



APA Group Pipelines within the Casey Central Town Centre Precinct Structure Plan

AS 2885.1 Safety Management Study/Risk Assessment Workshop & Report

Rev No.	Revision Description	Prepared / Revised By	Reviewed By	Approved By	Revision Date
A	Draft Review	P. Walters Snr. Pipeline Eng.	D. Tucci Snr. Concept Eng.	R. Lourensz Engineering Services Manager, Victoria	8/10/14
B	Draft	P. Walters Snr. Pipeline Eng.	D. Tucci Snr. Concept Eng.	R. Lourensz Engineering Services Manager, Victoria	15/10/14
C	Draft following comments	P. Walters Snr. Pipeline Eng.	D. Tucci Snr. Concept Eng.	R. Lourensz Engineering Services Manager, Victoria	28/11/14
D	Draft following APA discussions	P. Walters Snr. Pipeline Eng.	D. Tucci Snr. Concept Eng.	R. Lourensz Engineering Services Manager, Victoria	1/12/14
E	Draft following further comments	P. Walters Snr. Pipeline Eng.	D. Tucci Snr. Concept Eng.	R. Lourensz Engineering Services Manager, Victoria	28/1/15
0	For Use	P. Walters Snr. Pipeline Eng.	D. Tucci Snr. Concept Eng.	R. Lourensz Engineering Services Manager, Victoria	28/1/15
Reference No.		Status		Version No.	
				0	



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1.0 EXECUTIVE SUMMARY

The Safety Management Study (SMS) in this report is for the APA Morwell to Dandenong natural gas pipeline located within the boundaries of the proposed Casey Central Town Centre Precinct Structure Plan (PSP). The SMS was conducted on the Casey Central Town Centre PSP plan (dated 18/9/14) presented by MPA. Detail of the PSP is presented in Appendix 4.

Location Analysis

With the development of the Casey Central Town Centre PSP the location classification of the Morwell to Dandenong pipeline in this area will remain unchanged at T1 (Residential).

No sensitive or industrial areas are added to the existing location classification due to prior consultation with APA.

The location of “High Density” residential housing was discussed in the assessment meeting and the definition used in the PSP was considered to be within the bounds of T1 for the pipeline location classification and is not the major use of land within the pipeline measurement length.

The requirements for AS2885.1-2012 are met for the pipeline with this location classification.

Risk Assessment

All threats identified in this risk assessment were either of Intermediate and “As Low as Reasonably Practicable” (ALARP), Low or not a credible risk to the pipeline, apart from one threat which could not be assessed as further information is required prior to assessment.

The threat not assessed is for Parallel installation of power lines (above and below ground) near the easement. The distance from any parallel power line and length of exposure (distance of power line in parallel to the pipeline), and the power line size (current capacity) is required to determine (by calculation) if the threat is credible. At the time of the SMS meeting it was not known if any power lines were planned for this area and an action to find the location of any proposed power lines was included in the SMS Actions.

Continuing liaison between Council, MPA, APA and land developers should ensure that construction activities and post construction activities pose minimal risk to the high pressure natural gas pipeline located within the boundaries of this development. The main actions required from this assessment include:

- Council will request input from APA at pre-application stage in regards to road construction, sewer installation and drainage pipeline installation within a distance of 60m from the pipeline easement. APA note that planning requirements are only effective once a planning permit application has been lodged. And that the Metropolitan Planning Authority are looking at including a requirement in the PSP that Council seek comment from APA on planning permit applications for these works.



- APA to provide input to road construction, sewer installation and the drainage pipeline to the retarding basin in the pipeline easement and also provide its excavation procedures near the pipeline to the developer/Council.
- During construction of the subdivision concrete slabs to be installed above the pipeline at all service crossings of the pipeline, including drainage crossings above the pipeline.
- Easement to exclude the use of rippers and Horizontal bores in/through the pipeline easement area of the pipeline and HDD towards the pipeline easement in the pipeline's measurement lengths.
- APA to inform Council of the requirement to prevent heavy vehicles (over 8 tonne per axle) from easement access during construction activities, except where specific permission has been obtained from APA (APA will be required to undertake stress calculations for these heavy vehicles).
- APA to be presented with construction methodology and Construction Company to seek APA endorsement for construction methodology in the pipeline easement.
- Vertical drilling in the pipeline easement is not permitted to occur during development. Council/developer to ensure that any plans for undertaking this construction method will not be permitted in easement area.
- During construction/redevelopment of roads in this development concrete slabs are to be installed over the pipeline for the width of the road reserve.
- If traffic lights or street lights are required within the pipeline easement these are to be located on wide bases to prevent excavation to significant depths in the pipeline easement.

