PROCEDURE

APA Group

MAN-368

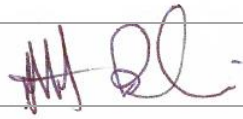
APA Victoria Transmission ESV Safety Case

NOTE:
Refer to the National ER&S Plan 320-PL-ER-0001 in the event of an emergency incident.
EME-020 VTS ER Manual has been archived.
Updated MAN-368 ESV Safety Case reflects this change and is with ESV for review.

Version: 16.1 Issued: 4/12/2014

DOCUMENT CONTROL

Approval

Summary of Changes	Full review of emergency plan and update to reflect site requirements, check attachments.	
Custodian	Albert Brovedani, Technical Regulations Manager, Infrastructure	
Reviewed	Craig Bonar, Manager East Coast Grid Engineering, Infrastructure Strategy & Engineering	
Approved	Kerryanne Mallitt, General Manager Transmission Operations	

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Responsibility

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Table of Contents

1 INTRODUCTION

Under the Gas Safety (Safety Case) Regulations 2008 the Safety Case is a document describing in detail the operating and management practices adopted by a business that seeks to minimise to *"as low as reasonably practicable" (ALARP)*, the non-commercial risks and hazards arising from the operation of the business.

2 DOCUMENT SCOPE

This Policy specifies the documents, which comprise the Safety Case for the licenced pipelines which are collectively known as the Victorian Transmission System (VTS), as accepted by the Energy Safe Victoria in accordance with the Gas Safety Act 1997.

Also identified is the person responsible for the operation of the facility, the person responsible for the Safety Case and the address where the records are kept.

APA GasNet will not commission or operate a facility without an accepted Safety Case in place, and shall at all times comply with the accepted Safety Case.

The Safety Case is revised once every five years, or upon changes to the facilities which would initiate a change in risk profile, and APA shall submit any Safety Case revision to Energy Safe Victoria.

3 RESPONSIBILITY OF ASSET

The title of the position and the name and business address of the person who has management of the facility and is responsible for its safe operation is:

Mick McCormack
Managing Director
APA Group,
Level 19, HSBC Building
580 George St,
Sydney 2000

4 RESPONSIBILITY OF SAFETY CASE

The person who is responsible for the preparation and submission of this safety case is:

Albert Brovedani
Technical Regulations Manager
APA Group, 180 Greens Rd
Dandenong South, Victoria, 3175
Email: Albert.Brovedani@apa.com.au

5 RECORDS STORAGE

All records related to this Safety Case are kept at:

APA Group, Dandenong Office
180 Greens Road
Dandenong South, VIC 3175
Custodian: Albert Brovedani, Technical Regulations Manager

Email: Albert.Brovedani@apa.com.au

6 FACILITY DESCRIPTION

A detailed description of the structure, assets, function and operation of the pipeline system to which the APA-VT ESV Safety Case applies is specified in MAN-368-ATT01.

The description contains sufficient information to enable the extent and scope of the system, its operations and associated risks to be assessed.

7 PIPELINE SAFETY MANAGEMENT STUDY & FORMAL SAFETY ASSESSMENT

APA GasNet conducts a Pipeline Safety Management Study (SMS) on the VTS in accordance with AS 2885.1 as a minimum once every five years, or as specific changes require a review.

The SMS is a major source of assessing risks to the pipeline and forms the basis for resourcing requirements, protection measures and many of the systems and operational procedures that apply to safe operation of the VTS. This is further described in *MAN-107 "APA VT Safety Management Manual*" and the most recent SMS report is included as an attachment to this Safety Case.

A Formal Safety Assessment of pipeline operational activities is also undertaken and is specified in *MAN-368-ATT02 "Formal Safety Assessment"*.

The assessment is consistent with the Facility Description and provides the following:

a) A description of the methodology used and the investigations undertaken for the formal safety assessment; and
b) An identification of all hazards having the potential to cause a gas incident; and
c) A detailed and systematic assessment of risk, including the likelihood and consequences of a gas incident; and
d) A description of technical and other measures undertaken, or to be undertaken, to reduce that risk to ALARP.

Results of the SMS are considered when performing the Formal Safety Assessment, with particular focus on "intermediate" risks from the SMS, and also including a review of incidents over the previous 5 years.

Whilst there is a focus on achieving ALARP on the VTS at all times, APA also develops Asset Management Plans which seek to ensure the integrity of the pipeline and mechanical maintenance of facilities are reliable and to a standard that prevents potential gas incidents identified through the SMS and Formal Safety Assessment.

The Pipeline Integrity Management Plan (PIMP) details the specific activities undertaken to ensure integrity issues are dealt with in a systemic manner based upon various data and risk identification sources. The PIMP is submitted as part of the Safety Case and is specified in document 320-PL-AM-0006.

8 SAFETY MANAGEMENT SYSTEM

The safety management system to be followed in relation to the facility is specified in MAN-107 "Safety Management System".

9 ENVIRONMENTAL MANAGEMENT PLAN

Environmental issues and the protection to the environment from the impact of APA GasNet activities is governed by the Environment Management Plan (EMP) and a set of Environmental procedures and work instructions.

The EMP outlines the environmental management requirements and site specific information required to manage and minimise the potential environmental risks from pipeline operations and maintenance activities associated to the VTS. The EMP is prepared in accordance with Division 3 Section 133 of the Pipelines Act (Victoria) 2005 and Part 7 Section 36 of the Pipelines Regulations (Victoria) 2007.

The EMP was published on the 24th July 2013 and is reviewed once every five years.

The overall purpose of the EMP is to demonstrate how pipeline operations interact with the environment and how consequential environmental risks are reduced to ALARP by:

- Providing information on the environment in which pipeline operations are taking place;
- Identifying environmental risks associated with pipeline operations and their potential consequences;
- Identifying environmental objectives and performance criteria for the VTS;
- Describing the management implementation plan to identify, assess and control environmental risks;
- Defining requirements for environmental reporting to statutory bodies; and
- Describing the program for monitoring and auditing of environmental risks and effects.

APA GasNet also maintains an Environmental Risk Register which is attached to the VTS Safety Case as document number being; MAN-368-ATT03.

10 DOCUMENT MANAGEMENT

All documentation, asset records, MDR's and drawings, including the entire Safety Case and all superseded versions will be securely stored or archived in accordance with APA Group's Document Management Systems' Policy. In some cases, these documents and/or records will be archived for least seven (7) years or as required, for the lifetime of the asset.

"Documentation" also includes all gas incident reports and analysis for the asset/facility; SMS reviews, calibration and repair records and all relative training records.

The records required to be kept under sub-regulation (1) Gas Safety (Safety Case) Regulation 2008-SCT 37 are:

a) the accepted safety case;
b) any revisions of the accepted safety case;
c) any written audit reports of the accepted safety case;
d) any reports of investigations by the gas company of gas incidents;
e) a copy of each report given by the gas company to Energy Safe Victoria.

11 ATTACHMENTS

Reference	Title / Description
MAN-368-ATT01	Facility Description
MAN-368-ATT02	Formal Safety Assessment
MAN-368-ATT03	Environmental Risk Register
MAN-107	(APA VT) Safety Management System
320-PL-AM-0006	VTS Pipeline Integrity Management Plan
320-PL-AM-0008	Asset Management Plan

12 DEFINITIONS / ABBREVIATIONS

Abbreviation	Description
ALARP	As Low as Reasonably Practicable
APA Group	Asset owner
APA VTS	APA Victoria Transmission
EMP	Environment Management Plan
ESV	Energy Safe Victoria
MDR	Manufacturers Data Records
PIMP	Pipeline Integrity Management Plan
SMS	Safety Management Study
VTS	Victorian Transmission System

13 REFERENCES

Title
Gas Safety Act 1997
Gas Safety (Safety Case) Regulations 2008

14 REVISION HISTORY

Revision	Date	Amendment	Author
0.1	20.4.98	Draft issue	B. W.

Revision	Date	Amendment	Author
1.0	22.4.98	Initial issue	B. W.
2.0	29.4.98	EME 020 added	B. W.
3.0	21.5.98	Forward by Chairman included	B. W.
4.0	19.8.98	Revised procedure MAN 369 identified	M.M.
5.0	14.9.98	Scope amended, Appendices A and B added	B. W.
6.0	18.6.99	Converted from TPA to GPU GasNet document Appendix C added	B. W.
7.0	12.7.99	Appendix A - Safety Case Forward - resigned	M. M.
8.0	18.11.99	Personal responsibility for the Safety Case amended	B. W.
9.0	09.02.00	Personal responsibility for the Safety Case amended	M.M.
10.0	24.05.02	Changed name to GasNet and heading to OGS Safety Case	B.A.
11.0	29.08.03	Revision of Safety Case	M. Snell
12.0	30.05.05	Change Responsibilities to positions	M. Snell
13.0	19.12.08	Revision of Safety Case	M. Snell
14.0	29.05.09	Revised to meet requirements of 2008 Regulations	M. Snell
15.0	17.08.12	Revised to reflect organisational change	M. Snell
16.0	02.12.14	Revision of Safety Case	A. Brovedani
16.1	02.06.15	Revision following submission to ESV	A. Brovedani

PROCEDURE

APA Group

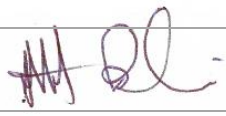
MAN-368-ATT02

ESV Safety Case
Formal Safety Assessment

Version: 8.0 Issued: 4/12/2014

DOCUMENT CONTROL

Approval

Summary of Changes	Full review of emergency plan and update to reflect site requirements, check attachments.	
Custodian	Albert Brovedani, Technical Regulations Manager, Infrastructure	
Reviewed	Craig Bonar, Manager East Coast Grid Engineering	
Approved	Kerryanne Mallitt, General Manager Transmission Operations	

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1 INTRODUCTION

As part of the ESV Safety Case, APA has carried out a formal safety assessment to identify and assess the hazards inherent in its operations. This Procedure sets out the methodology used to conduct the assessment, the models used for assessment, and the results of the process.

2 DOCUMENT SCOPE

This document contains:

- A description of the methodology used and investigations undertaken for the formal safety assessment,
- An identification of all hazards having the potential to cause a gas incident,
- A detailed and systematic assessment of risk, including the likelihood and consequences of a gas incident, and
- A description of technical and other measures undertaken to reduce that risk as far as practicable.

3 OVERVIEW

The initial risk assessment was conducted in 1998 in three stages as follows:

1) The systematic identification of all hazards – taking an "all risks" approach, identifying all hazards without regard to their nature, cause, or severity. Each hazard was subsequently assessed to eliminate hazards not having potential to cause a gas incident (e.g. occupational health issues).
2) Each remaining hazard was subject to a detailed and systematic assessment of the consequences and likelihood to determine the residual risk classification.
3) For each of these hazards, all technical, procedural and other measures in place or to be undertaken to reduce or mitigate the risk as far as reasonably practicable were identified.

This methodology complies with the various requirements found in:

- Victorian Gas Safety Act and Gas Safety (Safety Case) Regulations 2008
- AS 2885.1, Pipelines – Gas and Liquid Petroleum (specifically Part 1 Section 2 – Safety)
- Australian Pipeline Industry Association Inc. (APIA) Companion Document to AS 2885.1
- AS 3931, Risk analysis of technological systems
- AS 4360, Risk Management
- Victorian Gas Industry Act
- Victorian Pipelines Act
- Australian Gas Association (AGA) AG606 – Code of Practice for the Preparation of a Safety Case for Gas Networks.

3.1 Risk Assessment Methodology

1.1.1 Hazard Identification Methodology

Hazards were identified through a series of workshops involving technical staff from all disciplines to bring all the available experience to the task.

These workshops followed a structured approach based on segmentation of the business areas along the supply chain model. The supply chain model was established in the first workshop and re-evaluated for its completeness following the identification stage. The business areas that were explored are:

• Design – philosophy and brief	• Metering and Injection
• Design – specifications, standards and legal requirements	• Quality analysis
• Design – parameters, criteria and survey	• Odorisation
• Material acceptance	• Compression stations
• Construction	• Regulation
• Project contract management	• Heating
• Acceptance testing	• Valve control
• Integration	• Transmission
• Quality assurance	• Offline sampling
• Commissioning	• LNG vaporisation, odorisation, and recompression
• Information management	• Personnel selection and training
• Operating procedures – development and maintenance	• Liquids removal
• Operating procedures – training	• Cathodic protection
• Warehousing materials	• Pipeline security
• Change management	• Commissioning
• Emergency management	• Intelligent pigging
• Property and asset management	• Monitoring and SCADA

An "all risks" approach to hazard identification was adopted, in order to document all hazards without regard to their nature or severity. This was a clear and deliberate decision taken to ensure the rigour of the identification process despite the necessity for further assessment to remove non-"gas incident" hazards. Workshop participants were encouraged to think beyond the confines of their current positions in order to fully utilise the wealth of experience represented by the groups.

