas and liquid petroleum General requirements
- AS/NZS 2885.1:2018 Gas and liquid petroleum Design & Construction
- AS2885.3 :2012 Gas and liquid petroleum Operations and Maintenance
- AS/NZS 2885.6:2018 Pipelines - Gas and liquid petroleum - Pipeline safety management

When conflict exists between the various applicable documents, the following order shall apply, in decreasing order of precedence. Where APA requirements are more stringent, they shall take precedence.

- Acts of law or other legislation
- Government licenses and permits
- APA Engineering Standards. This will be covered by documented practices and any specific inputs from Licensees risk assessments

APPENDIX E: SMS Technical Presentation

AS 2885.1 SMS Workshop
Greater Avalon Employment Precinct

Technical Information

November 2024

Facilitator:- Mark Harris
Delphi Risk Management Consulting
Ph 0438890968
markharris@delphirisk.com.au

AS 2885.1 SMS Workshop
Greater Avalon Employment Precinct

	Time	Agenda Items	Presenter
1	9am	Welcome	All
2	9:10am	Workshop Overview and Objectives	Facilitator
3	9:15am	Pipeline Design Review/ Operating Approach • Wall Thicknesses • Rupture and puncture • Radiation contours • Location Classes • Other relevant items	Facilitator/APA
4	9:30am	GAEP Review	VPA
5	10:00am	Non-Location Specific Threats Review	All
	•	• Review identified non-location specific threats – confirm or add as required • Review external interference controls applied and assess adequacy • Review design controls applied and assess adequacy	
6	10:30am	Morning Tea	
7	10:45am	Location Specific Threats /Site Water Management Review	MW
	•	• Review likely water management crossing the pipeline easement	
7	11:00am	Non-Location Specific Threats Review Cont.	All
8	12:30am	Lunch break	
9	1:00pm	Non-Location Specific Threats Review Cont.	All
10	1:30pm:	Review of Actions	All
	•	• Review the Actions identified through the Workshop.	
11	2:00pm	Workshop Close	

BROOKLYN to LARA Pipeline Licence No. PL266 (T112) – APA (Built 2008) Design Information

Substance conveyed	**Natural Gas**
Measurement Length (ML)	525m (4.7 kW/m2 Heat Radiation Zone)
	321 (12.6 kW/m2 Heat Radiation Zone)
Length of pipeline affected	~8160 m + 2 x 525m (Total 9210m approx.)
Pipeline section under review within PSP	~KP47125 to KP55285 (plus ML each end)
Outside Diameter	500 mm
Easement	20m
Wall Thickness	11.1mm WT
Depth Of Cover	1.05m to 1.8m
Pipe specification	GR.5L-X70 (coating FBE)
Max. Allowable Operating Pressure	10200 kPa (MAOP)
Location Class - Primary	R1/R2 (Existing) T1 (New)
Location Class - Secondary	C (KP50626-52320 - Dirt Track), S, I (New due GAEP proposed uses)
CDL	195.73 mm (@ 11.1mm WT) (2/3rds 130mm)
Credible Excavator Size in the area	20T with General Purpose Teeth & (Penetration/Tiger Teeth in Dev Areas)
Credible Hole Size from Excavator	50mm for an excavator 20T
Credible Hole Size from Auger	50mm
Hole size & ML based on 10GJ/s release rate	50mm
Hole size & ML based on 1GJ/s release rate	31
50mm Hole size & ML	85m (>10 GJ/s)
Credible hole (50mm) ML	85m for an Excavator

BROOKLYN to LARA Pipeline Licence No. PL266 (T112) – APA (Built 2008) Design Information

Credible Excavator Size	**20T typically with Std General Purpose Teeth or possibly Penetration or Tiger Teeth during major developments**
Max equipment sizes without risk of a leak(B Factor 1.3, 10.8mm WT)	
- Excavator with General Purpose Teeth	>55T
- Excavator with Tiger Teeth (Single Point Penetration)	25T
- Excavator with Twin Tiger Teeth (both Points Penetration)	>55T
- Excavator with Penetration Teeth	25T
Max equipment sizes without risk of a Rupture (B Factor 1.3, 10.8mm WT)	
- Excavator with General Purpose Teeth	>55T
- Excavator with Tiger Teeth (Single Point Penetration)	>55T
- Excavator with Twin Tiger Teeth (both Points Penetration)	>55T
- Excavator with Penetration Teeth	35T

APA BROOKLYN to CORIO Pipeline Licence No. PL81 (T24) – (Built 1971) Design Information