With plans in place and reviewed by APA, completion of the assessment for the threat not assessed here, and with other items requiring action from section 4 of this report and the SMS Sheets, this safety management study concludes that the Morwell to Dandenong Natural Gas Pipeline will continue to be in compliance with the SMS requirements of AS2885.1-2012 in the area located within the Casey Central Town Centre Precinct Structure Plan area shown in Appendix 4.

2.0 INTRODUCTION

This document is a report on a Safety Management Study (SMS) carried out in accordance with Australian Standard AS2885 Pipelines – Gas and Liquid Petroleum – Part 1 Design and Construction - 2012, for the Morwell to Dandenong Natural Gas Pipeline located within the boundaries of the proposed Casey Central Town Centre Precinct Structure Plan (PSP 12). This pipeline is owned and operated by the APA Group. The Morwell to Dandenong pipeline is operated under Victorian Pipeline Licence 50.

This report consists of three main sections, the Executive Summary, Assessment Report and the SMS Sheets (Appendix 1). Appendix 2 provides the calculations for penetration resistance and other properties required for the SMS. A further appendix (Appendix 3)



provides the “As Low As Reasonably Practicable” (ALARP) assessment required from the SMS Actions listed in Appendix 1.

The Executive Summary gives an overview of the findings from the SMS on the pipeline in this area. The meeting was held at the Metropolitan Planning Authority (MPA) office in Melbourne, Victoria on 14 August 2014.

The Assessment Report outlines the methodology used in the SMS and discussion of results from the process. This section is the main written body of the report.

The final section, the SMS Sheets, give the detail of the assessment, including some considerations and actions for the mitigation of individual threats identified during the risk assessment. The SMS Sheets can include details of the pipeline obtained from the pipeline GIS and the pipeline Design Basis. Details of the Location Analysis are also given in these sheets. The first section of the SMS includes the site specific threats to be assessed along the pipelines route. The second section of the sheets is for General Threats to the pipelines in this area. Details contained in this SMS should be included in the SMS's for these pipelines when final reports have been completed.



3.0 PARTICIPANTS

This SMS was held on 14 August 2014 at the MPA offices. The meeting consisted of staff and management from all parties concerned with this development and its relationship with the APA owned natural gas pipelines. Those present during this meeting were:

Name	Company/Entity	Work Base
Daniel Tucci	APA Group	Dandenong
Ron Lourensz	APA Group	Dandenong
Chris Braddock	MPA	Melbourne
Matt Stafford	MPA	Melbourne
Belinda Smith	MPA	Melbourne
Keri New	City of Casey	Narre Warren
Paul Walters (Facilitator)	APA Group	Fyshwick



4.0 ASSESSMENT REPORT

The methodology used for this SMS was that referenced in Australian Standard AS2885 Pipelines – Gas and Liquid Petroleum – Part 1 Design and Construction – 2012, Section 2.

The details of the SMS are contained in the SMS Sheets (Appendix 1), which also contain location classification information from this assessment.

4.1 Description of the Pipeline Design and Operation

The proposed Casey Central Town Centre Precinct Structure Plan (PSP) included land over which the APA Group-owned Morwell to Dandenong natural gas pipeline is located. This pipeline is licenced in the State of Victoria as Pipeline Licence 50.

The Victorian natural gas transmission system consists of six main systems. The Morwell to Dandenong pipeline is part of the Lurgi system. The Lurgi system supplies natural gas to the towns between Morwell and Dandenong and can be supplied from either the Morwell end via the Tyers Offtake or from Dandenong. The Morwell to Dandenong pipeline is the main pipeline in this system.

All APA Group Victorian assets are held by APA GasNet Australia (Operations) Pty Ltd. APA is responsible for ensuring that its assets are maintained in good working order to be able to meet the obligations of APA GasNet under the Service Envelope Agreement.

AEMO (Australian Energy Market Operator) is responsible for controlling the operation of the gas transport systems, and hence this pipeline, covered by the APA GasNet Access Agreement and Service Envelope Agreement including the control of gas quality entering the system, the odourisation of gas, system planning, and security of supply. The APA GasNet Access Arrangement covers all of APA's pipelines within Victoria and the Interconnect between Barnawartha and Culcairn.