3.1.1 Review

3.1.1.1. 2001/2002 Review

Minor changes in the risk assessment methodology were adopted with the inclusion of property value as the primary means of assessing "loss of amenity/property damage". Previously, the loss of amenity/property damage assessment was purely qualitative and difficult to assess reliably.

During the review process, the Risk Register was also reviewed in light of incidents reported since the original risk assessment was conducted and after a number of asset-specific risk assessments, such as the valve risk assessment. Where appropriate, changes were made to hazards, consequences, likelihoods and controls. The format of the Risk Register was also modified.

3.1.1.2. 2003 Review

The review started by the development of a cause-effect map. The map links the effects (injury/death, property damage, supply restriction/failure, environmental damage and commercial impacts) through events to hazards or causes. The hazards from the pre-existing risk register were mapped on to the cause effect map and the map reviewed for completeness.

Existing hazards have been rationalised to remove duplication and a number of new hazards added. Commercial impacts were added to cover effects such as metering which has no safety consequences but could result in significant business risk.

Risk process maps were also developed for corrosion, third part protection, overpressure and human effects where further detail of the risk management processes is desirable.

A review of incidents since 2002/2003 identified changes to the consequence, likelihood and risk of hazards 16 inadequate incorrect or outdated operating and maintenance procedures, 45 venting purging blowdown and flaring, 48 intrusion vandalism and theft, 52 communications failure.

The risk review was performed through a consultative process with APA-VT section managers and key personnel. The risk register, cause and effect map and risk process maps were circulated to section managers and GasNet for review and comment.

3.1.1.3. 2008 Review

The Formal Safety Assessment was updated to use the risk matrix from AS2885.1-2007, except that the "Remote" likelihood of the standard was extended to two decades of probability and described as "Remote" and "Improbable" to keep it in line with the APA-VT MHF Safety Case.

The FSA review was performed in a workshop comprising of Manager Transmission Operations, Manager Asset Management and Engineering Victoria, Manager Projects Victoria, Manager Operations Support and Manager Technical Regulations.

The review removed duplication in the "old" hazard register and reassessed the risk levels of all threats.

3.1.1.4. 2014 Review

The FSA was reviewed and updated to comply with the format of ISO AS/NZS 31000, the Risk Management Standard using a tailored database known as CGR. The CGR database provides the flexibility to allow the FSA to become a live document that is regularly updated, although the five yearly reviews will still take place.

The FSA was reviewed in a workshop format comprising a multi-disciplined team across the business and was attended by:

Craig Bonar, Manager East Coast Engineering	Albert Brovedani, Technical Regulations Manager
Alice Rawlinson, Environment Manager	Raymond Tan, Operations Support Manager Group Services
Daniel Tucci, Senior Concept Engineer	Carlo Corso, Operations Support Manager Operations Services
Lachie Marshall, Land Agent Victoria	Alan Burt, Engineering Manager Development
John Rodrigues, Principal Planning Engineer	Ron Lourensz, Engineering Services Manager Victoria
Benjamin Foo, Pipeline Services Engineer	Jonathan Bryan, Technical Regulations Manager

The main requirement is to identify all hazards in the operation and maintenance of the VTS which have the potential to cause a "*Gas Incident".* A *"Gas Incident"* means any incident or event relating to the conveyance, supply or use of gas which causes or has the potential to cause—

(a) the death of or injury to a person; or

(b) significant damage to property; or

(c) an explosion;

As a part of this workshop each hazard on the register was reviewed, the results of the most recent VTS SMS considered, and a review of all hazards and incidents reported over the past five years undertaken as a form of being able to identify a comprehensive list of hazards for the FSA.

Each hazard was subject to a detailed and systematic assessment of the consequences and likelihood to determine the risk classification.

For each of these hazards, all technical, procedural and other measures in place or to be undertaken to reduce or mitigate the risk as far as reasonably practicable have been identified and documented to determine the residual risk ranking.

It was determined that some of the hazards from previous assessments would fit better as consequences to a risk, therefore there are now less hazards on the register, consequences are better defined and all controls have been identified.

3.2 Assessment Model

3.2.1 Consequence

Consequence was defined as: "The most realistic outcome expected if the hazardous event occurs. The consequence may take the three forms shown in any combination and where this occurs; the most severe of the realistic outcomes has been used".

	Safety/People	Security of Supply	Environment
Catastrophic	Multiple fatalities	Long term interruption of supply	Effects widespread; viability of ecosystems or species affected; permanent major changes
Major	Few fatalities; several people with life threatening injuries	Prolonged interruption; long term restriction of supply	Major off-site impact; long term severe effects; rectification difficult
Severe	Hospitalisation injuries	Short term interruption; prolonged restriction of supply	Localised (<1ha) and short term (<2y) effects; easily rectified
Minor	Medical attention injuries	Short term interruption; restriction of supply but shortfall met from other sources	Effect localised (<0.1ha) and very short term (weeks); minimal rectification
Trivial	Minimal Impact on Health & Safety	No impact; no restriction of supply	No effects; minor on-site effects rectified rapidly with negligible residual effects

3.2.2 Likelihood

The likely frequency that the hazardous event will occur and result in the expected outcome as noted by Consequence:

Likelihood	Frequency
Frequent	Expected to occur at least once per year or more
Occasional	May occur occasionally in the life of the pipeline
Unlikely	Unlikely to occur in the life of the pipeline, but possible
Remote	Not anticipated for this pipeline at this location
Hypothetical	Theoretically possible, but has never occurred on a similar pipeline

3.2.3 Risk Matrix

Based on the likelihood and consequence of a hazardous event, the residual risk is classified into five categories as defined below for the purposes of managing that residual risk. The definitions of management actions for each of the five classes are as follows:

Likelihood		Consequence			
	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

3.2.4 Risk management actions by risk class

Extreme Risk	Modify the threat, the frequency or the consequences so that the risk is reduced to intermediate or lower. For an in service pipeline the risk shall be reduced immediately
High Risk	Modify the threat, the frequency or the consequences so that the risk is reduced to intermediate or lower. For an in service pipeline the risk shall be reduced as soon as possible, typically within a timescale of not more than a few weeks.
Intermediate Risk	Repeat the risk identification and risk evaluation process to verify and, where possible, quantify the risk estimation; determine the accuracy and uncertainty of the estimation. Where the risk rank is confirmed to be intermediate, if possible modify the threat, the frequency or the consequence to reduce the risk to low or negligible. Where the risk rank cannot be reduced to 'low' or 'negligible', action shall be taken to" remove threats, reduce frequencies and/or reduce severity of consequences to the extent practicable; and demonstrate ALARP For an in-service pipeline, the reduction to 'low' or 'negligible' or demonstration of ALARP shall be completed as soon as possible; typically within a timescale of not more than a few months.
Low Risk	Determine the management plan for the threat to prevent occurrence and to monitor changes which could affect the classification.
Negligible Risk	Review at the next review interval.

4 ATTACHMENTS

Reference	Title / Description
MAN-368-ATT03	ESV-VTS Safety Case Risk Register
MAN-368-ATT04	ESV-VTS Safety Case Bowties

5 DEFINITIONS / ABBREVIATIONS

Abbreviation	Description
APA Group	Asset owner
APA VTS	APA Victoria Transmission
FSA	Formal Safety Assessment
Regulations	Gas Safety (Safety Case) Regulations 2008

6 REFERENCESS

Abbreviation	Description
[Vic] Gas Safety (Safety Case) Regulations 2008	

7 REVISION HISTORY

Revision	Date	Amendment	Author
0.1	20/04/1998	Draft issue	B. W
1.0	23/04/1998	Initial issue	B. W
2.0	19/08/1998	Review of Procedure and Attachments	M. M
3.0	20/05/2002	Complete rewrite of procedure and attachments	M. Snell
4.0	29/08/2003	2003 Review of Safety Case	M. Snell
5.0	13/12/2005	Changed OGS to ESV	M. Snell
6.0	19/12/2008	Revised Safety Case & renumbered MAN368Att02	M. Snell
7.0	29/05/2009	Updated to SC Regulations 2009	M. Snell
8.0	20/08/2014	Safety Case revision, update of risk register and bowties	A. Brovedani I. Shepherd
8.1	03/06/2015	Update following ESV submission	A.Brovedani

APA Group

Victorian Transmission System Hazard Register

Workshop Report

Generated: 03 Aug 2015 at 01:52PM +1000 by Albert Brovedani

CONFIDENTIAL

Facilitator Albert Brovedani **Owner** Albert Brovedani

Type	Division/Business Unit/Function	Register	Location	Created at
Workshop	Transmission	Victorian Pipeline Safety Case	Victorian Transmission System	18/09/2013

Updated at
13/07/2015

Victorian Transmission System Hazard Register

ID #12

Workshop start date
18/09/2013

Workshop Purpose/Goal
Review of hazards for Pipeline Safety Case review MAN368

Review Date (Optional)
30/09/2018

Safety Case Formal Safety Assessment review

External Participants

Alan Burt

Workshop Risks

	ID	Inherent Risk	Residual Risk	Target Risk	Title	Approval Status	Division/Business Unit/Function	Register	Risk Owner	Approver
R	0221	High	Interme...	not rated	External interference resulting in damage to the pipeline	Approved	Infrastructure Development	Victorian Pipeline Safety Case	Albert Brovedani	Albert Brovedani
R	1103	High	Interme...	not rated	In-service Live welding / Hot tap & stoppling	Approved	Transmission	Victorian Pipeline Safety Case	Albert Brovedani	Albert Brovedani
R	1106	High	Interme...	not rated	Pipeline comissioning	Approved	Transmission	Victorian Pipeline Safety Case	Albert Brovedani	Albert Brovedani
R	1107	High	Interme...	not rated	Venting & flaring	Approved	Transmission Operations	Victorian Pipeline Safety Case	Albert Brovedani	Albert Brovedani
R	0244	High	Low	not rated	Corrosion of steel pipeline	Approved	ECG Engineering	Victorian Pipeline Safety Case	Albert Brovedani	Albert Brovedani
R	1094	High	Low	not rated	Excavation or trenching works - hazardous task	Approved	Field Services	Victorian Pipeline Safety Case	Albert Brovedani	Albert Brovedani

R	1086	High	Low	not rated	Failure of equipment or materials	Approved	Transmission	Victorian Pipeline Safety Case	Albert Brovedani	Albert Brovedani
R	1093	Interme...	Low	not rated	Compressor Failure	Approved	Field Services	Victorian Pipeline Safety Case	Albert Brovedani	Albert Brovedani
R	1088	Interme...	Low	not rated	Physical damage to above ground infrastructure	Approved	ECG Engineering	Victorian Pipeline Safety Case	Albert Brovedani	Albert Brovedani
R	0243	High	Low	not rated	Damage to pipeline caused by environmental factors	Approved	Transmission	Victorian Pipeline Safety Case	Albert Brovedani	Albert Brovedani
R	1084	Interme...	Low	not rated	Inadequate / Incorrect design input	Approved	Infra Construction	Victorian Pipeline Safety Case	Albert Brovedani	Albert Brovedani
R	1092	Interme...	Low	not rated	Pipeline leaks	Approved	Infrastructure Construct	Victorian Pipeline Safety Case	Albert Brovedani	Albert Brovedani
R	1091	Interme...	Low	not rated	Overpressure	Approved	Transmission Operations	Victorian Pipeline Safety Case	Albert Brovedani	Albert Brovedani
R	1104	Interme...	Low	not rated	Pigging Operations - hazardous task	Approved	Transmission	Victorian Pipeline Safety Case	Albert Brovedani	Albert Brovedani
R	1085	Interme...	Low	not rated	Legislative / regulatory change - failure to comply	Approved	Infrastructure Strategy & Engineer	Victorian Pipeline Safety Case	Albert Brovedani	Albert Brovedani

Workshop Review Risks

No items found

Control Recommendations

No items found

Risk Owner Albert Brovedani

TYPE	RISK ID	STATE	DIVISION/BUSINESS UNIT/FUNCTION	REGISTER	RISK REVIEW DATE
Risk	0221	Approved	Infrastructure Development	Victorian Pipeline Safety Case	27/09/2019

CREATED AT	UPDATED AT
18/09/2013	04/12/2014

External interference resulting in damage to the pipeline

Inherent	Residual	Control Effectiveness
High	Intermediate	4-Satisfactory
People	People	Control Effectiveness

Target

Not yet risk rated

DESCRIPTION

Direct contact with pipeline from external interference caused by a third party resulting in damage to the pipeline

