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22nd August 2013

Mark Riddell
Associate Director
Pritchard Francis Pty Ltd
469 Wellington Street
PERTH WA 6000

Email: mark.ri@pfeng.com.au

Dear Mr Riddell,

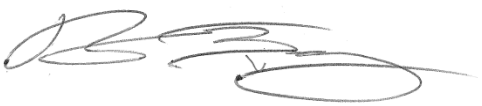
RE: Pipeline Risk Management Plan - Lots 21, 569 & 1263 Sixty Eight Road, Baldivis

We refer to the development proposal for Lots 21, 569 & 1263 Sixty Eight Road, Baldivis, and the pipeline risk management plan 401012-01382-SR-REP-0001. APA Group's (APA) high pressured Parmelia Gas Pipeline (PGP), traverses through the north western section of the development plan 2342-14C-01.

Upon review of the amended development plan, the proposed changes do not introduce any new risks to the PGP, nor does it change the location classification of the final proposed development. APA believes that the PGP will be in compliance with AS2885 and APA requirements if the conditions and actions in Appendix 6 of 401012-01382-SR-REP-0001 are adhered to. APA is satisfied that the above mentioned pipeline risk management plan still applies to the amended development plan and no further conditions or actions are required.

If any further changes are made to the development plan, APA must be advised and the pipeline risk management plan reviewed prior to the commencement of works.

Yours faithfully



Bill Ivory
Land Agent WA
APA Group

WorleyParsons

resources & energy

SIXTY EIGHT ROAD JOINT VENTURE

Lots 21, 569 & 1263 - Sixty Eight Road, Baldivis

Pipeline Risk Management Plan

401012-01382-SR-REP-0001

18-Oct-10

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SIXTY EIGHT ROAD JOINT VENTURE
LOTS 21, 569 & 1263 - SIXTY EIGHT ROAD, BALDIVIS
PIPELINE RISK MANAGEMENT PLAN

Disclaimer

PROJECT 401012-01382-SR-REP-0001 - LOTS 21, 569 & 1263 - SIXTY EIGHT ROAD, BALDIVIS

REV	DESCRIPTION	ORIG	REVIEW	WORLEY-PARSONS APPROVAL	DATE	CLIENT APPROVAL	DATE
A	Issued for internal review	KS K Szajnkienig	GL G Lane	N/A	21-May-2010	N/A	
B	Issued For Client Review	KS K Szajnkienig	GL G Lane	GL G Lane	16-June-2010	BM B. Martin	21-July-2010
0	Issued For Use	G Lane	K Szajnkienig	G Lane	18-Oct-2010		

CONTENTS

Appendices

1. INTRODUCTION

1.1 Background

The WA Planning Commission (WAPC) requires that any land development in the vicinity of high pressure gas transmission pipelines maintains certain setback distances (Ref. 1). These distances vary depending on the area of metropolitan Perth that is traversed by the pipeline.

For any proposal within the setback distances a Pipeline Risk Management Plan (PRMP) is required as part of the application for planning approval. The PRMP is required to demonstrate that:

- all threats from the pipeline have been assessed;
- additional risk mitigation measures, if required, have been identified; and
- residual risks from the pipeline to adjacent populations will be at acceptable levels consistent with AS2885: The Australian Standard for Pipelines: Gas and Liquid Petroleum (Ref. 2) and WA EPA Guidance Note No.2 (Ref. 3).

The proposed residential development is located on the corner of Sixty Eight and Baldivis Roads, in Baldivis.

The proposed development will introduce occupancy parallel to the pipeline and therefore impact the area location class as defined by AS2885.1-2007. The AS2885 Location Class for the proposed development is Residential (T1). The location class is dependent on the land use and population density within the 4.7KW/m^2 radiation contour measurement length as per AS2885.1-2007. The “T1” primary class is due to the block size of the sub-division (i.e. less than 1 hectare).

An AS2885.1-2007 pipeline risk assessment was conducted on the 20th of May, 2010 for the relevant section of the Parmelia pipeline affected by the proposed subdivision. The risk assessment reassessed current threats/safeguards, determined threats to the Parmelia pipeline resulting from the proposed development and risks to the development occupants who are adjacent to the pipeline.

1.2 Purpose

This Pipeline Risk Management Plan (PRMP) has been prepared for Sixty Eight Road Joint Venture. It has been prepared as per “Planning Bulletin 87” by the Western Australian Planning Commission (October 2007).

This PRMP should be read in conjunction with the AS2885.1-2007 risk assessment (refer Appendix 5) as the threats and actions identified during the risk workshop form part of this plan.

As a minimum the PRMP needs to document:

- The mitigation measures needed to achieve low, negligible or As Low As Reasonably Practicable (ALARP) risk level;

- The responsibility for the installation of those mitigation measures;
- Any on-going management measures; and
- The responsibility for the cost of implementing the mitigation measures.

This PRMP, once endorsed by the Pipeline Operator, will need to be forwarded by the applicant to the relevant planning authority as part of the planning proposal.

1.3 Scope

This PRMP considers the section of the Parmelia Pipeline that extends within the "measurement length" (279m) from the northern and southern boundaries of the proposed development. This length corresponds to an approximate pipeline length of 1,484m between Line Markers LM235-08 and LM235-17 (refer Appendix 2).

The proposed development area is designated as Lots 21, 569 and 1263 on the corner of Sixty Eight and Baldivis Roads.

The scope of the risk assessment work for this PRMP includes:

- The relevant section of the buried Parmelia Natural Gas Pipeline;
- Road and services (electricity, water, gas, communications, drainage) near the pipeline; and
- Other land use along the relevant section of the pipeline.

Any additional pipeline threats which become apparent due to changes in the development proposal must be reassessed.

Exclusions from the scope of the PRMP include:

- Threats that lie outside the "measurement length" from the development boundary were not considered in this assessment; and
- Threats to the pipeline during development works on Lots 21, 569 and 1263. If the proposed development proceeds, the developer should:
    1. conduct a construction HAZID;
    2. produce a Pipeline Protection Plan (PPP); and
    3. follow the advice from the Pipeline Operator for any work in the vicinity of the pipeline.

1.4 Pipeline Specification

The following pipeline details relevant to the pipeline section under review were presented and agreed at the start of the workshop:

TABLE 1 – PARMELIA TRANSMISSION PIPELINE SPECIFICATIONS

Pipeline	Parmelia (Main Line – Thomas Road to Pinjarra)
Design Code	ASME B31.3
Diameter (NB)	355.6mm
MAOP	5.61 MPag
Pipe Grade	API 5L X52
Pipe wall thickness	5.56mm
Pipe coating	Yellow Jacket
Corrosion Prevention System	Impressed Current (Direct Current)
Depth of Burial (nominal)	750mm minimum
Distance to 4.7KW/m2	279m (full bore rupture)

1.5 Acronyms and Abbreviations

The following acronyms and abbreviations have been used in this report.