Substance conveyed	**Natural Gas**
Measurement Length (ML)	248m (4.7 kW/m2 Heat Radiation Zone) (Based on MOP)
	~152 (12.6 kW/m2 Heat Radiation Zone)
Length of pipeline affected	~8590m + 2 x 248m (Total ~9086m)
Pipeline section under review within PSP	~KP36100 to KP44690 (plus ML each end)
Outside Diameter	350 mm
Easement	20m
Wall Thickness	5.56mm WT
Depth Of Cover	0.9m to 1.2m
Pipe specification	GR.5L-X60 (coating Coal Tar Enamel)
Max. Allowable Operating Pressure	7390 kPa (MAOP) 5150 kPa (MOP)
Location Class - Primary	T1 (Was R1/R2)
Location Class - Secondary	I,C (existing) S (New)
CDL	154.20 mm (@ std 5.56mm WT) (2/3rds 102mm)
Credible Excavator Size in the area	20T with General Purpose Teeth & (Penetration/Tiger Teeth in Dev Areas)
Credible Hole Size from Excavator	50mm for an excavator 20T
Credible Hole Size from Auger	50mm
Hole size & ML based on 10GJ/s release rate	146mm
Hole size & ML based on 1GJ/s release rate	47mm
50mm Hole size & ML	57m (>10 GJ/s)
Credible hole (50mm) ML	57m for an Excavator

APA BROOKLYN to CORIO Pipeline Licence No. PL81 (T24) – (Built 1971) Design Information

Credible Excavator Size	**20T typically with Std General Purpose Teeth or possibly Penetration or Tiger Teeth during major developments (Based on MOP)**
Max equipment sizes without risk of a leak(B Factor 1.3, 10.8mm WT)	
- Excavator with General Purpose Teeth	>55T
- Excavator with Tiger Teeth (Single Point Penetration)	5T
- Excavator with Twin Tiger Teeth (both Points Penetration)	15T
- Excavator with Penetration Teeth	5T
Max equipment sizes without risk of a Rupture (B Factor 1.3, 10.8mm WT)	
- Excavator with General Purpose Teeth	>55T
- Excavator with Tiger Teeth (Single Point Penetration)	>55T
- Excavator with Twin Tiger Teeth (both Points Penetration)	25T
- Excavator with Penetration Teeth	25T