LOCATION
Victorian Transmission System

APPROVER
Albert Brovedani

Doc. Control: 193

Causes + Preventing Controls

2 items **19/19** in place controls

1.	**Failure of pipeline due to impact, crushing, vibration, point loading, explosives**	11/11 in place
1.1	**Design standards and risk assessment (safety management study)** **Cross Reference / Supporting Documents:** ESD077 Design Management, AS2885.1 sec 2.3 Safety Management Study **Comments (optional):** material specification, additional wall thickness or depth in high risk area, separation distance from other underground facilities, concrete slabbing, etc as per AS2885.1	✓
1.2	**Review / approval of works on easements** **Cross Reference / Supporting Documents:** 320-PR-HEL-004 Authorised Third Party Encroachment Management	✓
1.3	**Security patrols - aerial & road / foot patrol** **Cross Reference / Supporting Documents:** 320-PR-HEL-0001 Aerial Surveillance Procedure; 320-PR-HEL-0003 National Ground Patrol Procedure **Objectives:** Detection of unauthorised activity within pipeline easement	✓
1.4	**Pipeline identification signage and hot line reporting** **Cross Reference / Supporting Documents:** 320-PL-HEL-0001 Land Management Plan **Objectives:** Signage warning of high pressure gas pipeline in the vicinity and contact number to call for advice	✓

Consequences + Mitigating Controls

6 items **13/13** in place controls

1.	**Asset damage**	3/3 in place
1.1	**Pipeline protection as per Safety Management Study may minimise damage i.e. wall thickness,concrete sleeve, etc.**	✓
1.2	**Spare pipe** **Cross Reference / Supporting Documents:** PIP181 Transmission Pipeline Damage Management **Objectives:** Availability of spare pipe may minimise outage	✓
1.3	**In Line inspection** **Cross Reference / Supporting Documents:** 320-PL-AM-0006 Pipeline Integrity Management Plan; 530-GD-E-0001 Corrosion Management Guide	✓
2.	**Loss of supply**	6/6 in place
2.1	**Pipeline repair procedures** **Objectives:** Isolation and repair of the pipeline will minimise time impact as a temporary by-pass can be constructed to ensure security of supply until a permanent repair is completed	✓
2.2	**Spare pipe** **Objectives:** Rated spare pipe kept in yard at Dandenong and is readily available	✓
2.3	**Bushfire Management Procedure - Emergency response plan** **Cross Reference / Supporting Documents:** 320-PR-HS-0007 Bushfire Management Procedure;	✓

1.5	**Conditions of works imposed on adjacent sites** **Cross Reference / Supporting Documents:** 320-PR-HEL-0004 Authorised Third Party Encroachment Management	✓
1.6	**Inspector at adjacent works sites** **Cross Reference / Supporting Documents:** PPL231 External Interference Protection - Pipelines	✓
1.7	**Use of "one call" systems DBYD** **Cross Reference / Supporting Documents:** PPL231 External Interference Protection - Pipelines	🔗 ✓
1.8	**Liason with local gas, utilities, shires, contractors** **Cross Reference / Supporting Documents:** PIP273 Pipeline Excavation, PPL338 Site Access Notification to AEMO & property owners / occupiers	✓
1.9	**Work permits for APA work** **Cross Reference / Supporting Documents:** OPS166 Safe Work Permit & Facilities Release System	✓
1.10	**Stakeholder awareness program** **Cross Reference / Supporting Documents:** 320-PL-HEL-0001 Land Management Plan **Objectives:** Pipeline awareness for residents, Councils and businesses within vicinity of the pipeline is a key measure for protection of the pipeline	✓
1.11	**Pipeline identification signage and hot-line reporting** **Cross Reference / Supporting Documents:** PIP300 Pipeline Marking	🔗 ✓
2.	**Inaccurate or misinterpreted pipeline location information leading to damage to pipelines/underground assets**	**8/8 in place**
2.1	**Up to date as-built drawings** **Cross Reference / Supporting Documents:** QUA081 Drawing control	✓
2.2	**Accurate recording/retrieval of information** **Cross Reference / Supporting Documents:** MAN232 Change Management	✓
2.3	**Document control procedures** **Cross Reference / Supporting Documents:** MAN079 Preparation & Management of Documentation	✓
2.4	**Operating procedures / training**	✓
2.5	**Pipeline locator equipment / proving buried assets** **Cross Reference / Supporting Documents:** PPL231 External interference protection	✓
2.6	**Use of "one call" systems DBYD** **Cross Reference / Supporting Documents:** PPL231 External Interference Protection - Pipelines	🔗 ✓
2.7	**Engineering assessment of other authorities proposals** **Cross Reference / Supporting Documents:** PIP034 management of Transmission Pipeline Easements	✓
2.8	**Pipeline identification signage and hot-line reporting**	🔗 ✓
	EME020 Emergency Management Manual **Objectives:** Minimise any consequence of uncontrolled gas release	
2.4	**SCADA monitoring and pipeline control**	✓
2.5	**Interconnection of East Coast grid** **Objectives:** Flexibility in making up shortfall by connection to other sources	✓
2.6	**Ability to inject LNG into the grid or transport to site** **Objectives:** Dandenong LNG facility is designed as a back up for loss of supply	✓
3.	**Property damage**	**1/1 in place**
3.2	**Liason with emergency services**	🔗 ✓
4.	**Injury or death** **Comments:** Injury or death	**1/1 in place**
4.2	**Liason with emergency services**	🔗 ✓
5.	**Regulatory breach** **Comments:** Could result in prosecutions against the company / staff and / or fines if safety case or standards not observed	**1/1 in place**
5.1	**Management system - which includes Policy, procedures, maintenance system, pipeline surveillance systems, 5 yearly safety management study, liaison in relation to land use changes and developments, emergency response procedures, safety systems**	✓
6.	**Environmental consequence of potential bushfire**	**1/1 in place**
6.1	**Environmental Management Plan & Environmental procedures** **Cross Reference / Supporting Documents:** Bushfire Management Procedure; EME-020 Emergency Response Procedure; MAN-368 Att 03 Environmental Risk Register	🔗 ✓

Cross Reference / Supporting Documents:
PIP300 Pipeline Marking

Actions

No items found

Issues

No items found

Learnings

No items found

Assurance Functions / Notes

ID	Comment/Note	Owner	Created at
1	Demonstration of ALARP What else could we do to reduce the risk? Create greater separation of the pipeline from physical interference by; 1. Concrete slab the entire length of VTS pipelines 1,995 km 2. Place physical barriers (fences) on the entire length of the easement 3. Maintain a buffer zone keeping buildings and activities free from the radiation zone of the pipeline along the length of the easement Why have we not done it? 1. It is impractical to slab the entire length of pipelines, it is too costly, and is not a common practice amongst pipeline companies. High risk areas have appropriate physical protections in place which are constantly reviewed via SMS 2. APA does not have rights to place a fence along the length of the easement, the cost would be too great and it could possibly cause maintenance issues. 3. Impractical as there is no legislative basis for doing so. Planning decisions are often made without consultation of the pipeline owner nor without any consideration of the pipeline The cost of the above solutions outweighs the benefit as the pipeline threats are thoroughly analysed during the 5 yearly Safety Management Study for non-location and location specific threats along the entire length of each pipeline. Extra protection is considered specifically where required.	Albert Brovedani	03/Jun/2015 16:32 PM

Attachments

No Attachments found

Risk Owner Albert Brovedani **Raised by** Albert Brovedani

TYPE	RISK ID	STATE	DIVISION/BUSINESS UNIT/FUNCTION	REGISTER	RISK REVIEW DATE
Risk	1106	Approved	Transmission	Victorian Pipeline Safety Case	30/11/2019

CREATED AT	UPDATED AT
30/07/2014	02/07/2015

Pipeline comissioning

Inherent	Residual	Control Effectiveness
High	Intermediate	4-Satisfactory
People	People	Control Effectiveness

Target

Not yet risk rated

DESCRIPTION

Potential gas release - Introducing gas into the pipeline and pressurising the pipeline to the Transmission Pipeline System Operating Pressure

LOCATION
Victorian Transmission System

APPROVER
Albert Brovedani

RISK STATUS
Active

Doc. Control: 24

4 items **7/7** in place controls

Causes + Preventing Controls

1. Pipeline rupture during commissioning due to poor quality pipe or weakened joints — 1/1 in place

1.1 **Hydrotesting of pipeline sections during construction** ✓

Objectives:
Test strength of pipe and welds under design pressure

Comments (optional):
Job specific testing of welds and hydro tests for shop and field fabrication. This is a hold point prior to consent to operate on VTS assets

2. incomplete installation of equipment, valves & fittings — 1/1 in place
Comments: may cause a gas escape that may ignite during commissioning

2.1 **pre-commissioning procedure** ✓

Objectives:
Check all fittings, valves & ancillary equipment are correctly installed and all end points are completed with flanges, caps, or plugs

Comments (optional):
Pre-commissioning procedure is specific to job requirement as part of Construction Safety Management Plan

3. Incorrect valve position — 3/3 in place
Comments: may cause a gas escape that may ignite during pipeline commissioning

1 items **2/2** in place controls

Consequences + Mitigating Controls

1. Damage to people or property due to ignition from gas release — 2/2 in place

1.1 **Site specific emergency procedures from Construction Safety Management Plan** ✓

1.2 **Pipeline isolation plan** ✓

Objectives:
Limit the amount of gas flowing through that section of pipeline to minimise fuel source

3.1	**Work instructions**	✔
3.2	**Ensure valves are labelled correctly** **Cross Reference / Supporting Documents:** VLV387 Valve Numbering System	✔
3.3	**Utilise tagging and isolation procedures**	✔
4.	**Exposure to confined space hazards** 2/2 in place **Comments:** Exposure to gas and lack of oxygen during valve operations in a valve pit	
4.1	**Confined space entry procedure**	✔
4.2	**Utilise PPE and gas & oxygen analyser**	✔

Actions

No items found

Issues

No items found

Learnings

No items found

Assurance Functions / Notes

ID	Comment/Note	Owner	Created at
1	Demonstration of ALARP; What else could we do to reduce the risk? No alternative mitigation available when commissioning, pipeline must be pressurised. All testing and safety considerations within best industry practice are followed. Specific commissioning plans are developed upon best engineering technical knowledge including referencing field operations staff who have intimate knowledge of the pipeline system. Why have we not done it? Introducing pressurised gas into a pipeline always provides an element of risk, the likelihood is contained to a very low level however the consequence cannot be minimised any further.	Albert Brovedani	02/Jul/2015 11:33 AM

Attachments

No Attachments found

Risk Owner Albert Brovedani **Raised by** Albert Brovedani

TYPE	RISK ID	STATE	DIVISION/BUSINESS UNIT/FUNCTION	REGISTER	RISK REVIEW DATE
Risk	1103	Approved	Transmission	Victorian Pipeline Safety Case	27/09/2019

CREATED AT	UPDATED AT
30/07/2014	02/07/2015

In-service Live welding / Hot tap & stoppling

Inherent	Residual	Control Effectiveness
High	Intermediate	4-Satisfactory
People	People	Control Effectiveness

Target

Not yet risk rated

DESCRIPTION

Hazardous activity - controls would be specific to individual task performed by a specialist contractor

LOCATION
Victorian Transmission System

APPROVER
Albert Brovedani

RISK STATUS
Active

Doc. Control: 17

Causes + Preventing Controls

1 items **7/7** in place controls

1. Weld hot tap fitting onto pipeline — 7/7 in place
Comments: Exposure to gas if pipeline is penetrated during hot tap Ignition of gas gas present from existing valves in near vicinity. Burns due to contact with hot metal, heat & sparks Fire caused by welding or grinding sparks. Collapse of trench.