The Morwell to Dandenong Pipeline was commissioned in 1956, is approximately 127km in length with a nominal pipe diameter of 450mm. The pipe is coated with a coal tar enamel coating to protect against corrosion (along with a cathodic protection system) and is buried to a depth of approximately 900mm in the vicinity of the PSP. The pipeline runs through an area that will be classified as Residential (T1) (Primary Class) with no secondary classification. The pipeline was designed, constructed and tested to the USA Standard B31.8-1968 Gas Transmission and Distribution Piping Systems. Operation, maintenance and modifications are undertaken to the requirements of the most up to date version of the AS2885 standard suite. The pipeline is designed for a maximum operating pressure of 2,760kPa.

During construction of this pipeline a cold form bend was made in the pipeline in the area where road construction and compaction activities are to occur. This bend is to be assessed for pipeline integrity (proven) by APA prior to activities taking place.



The basic design features of the pipelines are:

Morwell to Dandenong Pipeline – Licence 50	
Substance conveyed	Natural Gas
Measurement Length	275m (4.7kW/m ² Heat Radiation Zone)
Length of pipeline	Approximately 127km
Outside diameter	450 mm (Nominal)
Wall thickness	7.94 mm (Light wall), and 9.9 mm (Heavy Wall)
Pipe specification	API-5L grade A
Maximum Allowable Operating Pressure (MAOP)	2,760 kPag

The GIS for the pipeline indicates minimum specified depth of cover, and the features along the route of the pipeline.

All above ground pipework and steelwork on the pipeline is painted with a high quality corrosion resistant paint system.

4.2 Description of Casey Central Town Centre Precinct Structure Plan (PSP)

The Casey Central Town Centre Precinct Structure Plan (PSP 12) area is bounded by the existing Casey Central Shopping Centre (Westfield) to the north and Narre Warren-Cranbourne Road to the West, and the proposed Rosebank Drive to the south and Bray Boulevard to the east. The APA Morwell to Dandenong pipeline runs parallel to Rosebank Drive on the south side of the proposed development.

The draft Casey Central Town Centre PSP nominates land for residential and commercial uses (including public open spaces, retail and employment areas), and will guide future urban development of the site.

Once the Casey Central Town Centre PSP is approved and incorporated into the Casey Planning Scheme, all future applications to use or develop the land within the site must be in accordance with the PSP in order for a planning permit to be issued.

This SMS/Risk Assessment Report assesses the revised draft urban structure for the Casey Central Town Centre in the pdf file “PSP 12_Future Urban Structure_detailed version_A4” dated 18 September 2014. The PSP plan was reviewed post assessment date (14 August 2014) following receipt of the 18 September 2014 review and the changes do not impact the SMS outcomes. This plan indicates the presence of several areas of significance within the pipelines’ measurement lengths.

On the Morwell to Dandenong pipeline route the following items are within the pipeline measurement length:

- Areas of High Density Residential



- Areas of Medium Density Residential
- A Mixed Use area which are usually multistorey developments with ground level retail and upper level residential or office/commercial land uses.
- A Retarding Basin
- Offices
- A Park
- A Community facility.

Of particular note for this SMS are the population densities of these areas. It is noted that the suburban development population densities (including that smaller areas of “high density”) are in alignment with those in other suburban areas located near APA pipelines and as such can have land classifications as per those areas (Residential T1).

This development does not propose any areas of sensitive use (see definition below in Section 4.3) within the pipeline measurement length.

4.3 Location Analysis

The Location Analysis for the pipeline was completed using APA’s pipeline GIS data, proposed plans for the Casey Central Town Centre PSP provided by MPA, and the detailed knowledge of personnel from various stakeholders in attendance.

The Location Analysis documented in the SMS Sheets, details the primary and secondary location classifications for the pipeline in the area of this proposed development and for a distance of the measurement length of the pipeline between the eastern and western boundaries of the PSP, in accordance with AS2885.1 – 2012. The approximate pipeline measurement lengths are also documented in this section. The measurement length is the distance from the pipeline that is to be considered in assessment of the location classification. The measurement length is also the distance from the commencement and completion of a location classification requiring greater protection measures than those classifications before or after that location. As is required by the Standard, consideration has been given to future development along the pipeline route both within and outside the pipeline measurement length when assessing the pipeline classification.