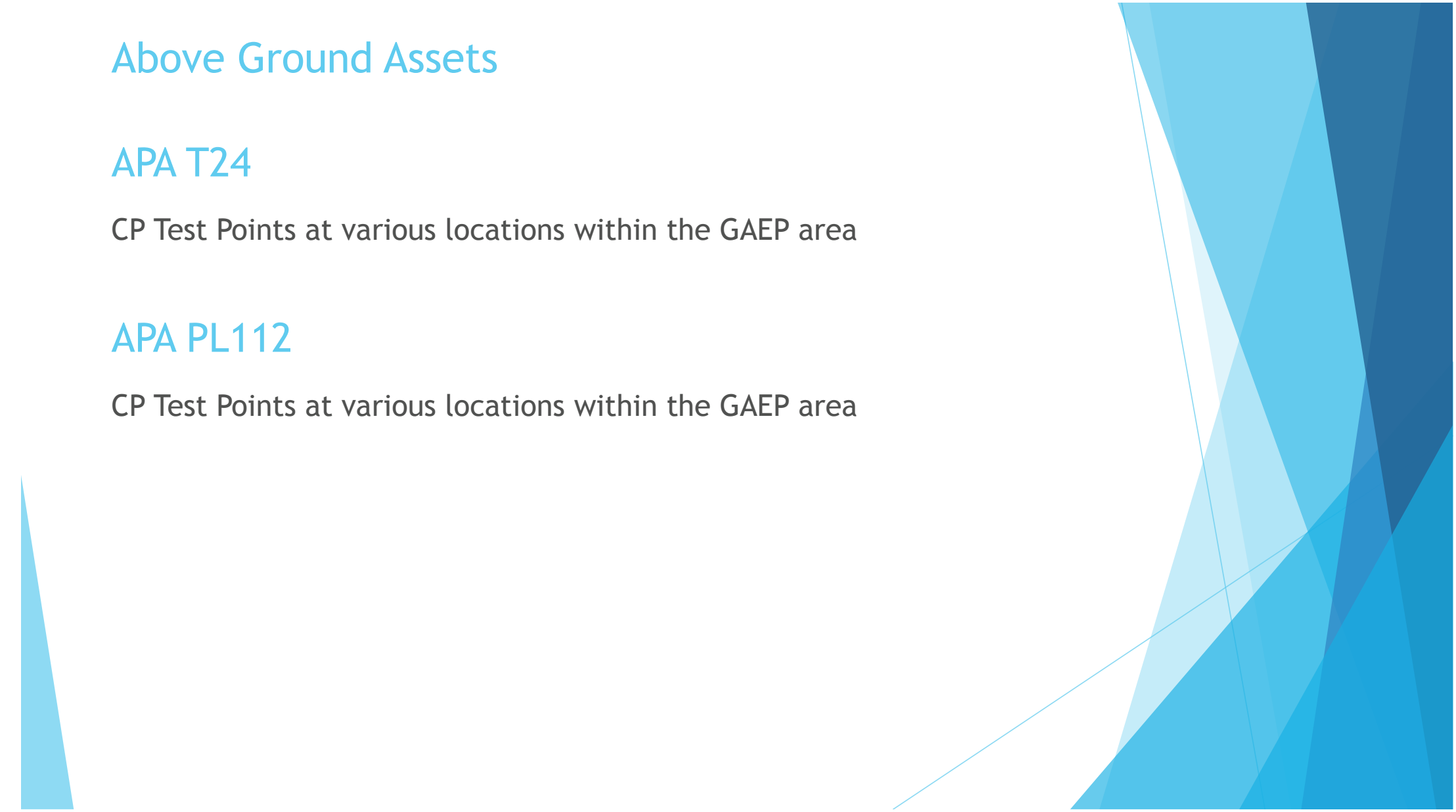
Above Ground Assets

APA T24

CP Test Points at various locations within the GAEP area

APA PL112

CP Test Points at various locations within the GAEP area



Generic Protections – By APA

Patrolling :
Ground patrol – Weekdays
Aerial patrol – Monthly

Liaison with land users – Walked annually including liaison with land users/owners
Marker signs, max. spacing
T1 100m T1/I 100m, T1/S 50m

Buried Marker Tape (300mm above pipe) – No PL81 (T24), Possibly for PL266 (T112)

Pipeline Awareness Programs, B.Y.D.A, Landholder Liaison

Typical Industry Depth Of Cover :
1.2 to 4m at roads, railways & creeks etc

Bollards and Fencing for above ground facilities

Land Use (both during Construction & Existing land use?)

Nominate in general the types of activities expected from land users over the length of the pipeline. (e.g. Farmers, Council, Constructors etc.)

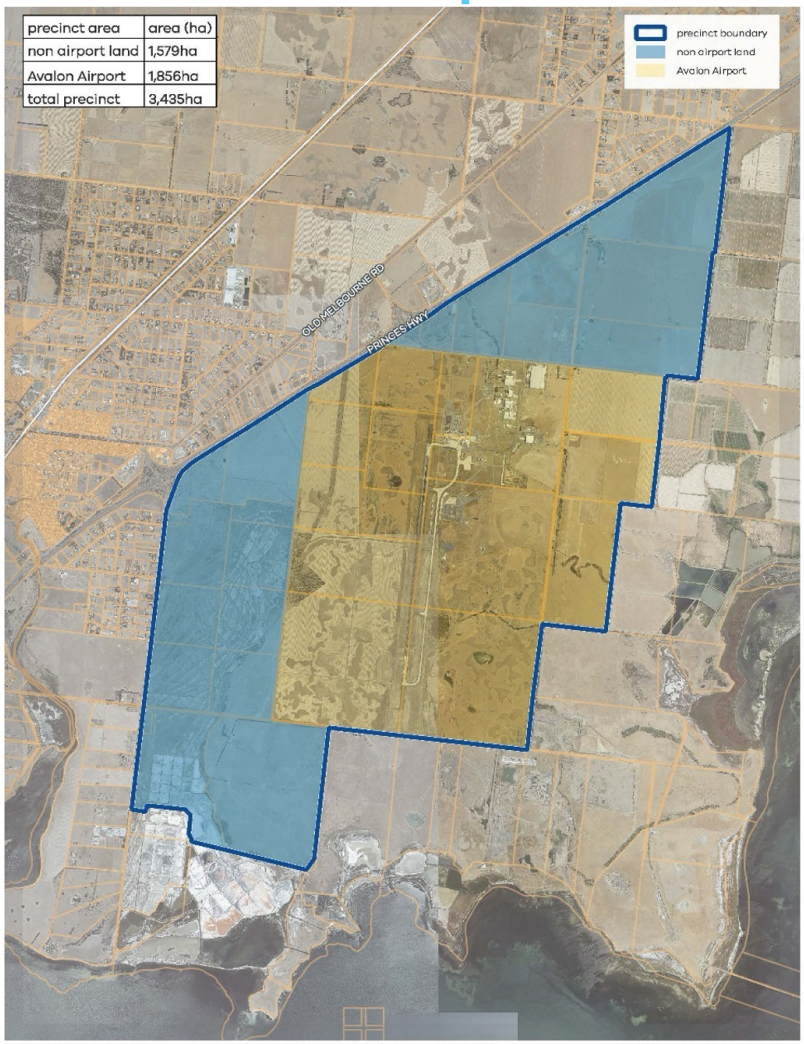
Existing Use:

- 20T excavator with GPT
- 20T excavator with TT/Pen Teeth
- 50mm hole by vertical auger
- 50mm hole by HDD