1.1 **Specialist hot tap firm used for this task** ✓
Cross Reference / Supporting Documents:
Job specific procedure developed when requried
Objectives:
T.D. Williamson, Furmanite or another specialist firm to be used for this task

1.2 **Specialist hot tap machine used with stoppling of gas pipeline** ✓
Objectives:
Isolation from gas source during hot tap

1.3 **Welding procedures, welders and weld qualification record must be provided to ESV for approval prior to works** ✓
Objectives:
Ensure welding safety. Specific job related procedure and qualifications applied to each job

1.4 **Approved task by regulator as part of Safety Management Plans for construction** ✓
Objectives:
Formal approval for safety of task

1.5 **Pipeline pressure will be reduced or pipeline** ✓

Consequences + Mitigating Controls

2 items **3/3** in place controls

1. Damage to people or property if ignition of gas during task — 1/1 in place

1.1 **Project specific emergency procedures developed as part of Construction Management plan** 🔗 ✓
Objectives:
Minimise consequences to surrounding people and environment

2. Fire from welding or grinding sparks — 2/2 in place

2.1 **Project specific emergency procedures developed as part of Construction Management plan** 🔗 ✓
Objectives:
Minimise consequences to surrounding people and environment

2.2 **Stopple** ✓
Objectives:
Restrict the flow of gas into the section of pipe to remove ignition source and provide isolation in case there is a problem with the cut or the fitting

isolated during activity

Objectives:
Reduce potential for large volume of gas to light

1.6 **Trenching and shoring procedure** ✔

Objectives:
Job specific procedure would be provided as part of Construction Management Plan

1.7 **Safe Work Procedures, risk assessment and qualified Permit issuing Officer required for task** ✔

Cross Reference / Supporting Documents:
JHA, Permit to Work, SWMS

Objectives:
Ensure the job is done specific to the conditions and resources available on the day

Actions

No items found

Issues

No items found

Learnings

No items found

Assurance Functions / Notes

ID	Comment/Note	Owner	Created at
1	Demonstration of ALARP. What more can be done to reduce the risk? 1. Elimination of the task would be the safest option 2. Purge gas from the section of pipeline being hot-tapped at each closest valve location Why has it not been done? 1. This is not possible as connection onto existing pipelines need to be made from time to time. 2. Interruption of gas supply not practical and stoppling is a proven effective measure of keeping a small section of pipeline as gas free whilst the tap and fittings are made No further mitigation available	Albert Brovedani	02/Jul/2015 11:28 AM

Attachments

No Attachments found

Risk Owner Albert Brovedani **Raised by** Albert Brovedani

TYPE	RISK ID	STATE	DIVISION/BUSINESS UNIT/FUNCTION	REGISTER	RISK REVIEW DATE
Risk	1107	Approved	Transmission Operations	Victorian Pipeline Safety Case	29/11/2019

CREATED AT	UPDATED AT
30/07/2014	13/07/2015

Venting & flaring

Inherent	Residual	Control Effectiveness
High	Intermediate	4-Satisfactory
People	People	Control Effectiveness

Target

Not yet risk rated

DESCRIPTION

Hazardous task - controlled release of gas

LOCATION
Victorian Transmission System

APPROVER
Albert Brovedani

RISK STATUS
Active

Doc. Control: 37

2 items **8/8** in place controls

Causes + Preventing Controls

1.	**Mechanical failure of flare, fittings, hose due to incorrect design for Maximum Allowable Operating Pressure**	5/5 in place
1.1	**Visual inspection of all fittings, hoses & connections**	✓
1.2	**Only approved purge stack shall be used**	✓
1.3	**Notify fire authority and other relevant parties of activity**	✓
1.4	**Training of operators**	✓
1.5	**Permit to work, JHA & SWMS** **Objectives:** Ensure a controlled environment with competent operators according to approved procedures	✓
2.	**Flare off gas - burns during lighting, fire from gas leaks on flare hose, excessive noise**	3/3 in place
2.1	**De-pressurise / flaring procedure** **Objectives:** check connections, use of pilot light, continue flaring until stable combustion and adequate purge has been completed.	✓
2.2	**PPE / hearing protection**	✓
2.3	**set up exclusion zone and sight purging away from ignition sources** **Objectives:** protection of the public	✓

1 items **1/1** in place controls

Consequences + Mitigating Controls

1.	**Property damage or personal injury from uncontrolled fire or explosion**	1/1 in place
1.1	**Emergency response and pipeline isolation procedures** **Objectives:** Minimise the consequences of an incident	✓

Actions

No items found

Issues

No items found

Learnings

No items found

Assurance Functions / Notes

ID	Comment/Note	Owner	Created at
1	Demonstration of ALARP; What else could have been done to reduce the risk? Elimination of task. Why have we not done it? Venting / flaring is only performed where necessary or in an emergency situation. At times a gas free environment is required for maintenance or alterations to pipe work and facilities. No further mitigation is available.	Albert Brovedani	02/Jul/2015 11:34 AM

Attachments

No Attachments found

Risk Owner Albert Brovedani

TYPE	RISK ID	STATE	DIVISION/BUSINESS UNIT/FUNCTION	REGISTER	RISK REVIEW DATE
Risk	0244	Approved	ECG Engineering	Victorian Pipeline Safety Case	30/09/2018

CREATED AT	UPDATED AT
21/02/2014	04/12/2014

Corrosion of steel pipeline

Inherent	Residual	Control Effectiveness
High	Low	4-Satisfactory
People	People	Control Effectiveness

Target

Not yet risk rated

DESCRIPTION

Corrosion leading to metal loss and possible loss of containment
Document 320-PL-AM0006 - Pipeline Integrity Management Plan contains information on management of corrosion

LOCATION
Victorian Transmission System

APPROVER
Albert Brovedani

Doc. Control: 145

Causes + Preventing Controls

3 items **19/19** in place controls

1.	**External coating damage** **Comments:** Damage to coating may cause steel pipeline to be exposed to soil and possible corrosive elements	8/8 in place
1.1	**External Pipeline Coating** **Objectives:** Provide robust and resistant coating quality to adequately protect the pipe from environmental factors	✓
1.2	**10 yearly coating surveys (unpiggable pipelines only)** **Cross Reference / Supporting Documents:** OPS509 Maintenance Schedules	✓
1.3	**Pipeline inspections - intelligent pigging** **Objectives:** High tech data tool which is used to accurately detect location of pipe metal loss and track deterioration rates	🔗 ✓
1.4	**Cathodic protection systems** **Objectives:** Electrical current provides protection to steel structure from corrosive elements in locations where pipeline coating is damaged **Comments (optional):** 6 monthly CP surveys are used to ensure protection systems are operating effectively	🔗 ✓
1.5	**Conduct dig ups to perform pipe & coating repairs**	✓
1.6	**Competency and training of relevant personnel/**	🔗 ✓

Consequences + Mitigating Controls

4 items **6/6** in place controls

1.	**Safety of people** **Comments:** An ignition source during loss of containment could result in ignition and fire / heat radiation causing exposure to people within the consequence zone.	2/2 in place
1.1	**5 yearly safety management study provides protection measures based on location class and possible pipeline exposure taking into account the surrounding environment** **Objectives:** Reduce the consequences of a pipeline failure event	✓
1.2	**Many pipelines are located within easements. Pipeline regulations require licensee approval for structures within 3 to 6 metres of a pipeline. the Pipeline Act requires licensee and ministerial approval for structures within 3 metres of a pipeline with control measures in place to reduce consequences of a pipeline incident** **Objectives:** Separation from housing and population	✓
2.	**Property damage** **Comments:** An ignition source during loss of containment could result in ignition and fire / heat radiation causing exposure to property in the vicinity	1/1 in place
2.1	**Emergency response and pipeline isolation procedures**	🔗 ✓
3.	**Loss of supply** **Comments:** Temporary loss of supply could eventuate whilst incident investigations are undertaken, depending upon location of rupture	2/2 in place
3.1	**Pipeline repair procedures**	🔗 ✓

	technicians	
1.7	**Inspection of transition sleeves & condition of above ground pipework**	✓
1.8	**Third party liaison activities** **Cross Reference / Supporting Documents:** 320-PL-HEL-0009 Third Party Pipeline Awareness Plan **Objectives:** Pipeline hits may lead to corrosion	✓
2.	**Internal pipeline corrosion**	**6/6 in place**
2.1	**Monitor levels of corrosive contaminants and inhibitors**	✓
2.2	**Cathodic protection systems** **Objectives:** Electrical current provides protection to steel structure from corrosive elements in locations where pipeline coating is damaged **Comments (optional):** 6 monthly CP surveys are used to ensure protection systems are operating effectively	🔗 ✓
2.3	**Gas quality**	✓
2.4	**Pipeline inspections - intelligent pigging** **Objectives:** High tech data tool which is used to accurately detect location of pipe metal loss and track deterioration rates	🔗 ✓
2.5	**Internal lining**	✓
2.6	**Competency and training of relevant personnel/ technicians**	🔗 ✓
3.	**Stress corrosion cracking**	**5/5 in place**
3.1	**SCC assessments conducted in the past, occurrence is remote in factory coated pipe** **Comments (optional):** SCC can be caused by elevated temperature, tensile stress on the pipeline and a corrosive environment and is a form of external corrosion not generally detected by Intelligent pigging. No evidence within VTS of SCC. There is no evidence of stress corrosion cracking on the VTS.	✓
3.2	**Leakage Detection** **Objectives:** Look for visible signs of pinhole leaks	✓
3.3	**High level assessment of SCC** **Comments (optional):** No known SCC detected within VTS	✓
3.4	**Factory coated pipeline** **Comments (optional):** No known issues of SCC within factory coated pipe worldwide	✓
3.5	**Thicker wall pipe downstream of compressor stations** **Comments (optional):** In most cases	✓
	Objectives: Isolation and repair of the pipeline will minimise time impact as a temporary by-pass can be constructed to ensure security of supply until a permanent repair is completed	
3.2	**Interconnection of pipeline grid** **Objectives:** Interconnection of grid will minimise the area of any supply loss	✓
4.	**Bushfire**	**1/1 in place**
4.1	**Environmental Management Plan & Environmental procedures** **Cross Reference / Supporting Documents:** Bushfire Management Procedure; EME-020 Emergency Response Procedure; MAN-368 Att 03 Environmental Risk Register	🔗 ✓

Actions

No items found

Issues

No items found

Learnings

No items found

Assurance Functions / Notes

No items found

Attachments

No Attachments found

Risk Owner Albert Brovedani **Raised by** Albert Brovedani

TYPE	RISK ID	STATE	DIVISION/BUSINESS UNIT/FUNCTION	REGISTER	RISK REVIEW DATE
Risk	1086	Approved	Transmission	Victorian Pipeline Safety Case	30/11/2019

CREATED AT	UPDATED AT
21/07/2014	04/12/2014

Failure of equipment or materials

Inherent	Residual	Control Effectiveness
High	Low	4-Satisfactory
People	People	Control Effectiveness

Target

Not yet risk rated

DESCRIPTION

Equipment or materials not suitable to task

LOCATION	ACTION WINDOW	APPROVER
Victorian Transmission System	21/7/2014 - 4/8/2014	Albert Brovedani

RISK STATUS

Active

Doc. Control: 54

Causes + Preventing Controls

2 items **9/9** in place controls

1.	**Inadequate / incorrect specification of equipment / materials**	5/5 in place
1.1	**Methodology & philosophy for system design (Design Basis Manual)** **Cross Reference / Supporting Documents:** ESD077 Design Management; ESD100 Project Management; HAZ238 Hazop study guiide	✓
1.2	**Testing of equipment or material** **Cross Reference / Supporting Documents:** ESD077 Design Management; ESD089 Inspection and testing; PIP299 Purging & Commissioning TP Pipeline: PIP339 Hydrostatic Testing	🔗 ✓
1.3	**Risk assessment** **Cross Reference / Supporting Documents:** HAZ238 Hazop study guide **Action window:** 21/7/2014 - 4/8/2014	🔗 ✓
1.4	**Design management including training & competency of staff**	✓
1.5	**Engineering review** **Comments (optional):** review specification & feedback to design	🔗 ✓
2.	**Component failure after installation due to poor quality or inadequate testing or inspection**	4/4 in place

Consequences + Mitigating Controls

2 items **8/8** in place controls

1.	**Safety issues**	4/4 in place
1.1	**Corrective repair / replacement**	🔗 ✓
1.2	**Engineering review** **Comments (optional):** review specification & feedback to design	🔗 ✓
1.3	**Safety critical controls**	🔗 ✓
1.4	**Incident review to prevent reoccurence** **Comments (optional):** Including lessons learnt	🔗 ✓
2.	**Security of supply**	4/4 in place
2.1	**Engineering review** **Comments (optional):** review specification & feedback to design	🔗 ✓
2.2	**Corrective repair / replacement**	🔗 ✓
2.3	**Safety critical controls**	🔗 ✓
2.4	**Incident review to prevent reoccurence** **Comments (optional):** Including lessons learnt	🔗 ✓

2.1 **Procedures for testing, sampling and inspection of all materials and parts**

Cross Reference / Supporting Documents:
CSM312 Inspection of Materials; CSM313 Product Recall: ESD089 Inspection and Testing: STD247 Inspection & Testing of Electrical Equipment

2.2 **Risk assessment**

Cross Reference / Supporting Documents:
HAZ238 Hazop study guide

Action window:
21/7/2014 - 4/8/2014

2.3 **Materials and parts re-checked prior to installation**

Cross Reference / Supporting Documents:
ESD085 Product Identification and Traceability

Action window:
21/7/2014 - 4/8/2014

2.4 **Procedures for site testing and commissioning**

Cross Reference / Supporting Documents:
ESD089 Inspection and testing; PIP250 Purging and Commissioning TP Pipeline Policy; PIP299 Purging and Commissioning TP Pipeline Procedure

Action window:
21/7/2014 - 4/8/2014

Actions

No items found

Issues

No items found

Learnings

No items found

Assurance Functions / Notes

No items found

Attachments

No Attachments found

Risk Owner Albert Brovedani **Raised by** Albert Brovedani

TYPE	RISK ID	STATE	DIVISION/BUSINESS UNIT/FUNCTION	REGISTER	RISK REVIEW DATE
Risk	1094	Approved	Field Services	Victorian Pipeline Safety Case	30/08/2019

CREATED AT	UPDATED AT
29/07/2014	04/12/2014

Excavation or trenching works - hazardous task

Inherent	Residual	Control Effectiveness
High	Low	4-Satisfactory
People	People	Control Effectiveness

Target

Not yet risk rated

DESCRIPTION

Excavation, trenching and shoring not completed properly can cause a danger to workers and the public. Pipeline could be hit by excavation equipment.