68RDJV	Sixty Eight Road Joint Venture
ALARP	As Low as Reasonably Practicable {risk level}
AS	Australian Standard
CIC	Common Infrastructure Corridor
CP	Cathodic Protection
DBYD	Dial Before You Dig
DCVG	Direct Current Voltage Gradient
DOC	Depth of Cover
EIP	External Interference Protection
HDD	Horizontal Directional Drilling
MAOP	Maximum Allowable Operating Pressure {of the pipeline as in AS2885}
MDPE	Medium Density Polyethylene
MPa	Mega Pascal
POS	Public Open Space
PPP	Pipeline Protection Plan
PRMP	Pipeline Risk Management Plan
PSV	Pressure Safety Valve
SCC	Stress Corrosion Cracking
SMS	Safety Management Study
UE	Urban Endeavour
WAPC	Western Australian Planning Commission
WP	WorleyParsons Services Pty. Ltd.

2. SETBACK DISTANCE

The setback distance is dependant on the type of land use or development and Planning Bulletin 87 tabulates various setback distances based on a pipeline depth of cover (DOC) of 760mm. These setback distances are based on the generic quantitative risk assessment (QRA) undertaken in 2004 by Advantica Worley for the Gas Pipeline Working Group.

From Planning Bulletin 87, the standard setback distance for a Residential zoned area, along the Parmelia pipeline south of Caversham, has been given as 65m (at a 90 degree angle from the pipeline).

The risk level for the relevant development set by the EPA is based on a potential fatality rate of one in a million per year or less, within the setback distance.

If the pipeline section under consideration is buried at 1200mm (ie deeper than the 760mm used in the QRA). Based on figure 4 from the WorleyParsons document 450-10078-00-SR-RP-004, (produced for Agility) it is possible to determine setback distances due to different DOCs. At a depth of cover of 1200mm and a MAOP of 5.6MPag, the setback distances will be as follows:

1) Sensitive location = 70m (ie distance to the $0.5x10^{-6}$/annum risk contour)
2) Residential = 60m (ie distance to the $1x10^{-6}$/annum risk contour)
3) Industrial/Commercial = 0m (ie distance to the $5 x10^{-6}$/annum risk contour)

Also, note that as per AS2885.1-2007 requirements, the “Sensitive Use” location class is “assigned to any portion of the pipeline where there is a sensitive development within a measurement length” – ie for this pipeline that means anywhere within 279m from the pipeline.

So if a child-care facility (as an example) was located within the 279m, then “High Density” design requirements apply as per AS2885.1-2007. This includes, as a minimum, 50m sign spacing and a re-visit of the AS2885.1-2007 risk assessment.

3. MITIGATION MEASURES

3.1 Risk Mitigation For Proposed Lot Developments

The following risk mitigation measures to be implemented (see Table 2) for lot development have been agreed between the developer and pipeline operator. The following 10 items either:

- Have a cost impact as a result of the proposed development;
- Address a threat to the Parmelia pipeline; or
- Have a restriction on the land usage.

TABLE 2 – RISK MITIGATION DURING LOT DEVELOPMENTS

Action Number	Risk Mitigation Measure	Implementation Responsibility	Cost Responsibility
1	Increase signage through new T1 area to comply with signage requirements in AS2885.1-2007	APA Gp	68RDJV
2	Contact Water Corporation and confirm excavator size and type that could be expected to be used to excavate 1400mm steel pipe in this area. If equipment size and bucket type could credibly result in puncture then consider additional physical measure and advise 68RDJV.	APA Gp	*
3	APA to advise 68RDJV as to the minimum separation distance between pipeline and transformers.	APA Gp	-
4	68RDJV to locate transformers as advised by APA.	68RDJV	68RDJV
5	68RDJV to ensure utilities running in proposed road reserve (parallel to pipeline easement) do not encroach on POS.	68RDJV	*
6	68RDJV to ensure boundary of road reserves is at least 10m from pipeline centre line. If proposed roads cannot meet this criteria then 68RDJV to consult with APA regarding design solutions necessary.	68RDJV	*
7	APA to advise 68RDJV as to vegetation and landscaping limitations/restrictions on easement.	APA Gp	*

Action Number	Risk Mitigation Measure	Implementation Responsibility	Cost Responsibility
8	68RDJV to ensure no sensitive location (as defined in AS2885) is proposed within 279m of easement boundary (as per PB87) within Lots 569, 1263 and subsequent titles.	68RDJV	*
9	Confirm (as per action 579 from 2008 SMS) that there are no power poles within 5m of pipeline at this location.	APA Gp	-
10	68RDJV to provide Engineering drawings for all services to APA for approval. Slabbing will be required for services crossing (above or below) the pipeline as well as a minimum separation distance.	68RDJV	68RDJV

* No significant cost is expected at this stage of the proposed development but if action is not closed out satisfactorily in a timely manner then there may be cost implication for 68RDJV.

3.2 Ongoing Management Measures

The following management measures are identified based on typical Pipeline Operator requirements. These are the measures that need to be continued on an ongoing basis until the pipeline is decommissioned:

TABLE 3 – ONGOING RISK MITIGATION MEASURES

Item	Responsibility	Management Measure
1	Pipeline Operator	Continuation of existing pipeline condition monitoring.
2		Continuation of all necessary operating and maintenance practices as per the latest approved relevant APA operating/maintenance procedures.
3		Periodic review of AS2885.1 risk assessment.
4		Liaison with all relevant Common Infrastructure Corridor users.
5		Continuation of all land management system requirements.

4. CONCLUSIONS

The proposed development of Lots 21, 569 and 1263 poses potentially ongoing threats to the APA Parmelia Pipeline and vice versa. These threats were evaluated and risk assessed, were necessary using the AS2885.1-2007 Pipeline Risk Assessment Procedure.

The workshop was conducted in a positive and constructive manner. Contributions made by the study participants (refer Appendix 1) were critical to the success of the study and this was actively encouraged. Each participant brought specific knowledge, skill, experience and judgements to the workshop.

The results of the AS2885.1-2007 risk assessment can be seen in Appendix 5.

A number of actions have been raised and responsibilities assigned – it remains the responsibility of the relevant people to actively and expeditiously progress the actions to a suitable conclusion in order to bring the various pipeline threats to ALARP risk levels. All actions logged in Appendix 6 have been transferred to Section 3.1 of the report but Appendix 5 Risk Assessment Minutes should be referred to for the context of the actions.

It is also noted that the threat posed by the excavation of the water main (refer record LS-2 in the minutes in Appendix 5) resulted in further discussion within APA, and email correspondence between APA and WP, after the workshop. The result of this is justification as to the relevant risk being ALARP, and this is documented at the end of the worksheet (refer Appendix 5 page 3).