AS2885.1-2012 gives four primary location classes:

R1 - Rural - Land that is unused, undeveloped or is used for rural activities such as grazing, agriculture and horticulture.

R2 - Rural Residential - Land that is occupied by single residence blocks typically in the range 1 to 5 ha.

T1 - Residential - Residential applied where multiple dwellings exist in proximity of other dwellings and are serviced by common public utilities.

T2 - High Density - multi story dwellings where a large number of people congregate.

And five secondary location classes:

S – Sensitive Use: where consequences of a failure may be increased due to use by a community unable to protect themselves from consequences of pipeline failure.



Schools, hospitals, aged care facilities and prisons within the pipeline measured length are examples of this classification. The requirements are as for T2.

I – Industrial: Manufacturing, processing, maintenance, storage or similar activities. These are assigned to any portion of land immediately adjoining the pipeline. The requirements are for T1.

HI – Heavy Industrial: Heavy industry or toxic industrial use. Require assessment of any threats to the pipeline or may cause pipeline failure to escalate. Depending on assessment R2, T1 or T2 may apply

CIC – Common Infrastructure Corridor: Multiple infrastructure development within a common easement or reserve or in easements which are in close proximity. A CIC secondary classification places the following requirements on the pipeline owner/operator - To control the activities that take place in the CIC easement some form of agreement should be in place (AS2885.1-2012 Clause 5.5.4(e)). The pipeline route contains significant areas which are located within the easements for roads and powerlines as such an agreement will be put into place for activities undertaken in these easements as necessary.

W – Submerged: When a waterway is considered a design condition affecting the design of the pipeline. (i.e. when some type of design has been completed for the crossing)

By following a systematic approach to analysis of the easement from the GIS in association with the proposed development plans, a profile of the land use along the pipeline's route through the development was established.

The SMS/Risk Assessment Workshop commenced with a detailed description of the proposed development to be undertaken along the pipeline route with particular attention paid to developments within the pipeline measurement lengths. Description of the pipeline in these areas was then explained along with the requirements which APA is required to comply with in various location classifications. These descriptions along with calculations undertaken for various aspects of equipment used near the pipelines, and the knowledge of construction that may take place over the pipeline for this development was the basis for determination of the location classifications given in this assessment.

The table below indicates areas of different location classification on these pipeline sections.

Description of Changes	Required External Interference Protection	External Interference Protection to be put in Place	Comments/Actions
	<p>In accordance with clause 4.7.2 of AS2885.1-2012 this classification requires that the pipeline is unable to rupture in this area.</p> <p>In accordance with clause 4.7.3 of AS2885.1-2012 this classification requires that the maximum discharge rate of any gas release is limited to below 10GJ/s.</p>	<p><i>procedural protection measure:</i> AS2885.1-2012 5.5.6(a)(ii) Pipeline awareness - Buried marker tape. Protection of the pipeline route using pipeline marker tape, which is located at least 300mm directly above the pipeline to enable external parties to identify that they are digging near a high pressure gas pipeline.</p> <p>The critical defect length for this pipeline is not less than 150% of the axial length of the largest equivalent defect likely on this pipeline. Therefore, the pipeline is in compliance with clause 4.7.2. of AS 2885.1-2012. As per pre SMS calculations in Appendix 2</p> <p>The maximum discharge rate from the largest credible defect on this pipeline has been calculated to be 0.778GJ/s, with radiation distances of 29m for 12.6kW/m² and 46m for 4.7kW/m².</p> <p>This pipeline is compliant with the maximum discharge rate for T1 location areas.</p>	



4.4 Threat Identification

The threats analysis was carried out by a systematic approach of identifying any threats associated with the features along the pipeline route, in the vicinity of the pipeline (to the measurement length) as well as on the pipeline easement itself. The initial threat identification was completed by using threats found for similar areas of pipelines. These threats were discussed in relation to the areas under analysis during the SMS meeting and also used to assist in prompting any other threats for the specific areas. The threats were then analysed to determine if they are credible threats for that location on the pipeline route. If the threats were not seen as credible then no further action was required. If the threats were seen as credible then the protection measures to mitigate these threats were considered.

The Threats Analysis section of the SMS Sheets details the threats considered at each location along the pipeline routes and the non-location specific threats. The threats analysis details the requirements requested in AS2885.1-2012 Clause 2.3.2.3 including the equipment used in the threat.