LOCATION
Victorian Transmission System

APPROVER
Albert Brovedani

RISK STATUS
Active

Doc. Control: 37

3 items **10/10** in place controls

Causes + Preventing Controls

1.	**Collapse of trench**	**4/4 in place**
1.1	**Excavation procedure** **Comments (optional):** Permit to work & JHA, work instruction	✓
1.2	**Shoring and benching of all work to prevent collapse** **Cross Reference / Supporting Documents:** PIP273 Pipeline excavation	✓
1.3	**Job Hazard Analysis**	✓
1.4	**Excavation training**	✓
2.	**Demarcation zone unclear**	**5/5 in place**
2.1	**Excavation procedure** **Comments (optional):** Permit to work & JHA, work instruction	✓
2.2	**Job Hazard Analysis**	✓
2.3	**Excavation training**	✓
2.4	**Design to minimise exposure to risk** **Cross Reference / Supporting Documents:** ESD077 Design Management;	✓
2.5	**Exclude the public from hazardous work area by; fence/ barricade, warning signs, temporary covers, security patrols** **Cross Reference / Supporting Documents:** ESD355 Construction safety; PIP273 Pipeline	✓

2 items **2/2** in place controls

Consequences + Mitigating Controls

1.	**Injury to staff or public**	**1/1 in place**
1.1	**Emergency response plan**	✓
2.	**Damage to infrastructure**	**1/1 in place**
2.1	**Emergency repair procedures**	✓

Excavation

3.	Pipeline struck by excavation equipment	1/1 in place
3.2	**Excavation procedure** ✓ **Comments (optional):** Permit to work & JHA, work instruction, supervision	

Actions

No items found

Issues

No items found

Learnings

No items found

Assurance Functions / Notes

No items found

Attachments

No Attachments found

Risk Owner Albert Brovedani **Raised by** Albert Brovedani

TYPE	RISK ID	STATE	DIVISION/BUSINESS UNIT/FUNCTION	REGISTER	RISK REVIEW DATE
Risk	1093	Approved	Field Services	Victorian Pipeline Safety Case	30/08/2019

CREATED AT	UPDATED AT
29/07/2014	04/12/2014

Compressor Failure

Inherent	Residual	Control Effectiveness
Intermediate	Low	4-Satisfactory
People	People	Control Effectiveness

Target

Not yet risk rated

LOCATION
Victorian Transmission System

APPROVER
Albert Brovedani

RISK STATUS
Active

Doc. Control: 14

Causes + Preventing Controls

2 items **9/9** in place controls

1.	Component failure	5/5 in place
1.1	**Regular maintenance - scheduling through the Maintenance Connection system** **Cross Reference / Supporting Documents:** BCS544 - Brooklyn Compressor Station Operators Manual; GCS023 - Gooding Compressor Station Ooperation & Maintenance Manual; WCG276 - Wollert Operating & Maintenance Manual; OPS394 - Maintenance Policy; OPS509 - Maintenance Schedules **Objectives:** Maintenance Engineering Planner is required to ensure facilities are maintained in accordance with design standards	✔
1.2	**Design** **Cross Reference / Supporting Documents:** ESD-077 Design Management - **Objectives:** Facilities are designed to fail safe, have redundancy and are alarmed. Some facilities are designed with gas detectors	✔
1.3	**Operational procedures are managed by AEMO** **Cross Reference / Supporting Documents:** Service Envelope Agreement **Objectives:** Operate the pipeline within its design limits	✔
1.4	**Condition monitoring**	🔗 ✔
1.5	**Emergency shut down to isolate equipment** **Objectives:** Shut down equipment to fail safe and limit any	✔

Consequences + Mitigating Controls

2 items **3/3** in place controls

1.	Reduced pipeline capacity	2/2 in place
1.1	**Repair procedures**	✔
1.2	**Spare parts inventory** **Objectives:** Enable quick repair and reduce down time	✔

2.	Safety issues	1/1 in place
2.1	**Emergency response plan** **Cross Reference / Supporting Documents:** EME556 - Compressor Station Site Emergency Procedure **Objectives:** Minimise any consequence of uncontrolled gas release	✔

damage or consequence of damage

2.	**Failure of auxiliary equipment** **Comments:** Equipment feeding into compressor causes failure	4/4 in place
2.1	**Design** **Objectives:** Facilities are designed to fail safe, have redundancy and are alarmed. Some facilities are designed with gas detectors	✓
2.2	**Incorrect operation** **Cross Reference / Supporting Documents:** Service Envelope Agreement **Objectives:** The pipeline facilities are designed to fail safe by managing pressure and temperature limits	✓
2.3	**Condition monitoring**	🔗 ✓
2.4	**Regular maintenance** **Cross Reference / Supporting Documents:** OPS509 Maintenance Schedules	✓

Actions

No items found

Issues

No items found

Learnings

No items found

Assurance Functions / Notes

No items found

Attachments

No Attachments found

Risk Owner Albert Brovedani **Raised by** Albert Brovedani

TYPE	RISK ID	STATE	DIVISION/BUSINESS UNIT/FUNCTION	REGISTER	RISK REVIEW DATE
Risk	1088	Approved	ECG Engineering	Victorian Pipeline Safety Case	30/08/2019

CREATED AT	UPDATED AT
22/07/2014	04/12/2014

Physical damage to above ground infrastructure

Inherent	Residual	Control Effectiveness
Intermediate	Low	4-Satisfactory
Security of Supply	Security of Supply	Control Effectiveness

Target

Not yet risk rated

DESCRIPTION

Terrorism has been used as the measure for the worst case scenario for this risk, however vandalism or vehicle damage could be a cause of damage to above ground infrastructure.

LOCATION
Victorian Transmission System

APPROVER
Albert Brovedani

RISK STATUS
Active

Doc. Control: 40

Causes + Preventing Controls

3 items **10/10** in place controls

1.	**Deliberate damage by intruders to facilities** **Comments:** Could include sabotage & terrorism	5/5 in place
1.1	**Fenced compounds & locked buildings** **Cross Reference / Supporting Documents:** OPS260 Security Around Assets; SEC189 Security Fencing **Objectives:** Provide a physical barrier to entry. **Comments (optional):** Key sites have been identified	✓
1.2	**Safety Management Studies/ Risk Assessment / HAZOPS** **Cross Reference / Supporting Documents:** HAZ238 Hazop Study Guide **Objectives:** Consideration to surrounding environment and threats undertaken through SMS / Risk Assessments. HAZOPS used to ensure equipment is fail safe if damaged or malfunctions.	✓
1.3	**Critical equipment is locked**	🔗 ✓
1.4	**Palisade fencing at critical sites** **Cross Reference / Supporting Documents:** MAN-621 Security Risk Management Plan	✓
1.5	**targeted patrols**	✓
2.	**Accidental damage during maintenance or**	3/3 in place

Consequences + Mitigating Controls

4 items **5/5** in place controls

1.	**Damage to assets**	2/2 in place
1.1	**Remote monitoring of site** **Objectives:** SCADA alarms could detect damage to facilities, pressure change could also be detected possibly indicating a problem at stations or facilities	✓
1.2	**Regular facility inspections to identify undetected damage**	✓
2.	**Injury to people**	1/1 in place
2.1	**Equipment to isolate section of pipeline**	✓
3.	**Supply interruption**	1/1 in place
3.1	**Interconnection of East Coast Grid reduces the consequence of supply loss over a greater area, effects may be localised or contained within a specific area.** **Objectives:** Minimise any consequence of supply loss	✓
4.	**Bushfire from gas release**	1/1 in place
4.1	**Bushfire Management Procedure - Emergency response plan** **Cross Reference / Supporting Documents:** 320-PR-HS-0007 Bushfire Management Procedure; EME020 Emergency Management Manual **Objectives:** Minimise any consequence of uncontrolled gas release	🔗 ✓

	other work	
2.1	**Work permit conditions** **Cross Reference / Supporting Documents:** OPS166 Safe Work Permit & Facilities Release System	✔
2.2	**Critical equipment is locked**	🔗 ✔
2.3	**Operating and maintenance procedures / training** **Cross Reference / Supporting Documents:** MAN236 Competency and Training Management	✔
3.	**Vehicle impact**	**2/2 in place**
3.1	**Critical equipment is locked**	🔗 ✔
3.2	**Placement of bollards** **Cross Reference / Supporting Documents:** ESD077 Design Management **Objectives:** Physical measure to prevent interference from vehicles and equipment	✔

Actions

No items found

Issues

No items found

Learnings

No items found

Assurance Functions / Notes

No items found

Attachments

No Attachments found

Risk Owner Albert Brovedani

TYPE	RISK ID	STATE	DIVISION/BUSINESS UNIT/FUNCTION	REGISTER	RISK REVIEW DATE
Risk	0243	Approved	Transmission	Victorian Pipeline Safety Case	27/09/2019

CREATED AT	UPDATED AT
21/02/2014	04/12/2014

Damage to pipeline caused by environmental factors

Inherent	Residual	Control Effectiveness
High	Low	4-Satisfactory
Security of Supply	Security of Supply	Control Effectiveness

Target

Not yet risk rated

DESCRIPTION

These instances may cause movement and stresses on the pipeline, erosion may expose pipe and subject the pipe to being hit.

Wollert to Wodonga used as scenario for worst case rupture.

LOCATION	ACTION WINDOW	APPROVER
Victorian Transmission System	29/7/2014 - 12/8/2014	Albert Brovedani

Doc. Control: 87

Causes + Preventing Controls

3 items **10/10** in place controls

1.	**Pipeline damage due to flood, erosion, landslips, subsidence, earthquake or other environmental factors**	7/7 in place
1.1	**Design hazard / risk assessment** **Cross Reference / Supporting Documents:** CVW203; Site drainage, CVW204: Prevention of soil erosion, ESD077: Design management, PIP220: Vegetation within Corridor Reserves, PIP354: Pipeline Route Selection, PIP384: Design of Special Crossings **Objectives:** Design policies and route selection are used to minimise these exposures as much as possible. Choose the most desirable pipeline route through route surveys, soil surveys, earthquake studies, creek/river crossings Pipelines designed to comply with AS2885 or predecessor standard	✓
1.2	**Route selection to minimise exposure** **Cross Reference / Supporting Documents:** PIP354 Pipeline Route Selection	✓
1.3	**Patrolling and inspections**	🔗 ✓
1.4	**Remedial works for identified problems**	🔗 ✓
1.5	**5 yearly safety management study** **Cross Reference / Supporting Documents:** HAZ238 Hazop study guide	🔗 ✓
1.6	**Design criteria and mitigation techniques** **Cross Reference / Supporting Documents:**	🔗 ✓

Consequences + Mitigating Controls

3 items **9/9** in place controls

1.	**Coating damage leading to pipe damage**	2/2 in place
1.1	**Remedial works for identified problems**	🔗 ✓
1.2	**ILI program, Cathodic protection**	✓
2.	**Pipeline movement / stress on pipe steel**	4/4 in place
2.1	**Pipeline repair plan** **Objectives:** Implement a by-pass to minimise downtime and then build permanent solution	🔗 ✓
2.2	**Design review**	✓
2.3	**Patrolling and inspections**	🔗 ✓
2.4	**Environmental Management Plans**	🔗 ✓
3.	**Rupture / loss of containment**	3/3 in place
3.1	**Remedial works for identified problems**	🔗 ✓
3.2	**Pipeline repair plan** **Objectives:** Implement a by-pass to minimise downtime and then build permanent solution	🔗 ✓
3.3	**Bushfire Management Procedure - Emergency response plan** **Cross Reference / Supporting Documents:** 320-PR-HS-0007 Bushfire Management Procedure; EME020 Emergency Management Manual **Objectives:** Minimise any consequence of uncontrolled gas release	🔗 ✓

PIP354 Pipeline route selection

Objectives:
consider stabilisation of pipeline through design criteria application such as depth under creeks/ rivers, concrete weight coating, reinforced banks/river beds, trench breakers, directional drills, independent support of structures

1.7	**Environmental Management Plans**	
2.	**Lightning Strike**	1/1 in place
2.1	**Plant earthing / Surge protection** **Action window:** 29/7/2014 - 12/8/2014	
3.	**Bushfire**	2/2 in place
3.1	**Buried pipeline & cleared easement**	
3.2	**Design criteria and mitigation techniques** **Cross Reference / Supporting Documents:** PIP354 Pipeline route selection **Objectives:** consider stabilisation of pipeline through design criteria application such as depth under creeks/ rivers, concrete weight coating, reinforced banks/river beds, trench breakers, directional drills, independent support of structures	

Actions

No items found

Issues

No items found

Learnings

No items found

Assurance Functions / Notes

No items found

Attachments

No Attachments found

Risk Owner Albert Brovedani **Raised by** Albert Brovedani

TYPE	RISK ID	STATE	DIVISION/BUSINESS UNIT/FUNCTION	REGISTER	RISK REVIEW DATE
Risk	1084	Approved	Infra Construction	Victorian Pipeline Safety Case	29/11/2019