Correspondence and active liaison between the Pipeline Operator and the owners of Lots 21, 569 and 1263 will be required on an ongoing basis to progress the proposed development. The actions raised also reflect this.

Should the proposed development proceed, it is recommended that a PPP be produced (and as also required by WAPC PB87) once the construction contractor has been selected but before construction begins.

5. REFERENCES

1. High Pressure Gas Transmission Pipelines in the Perth Metropolitan Region. Planning Bulletin 87, Western Australian Planning Commission, October 2007.
2. AS2885.1: Australian Standard: Pipelines – Gas and Liquid Petroleum, Part 1 Design and Construction, 2007.
3. Guidance for Risk Assessment and Management: Off-site individual risk from Hazardous Industrial Plant, Guidance Note No.2 WA EPA, July 2000.

Appendix 1 – Workshop Attendance Record

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Meeting Attendance Record

Date	20th May 2010
Meeting topic	Lots 21, 569 & 1263 Baldivis and 68 Roads, Baldivis AS2885 Risk Assessment
Held by	WorleyParsons
Venue	Level 5 Conference Room, RBA Building – 45 St Georges Tce, Perth 6000

NAME	SIGNATURE	POSITION	COMPANY
GEOFF LANE		Facilitator	WP
KAMIL SZAJNKIENIG		SCRIBE	WP
PAUL REVELL		Lands Co-ordinator	APA
BEN MARTIN		Project Manager	UE
CLAYTON WYLIE		MECHANICAL ENGINEER	APA
GERRY CONNELL		LANDS OFFICER	APA.

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☐ **Other (please specify)**

Appendix 2 – Aerial Photography and Mapping

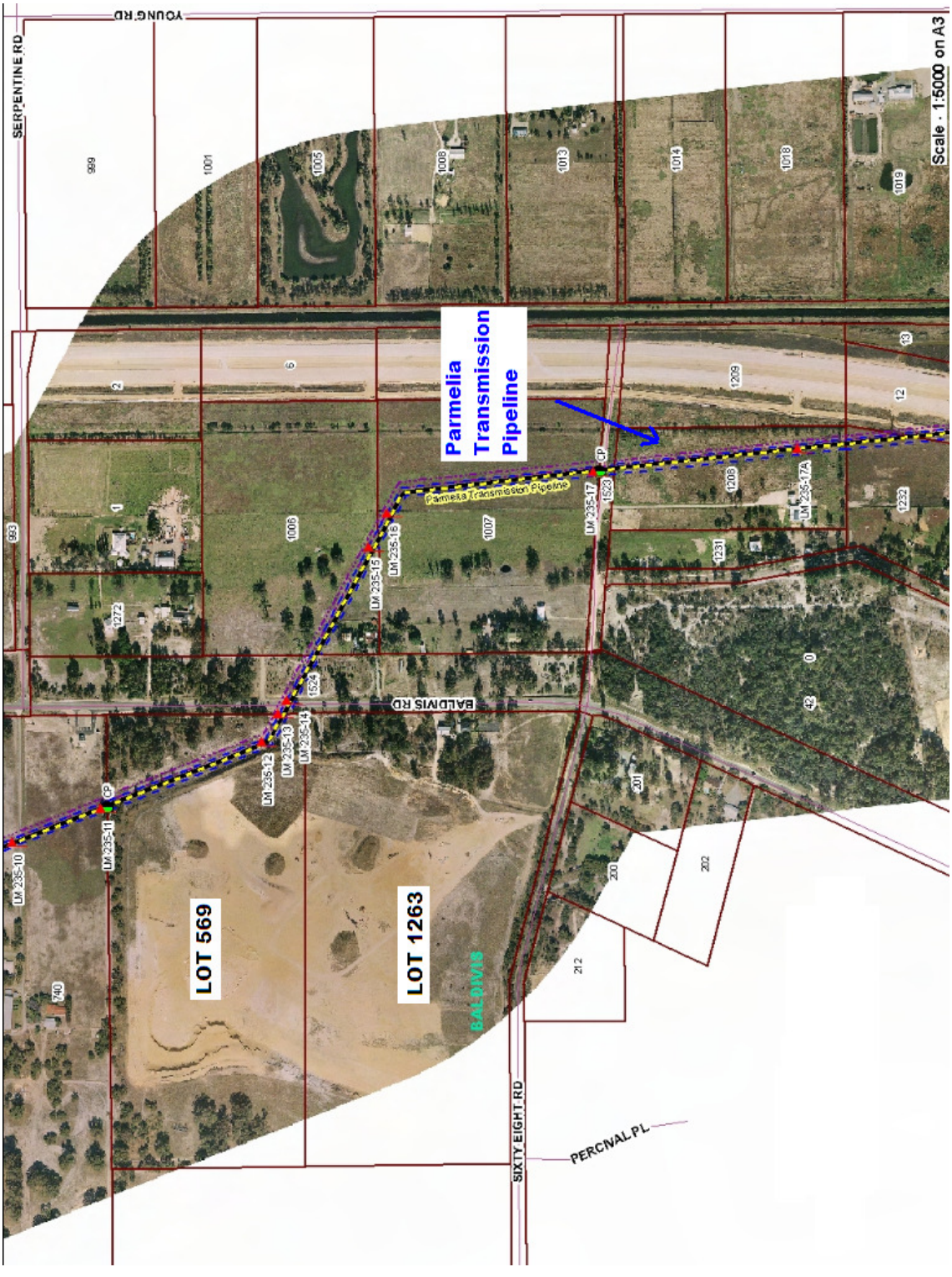

Figure 1 – Location of Parmelia pipeline relative to Lots 569 and 1263.