4.3 Not Credible Threats

Any threats considered not credible were documented and the reasons that these threats were considered to be not credible were documented in the SMS Sheets (Appendix 1) as required in AS2885.1-2012 Clause 2.3.2.6.

4.4 Protection Measures Taken to Mitigate Identified Threats

The protection measures to mitigate identified threats are shown in that section of the SMS Sheets. Two columns give the site specific explanations of protection measures relating to specific threats identified for a location.

4.5 Protection Against External Threats

Australian Standard 2885.1-2012 identifies that the greatest risk to a pipeline system as third party interference or external threats. For this reason the Standard requires buried natural gas pipelines to have a number of physical and procedural methods of protection from external interference in place. The number of methods of protection required varies depending upon the pipeline location. These are discussed in the location classification section of this report.

The pipeline sections under study in this report has areas located in the T1 primary class locations. These classification areas require at least two procedural methods of external interference protection and at least two physical measures of external interference protection. T1 areas require that the maximum discharge rate of gas from the pipeline is to be less than 10GJ/s.

4.6 Failure Analysis

Following the identification of a credible threat in the Threats Analysis and with recognition of the mitigating factors for these threats, a Failure Analysis is undertaken. Information



about the threat is used to determine the type of failure, failure dimensions, and area affected by the threat. Calculations for critical defect lengths (AS2885.1-2012 Clause 4.8.5), penetration resistances (AS2885.1-2012 Clause 4.11.3), rupture capability (AS2885.1-2012 Clause 4.7.2), and radiation contours (AS2885.1-2012 Clause 4.10) for the pipe used within the proposed Casey Central Town Centre PSP were undertaken and the results shown in the appropriate area in Appendix 1. Worst case information is used in the documentation for all cases. The Failure Analysis documentation was completed as specified in AS2885.1-2012 Clause 2.3.4.3 in the SMS Sheets. Appendix 2 contains the calculations for the failure analysis.

4.7 Risk Evaluation

Following the identification of a credible threat in the Threats Analysis, with recognition of the mitigating factors for these threats, and completion of a Failure Analysis for any threat that was thought to be capable of causing a hazardous event, a risk evaluation was carried out. This evaluation used the tables supplied in AS2885.1-2012 as guidelines to evaluate the risk of the credible threat.

For each threat at specific locations the frequency of an occurrence of the threat was discussed and consensus (or near consensus) obtained for a level of frequency as shown in AS2885.1-2012 Table F3. This same method was carried out for consequences of the threat using Table F2 from AS2885.1-2012. From these two outcomes Table F4 is used to evaluate the risk of the threat.

4.8 Results summary

A total of 30 threats were addressed in this SMS. Each threat was assessed individually and documented in the SMS Sheets. The assessment meeting identified 24 site specific threats and 6 non site specific threats.

Of the 30 threats 10 were deemed to be credible, 19 were not credible and 1 requires additional information before it could be assessed.

The 10 credible threats consisted of 1 threat of Intermediate risk ranking, 7 threats with a Low risk rating and the other two threats did not require assessment with the additional measures of protection proposed at the SMS meeting put in place.

The intermediate threat (**Threat ID 17**) was for horizontal directional drilling under the pipeline easement. This operation has the potential for causing pipeline penetration and ignition of escaping product, which in turn may fatally injure the public in the vicinity of the pipeline. An ALARP assessment has taken place following the SMS and this assessment indicated that to ensure this threat was as low as reasonably possible liaison activities to prevent or control the use of HDD over the pipeline easement in this Development be undertaken via Council Development specifications. Other protection measures in place to protect against this threat are as follows:

Pipeline Protection –

- Pipeline wall thickness



- Hazard prevention –
- Pipeline Patrolling
 - Dial Before You Dig
 - Liaison activities
 - Marker Posts
 - Marker Tape in some areas
 - Pipeline Patrolling

With measures from the ALARP analysis in place as well as the above protection measures this threat remains Intermediate but is ALARP and in compliance with AS2885.1-2012 requirements. Post SMS - *ALARP analysis has been undertaken and confirmed this threat to be Intermediate and ALARP, with no further actions required.*

The 1 threat requiring additional information is as follows:

- The threat is for Parallel installation of power lines near the easement. The threat not assessed is for Parallel installation of power lines (above and below ground) near the easement. The distance from any parallel power line and length of exposure (distance of power line in parallel to the pipeline), and the power line size (current capacity) is required to determine (by calculation) if the threat is credible. At the time of the SMS meeting it was not known if any power lines were planned for this area and an action to find the location of any proposed power lines was included in the SMS Actions.