CREATED AT	UPDATED AT
17/07/2014	04/12/2014

Inadequate / Incorrect design input

Inherent	Residual	Control Effectiveness
Intermediate	Low	4-Satisfactory
People	People	Control Effectiveness

Target

Not yet risk rated

DESCRIPTION

Inadequate design causes inability to function as desired

LOCATION
Victorian Transmission System

APPROVER
Albert Brovedani

RISK STATUS
Active

Doc. Control: 43

1 items **6/6** in place controls

Causes + Preventing Controls

1.	**Inadequate brief** **Comments:** Project requirements are not clearly defined	6/6 in place
1.1	**Design basis manual/ FEED study report** **Cross Reference / Supporting Documents:** ESD077 Design Management,	✓
1.2	**Training and competency of engineers**	✓
1.3	**Design Reviews** **Cross Reference / Supporting Documents:** ESD077 Design Management **Objectives:** ensure design meets specification and functionality requirements	✓
1.4	**Safety Management Study & other risk assessments** **Cross Reference / Supporting Documents:** HAZ187 Hazardous Areas Guidelines for Field Instrumentation & Electrical Equipment; HAZ238 Hazop Study Guide **Objectives:** Consideration on external threats undertaken during planning process	✓
1.5	**Risk based design**	✓
1.6	**Testing of equipment or material** **Cross Reference / Supporting Documents:** ESD077 Design Management; ESD089 Inspection	🔗 ✓

3 items **5/5** in place controls

Consequences + Mitigating Controls

1.	**Supply restriction** **Comments:** Breach of commercial agreement if unable to fulfil delivery requirements	1/1 in place
1.1	**Alarms to AEMO & GasNet control rooms**	🔗 ✓
2.	**Safety issues**	1/1 in place
2.1	**Emergency response and pipeline isolation procedures**	🔗 ✓
3.	**Asset integrity issues**	3/3 in place
3.1	**project close out & lessons learnt**	✓
3.2	**Safety devices**	✓
3.3	**Alarms and associated response plans**	✓

and testing; PIP299 Purging & Commissioning TP
Pipeline: PIP339 Hydrostatic Testing

Actions

No items found

Issues

No items found

Learnings

No items found

Assurance Functions / Notes

No items found

Attachments

No Attachments found

Risk Owner Albert Brovedani **Raised by** Albert Brovedani

TYPE	RISK ID	STATE	DIVISION/BUSINESS UNIT/FUNCTION	REGISTER	RISK REVIEW DATE
Risk	1104	Approved	Transmission	Victorian Pipeline Safety Case	30/11/2019

CREATED AT	UPDATED AT
30/07/2014	04/12/2014

Pigging Operations - hazardous task

Inherent	Residual	Control Effectiveness
Intermediate	Low	4-Satisfactory
Security of Supply	Security of Supply	Control Effectiveness

Target

Not yet risk rated

LOCATION
Victorian Transmission System

APPROVER
Albert Brovedani

RISK STATUS
Active

Doc. Control: 6

3 items **3/3** in place controls

Causes + Preventing Controls

1.	**Stuck pig due to lack of flow**	1/1 in place
1.1	**Operating procedure** **Comments (optional):** Specific pigging procedures are developed to suit the pipeline system	✓
2.	**Stuck pig due to pipe characteristics**	1/1 in place
2.1	**Design of pipeline / pig bars, radius of bends** **Cross Reference / Supporting Documents:** PIP382 Designing Pipelines to Accommodate Intelligent pigging	✓
3.	**Velocity of pig under pressure could cause damage at catching end**	1/1 in place
3.1	**Pig traps designed to safely catch pig at end of operation**	✓

2 items **3/3** in place controls

Consequences + Mitigating Controls

1.	**Restriction of supply** **Comments:** If pig is stuck and cannot be retrieved	1/1 in place
1.1	**Pig tracking and pig recovery procedure**	✓
2.	**People or property damage** **Comments:** At catching end due to pig under pressure	2/2 in place
2.1	**Job safety procedures**	✓
2.2	**Emergency response procedures**	✓

Actions

No items found

Issues

No items found

Learnings

No items found

Assurance Functions / Notes

No items found

Attachments

No Attachments found

Risk Owner Albert Brovedani **Raised by** Albert Brovedani

TYPE	RISK ID	STATE	DIVISION/BUSINESS UNIT/FUNCTION	REGISTER	RISK REVIEW DATE
Risk	1092	Approved	Infrastructure Construct	Victorian Pipeline Safety Case	30/08/2019

CREATED AT	UPDATED AT
28/07/2014	04/12/2014

Pipeline leaks

Inherent	Residual	Control Effectiveness
Intermediate	Low	4-Satisfactory
People	People	Control Effectiveness

Target

Not yet risk rated

LOCATION
Victorian Transmission System

APPROVER
Albert Brovedani

RISK STATUS
Active

Doc. Control: 41

Causes + Preventing Controls

1 items **6/6** in place controls

1.	Failure of joints, flanges or welds	6/6 in place
1.1	**Engineering policies for jointing;** **Cross Reference / Supporting Documents:** ESD077 Design management; HAZ187 Hazardous Area Guidelines for Field Instrumentation & Electrical Equipment; HAZ238 Hazop Study Guide; PIP155 Transmission Welding Procedures; PIP212 Pipeline Valve Design; PIP234 Flanged Joints - Installation; PIP340 Welding **Objectives:** Use of monolithic joints, Avoidance of split-body valves, Use of fire safe valves above ground, Use of welded valves where practical, Gasket material selection	✔
1.2	**Designed for isolation / redundancy** **Cross Reference / Supporting Documents:** ESD077 Design Management	✔
1.3	**Hydrostatic testing of all pipes and welded components & non-destructive tests** **Cross Reference / Supporting Documents:** PIP339 Hydrostatic Testing	✔
1.4	**Welding procedures / training** **Cross Reference / Supporting Documents:** PIP340 Welding **Objectives:** Weld requirements and standards, Competency & qualification, testing reuirements including 100% NDT for critical welds	✔

Consequences + Mitigating Controls

1 items **7/7** in place controls

1.	Ignition source & possible fire	7/7 in place
1.1	**Emergency response procedures**	✔
1.2	**Isolation Plan** **Cross Reference / Supporting Documents:** 320-GD-HS-0001 Isolation Lock Out & Tag Out **Objectives:** Isolate and de-pressurise section of pipeline to limit gas escape & enable repair	✔
1.3	**Pipeline repair plan** **Objectives:** Implement a by-pass to minimise downtime and then build permanent solution	🔗 ✔
1.4	**Leak identification**	✔
1.5	**All metering pits have gas leak monitoring & 3 monthly check of other pits**	✔
1.6	**Pipeline awareness** **Comments (optional):** Including signage & stakeholder awareness programs, aerial patrol, etc	✔
1.7	**Odorised gas** **Cross Reference / Supporting Documents:** Odorant manual **Objectives:** Odorisation for easy detection of leaks within the system, particularly in populated areas.	✔

1.5 **Quality assurance on production welds** ✔
Cross Reference / Supporting Documents:
ESD085 Product Identification and Traceability;
PIP340 Welding

1.6 **Leak testing during commissioning** ✔
Cross Reference / Supporting Documents:
PIP339 Hydrostatic Testing

Actions

No items found

Issues

No items found

Learnings

No items found

Assurance Functions / Notes

No items found

Attachments

No Attachments found

Risk Owner Albert Brovedani **Raised by** Albert Brovedani

TYPE	RISK ID	STATE	DIVISION/BUSINESS UNIT/FUNCTION	REGISTER	RISK REVIEW DATE
Risk	1091	Approved	Transmission Operations	Victorian Pipeline Safety Case	30/08/2019

CREATED AT	UPDATED AT
28/07/2014	04/12/2014

Overpressure

Inherent	Residual	Control Effectiveness
Intermediate	Low	4-Satisfactory
People	People	Control Effectiveness

Target

Not yet risk rated

DESCRIPTION

Overpressure of downstream system

LOCATION
Brooklyn Compressor Station

APPROVER
Albert Brovedani

RISK STATUS
Active

Doc. Control: 40

2 items **14/14** in place controls

Causes + Preventing Controls

1.	**Inappropriate valve operation**	**7/7 in place**
1.1	**Operating and maintenance procedures and training (especially for control equipment & SCADA)** **Cross Reference / Supporting Documents:** BCS544 Brooklyn Compressor Station Operator's Manual; GCS023 Gooding Compressor Station Operating & Maintenance Manual; MAN236 Competency & Training Management; WCG276 Operating & Maintenance manual - Wollert **Objectives:** Pipeline is operated by AEMO	✓
1.2	**Liaise with supplier / AEMO** **Cross Reference / Supporting Documents:** Service Envelope Agreement	✓
1.3	**24 hour manned control room with overpressure alarms**	🔗 ✓
1.4	**Overpressure protection systems** **Cross Reference / Supporting Documents:** ESD077 Design Management; STD222 Standard for pressure Regulating Facility - Design & Construction	✓
1.5	**Critical valves that could cause overpressure are all locked and identified** **Cross Reference / Supporting Documents:** PIP212 Pipeline valve design; VLV352 control Valves; PIP268 Pipeline valves inspection, operation and maintenence	✓

3 items **3/3** in place controls

Consequences + Mitigating Controls

1.	**Damage to downstream equipment** **Comments:** May result in a leak	**1/1 in place**
1.1	**Isolation plans**	✓
2.	**Loss of supply**	**1/1 in place**
2.1	**Repair procedures**	✓
3.	**Safety issue**	**1/1 in place**
3.1	**Emergency response procedures** **Cross Reference / Supporting Documents:** EME020 Emergency Management Manual **Objectives:** Minimise any consequence of uncontrolled gas release	✓

1.6	**Design of pipeline system**	✔
1.7	**Work instructions** **Objectives:** Work instruction are issued within the maintenance scheduling system and permitting / JHA requirements are in place for performance of the work	✔
2.	**Failure of valves to operate when required**	**7/7 in place**
2.1	**Methodology and philosophy for system design (Design Basis Manual)** **Cross Reference / Supporting Documents:** ESD077 Design Management; ESD110 Project Management; STD222 Standard for Pressure Regulating facility - Design & construction	✔
2.2	**Maintain SCADA and equipment to isolate and emergency shutdown / failsafe** **Cross Reference / Supporting Documents:** BCS544 Brooklyn Compressor Station Operator's Manual; GCS023 Gooding Compressor Station Operating & Maintenance Manual; PIP286 Pipeline Valves - Inspection Operation and Maintenance; PIP269 Regulator & Over Pressure Protection Systems - Inspection Operation & maintenance Procedure; WCG276 Operating & Maintenance manual - Wollert	✔
2.3	**Alarms to AEMO & GasNet control rooms**	🔗 ✔
2.4	**24 hour manned control room with overpressure alarms**	🔗 ✔
2.5	**Change Management procedures** **Cross Reference / Supporting Documents:** MAN232 Change Management	✔
2.6	**Maintenance program on assets**	✔
2.7	**5 yearly safety management study** **Cross Reference / Supporting Documents:** HAZ238 Hazop study guide	🔗 ✔

Actions

No items found

Issues

No items found

Learnings

No items found

Assurance Functions / Notes

No items found

Attachments

No Attachments found

Risk Owner Albert Brovedani **Raised by** Albert Brovedani

TYPE	RISK ID	STATE	DIVISION/BUSINESS UNIT/FUNCTION	REGISTER	RISK REVIEW DATE
Risk	1085	Approved	Infrastructure Strategy & Engineer	Victorian Pipeline Safety Case	30/11/2019

CREATED AT	UPDATED AT
21/07/2014	04/12/2014

Legislative / regulatory change - failure to comply

Inherent	Residual	Control Effectiveness
Intermediate	Low	4-Satisfactory
Security of Supply	Security of Supply	Control Effectiveness

Target

Not yet risk rated

DESCRIPTION

Unaware of material change to regulations or Standards that leads to a compliance breach

LOCATION
Victorian Transmission System

APPROVER
Albert Brovedani

RISK STATUS
Active

Doc. Control: 26

Causes + Preventing Controls

1 items **6/6** in place controls

1.	**Failure to recognise material legislative change** **Comments:** Positive regulatory obligation is missed	6/6 in place
1.1	**Subscription to legal and Standards update and news services** **Objectives:** Access to changed legislation and Standards including consultation phase	✓
1.2	**Regular contact and briefing with relevant regulatory authorities** **Objectives:** ESV issue guideline documentation on material issues to assist Licensee's compliance with submission of documentation. Changes to Pipeline Act / Regulations will likely trigger a change to the Safety Case.	✓
1.3	**APA compliance team meetings** **Objectives:** Consultation amongst key staff on changing legislative requirements for consistency of processes.	✓
1.4	**Safety Case requirements, EMP, etc**	✓
1.5	**Internal auditing program**	🔗 ✓
1.6	**Appropriate response to non-compliance issues from regulator audits/ observations / incidents**	✓