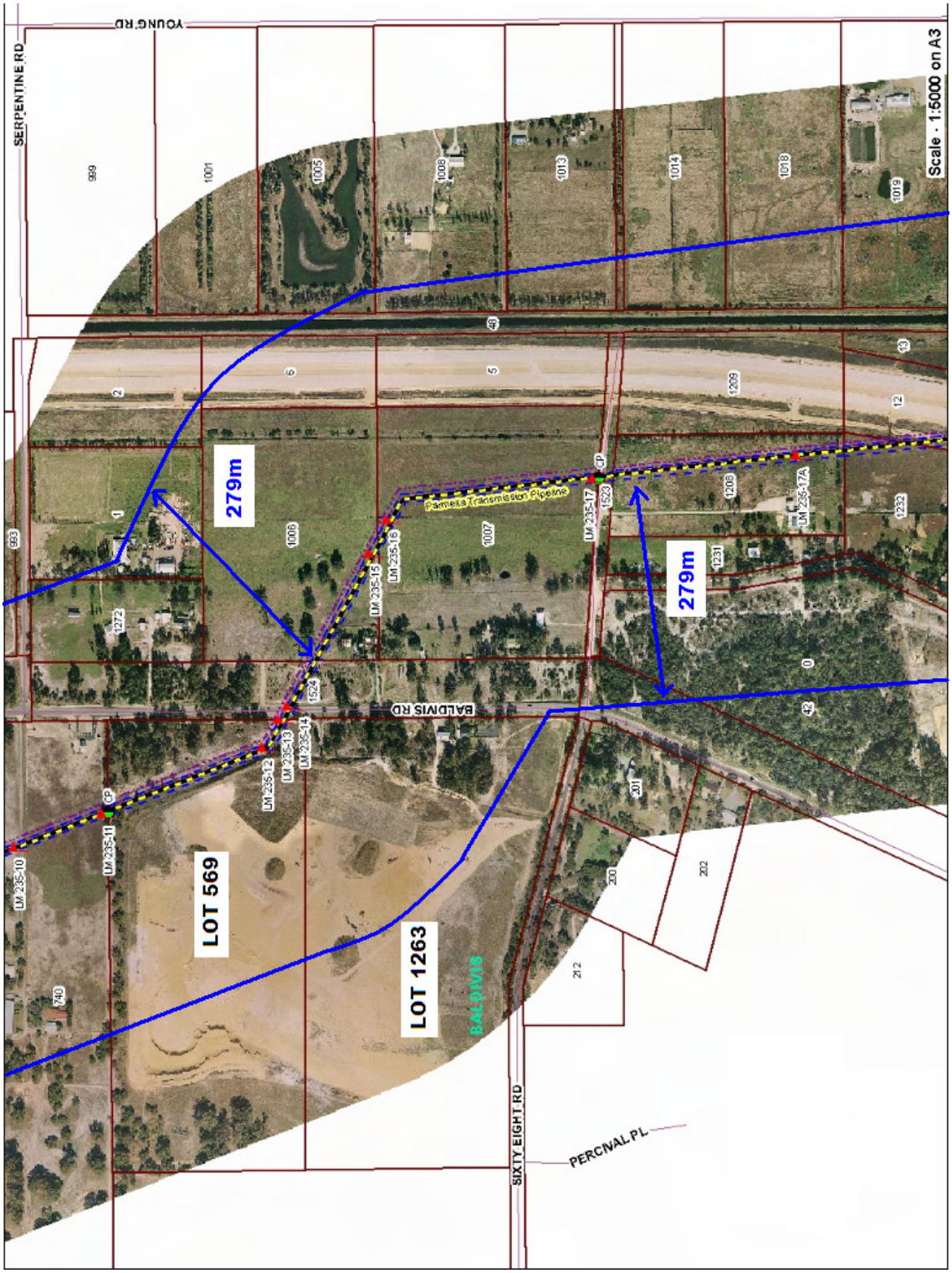

Figure 2 – 279m "Measurement Distance" from Parmelia pipeline relative to Lots 569 and 1263.

Figure 3 – Proposed Structure Plan for Lots 21, 569 and 1263.

Appendix 3 – AS2885.1-2007 Risk Assessment Methodology

AS2885 Risk Assessment Methodology

General

The methodology for the risk assessment is outlined in AS2885.1-2007. AS2885 is the only international pipeline code for cross-country pipelines that is risk based and aimed at managing the specific threats to a pipeline. The standard focuses on the identification of all possible threats to the pipeline and the management of these threats, either by:

- physical and procedural external interference protection measures; or
- design and procedural measures to prevent the occurrence of loss of containment incidents.

The AS2885 risk assessment was conducted via a workshop with representation from the Pipeline Operator and from the Developer (refer Appendix 1).

Methodology

The methodology normally used for pipeline risk assessment is based on AS 2885.1-2007. The process is illustrated below in Figure 4 and involves the following steps:

1. Location Analysis – The pipeline route is reviewed and the general land use in the area identified. Areas of particular significance that could pose additional threats to pipeline integrity (eg, road crossings) are noted.
2. Threat Identification – Identification of threats (using a facilitated brainstorming approach) considers all threats with the potential to damage the pipeline, cause supply interruption, cause release of fluid, or harm to people and/or environment. The safety management study team decides whether each identified threat is credible or not credible. For threats that are considered not credible, a reason for this is given and the threat not assessed further.
3. External Interference Protection – Physical and procedural measures that could reduce the threat of external interference to the pipeline are identified where applicable. If these are considered sufficient to control the threat to the pipeline (commensurate with the relevant location class), then the threat does not require further assessment.
4. Protection by Design and/or Procedures – Design measures and procedures that protect the integrity of the pipeline are identified. If these were considered sufficient to control the threat to the pipeline, then the threat does not require further assessment.
5. Failure Analysis – Where controls may not prevent failure for a particular threat, the threat is analysed to determine the damage that it may cause to the pipeline.
6. Risk Assessment – The frequency and severity of a potential event are determined, and categorised as high, intermediate, low or negligible risks using the AS2885.1-2007 risk matrix shown in Appendix 4. This qualitative risk assessment of failures is in accordance with ISO31000-2009.

7. Risk Management – For extreme and high risks; the threat frequency or the threat consequences are modified so that the risk rank is reduced to intermediate or lower. For intermediate risks; the risk is reduced to low or negligible or ALARP is demonstrated. For low risks; monitoring is required. For negligible risks; review is required at next safety management study.