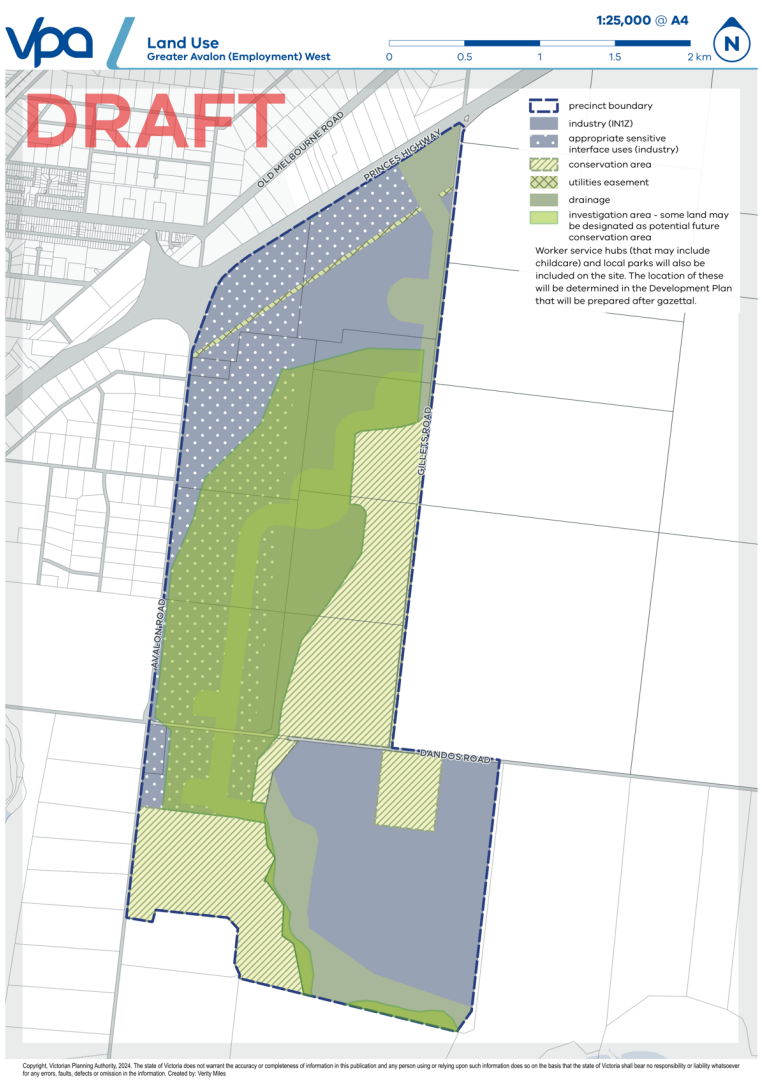
During Construction:

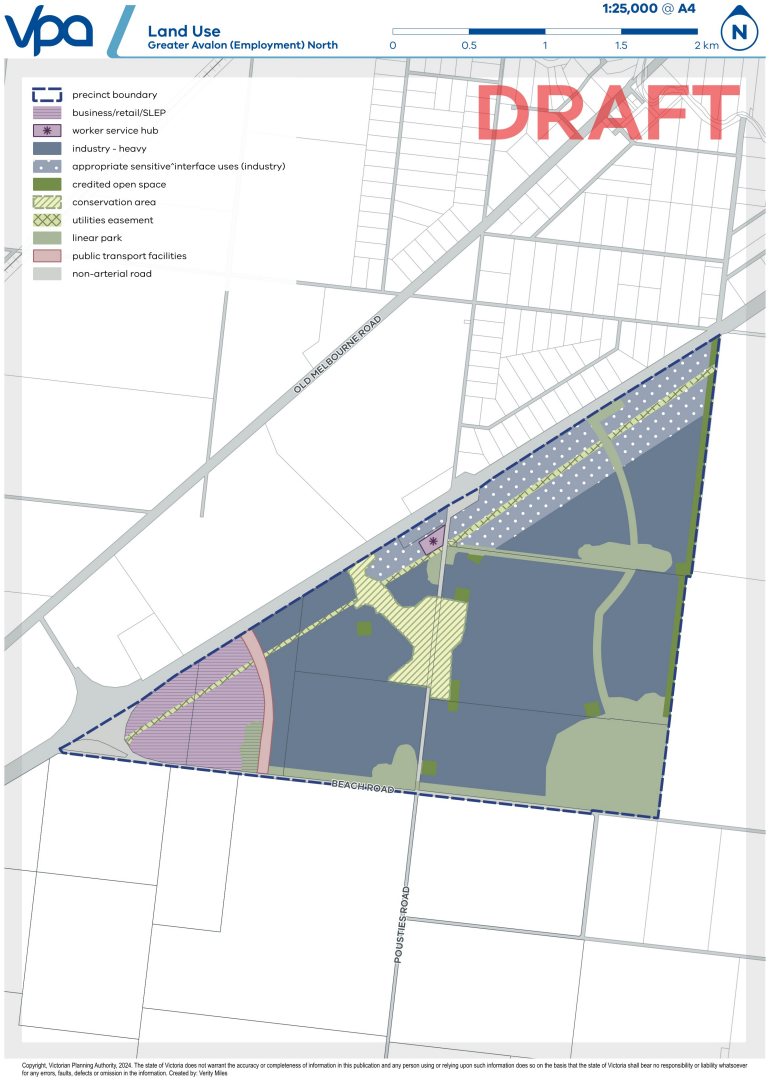
Water/Sewer Crossing Design	Yes
Boring and Open Cut	Yes
Blade Ploughing	Road Crossing Construction
Ripping	Possibly
Excavators	Yes - Size TBC
Bulldozers (use of Rippers)	Yes
Boring rigs (pole augers or HDD)	Yes TBC
Heavy Vehicles	Yes TBC
Sensitive Uses	Yes Childcare, location TBC