With the above remaining threat to be assessed, presently there are no threats which are not ALARP or above the Low rating found in this SMS, assuming the extra measures referred to in the SMS Sheets (and in discussions below) are put in place.

The standard (AS2885.1-2012 Table F5) outlines the management of threats with any of the five risk ranks as follows:

- Extreme and High risk ranking the threat frequency or consequences are to be modified to reduce the threat to Intermediate or lower.
- Intermediate threats should, if possible, have the threat frequency or consequences modified to reduce the risk rank to Low or Negligible. If this is not possible then ALARP shall be demonstrated for that threat.
- Low threats should have a management plan for the threat to prevent threat occurrence or to monitor changes that could affect the classification.
- Negligible threats should be documented and reviewed at the next assessment.

Site Specific Threats

Threats with actions for risk management are:

Threats 1 & 2 – New Development Construction Activities – Roads. Potential use of 30T excavator with tiger teeth attached during these construction activities. The pipeline will not rupture with this maximum size excavator, however pipeline penetration could occur with the



potential maximum hole size with of 95mm if penetrated by both teeth or 30mm if penetrated by only a single tooth. The threats considered here are for penetration of the pipeline by excavation equipment causing ignition and death/serious injury to excavator operator or spotter.

- | | |
|---------------------------|--|
| Pipeline Protection – | <ul style="list-style-type: none"> • Depth of cover • Wall thickness |
| Hazard prevention – | <ul style="list-style-type: none"> • SMS conditions - Development plans will adhere to conditions in this SMS and other APA documentation and be approved by APA prior to construction activities. • APA Supervision • DBYD • Liaison activities |
| Risk Management Actions - | <ul style="list-style-type: none"> • Council will request input from APA in regards to this construction. • APA to provide input and its excavation procedures near the pipeline to developer/Council. • During road construction concrete slabs to be installed over the pipeline for the width of the road reserve to APA requirements for these roads. |

Threats 3 – Threat - New Development Construction Activities - Roads - Installation of Traffic or Street lights causes pipeline penetration from vertical drilling activities.

- | | |
|---------------------------|---|
| Pipeline Protection – | <ul style="list-style-type: none"> • Wall thickness |
| Hazard prevention – | <ul style="list-style-type: none"> • If traffic lights are to be installed they are to be placed on a wide base to prevent deep excavation (by vertical boring) in the vicinity of the pipeline. |
| Risk Management Actions - | <ul style="list-style-type: none"> • If traffic lights are to be installed they are to be placed on a wide base to prevent deep excavation (by vertical boring) in the easement of the pipeline. |

Threats 6 – Threat - New Development Construction Activities - Road construction compaction. With APA reviewing and endorsing the road construction methodology this threat does not require further assessment.



- | | |
|---------------------------|---|
| Pipeline Protection – | <ul style="list-style-type: none"> • Depth of cover • Wall thickness |
| Hazard prevention – | <ul style="list-style-type: none"> • SMS conditions - Development plans will adhere to conditions in this SMS and other APA documentation and be approved by APA prior to construction activities. • APA Supervision • DBYD • Liaison activities |
| Risk Management Actions - | <ul style="list-style-type: none"> • Construction methodology required prior to construction activities and to be endorsed by APA. • APA to prove the cold formed bend prior to construction activities. This bend is subject to this threat. • Restriction of access may be required during construction activities for vehicle access and compaction activities. |

Threats 8, 9, 10 & 11 – Threat - New Development Construction Activities - Sewers and Drainage Pipeline into Retarding Basin. Potential use of 30T excavator with tiger teeth attached during these construction activities. The pipeline will not rupture with this maximum size excavator, however pipeline penetration could occur with the potential maximum hole size with of 95mm if penetrated by both teeth or 30mm if penetrated by only a single tooth. The threats considered here are for penetration of the pipeline by excavation equipment causing ignition and death/serious injury to excavator operator or spotter.

- | | |
|---------------------------|--|
| Pipeline Protection – | <ul style="list-style-type: none"> • Depth of cover • Wall thickness |
| Hazard prevention – | <ul style="list-style-type: none"> • SMS conditions - Development plans will adhere to conditions in this SMS and other APA documentation and be approved by APA prior to construction activities. • APA Supervision • DBYD • Liaison activities |
| Risk Management Actions - | <ul style="list-style-type: none"> • Council will request input from APA in regards to this construction. • APA to provide input and its excavation procedures near the pipeline to |



developer/Council.