Consequences + Mitigating Controls

4 items **5/5** in place controls

1.	**Legal prosecution and fines** **Comments:** Legislation specifies penalties for regulatory breaches	2/2 in place
1.1	**Internal auditing program**	🔗 ✓
1.2	**Safety Case is the key document for specifying procedures and actions used for achieving compliance to Regulations and Standards** **Objectives:** Provides key measures used to achieve compliance	✓
2.	**Loss of operating licence** **Comments:** this would possibly only occur in severe circumstances or where wilful negligent conduct or repeated breaches take place	2/2 in place
2.1	**Stakeholder relationship** **Cross Reference / Supporting Documents:** Regulator guideline documents **Objectives:** Regular meetings and correspondence with regulators to ensure expectations are understood	🔗 ✓
2.2	**Resourcing of professional staff to advise on regulatory requirements and technical/operational staff to ensure requirements are met** **Cross Reference / Supporting Documents:** MAN-368 VTS Safety Case **Objectives:** To become fully conversant in regulatory requirements and become proactive in meeting the requirements	✓

3.	**Reputational impacts** **Comments:** Could cause added layer of complication in regard to approval applications	1/1 in place
3.1	**Stakeholder relationship** **Cross Reference / Supporting Documents:** Regulator guideline documents **Objectives:** Regular meetings and correspondence with regulators to ensure expectations are understood	
4.	**Delays in receiving operational consent**	0/0 in place

Actions

No items found

Issues

No items found

Learnings

No items found

Assurance Functions / Notes

ID	Comment/Note	Owner	Created at
1	Internal auditing program is designed to pick up key legislative / AS2885 requirements as they relate to the Safety Case or Pipeline Management System	Albert Brovedani	21/Jul/2014 14:28 PM

Attachments

No Attachments found

ENVIRONMENTAL RISK ASSESSMENT

REPORT

TRANSMISSION – VICTORIA

HSE Group
Alice Rawlinson
Environment Manager

16 April 2014

Table of Contents

1. Executive summary

This report presents the findings from the March 2014 environmental risk assessment workshop conducted on activities associated with APA's transmission business in Victoria.

Only environmental risks were considered in the risk assessment (i.e. other risks such as those affecting reputation, personnel and financial were excluded).

The workshop was conducted in accordance with the Terms of Reference document.

General environmental aspects were evaluated as well as aspects associated with specific activities.

Of the 40 items considered:

- 3 risks were considered to be not credible
- 0 residual risks were assessed to be extreme
- 1 residual risk was assessed to be high; and
- 9 residual risks were assessed to be moderate.

Although the majority of risks were ranked low and moderate, a number of action items were identified. All risks and actions for close out should be subject to ongoing review and monitoring by APA.

2. Introduction

This report describes the environmental risk assessment for the Victorian transmission business. The workshop was held at the APA office in Dandenong on March 16, 2014. This report details the scope of work, methodology applied and the workshop results and findings.

The workshop was conducted in accordance with the workshop Terms of Reference.

3. Background

APA own and/or operate assets in multiple Australian states. There are inherent risks associated with APA's activities (i.e. operations, maintenance, construction, commissioning and general personnel activities in the office and field) as well as risks related to pipeline contents. It is those risks that have the potential to lead to environmental impacts that are of relevance to this assessment.

Environmental risk assessments are being conducted across transmission, networks and infrastructure development within APA, allowing the business to:

- Better understand its environmental risk profile;
- Develop a more rigorous basis for strategic planning;
- Improve compliance with relevant legislation;
- Manage proactively rather than reactively;
- Continually improve on environmental performance; and
- Operate with greater openness and transparency with environmental decision making.

4. Scope of works

The scope of this workshop was to consider the aspects and impacts associated with APA's activities identified in section 3.

Specifically included in the scope of works are all environmental issues, including land access and cultural heritage.

Specifically excluded are occupational health and safety issues, reputational, security and financial implications.

5. Methodology

The risk assessment process applied was consistent with ISO 14001:2004 Environmental Management Systems, ISO 31000:2009 Risk Management Systems and AS2885 the Australian Pipeline Standard.

The workshop considered the cause/aspect, impact, assessment and mitigation measures.

A summary of the process is as follows:

- Review of workshop purpose, scope, objectives and stakeholders;
- Identify activities, cause, aspects and impacts using existing list and brainstorming;
- Evaluate the likelihood and consequence of each risk to determine a risk ranking;
- Treat the risk by identifying existing and additional control or mitigating measures;
- Re-evaluate the risk to determine a residual risk ranking; and
- Assign actions and actionees – person/people accountable for closing out actions.

6. Risk assessment

Risk rankings were assigned to consequence and likelihood using the APA risk matrix shown in Appendix 1.

In assigning a level of likelihood, the working group took into consideration the likelihood of the consequence being realised given the existing controls in place. The risk matrix likelihood criteria includes both quantitative and qualitative wording and both were used to help guide the assignment of a relevant frequency/likelihood to the identified consequence.

Consequence and likelihood were combined to produce an estimated level of risk associated with a particular hazardous activity.

7. Attendees

The following employees attended the risk assessment:

- Albert Brovedani – Technical Regulations Manager
- Alice Rawlinson – Environment Manager
- Andrew Adams – Manager Measurement
- Brynne Jayatilaka – Environment Officer
- Carlo Corso – Operations Support Manager
- Darren Flaus – Manager Field Services South East
- Ian Johnson – Regional Manager Gippsland
- Shane Matthews – Regional Manager Otways

The following employees attended to provide input regarding risks associated with weeds and cultural heritage:

- Colin Mason – Lands Projects Coordinator

- Melissa Dunk – Team Leader, Land Services

7.1 Risk register

The results of the workshop have been documented in the risk register, attached (refer to Appendix 2).

7.2 Recommendations

A number of actions were recommended by the workshop team, as contained in the risk register.

Recommendations (or actions) fall into 2 categories:

1. The risk was deemed to be low but an action was raised to clarify or re-enforce some aspect.
2. The risk was deemed to be too high and so an action was raised in direct relation to reducing the risk rating.

It is recommended that all actions be closed out prior to the next review.

7.1 Limitations

The risk assessment did not consider reputational and financial impacts as a result of environmental legislative and license non-compliance, which means the risk register is not exhaustive

8. Review

A review of this risk register should occur within 2 years (as a minimum) or as required (e.g. following an incident, legislative or license non compliance, or material system change).

9. Definitions

Term	Definition
Hazard	The potential of something to cause harm.
Aspect	Feature of an activity which interacts with the environment and has the potential to result in impact (e.g. oil spill) or is currently occurring.
Impact	Potential changes to the environment resulting from the aspect (e.g. soil contamination)
Significant environmental aspect	Aspects of particular significance to an organisation, based on risk ranking, compliance risks and business values.

10.Appendix 1 - APA Environmental Risk Matrix

			CONSEQUENCE Degree of Potential Harm					
		Environment	Limited effect of low significance to minimal area	Short-term temporary impairment to localised area	Prolonged but reversible impairment to localised area and does not affect ecosystem function	Uncontrolled, long term but reversible impairment to localised area and does not affect ecosystem function	Uncontrolled, long term but reversible environmental impairment of ecosystem function	Uncontained, long term serious environmental degradation OR permanent impairment to ecosystem function.
LIKELIHOOD Possibility, Probability, Frequency of exposure, Historical evidence	**Description**	**Descriptor**	**Insignificant -1**	**Minor -2**	**Medium -3**	**Significant -4**	**Major -5**	**Catastrophic -6**
	Is currently occurring, or will almost definitely occur	**Frequent -6**	Low (7)	Moderate (13)	High (21)	Extreme (31)	Extreme (33)	Extreme (36)
	Can be expected to occur in most circumstances	**Likely -5**	Low (6)	Moderate (12)	High (20)	High (24)	Extreme (32)	Extreme (35)
	Can be expected to occur in certain circumstances	**Occasional -4**	Low (5)	Low (10)	Moderate (16)	High (23)	High (27)	Extreme (34)
	May occur in certain circumstances	**Possible -3**	Negligible (3)	Low (9)	Moderate (15)	High (22)	High (26)	High (30)
	Not expected to occur but may occur in abnormal circumstances	**Unlikely -2**	Negligible (2)	Low (8)	Moderate (14)	Moderate (18)	High (25)	High (29)
	Conceivable but only in exceptional circumstances	**Rare -1**	Negligible (1)	Negligible (4)	Low (11)	Moderate (17)	Moderate (19)	High (28)

Risk Matrix Supplementary Information

Likelihood Descriptions

Likelihood Descriptor	Likelihood Description	Likelihood Explanation
Rare	Conceivable but only in exceptional circumstances	Either is not known to have occurred or has not occurred in many 'exposures' to the potential risk.
Unlikely	Not expected to occur but may occur in abnormal circumstances	Aware that the event has occurred occasionally either within APA or externally. However, it is not something that would be classed as a common occurrence and would only occur in certain remote circumstances.
Possible	May occur in certain circumstances	Occurs either within APA or known environment on an irregular basis but frequently enough to be more than a remote possibility.
Occasional	Can be expected to occur in certain circumstances	Knowledge/evidence either within APA or externally suggests this event/risk occurs occasionally from time to time but not regularly.
Likely	Can be expected to occur in most circumstances	Knowledge/evidence either within APA or externally suggests this event/risk occurs at regular intervals.
Frequent	Is currently occur ring, or will almost definitely occur	Knowledge/evidence either within APA or externally suggests this event/risk occurs almost all of the time. The occurrence of this risk is common and expected.

Consequence – Environment Descriptions

Consequence Environment Descriptor	Consequence Description - Environment	Consequence – Environment Explanation
Insignificant	Limited effect of low significance to minimal area	Short-term (less than 12 months) temporary impairment to the biological or physical environment of a very localised area (<0.1ha). Isolated, easily contained, minor harm e.g. noise complaint.
Minor	Short-term temporary impairment to localised area	Temporary short-term (< 12 months) impairment to the biological or physical environment of a very localised area (<0.1ha)
Medium	Prolonged but reversible impairment to localised area and does not affect ecosystem function	Prolonged (more than 12 months but less than 2 years) reversible impairment to the biological or physical environment of a localised area (<1ha) which is easily rectified and which does not affect ecosystem function.
Significant	Uncontrolled, long term but reversible impairment to localised area and does not affect ecosystem function	An uncontrolled off-site release or event resulting in reversible prolonged (more than 2 years but less than 5 years) impairment to the environment but which does not affect ecosystem function.
Major	Uncontrolled, long term but reversible environmental impairment of ecosystem function	An uncontrolled off-site release or event in wide area resulting in reversible long-term environmental impairment of ecosystem function.
Catastrophic	Uncontained, long term serious environmental degradation OR permanent impairment to ecosystem	Uncontained, long-term serious environmental degradation OR permanent impairment to ecosystem function or habitat.

	function.	

Risk Management Action Descriptions

Risk Level	Description	Key Actions
Extreme	Extreme risk	Do not proceed with work. Immediate action required to mitigate or reduce risk to ALARP. If not reasonably practicable to do so all appropriate control measures must be applied and risk escalated to Executive Group Manager of the relevant business for resolution before work starts. Monitor changes which could affect the risk classification.
High	High risk	Do not proceed with work without management approval. Immediate action required to mitigate or reduce risk to ALARP. If not reasonably practicable to do so all appropriate control measures must be applied and risk escalated to General Manager of the relevant business for approval to proceed and/or resolution before work starts. Monitor changes which could affect the risk classification.
Moderate	Moderate Risk	Work can proceed once supervisor has confirmed process has been adequately followed and risk controls identified and implemented. Management instructions must be specified before work commences and must be followed. Proper diligence must be exercised and reasonable steps / precautions must be taken to ensure the risk level is controlled to as low as reasonably practicable. Periodic monitoring required.
Low	Low risk	Manage by routine plans and procedures. Proper diligence must be exercised and reasonable steps / precautions must be taken to ensure the risk level is controlled to as low as reasonably practicable. Monitor changes which could affect the risk classification.
Negligible	Negligible Risk	

11.Appendix 2 – Victoria Transmission : Environmental Risk Register

Activity	Sub-Activity	Cause	Aspect	Impact	Cred (Y/N)	Initial Risk Analysis			Existing controls	Residual Risk Analysis			Action	Actionee	Remarks
						L	C	RR		L	C	RR			
General															
General - driving vehicles	Driving on easement and off road only	Service vehicles contaminated with weeds accessing easement e.g. off road (APA and Sea Gas)	Weeds	* Remnant vegetation destruction * loss of native flora * ecosystem impacts * public complaints. * Water quality and catchment related impacts * loss to agricultural productivity * erosion issues	Y	5	4	24 (H)	OEMP CEMP's Weed spray training Stakeholder interaction (councils) Limited easement driving Weed identification material	3	3	15 (M)	* Review spread/location of existing noxious weeds * OEMP review * Review existing weed management procedures and manuals * Improve training and awareness (implementation)	HSE and HELM	* Limited easement driving * Impacts largely to agricultural productivity and landowners
			Disease (bovine disease)	* agricultural productivity * community * fauna impacts	Y	3	4	22 (H)	OEMP CEMP Public signage Process (SEA Gas) e.g. animal awareness	3	4	22 (H)	* Review spread/location (Colin Mason and Andrew Mills) * OEMP review * Review existing procedures * Improve training and awareness	HSE and HELM	West of Portland
		Accidental collision with fauna/livestock	Fauna fatalities	* loss of protected fauna and livestock	Y	6	1	07 (L)	Shu roo Driver training	6	1	07 (L)			
		Pipeline survey/maintenance	Soil erosion and compaction	Loss of topsoil, compaction, formation of erosion channels, disturbance of vegetation	Y	2	2	08 (L)	N/A	2	2	08 (L)	Soil integrity procedures	HSE	