GAEP Development



GAEP Development





APPENDIX F: SMS Workshop Minutes

Greater Avalon Employment Precinct - Safety Management Study

Thursday, 7 November 2024

			Brooklyn to Lees Pipeline APA Lic 266 (T132) KP47125 to KP55285 (plus ML each end)	Brooklyn to Cons Pipeline APA Lic 81 (T24) KP36100 to KP44690 (incl ML each end)													
ThemID	Threats	Consequence	Credible Risk PL266 (Y/N)	Credible Risk PL81 (Y/N)	Reasons this threat is not a credible risk?	Physical Protection Measures	Procedural Protection Measures	Is Risk Mitigated as per AS2885? (If No then Risk Assess)	Comments	Frequency (AS2885.1 Table3.1)	Consequence (AS2885.1 Table3.2)	Pipeline Risk	Considerations which lead to assessment of Risk	Issue Arising	Actions	Responsibility	Due Date	Is Risk Mitigated as per AS2885?
1	**Excavator use over easement (Any size excavator)**	Damage to coating & or gouge to pipe requiring dig up and repair and temporary loss of supply.	Y	Y		Depth of Cover, WT	BYDA, Patrolling, PTW, signage	**No**		**Remote**	**Minor**	**Negligible**	Consequence - **Minor** as loss of supply can be made up from other sources; Likelihood - **Remote**, as pipeline impact is not anticipated because of procedures and location of pipeline easement.					**Yes**
2	**Excavator use over easement (up to 20T)**	Pipe Damage resulting in a hole causing loss of containment. Hole is less than critical defect length or max credible hole size (whichever is the smaller) 50mm hole leading to a ML 57-85m.	Y	Y	PL266 is not at risk of a hole due to design	Depth of Cover, WT	BYDA, Patrolling, PTW, signage	**No**		**Hypothetical**	**Major**	**Low**	Consequence - **Major** as potential work crew and/or onlookers could be seriously injured or killed (1-2 fatalities) (Supply consequence considered Severe not Major); Likelihood - **Hypothetical** as would only occur under extraordinary circumstances					**Yes**
3	**Excavator use over easement (up to 20T)**	Pipe Damage resulting in a hole causing loss of containment. Hole is greater than critical defect length leading to **rupture**	Y	Y	Pipelines cannot be ruptured by a 20T excavator with any type of teeth	Depth of Cover, WT	BYDA, Patrolling, PTW, signage	**Yes**										
4	**Excavator use over easement (>=20T) with penetration teeth**	Pipe Damage resulting in a hole greater than 2/3rds critical defect length leading to rupture	Y	Y	APA has confirmed that for these pipeline that rupture really isn't considered credible and that a hole is the worst case outcome	Depth of Cover, WT	BYDA, Patrolling, PTW, signage. During construction these activities will be highly controlled, appropriately managed	**Yes**							Construction Management Plan (CMP) to clearly define pipeline easement exclusion zone (temporary fencing). APA is to be provided the CMP prior to works to confirm their risk of impact is addressed satisfactorily. Risk considered credible and controlled with existing and new mitigations. Excavators to only use General Purpose Teeth over the pipeline easement unless specifically agreed by APA. All works over the pipeline easement must be permitted and supervised by APA.	Developer/APA	Prior to commencement of any works	**Yes**
5	**Boring and Driving of Piles for building footings**	Vibration from works damages the coating leading to corrosion and failure of the pipe	Y	Y		WT	BYDA, Patrolling, PTW, signage, Non-destructive digging, vibration monitoring	**Yes**	20mm/s is the acceptable limit for PL266 but 10mm/s PL81 measured at the pipeline						Assessment of potential activities which may require vibration monitoring, to be considered as part of APA's review of the CMP as part of Action 4			
6	**Boring and Driving of Piles for building footings**	Gouge to pipe or holing or rupturing the pipeline.	Y	Y		WT	BYDA, Patrolling, PTW, signage, Non-destructive digging.	**Yes**	(Easement will be fenced off during works to prevent uncontrolled piling on the easement Refer Action 4)									
7	**Augering of Piles for street light pole footings or fences**	Auger impacts pipeline damaging the coating and denting or gouging the pipeline which could require reducing the MAOP or replacement of a section. Potential loss of supply.	Y	Y		Depth of Cover, WT	BYDA, Patrolling, PTW, signage	**No**		**Remote**	**Minor**	**Negligible**	Consequence - **Minor** as loss of supply can be made up from other sources; Likelihood - **Remote**, as pipeline impact is not anticipated because of procedures and location of pipeline easement.		1. Lighting design to be reviewed by APA 2. If lighting needs to be included on the easement then use of concrete slab footings for light poles (rather than augered footings) within the pipeline easement to mitigate need for Augering in these areas. APA to approve proposed lighting construction method in these areas. Developer to refer to "APA Site Planning + Landscape Guidelines" (refer APA Website)	Developer/APA	Prior to completion of Detailed Design	**Yes**
8	**Augering of Piles for street light pole footings or fences**	Auger impacts pipeline causing a hole in the pipe (>50mm) which would require replacement of a section. Potential loss of supply and serious injury to auger operator if gas ignited (2% chance for a gas leak)	Y	Y		Depth of Cover, WT	BYDA, Patrolling, PTW, signage	**No**		**Hypothetical**	**Major**	**Low**	Consequence - **Major** as potential work crew and/or onlookers could be seriously injured or killed (1-2 fatalities) (Supply consequence considered Severe not Major); Likelihood - **Hypothetical** as would only occur under extraordinary circumstances					