- During construction concrete slabs to be installed between the pipeline and service and above the pipeline.

Threats 14 & 15 – Threat 14 is Heavy vehicle traffic on non road crossings during construction activities over the pipeline causes dents leading to long term pipeline failure. Threat 15 is Cover reduction through wet weather traffic on non road crossings during construction activities over the pipeline causes depth of cover reduction. Both threats are similar in the actions required.

- | | |
|---------------------------|--|
| Pipeline Protection – | <ul style="list-style-type: none"> • Depth of cover • Wall thickness |
| Hazard prevention – | <ul style="list-style-type: none"> • DBYD • Liaison activities • Marker Posts • Marker Tape in some areas • Pipeline Patrolling |
| Risk Management Actions - | <ul style="list-style-type: none"> • APA to put this in their input to council to prevent vehicles from easement access during construction activities. • APA to be presented with Construction methodology and Construction company to seek APA approval for construction methodology in the pipeline easement. |

Threats 18 & 19 – Threat - Installation of new service (Vertical drilling) (for power pole etc.). Threat 18 is for penetration of the pipeline by drilling equipment causes ignition and death/serious injury to drill operator or spotter. (Pilot drill only 50mm max. hole), while threat 19 is for supply issues.

- | | |
|---------------------------|--|
| Pipeline Protection – | <ul style="list-style-type: none"> • Wall thickness |
| Hazard prevention – | <ul style="list-style-type: none"> • Liaison activities • DBYD • Marker Posts • Pipeline Patrolling |
| Risk Management Actions - | <ul style="list-style-type: none"> • Vertical drilling in the pipeline easement is not permitted to occur during development. Council/developer to ensure that any plans for undertaking this construction method will not be permitted in easement area. Use |



of wide base supports will eliminate the need for this construction method.

5.0 CONCLUSIONS

All threats identified in this risk assessment were either of Intermediate and ALARP, Low or not a credible risk to the pipeline, apart from one threat which could not be assessed as further information is required prior to assessment.

Continuing liaison between Council, MPA, APA and land developers should ensure that construction activities and post construction activities pose minimal risk to the high pressure natural gas pipeline located within the boundaries of this development. The main actions required from this assessment include:

- Council will request input from APA at pre-application stage in regards to road construction, sewer installation and drainage pipeline installation within a distance of 60m from the pipeline easement.
- APA to provide input to road construction, sewer installation and the drainage pipeline to the retarding basin in the pipeline easement and also provide its excavation procedures near the pipeline to the developer/Council.
- During construction of the subdivision concrete slabs to be installed above the pipeline at all service crossings of the pipeline, including drainage crossings above the pipeline.
- Easement to exclude the use of rippers and Horizontal bores in/through the pipeline easement area of the pipeline and HDD towards the pipeline easement in the pipeline's measurement lengths.
- APA to inform Council of the requirement to prevent heavy vehicles (over 8 tonne per axle) from easement access during construction activities, except where specific permission has been obtained from APA (APA will be required to undertake stress calculations for these heavy vehicles).
- APA to be presented with construction methodology and Construction Company to seek APA endorsement for construction methodology in the pipeline easement.
- Vertical drilling in the pipeline easement is not permitted to occur during development. Council/developer to ensure that any plans for undertaking this construction method will not be permitted in easement area.
- During construction/redevelopment of roads in this development concrete slabs are to be installed over the pipeline for the width of the road reserve.
- If traffic lights or street lights are required within the pipeline easement these are to be located on wide bases to prevent excavation to significant depths in the pipeline easement.



With plans in place and reviewed by APA, completion of the assessment for the threat not assessed here, and with other items requiring action from section 4 of this report and the SMS Sheets, this safety management study concludes that the Morwell to Dandenong Natural Gas Pipeline will continue to be in compliance with the SMS requirements of AS2885.1-2012 in the area located within the Casey Central Town Centre Precinct Structure Plan information shown in Appendix 4.



APPENDIX 1

SMS Sheets



APPENDIX 2

Calculations



APPENDIX 3

ALARP Analysis



APPENDIX 4

Casey Central Town Centre PSP Information/Drawings