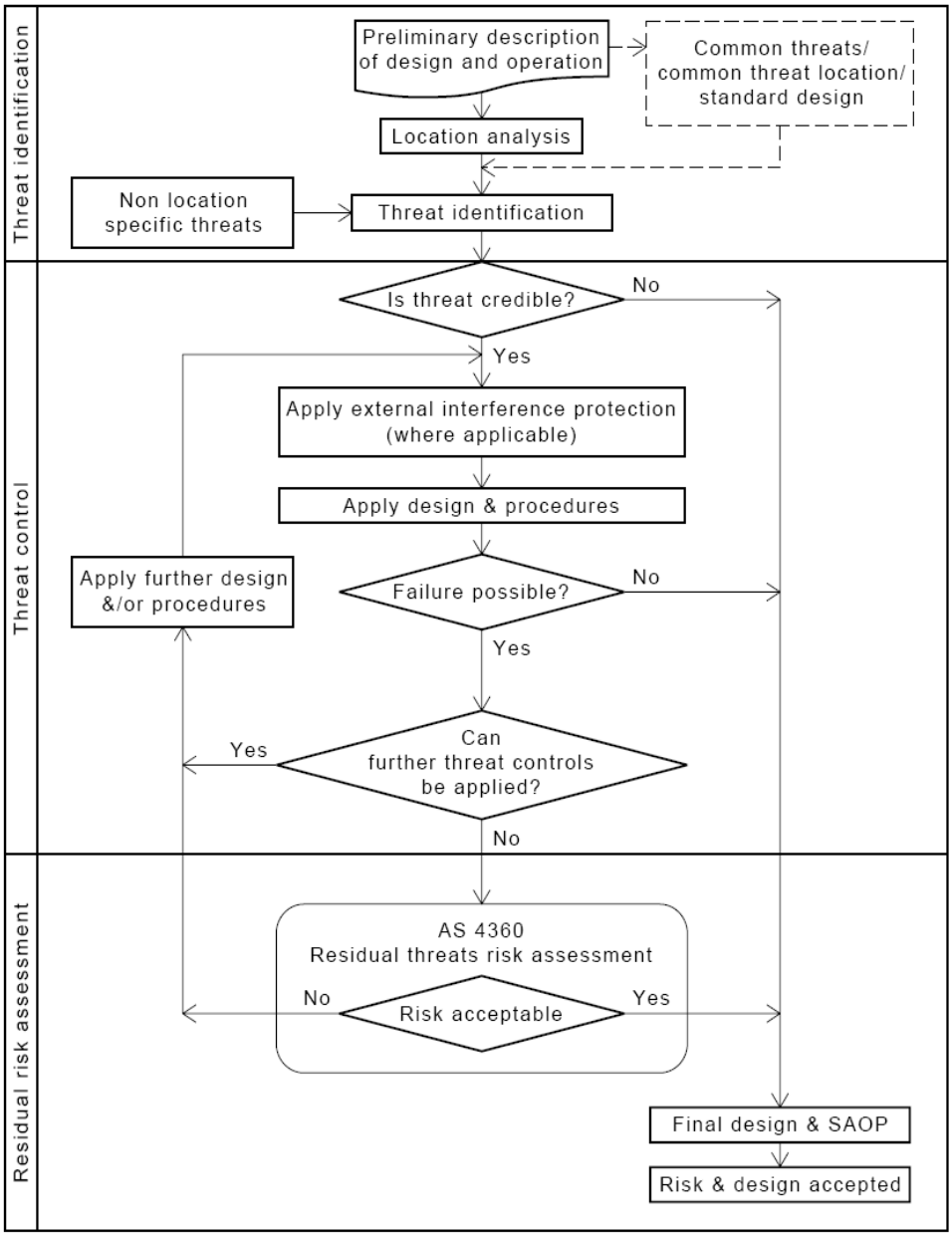

Figure 4 – The Pipeline Risk Assessment Process

Appendix 4 – AS2885.1-2007 Risk Assessment Matrix

AS2885.1 2007 - Risk Matrix

CONSEQUENCES	Typical Severity Classes		Catastrophic	Major	Severe	Minor	Trivial
	People		Multiple fatalities result	Few fatalities, or several people with life-threatening injuries	Injury or illness requiring hospital treatment	Injuries requiring first aid treatment	Minimal impact on health & safety
	Supply		Long term Interruption of supply	Prolonged interruption; long term restriction of supply	Short term interruption; prolonged restriction of supply	Short term interruption; restriction of supply but shortfall met from other sources	No impact; no restriction of pipeline supply
	Environment NOTE: Significant environmental consequences may occur in locations which are relatively small & isolated		Effects widespread; viability of ecosystems or species affected; permanent major changes	Major off-site impact; long term severe effects; rectification difficult.	Localised (<1 ha) & short-term (<2 yr) effects, easily rectified.	Effect very localised (<0.1 ha) and very short term (weeks), minimal rectification	No effect; minor on-site effects rectified rapidly with negligible residual effect
FREQUENCY	**Frequent**	Expected to occur once per year or more.	**Extreme**	**Extreme**	**High**	**Intermediate**	**Low**
	Occasional	May occur occasionally in the life of the pipeline	**Extreme**	**High**	**Intermediate**	**Low**	**Low**
	Unlikely	Unlikely to occur within the life of the pipeline, but possible.	**High**	**High**	**Intermediate**	**Low**	**Negligible**
	Remote	Not anticipated for this pipeline at this location.	**High**	**Intermediate**	**Low**	**Negligible**	**Negligible**
	Hypothetical	Theoretically possible, but has never occurred on a similar pipeline	**Intermediate**	**Low**	**Negligible**	**Negligible**	**Negligible**

Risk Management Actions	
Extreme:	Modify the threat, the frequency or the consequences so that the risk rank is reduced to 'intermediate' or lower. For an in-service pipeline the risk shall be reduced immediately.
High:	Modify the threat, the frequency or the consequences so that the risk rank is reduced to Intermediate or lower. For an in service pipeline the risk shall be reduced as soon as is possible, typically within a timescale of not more than a few weeks.
Intermediate:	Repeat threat identification and risk evaluation processes 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 rank to 'low' or 'negligible'. Where the risk rank can not be reduced to 'low' or 'negligible', action shall be taken to- a) remove threats, reduce frequencies and/or reduce severity of consequences to the extent practicable; and b) 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:	Determine the management plan for the threat to prevent occurrence and to monitor changes that could affect the classification.
Negligible:	Review at the next review interval.

Appendix 5 – AS2885.1-2007 Risk Assessment Minutes

SECTION 1

Location Analysis: Pipeline traversing rural landscape with Residential area within 'measurement length'
CIC Water corridor parallel (inundation areas no longer considered relevant)
Multiple rural blocks typically greater than 5ha and less than 30ha.

Primary Location Class: T1
Secondary Locational Class: CIC

Alignment Sheet(s): n/a
Start-Finish metres: 381131 - 382615
Predominant Land use: Residential and rural (Lots 569 and 1263 developed for residences)