9	**Augering of Piles for street light pole footings or fences**	Pipe Damage resulting in a hole causing loss of containment. Hole is greater than critical defect length leading to rupture	Y	Y	Augers have a 50mm drill bit on the tip and so the likely hole size from an auger is up to 50mm which is well below the CDL and so the pipeline cannot rupture from this threat	Depth of Cover, WT	BYDA, Patrolling, PTW, signage	**Yes**										
10	**Use of HDD to install Utilities across pipeline easement**	Damage to coating & or gouge to pipe requiring dig up and repair and temporary loss of supply.	Y	Y		WT	BYDA, Patrolling, PTW, signage + APA procedure for monitoring of HDD crossing including use of slit trenches to positively identify horizontal trenching	**Yes**							All proposed DRAFT crossing designs of the pipeline easement are to be provided to APA for their review prior finalisation of design	Developer/APA	Prior to completion of Detailed Design	**Yes**
11	**Use of HDD to install Utilities across pipeline easement**	Pipe Damage resulting in a hole causing loss of containment. Hole is less than critical defect length or max credible hole size assumed to be 50mm	Y	Y		WT	BYDA, Patrolling, PTW, signage + APA procedure for monitoring of HDD crossing including use of slit trenches to positively identify horizontal trenching	**Yes**										
12	**Use of HDD to install Utilities across pipeline easement**	Pipe Damage resulting in a hole causing loss of containment. Hole is greater than critical defect length leading to rupture	Y	Y		WT	BYDA, Patrolling, PTW, signage + APA procedure for monitoring of HDD crossing including use of slit trenches to positively identify horizontal trenching	**Yes**										
13	**Rail/Tram Crossing**	Over stressing the pipe resulting in pipe deformation (out of round), which could require reducing the MAOP or replacement of a section to allow for future integrity works. Potential loss of supply. Coating cracks leading to corrosion	N	N	No rail or trams in the development													
14	**Rail/Tram Crossing Perpendicular**	High voltage power associated with Tram may influence the CP of the pipeline.	N	N	No rail or trams in the development													
15	**Rail/Tram Crossing Parallel**	High voltage power associated with Tram may influence the CP of the pipeline.	N	N	No rail or trams in the development													
16	**Open cut Utilities installation (Water/Power/Comms) over or under the pipeline**	Pipe impacted during utility installation resulting in damage or a hole causing loss of containment. Hole is less than critical defect length or max credible hole size (whichever is the smaller). Maximum credible hole size for a 20T excavator 50mm hole leading to a ML 57 to 85m.	Y	Y		Depth of Cover, WT	BYDA, Patrolling, PTW, signage.	**Yes**	The PTW and BYDA are critical at installation as there is no additional stabbing protection.						1. Standard crossing designs to be applied to all new crossings including use of stabbing and marker tape to separate or protect the pipeline from third parties accessing their utilities. Developer to engage directly with APA to receive a copy of the relevant Standard Utility Crossing Dwgs. 2. Undertake coating inspection if utility is installed below pipeline and repair coating if necessary. Once likely crossing areas are known, Developer to engage with APA to undertake potholing to confirm pipeline Depth of Cover (DOC)	Developer/APA	Prior to completion of Detailed Design	**Yes**
17	**Open cut maintenance of Utilities (Water/Power/Comms) over pipeline**	Pipe impacted during utility installation resulting in damage or a hole causing loss of containment. Hole is less than critical defect length or max credible hole size (whichever is the smaller). Maximum credible hole size for a 20T excavator 50mm hole leading to a ML 57 to 85m.	Y	Y		Depth of Cover, WT, Stabbing	BYDA, Patrolling, PTW, signage, marker tape	**Yes**	Standard design has a stabbing and marker tape under the utility but over the pipeline stopping utility operator from impacting the pipeline whilst digging down to reach the utility									
18	**Open cut maintenance of Utilities (Water/Power/Comms) under pipeline**	Pipe impacted during utility installation resulting in damage or a hole causing loss of containment. Hole is less than critical defect length or max credible hole size (whichever is the smaller). Maximum credible hole size for a 20T excavator 50mm hole leading to a ML 57 to 85m.	Y	Y		Depth of Cover, WT, Stabbing	BYDA, Patrolling, PTW, signage	**Yes**	Standard design has a concrete slab and marker tape over the pipeline stopping utility operator from impacting the pipeline whilst digging down to reach the utility									
19	**Use of Bored or Jacked crossing to install Utilities under pipeline easement (e.g. Sewer pipe)**	Damage to coating, or gouge or a hole or rupture of the pipeline requiring dig up and repair and significant loss of supply.	Y	Y		WT	BYDA, Patrolling, PTW, signage + APA procedure for monitoring of bored or jack crossing including use of slit trenches to positively identify horizontal trenching	**Yes**	Setup for a Bored Crossing takes days by a highly experience contractor who will engage with APA									