		Vehicle exhausts	Emissions	localised air quality and GHG emissions, community	Y	6	1	07 (L)	Vehicle maintenance and replacement program Vehicle selection criteria Risk assessment (safeguard requirement)	6	1	07 (L)			
		No cultural heritage assessment and employee / contractor awareness; inadvertent disturbance	Cultural and European heritage	* Cultural heritage disturbance * Loss of heritage value * Community complaints	Y	2	3	14 (M)	OEMP	2	3	14 (M)	* Cultural heritage procedures * Training and awareness * Alignment sheets	HSE	
General - hot work	N/A	Smoking, welding, grinding, vehicles and machinery, flaring **(Regional/paddock/ vegetated areas)**	Uncontrolled fire	* Flora and fauna * Biodiversity * Habitat * Agriculture and productivity * Community/landowners	Y	4	5	27 (H)	Permit to work JHA/hot work Procedures Fire response training Emergency response training Competent personnel Fire response equipment (water trailer etc.) Fire services notification and/or attendance High fire danger period permits requests Corporate HSE inductions	1	5	19 (M)	* Review fire break requirements	HELM	

		Smoking, welding, grinding, vehicles and machinery, flaring **(facility/stations)**	Uncontrolled fire	* Flora and fauna* Biodiversity* Habitat* Agriculture and productivity* Community* Pollution/emissions	Y	2	4	18 (M)	Permit to work JHA/hot workProcedures Fire response training Emergency response training Competent personnel Fire response equipment (water trailer etc.) Fire services notification and/or attendance High fire danger period permits requests Corporate HSE inductions Fire suppression Emergency response plans (station specific) Fire monitoring Gravelled compounds Alarms back to base	1	5	19 (M)			Refer to Station Design Hazops, Hazard Registers.
Operations and Maintenance															
O&M - Compressor, MLV and Meter Station General Operation and Management	Vehicle/people movements	* Personnel unaware of cultural heritage site significance * Inadvertent contact with site * Deliberate contact with site * Grading of ROW * Lack of baseline data	Cultural heritage disturbance	* Cultural heritage disturbance * Loss of heritage value * Community complaints	Y	2	3	14 (M)	OEMP	2	3	14 (M)	* Cultural heritage procedures * Training and awareness * Alignment sheets	HSE	
	Ground breaking maintenance activities	* People unaware of site significance * Inadvertent contact * Deliberate contact * Grading of ROW	Cultural heritage disturbance	* Cultural heritage disturbance * Loss of heritage value * Community complaints	Y	3	3	15 (M)	National Excavation Procedure and Guidelines Implementation (training and awareness) National Working Group (communication) OEMP	2	3	14 (M)	* Review existing Excavation Procedure to account for approvals * Implementation of procedure	HSE	

		ROW disturbance	Recontouring of waterway banks, erosion	Sedimentation, drainage, compaction, waterway turbidity/ecosystems	Y	3	3	15 (M)	Management of transmission pipeline easements Excavation Procedure (not adequately implemented) OEMP General awareness	2	3	14 (M)	* Development of or improvement of environmental procedures (water and soil management) * Improved training and awareness of existing procedure * Additional corporate training/awareness * Identify competencies	HSE	
	Vegetation management	Slashing, clearing and pruning of ROW	Loss of local flora and fauna	Habitat, biodiversity, protected species, migratory species.	Y	5	1	06 (L)	OEMP General awareness	5	1	06 (L)	* Review Victorian regulations * Develop Vegetation procedures * Training	HSE and HELM	
	Pipeline excavation activities	Inadequate restoration of soil profile, inadequate containment of top or subsoil	Loss of top soil/incorrect management soil profile	Impacts to vegetation and soil integrity.	Y	5	2	12 (M)	National Excavation Procedure and Guidelines Implementation (training and awareness) Pipeline awareness (See above)	2	2	08 (L)			
		Open excavation	Fauna disturbance, entrapment of fauna in trench and pipe,	Fauna fatalities (livestock and native fauna)	Y	2	1	02 (N)	National Excavation Procedure and GuidelinesOEMP	2	1	02 (N)			
		Grit /sand blasting operations	Noise/vibration and dust	Community concerns	Y	1	1	01 (N)	Use of plastic lining to prevent dispersal	1	1	01 (N)			

			Debris	Soil contamination	Y	6	1	07 (L)	Plastic lining to contain debris Canopy to prevent dispersal for coal tar Licenced carriers for waste removal	6	1	07 (L)			
		Backfill inadequately compacted, backfill material inappropriate (DIG UPS)	Soil management (inversion, subsidence and compaction)	Erosion channels, vegetation regrowth (grass, aesthetics, community/landowner complaints	Y	4	3	16 (M)	Excavation Procedure and Guidelines OEMP Patrolling and monitoring Landowner liaison erosion control structures	2	2	08 (L)	* Soil integrity procedures to reference Excavation Procedure. * Training and awareness of soil integrity issues	HSE and HELM	
			Drainage to waterways	Surface water (creeks, streams) - increased sedimentation, turbidity, aquatic ecosystems	Y	3	3	15 (M)	Excavation Procedure and Guidelines OEMP Patrolling and monitoring Landowner liaison Sediment control structures	2	2	08 (L)	* Soil integrity procedures to reference Excavation Procedure. * Training and awareness of soil integrity issues	HSE and HELM	
			Acid Sulphate Soil	soil and vegetation, fauna	Y	2	2	08 (L)	N/A	2	2	08 (L)	* Identify presence of Acid Sulphate Soils (diagram) * Account for acid sulphate processes		
	Use of herbicides/pesticides for weed control (contractor and in-house activity)	Overspray, spillage	Overspray	Vegetation, soil contamination	Y	2	1	02 (N)	Landholder liaison Weed spray and chemical training	1	1	01 (N)			

	Corrosion protection	Deep anode well drilling	Waste material and land disturbance	NC	NC										
	General operation of equipment	* General operation of equipment* Maintenance, service vehicles* Valve calibration* Station ESD* Changing filter* Venting	Noise/vibration	Community concerns	Y	3	2	09 (L)	Pipeline awareness and/orStakeholder consultation	2	2	08 (L)			
	Ablutions mismanagement/leak	Sewage and grey water spill	Sewage and grey water spill		NC										
	Odorant handling, storage, transport	Release of odorant to air (Longford)	Odorant spill/leak	Community concerns/public outcry	Y	3	2	09 (L)	Odorant Procedure OEMP Training Competent personnel Bunding Specialist machinery for transfers Emergency response manual and training (longford local) Charcoal filters Odorant flare	2	2	08 (L)			refer to hazard register Vic transmission

		Release of odorant to air (Dandenong)	Odorant spill/leak	Community concerns/public outcry	Y	3	2	09 (L)	Odorant Procedure OEMP Training Competent personnel Bunding Specialist machinery for transfers Emergency response manual and training (longford local) Charcoal filters Odorant flare	2	2	08 (L)			
		Release of odorant to land	Odorant spill/leak to land	Soil and groundwater contamination, vegetation growth	Y	3	2	09 (L)	Odorant Procedure OEMP Training Competent personnel Bunding Specialist machinery for transfers Emergency response manual and training (longford local) Charcoal filters Odorant flare Spill kits	2	2	08 (L)			
	Compressor station, MLV and meter station general operations	* General operation of equipment * Maintenance, service vehicles * Valve calibration * Station ESD * Changing filter * Venting major pipeline section	Noise	Community concerns	Y	3	2	09 (L)	Pipeline awareness and/or Stakeholder consultation	2	2	08 (L)			

	Grey water drainage	Run off water containing oil or other contaminants (e.g. storm water) * Inadequate containment of drained material* Inadequate/lack of drainage	Contaminated run-off water	Soil, groundwater and/or surface water contamination - insignificant	Y	2	3	14 (M)	Interceptor systemsInternal bunding Inspection processesWork program	1	3	11 (L)			
	Compressor, GEA and heater operation	General operation of equipment	Exhaust emissions	N20, CH4 and CO2 release. Reduction in local and regional air quality (with respect to NOx, SOx, CO2 and PM10). Global warming impacts - moderate	Y	6	1	07 (L)	Maintenance regime Inspections Combustion analyses	6	1	07 (L)			
	Hazardous liquid materials storage/loss of containment(e.g. coolant, oil, chemicals)	* a/g tank inadequate bund capacity or leaching of oil through bund walls or floor * Flooding of bund (any oil in storage area washed out and enters surface water) * Spill during transfer to/from tanks (a/g) * Container damage Inadequate containment of materials (no bunding)	Hazardous liquid spill/leak (800L maximum)	soil and groundwater contamination	Y	4	3	16 (M)	Work program (bunding inspections) Spill kits Training and awareness MSDS registers Chemical audits	2	2	08 (L)	Review haz substances procedures and develop if required Training and awareness	HSE	

	General waste management (solid/liquid domestic waste (on-site)	Improper management of inert waste e.g. * Excessive build-up of waste * Inadequate or lack of containment * Damaged containers	General waste accumulation and/or spill	Aesthetics, hygiene and odour, vermin, fire risk	Y	5	2	12 (M)	Contractor disposal Work program (housekeeping) Adequate containment	3	2	09 (L)	Review waste management protocols and develop if required Training and awareness	HSE	
	handling of hazardous materials (e.g. coolant, waste oil, fuel, chemicals)	Mishandling of hazardous materials (e.g. coolant, waste oil, fuel, chemicals) or transport accident Inadequate containment of materials, or container damage	Hazardous liquid spill	soil and groundwater contamination	Y	4	3	16 (M)	Work program (bunding inspections) Spill kits Training and awareness MSDS registers Chemical audits	2	2	08 (L)	Review haz substances procedures and develop if required Training and awareness	HSE	
	Storage/handling of hazardous waste (e.g. lead acid batteries, paint containers, filter elements etc)	Improper management of regulated wastes e.g. * Poor containment or container damage, or no bunding * Mishandling of materials or transport accident	Hazardous waste	soil and groundwater contamination	Y	4	3	16 (M)	Work program (bunding inspections) Spill kits Training and awareness MSDS registers Chemical audits Procedure	2	3	14 (M)	Review hazardous waste disposal procedure (VIC)	HSE	
O&M - Gas pipeline management	Maintenance and operation of pipeline	Release of methane gas from* Corrosion* Equipment, pipeline and mechanical failure (e.g. valve leaks and joints)* Operator error* Third party damage	GHG emissions	localised air quality and GHG emissions, community	Y	5	2	12 (M)	Cathodic protection Asset Management PlanWorks ProgramLandowner liaisonDBYDPipeline awarenessPIMPSCADA system/monitoringTrained and competent personnel	2	2	08 (L)			

	Pipeline pigging	* Inadequate containment of waste material * Inappropriate disposal of waste material * Mishandling of waste material	Pipeline waste material spill	Soil and groundwater contamination	Y	5	2	12 (M)	Pigging procedures Design catchment facilities Certified waste removalists Trained/competent people Risk assessments	3	2	09 (L)	Review waste management protocols and develop if required Training and awareness	HSE	
	Natural gas release (unplanned, controlled)	* Operator error * Station ESD	GHG emissions	localised air quality and GHG emissions, community	Y	5	2	12 (M)	Asset Management Plan SCADA system Trained and competent people	3	2	09 (L)			
	Natural gas venting (planned)	Routine maintenance/testing	GHG emissions	localised air quality and GHG emissions, community	Y	6	1	07 (L)	Blow down procedure ENV 014 Trained/competent personnel Job specific risk assessment/work instruction	6	1	07 (L)			
	Pipeline coating coal enamel	Repairing activities and new work (e.g. tap in)	Releases of asbestos containing enamel	soil and groundwater contamination	Y	6	1	07 (L)	Plastic lining to contain debris Canopy to prevent dispersal for coal tar Licenced carriers for waste removal	6	1	07 (L)			
	Pipeline hydraulic testing	Release of hydro test water	Water release		NC										Potable/clear water in workshop
Third party works	Third party works (e.g. grading)	Third party interference with easement	Soil integrity (compaction/ erosion etc) cultural, weed spread	Biodiversity, habitat, community nuisance	Y	4	3	16 (M)	Pipeline awareness DBYD Works agreements Patrols Signage	3	3	15 (M)	Improvement of third party awareness	HELM	