Item	Chainage (m)	Threat	Threat Identification	Threat ID in APA 2008 SMS	Threat Credible (Y/N)	EIP Y/N	Controls for External Interference Protection i.e. Physical & Procedural/Design	Controls for non-EIP i.e. Procedural/Design Safeguards	Failure Possible Y/N	Further threat controls applied Y/N	Action ID	Actions	Action By	Frequency	Severity	Risk Ranking	Reduced to ALARP (Y/N)	ALARP Justification Comments	General Comments
LS - 1	380789 - 387287 (encompasses this section)	Sectional.	Inundation leading to floatation.	2845	N	N		Screw anchors.	N										Inundation no longer considered relevant for this area.
LS - 2			Parallel water pipe easement - 63mm MDPE & 1400mm Steel. Expected equipment greater than 20T for excavation by Utility Provider.	2848	Y	Y	**Physical** 1) Separation distance > 15m. 2) Penetration Resistance may provide some protection. **Procedural** 1) Third part liaison. 2) DBYD. 3) Warning Signs. 4) Patrolling.		Y	Y	1 2 8	Increase signage through new T1 area to comply with signage requirements in AS2885. Contact Water Corporation and confirm excavator size and type that could be expected to be used to excavate 1400mm steel pipe in this area. If equipment size and bucket type could credibly result in puncture then consider additional physical measure and advise 68RDJV. 68RDJV to ensure no sensitive location (as defined in AS2885) is proposed within 279m of easement boundary (as per PB87) within Lots 569, 1263 and subsequent titles.	APA - Cost by 68RDJV APA 68RDJV	**Remote**	**Major**	**Intermediate**	**Y**	**ALARP achieved based on satisfactory close out of Actions 1, 2 & 8. See also statements at end of this worksheet.**	Major consequence selected due to potential for fatalities in residential area. Remote frequency selected based on signage and water pipe separation distance from Parmelia.
LS - 3			Parallel water pipe easement - 1400mm Steel. Water pipe failure resulting in undermining of Parmelia.		Y	N		Inherent integrity of 1400mm Steel pipe (with CP) and isolation valves. Screw anchors in certain locations. Land levels such that run-off and hence undermining not considered likely. 15m separation may provide some protection.	N									
LS - 4			Excavation - Post Hole Auger, Star Picket Install, Bollard installation. Fences crossing & parallel - replacement/maintenance.	13812	Y	Y	**Physical** 1) Depth of cover. 2) Penetration Resistance . **Procedural** 1) Third part liaison. 2) Warning Signs. 3) Patrolling.		N									
LS - 5			Firebreak Clearing, Ploughing <300mm, Miscellaneous rural activities.	13813	Y	Y	**Physical** 1) Depth of cover. 2) Penetration Resistance. **Procedural** 1) Third part liaison. 2) Warning Signs. 3) Patrolling.		N									
LS - 6			Exploratory drilling.		N	Y													Exploratory drilling not considered credible in this area due to free hold land.
LS - 7			Water bore activities.		Y	Y	**Physical** 1) Penetration Resistance may provide some protection. **Procedural** 1) Third part liaison. 2) Warning Signs. 3) Patrolling. 4) DBYD. 5) Statutory requirements for water well drilling.		Y					**Hypothetical**	**Major**	**Low**	**-**	ALARP does not need assessment due to 'low' risk level	Major consequence selected due to potential for fatality. Hypothetical frequency selected due to statutory limitations on water well boring activities and no boring is expected along pipeline route.
LS - 8			Seismic surveys.		N	N													Seismic surveys not considered credible in this area due to free hold land.
LS - 9			Parallel Power.		N	N													No parallel Power in this section.
LS - 10			Induced voltages due to transformer location (required for development). Stray current affecting CP leading to corrosion (and also personnel safety).		Y	N		CP Surveys. Intelligent pigging. DCVG Surveys.	N		3 4	APA to advise 68RDJV as to the minimum separation distance between pipeline and transformers. 68RDJV to locate transformers as advised by APA.	APA 68RDJV						
LS - 11			Utilities (civil, water, power, drainage etc.) running in road reserve adjacent to public open space and pipeline easement. Depth of sewage expected to be > 1m.		N	Y					5	68RDJV to ensure utilities running in proposed road reserve (parallel to pipeline easement) do not encroach on POS.	68RDJV						Excavation of utilities not considered a threat to Parmelia due to utilities in proposed road reserve which is separated from Parmelia easement by 12m POS.

SECTION 1

Location Analysis: Pipeline traversing rural landscape with Residential area within 'measurement length'
CIC Water corridor parallel (inundation areas no longer considered relevant)
Multiple rural blocks typically greater than 5ha and less than 30ha.

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LS - 12			Proposed roads parallel or close to pipeline - maintenance of roads - excavation.		N	Y					6	68RDJV to ensure boundary of road reserves is at least 10m from pipeline center line. If proposed roads cannot meet this criteria then 68RDJV to consult with APA regarding design solutions necessary.	68RDJV						Threats from road are not considered credible provided a minimum separation of 10m is maintained.
LS - 13			Proposed roads parallel or close to pipeline - maintenance of roads - loads/vibratory equipment.		N	N						See Action #6							Threats from road are not considered credible provided a minimum separation of 10m is maintained.
LS - 14			Vegetation/landscaping (including irrigation) on easement.		N	N					7	APA to advise 68RDJV as to vegetation and landscaping limitations/restrictions on easement.	APA						Threat not credible provided APA requirements are adopted by 68RDJV - see action #7.
LS - 15			HDD.		N	Y													HDD not considered credible other than at road crossings (see below).
LS - 16			PMN: - Pipeline Operator (APA) exposing pipe for maintenance/inspection - up to 20T excavtor with flat bucket via procedure		Y	Y	**Physical** 1) Penetration Resistance. **Procedural** 1) APA Work Instruction. 2) Supervision.		Y	N				**Hypothetical**	**Major**	**Low**	**-**	ALARP does not need assessment due to 'low' risk level	This threat added Post Meeting. APA Work Instruction WI-4.9.20 Pipeline Excavation states that a maximum excavator size of 20 tonne is to be used at any time, but only with a general purpose bucket. At no time are tiger toothed buckets allowed. There are a number of procedural controls such as Supervision, no mechanical excavation within 300mm of a sighted pipeline or within 1m of an unsighted pipeline, etc also included in the WI. Likelihood of consequence (ie loss of containment due to APA puncturing pipeline) considered to be hypothetical.
LS - 17	381275	Track - Gravel landowner maintained.	Vehicle loading.	13821	Y	N		Calculation PAM-RA-01 to 08.	N										
LS - 18			Road Widening by grader - puncture by blade not expected.	13822	Y	Y	**Physical** 1) Depth of Cover. 2) Penetration Resistance. **Procedural** 1) Third part liaison. 2) Warning Signs. 3) Patrolling.		N										
LS - 19			Excavation road maintenance - grader only expected, puncture by blade not expected.	13823	N	Y													Excavation of track not considered credible due to nature of track.
LS - 20			Vibratory Equipment.	13824	N	N													Not credible due to unsealed track.
LS - 21	381277	Power line crossing.	Power line breakage. Induced voltage.	13825 & 13826	N	N													Not credible as per 2008 AS2885 SMS.
LS - 22			Power Pole replacement.		N	Y					9	Confirm (as per action 579 from 2008 SMS) that there are no power poles within 5m of pipeline at this location.	APA						Not credible if power pole greater than 5m from pipeline (action raised to confirm).
LS - 23	381684 - 381706		Vehicle loading.	13827	Y	Y		Calculation PAM-RA-01 to 08.	N										
LS - 24			Road Widening - front end loader or similar used to remove approx. 300mm of cover. Equipment not expected to puncture pipeline.	13828	Y	Y	**Physical** 1) Depth of Cover. 2) Penetration Resistance. **Procedural** 1) Third part liaison. 2) DBYD. 3) Warning Signs. 4) Patrolling.		N										
LS - 25			Excavation road maintenance - front end loader or similar used to remove approximately 300mm of cover. Equipment not expected to puncture pipeline.	13829	Y	Y	**Physical** 1) Depth of Cover. 2) Penetration Resistance. **Procedural** 1) Third part liaison. 2) DBYD. 3) Warning Signs. 4) Patrolling.		N										
LS - 26			Vibratory Equipment.	13830	Y	N		Third party liaison, DBYD, Patrolling - APA procedures invoked once made aware of proposed activities.	N										Not credible as per 2008 AS2885 SMS.
LS - 27	381684	Baldivis Road roundabout.	HDD in road reserve - if roundabout intersects with pipeline easement the potential for HDD to impact pipeline exists.		N	Y						Action 6 applicable							Not considered credible due to expectation of roundabout being at least 10m from easement - refer to action 6.