20	**Road Crossing (road legal vehicles).**	Over stressing the pipe resulting in pipe deformation (out of round), which could require reducing the MAOP or replacement of a section to allow for future integrity works. Potential loss of supply.	Y	Y		Depth of Cover, WT	Patrolling, PTW + APA approval of design and the final Construction Management Plan	**Yes**							1. Standard crossing designs to be applied to all new road crossings including use of concrete stabbing and marker tape to separate or protect the pipeline from third parties accessing their utilities. Developer to engage directly with APA to receive a copy of the relevant Standard Road Crossing Dwgs. 2. Undertake coating assessment on PL266 to determine if there are any coating defect and repair coating if necessary. 3. Once likely crossing areas are known, Developer to engage with APA to undertake potholing to confirm pipeline Depth of Cover (DOC) 4. Undertake re-coating of PL81 where pipeline is within the road reserve	Developer/APA	1&3 Prior to completion of Detailed Design 4. Prior to Construction	**Yes**
21	**Carpark over pipeline (road legal vehicles).**	Over stressing the pipe resulting in pipe deformation (out of round), which could require reducing the MAOP or replacement of a section to allow for future integrity works. Potential loss of supply.	Y	Y		Depth of Cover, WT	Patrolling, PTW + APA approval of design and the final Construction Management Plan	**Yes**							1. Once likely crossing areas are known, Developer to engage with APA to undertake potholing to confirm pipeline Depth of Cover (DOC). Confirm DOC suitable for carpark without damage to pipe or coating (refer API 1104)	Developer/APA	1. Prior to completion of Detailed Design	**Yes**
22	**Heavy vehicle access track to works (non road legal vehicles).**	Over stressing the pipe resulting in pipe deformation (out of round), which could require reducing the MAOP or replacement of a section to allow for future integrity works. Potential loss of supply.	Y	Y		Depth of Cover, WT	Patrolling, PTW + APA approval of design and the final Construction Management Plan	**Yes**							CMP to include a vehicle movement plan and clearly identified temporary vehicle crossings of the easement. Refer APA Heavy Vehicle Crossing dwg	Developer/APA	Prior to commencement of any works	**Yes**
23	**Increased DOC due to landscaping or pavement build-up or placement of Spoil?**	Over stressing the pipe resulting in pipe deformation (out of round), which could require reducing the MAOP or replacement of a section to allow for future integrity works. Potential loss of supply.	Y	Y		Depth of Cover, WT	Patrolling, PTW + APA approval of design and the final Construction Management Plan	**Yes**										
24	**Heavy lift cranes straddling pipeline. Use of tower crane on roadway near or over pipeline**	Over stressing the pipe resulting in pipe deformation (out of round), which could require replacement of a section to allow for future integrity works. Coating could also be damaged. Potential loss of supply for perhaps up to a month.	Y	Y		Depth of Cover, WT	Patrolling, PTW + APA approval of the Construction Management Plan and Lifting Plan	**Yes**							Ensure the CMP includes the requirement for APA to review and approve any proposed crane lifting plans over the pipeline.	Developer/APA	Prior to commencement of any works	**Yes**
25	**Crane heavy lift over easement**	Heavy components falls on the easement resulting in localised overstressing or damage of coating	Y	Y		Depth of Cover, WT	Patrolling, PTW + APA approval of the Construction Management Plan and Lifting Plan	**Yes**										
26	**CP interference from adjacent, parallel infrastructure or construction works.**	CP is damaged or compromised during works resulting in long term corrosion potential	Y	Y		TBC	CP/AC inspected monthly, CP test points checked 6 monthly.	**Yes**							Developer to work with APA to confirm location of CP infrastructure within the Development. CP infrastructure to be called out and protected in the CMP. Draft Electrical Design to be shared with APA for their review and acceptance. Developer to complete Electrical Hazard Assessment (AS4853) to be reviewed and accepted by APA (Avoid any paralleling of HV cables adjacent to the pipeline.)	Developer/APA	Prior to completion of Detailed Design	**Yes**
27	**Pipeline equipment exposed during crossing works potentially being inundated with stormwater compromising its operation.**	Pipe coating damaged if pipe trench left open during open cut crossing works	Y	Y		WT	BYDA, Patrolling, PTW	**Yes**	Steel plate or fencing and possible wool blankets to manage brittle fracture required as part of PTW									
28	**Natural Events - Floods (Erosion, Impact damage) Scouring of pipe trench, change in watercourse conditions during or after works.**	Stormwater occur as a result of the design of the stormwater harvesting as part of the Development	Y	Y		Depth of Cover, WT, Road coverage	Patrolling, APA review of Development Stormwater design	**Yes**							Stormwater from easement to be able to pass from assessment with the changes in topography due to the Development. APA to review design drawings. Catchment plans to be issued to APA for their review and acceptance	Developer/APA	Prior to completion of Detailed Design	**Yes**
29	**Vibration during construction (heavy vehicle movement/pile boring/excavation, demolition) causes stress on buried pipeline and possible damage to coating**	Potential localised corrosion resulting in reduced MAOP due to loss of wall thickness.	Y	Y		Depth of Cover, WT FBE coating more resistant to vibration risk	Patrolling, PTW + APA approval of the Construction Management Plan including limiting vibration	**Yes**							CMP to specifically require the use of static rollers only within 3m of the pipeline(s). Refer to APA Guidelines	Developer/APA	Prior to commencement of any works	**Yes**
30	**Threat - Vehicle collision with exposed pipeline during construction activities resulting in pipeline dent or gouge.**	Pipe coating damaged if pipe trench left open during open cut crossing works	Y	Y		WT, steel plate and or security fence	BYDA, Patrolling, PTW	**Yes**							CMP to include bollarding or fencing to control this risk while pipeline excavation is open	Developer/APA	Prior to commencement of any works	**Yes**
31	**Blasting.**	Uncontrolled blasting creates damage to coating and potential over stressing of the pipeline. Leading to loss of containment	N	N	No Blasting required													
32	**Rock breaking/ Rock saw/Hammer**	Pipeline damage leading to a LOC hole without any controls	N	N		WT Use of temporary fencing to prevent uncontrolled works over easement	Patrolling, PTW + APA approval of the Construction Management Plan including limiting rock breaking activities around pipeline easement	**Yes**							CMP to specifically require the exclusion of any rock breaking activities over the easement without the express permission of APA	Developer/APA	Prior to commencement of any works	**Yes**
33	**Potholing to locate pipe.**	Damage to pipe coating in process of locating pipe resulting in coating failure and possible corrosion to pipe.	Y	Y		WT	APA's approved potholing procedure.	**Yes**							1. Undertake potholing at locations of actual crossing points or earth works prior to completion of crossing designs. 2. Licensee permitting officer must be present during potholing. Licensee to provide potholing procedures	Developer/APA	Prior to completion of Detailed Design	**Yes**
34	**Tree removal adjacent to the pipeline.**	Ripping of trees where roots are in contact with pipe could damage coating, leading to corrosion damage and requiring repair.	Y	Y		Depth of Cover, WT	Patrolling + no ripping of trees on the easement	**Yes**							If there is a requirement for removal of trees from the pipeline easement developer must engage with and seek approval from APA prior to any tree removal	Developer/APA	Prior to commencement of any works	**Yes**
35	**Maintenance - Inadequate servicing of equipment**	APA cannot access assessment/entering the site to treat development	Y	Y		Seperation (Fencing)	Patrolling, PTW	**Yes**	Easement is generally accessible									
36	**Threat - New building footings located on edge of easement**	New building footing may present an additional stress to the pipeline, resulting in coating damage and eventual corrosion, leading to a leak.	Y	Y		Depth of Cover, WT	Patrolling, PTW + APA approval of the Construction Management Plan	**Yes**							Developer to consider appropriate physical or procedural controls such that future land owners will not be at risk of being undermined in the event of easement excavation where landholder boundaries are adjacent to the pipeline easement. Developer to engage directly with APA to agree building envelopes immediately adjacent to the pipeline easement.	Developer/ APA	Prior to completion of detailed design	**Yes**
37	**Intentional Damage - Sabotage, Terrorism or Malicious Damage**	coating damage or loss of containment	Y	Y		Depth of Cover, WT	Patrolling + additional population provides passive surveillance	**Yes**	No significant change from current risk level as a result of the Development									
38	**Threat - Deep ripping activities impacts the pipe and causes a loss of containment - leak but not rupture Ripping to 600mm**	Pipeline damage, leak or rupture	Y	Y		Depth of Cover (pipeline min DOC 1.2m), WT, Temporary fencing included in CMP	Patrolling, PTW + APA approval of the Construction Management Plan	**Yes**										
39	**Noise from the City Gate causes complains to APA and potential impact to normal operation**	Cannot operate the facility	N	N	No City Gates in the area													
40	**Odour from City Gate causes complaints to APA and potential impact to normal operation**	Cannot operate the facility	N	N	No City Gates in the area													
41	**Flammable gas plume from City Gate impinges nearest residents or nearest ignition source.**	Prevents normal venting operations from the City gate	N	N	No City Gates in the area													
42	**Inappropriate choice of vegetation within easement**	Blocking line of site between marker signs or roots damaging pipeline coating.	Y	Y			Patrolling, PTW	**Yes**							APA Easement Landscaping Guidelines to be incorporated into planning permit conditions.	VPA / COGG	Prior to issue of a planning permit or commencement of landscaping works	**Yes**
43	**Pipeline CTE coating contains asbestos**	Inspecting coating could release asbestos fibres putting health at risk.	N	Y	CTE only present on PL81	Separation	BYDA, Patrolling, PTW	**Yes**										
44	**Deep Excavation adjacent to pipeline easement**	Undermines or loosens soil around pipeline disturbing (potentially damaging) coating and or stressing the pipeline under its own weight as it is no longer supported	Y	Y		WT/Separation (at least 6m from edge of easement)	BYDA, Patrolling, PTW	**Yes**							Refer to Action ID36 above			