SECTION 1

Location Analysis: Pipeline traversing rural landscape with Residential area within 'measurement length'
CIC Water corridor parallel (inundation areas no longer considered relevant)
Multiple rural blocks typically greater than 5ha and less than 30ha.

Primary Location Class: T1
Secondary Locational Class: CIC

Alignment Sheet(s): n/a
Start-Finish metres: 381131 - 382615
Predominant Land use: Residential and rural (Lots 569 and 1263 developed for residences)

Item	Chainage (m)	Threat	Threat Identification	Threat ID in APA 2008 SMS	Threat Credible (Y/N)	EIP Y/N	Controls for External Interference Protection i.e. Physical & Procedural/Design	Controls for non-EIP i.e. Procedural/Design Safeguards	Failure Possible Y/N	Further threat controls applied Y/N	Action ID	Actions	Action By	Frequency	Severity	Risk Ranking	Reduced to ALARP (Y/N)	ALARP Justification Comments	General Comments
LS - 28	381680	Utilities in Baldivis Road easement.	Excavation of utilities above Parmelia - sewer, gas, water, power, telecoms - equipment < 10 tonne expected due to size of service and locality in road reserve.		Y	Y	**Physical** 1) Separation distance > 300mm may provide some protection. 2) Penetration Resistance. 3) Concrete slab. **Procedural** 1) Third part liaison. 2) DBYD. 3) Warning Signs. 4) Patrolling.		N		10	68RDJV to provide Engineering drawings for all services to APA for approval. Slabbing will be required for services crossing (above or below) the pipeline as well as a minimum separation distance.	68RDJV - Cost by 68RDJV						
LS - 29	381680	Utilities in Baldivis Road easement.	Excavation of utilities below Parmelia - sewer, gas, water, power, telecoms - equipment < 10 tonne expected due to size of service and locality in road reserve.		Y	Y	**Physical** 1) Penetration Resistance. 2) Concrete slab above Parmelia. **Procedural** 1) Third part liaison. 2) DBYD. 3) Warning Signs. 4) Patrolling.		N			See Action #10.							
LS - 30	381855	Power line crossing.	Power line breakage. and Induced voltage.	13831 & 13832	N	N			N										Not credible as per 2008 AS2885 SMS.
LS - 31	381950	Track - Gravel landowner maintained.	Vehicle loading.	13833	Y	Y		Calculation PAM-RA-01 to 08.	N										
LS - 32			Road Widening by grader - puncture by blade not expected.	13834	Y	Y	**Physical** 1) Depth of Cover. 2) Penetration Resistance. **Procedural** 1) Third part liaison. 2) Warning Signs. 3) Patrolling.		N										
LS - 33			Excavation road maintenance - grader only expected, puncture by blade not expected.	13835	N	Y			N										Excavation of track not considered credible due to nature of track.
LS - 34			Vibratory Equipment.	13836	N	N			N										Not credible due to unsealed track.

ALARP Justification for Threat LS-02

It is noted that (as per APA emails dated 10-09-2010 and 15-10-2010):

1 Water Corp SWMS#8 states DBYD plans to be read and understood prior to any digging and an Inspector to be on site if High Pressure Gas Pipes are in the vicinity

2 The Parmelia alignment and easement is clearly marked on Stirling Trunk Main as-constructed drawings indicating that Water Corp are aware of the Parmelia pipeline alignment.

3 In a telephone conversation with Water Corp Supervising Engineer David Holywell explained their trench method which gives a trench width of approximately 12m, a worst-case depth of 4.9m and a batter angle of 45degrees for the DN1400 water main. The alignment sheet shows approximately 16m separation for pipeline centrelines. So from the trunk main centreline, 16m-6m=10m separation. This leaves an actual separation of approx 10m from the edge of the trench (at the surface) to the Parmelia. The batter angle and the Parmelia depth also add a vertical component to the separation. David also commented that other services and infrastructure in the area are considered during all Water Corp excavation activities and that the 16m separation between assets would be considered as presenting a low risk to their activities. There is also the requirement to keep their excavations confined to their easement.

4 According to Terry Waddington, Water Corp Maintenance Co-ordinator, signage (and bollards) exists denoting a Trunk Main Section Valve which is situated in Lot 569. This, together with Parmelia signage, aids in correctly identifying the trunk main.

5 The close proximity of parallel services in corridors is an accepted and indeed *normal* practice among utility providers in WA and other T1 areas in Australia where APA Group operates transmission pipelines. The responsible nature of companies such as APA Group and Water Corp reduces the likelihood of the inadvertent excavation,of each others pipeline, through procedures and processes (i.e. awareness programs, ER procedures, aerial & ground patrols) which is why corridors are established. Procedures and training ensure that the operational risks are minimised and processes such as DBYD participation, demonstrate responsible operation.

6 In terms of excavation activities, the separation distance of 16metres presents a significantly large buffer for this type of work with competent crews.

7 Tiger teeth are not required for the soil in this area, in particular, conducting an excavation in the case of a washout as a result of failure of the trunk main.

8 It is also important to consider the design life of the assets in question. The trunk main has a design life of the order of 120 years with the Parmelia having a significantly shorter life. Given that the trunk main is only 10 years old the scenario is not likely to occur in the life of the Parmelia pipeline.

Non-Locational Specific Threats (refer also AS2885 AppC)

Item	Chainage (m)	Threat	Threat Identification	Threat Credible (Y/N)	EIP Y/N	Controls for EIP i.e. Physical & Procedural	Controls for non-EIP i.e. Procedural/Design Safeguards	Failure Possible Y/N	Further threat controls applied Y/N	Action ID	Actions	Action By	Frequency	Severity	Risk Ranking	Reduced to ALARP (Y/N)	ALARP Justification Comments	General Comments
NLS - 1	ALL	Corrosion	Internal due to Contaminants	N	N													Not credible due to sweet natural gas
NLS - 2	ALL	Corrosion	External	Y	N		Pipe coating (Yellow Jacket). Low risk soil type. CP System.	N										
NLS - 3	ALL	Corrosion	Internal Erosion (abrasion)	N	N													No cause of internal abrasion
NLS - 4	ALL	Corrosion	SCC / Environmental Corrosion Cracking	Y	N		Pipe coating (Yellow Jacket). Low risk soil type. MPI inspection of pipeline at every dig-up.	N										
NLS - 5	ALL	Corrosion	Biological Corrosion	N	N													No cause of biological corrosion
NLS - 6	ALL	Natural Events	Cyclones and Earthquakes	N	N													Cyclones and earthquakes not considered credible in this locality
NLS - 7	ALL	Natural Events	Bush fires affecting above ground piping (Threat not credible for below ground piping)	N	N			N										No above ground facilities in this section
NLS - 8	ALL	Natural Events	Lightning - leading to equipment failure	Y	N		CP survey. CP test post earthed via anode bed.	N										Not considered to be credible due to underground pipe. No nearby conductors
NLS - 9	ALL	Operations & Maintenance	Exceeding MAOP	Y	N		Operating procedures Alarms and trips Scada systems Pressure let down skids to AS2885. PSV at let down station.	N										
NLS - 10	ALL	Operations & Maintenance	Incorrect operation of Pigging	Y	N		Pigging work instructions and procedures, trained and experienced personnel.	N										
NLS - 11	ALL	Operations & Maintenance	Incorrect valve operating sequence	Y	N		Operator training and work instructions.	N										
NLS - 12	ALL	Operations & Maintenance	Incorrect operation of control & protective equipment	Y	N		Operating procedures	N										
NLS - 13	ALL	Operations & Maintenance	Bypass control system logic	Y	N		Operating procedures	N										
NLS - 14	ALL	Operations & Maintenance	Inadequate /Incomplete maintenance procedures	Y	N		External and internal audits. External validation where required. Internal reviews within maximum interval.	N										
NLS - 15	ALL	Operations & Maintenance	Maintenance actions contrary to maintenance procedures	Y	N		Basic job competency training modules and sign off. Supervision. Disciplinary procedures.	N										
NLS - 16	ALL	Operations & Maintenance	Inaccurate test equipment	Y	N		Testing and calibration of equipment by NATA.	N										
NLS - 17	ALL	Operations & Maintenance	Inadequate servicing of equipment	Y	N		APA training and competent personnel. Maintenance scheduling system (audited).	N										
NLS - 18	ALL	Design Defect	Temperature exceeds design; discharge from operating compressor stations.	N	N													No compressor stations within vicinity of this section.
NLS - 19	ALL	External Interference	Low DOC anywhere along pipeline	Y	N		DOC checks and continuous monitoring.	N										
NLS - 20	ALL	Operations & Maintenance	Design/as built document storage and retrieval	N	N													Not credible for this section due to no above ground facilities.
NLS - 21	ALL																	

Appendix 6 – AS2885.1-2007 Risk Assessment Actions

AS2885.1-2007 Risk Assessment Actions

Action #	Threat	Threat Analysis	Recommendations	Resp.
1	Sectional	Parallel water pipe easement - 63mm MDPE & 1400mm Steel. Expected equipment greater than 20T for excavation by Utility Provider.	Increase signage through new T1 area to comply with signage requirements in AS2885.	APA
2	Sectional	Parallel water pipe easement - 63mm MDPE & 1400mm Steel. Expected equipment greater than 20T for excavation by Utility Provider.	Contact Water Corporation and confirm excavator size and type that could be expected to be used to excavate 1400mm steel pipe in this area. If equipment size and bucket type could credibly result in puncture then consider additional physical measure and advise 68RDJV.	APA
3	Sectional	Induced voltages due to transformer location (required for development). Stray current affecting CP leading to corrosion (and also personnel safety).	APA to advise 68RDJV as to the minimum separation distance between pipeline and transformers.	APA
4	Sectional	Induced voltages due to transformer location (required for development). Stray current affecting CP leading to corrosion (and also personnel safety).	68RDJV to locate transformers as advised by APA.	68RDJV
5	Sectional	Proposed roads parallel or close to pipeline - maintenance of roads - excavation.	68RDJV to ensure utilities running in proposed road reserve (parallel to pipeline easement) do not encroach on POS.	68RDJV
6	Sectional	Proposed roads parallel or close to pipeline - maintenance of roads - excavation.	68RDJV to ensure boundary of road reserves is at least 10m from pipeline center line. If proposed roads cannot meet this criteria then 68RDJV to consult with APA regarding design solutions necessary.	68RDJV
	Sectional	Proposed roads parallel or close to pipeline - maintenance of roads - loads/vibratory equipment.	68RDJV to ensure boundary of road reserves is at least 10m from pipeline center line. If proposed roads cannot meet this criteria then 68RDJV to consult with APA regarding design solutions necessary.	68RDJV
	Baldivis Road roundabout.	HDD in road reserve - if roundabout intersects with pipeline easement the potential for HDD to impact pipeline exists.	68RDJV to ensure boundary of road reserves is at least 10m from pipeline center line. If proposed roads cannot meet this criteria then 68RDJV to consult with APA regarding design solutions necessary.	68RDJV
7	Sectional	Vegetation/landscaping (including irrigation) on easement.	APA to advise 68RDJV as to vegetation and landscaping limitations/restrictions on easement.	APA
8	Sectional	Parallel water pipe easement - 63mm MDPE & 1400mm Steel. Expected equipment greater than 20T for excavation by Utility Provider.	68RDJV to ensure no sensitive location (as defined in AS2885) is proposed within 279m of easement boundary (as per PB87) within Lots 569, 1263 and subsequent titles.	68RDJV
9	Power Line Crossing	Power Pole replacement.	Confirm (as per action 579 from 2008 SMS) that there are no power poles within 5m of pipeline at this location.	APA
10	Utilities in Baldivis Road easement	Excavation of utilities above Parmelia - sewer, gas, water, power, telecoms - equipment < 10 tonne expected due to size of service and locality in road reserve.	68RDJV to provide Engineering drawings for all services to APA for approval. Slabbing will be required for services crossing (above or below) the pipeline as well as a minimum separation distance.	68RDJV
	Utilities in Baldivis Road easement	Excavation of utilities below Parmelia - sewer, gas, water, power, telecoms - equipment < 10 tonne expected due to size of service and locality in road reserve.	68RDJV to provide Engineering drawings for all services to APA for approval. Slabbing will be required for services crossing (above or below) the pipeline as well as a minimum separation distance.	68RDJV