# 1 Business Case – Capital Expenditure (Capex)

# Western Outer Ring Main (WORM) Project

Service Provider: APA VTS Australia (Operations) Pty Limited
Asset: Victorian Transmission System (VTS) (i.e. APA GasNet System as defined under the Service Envelope Agreement (SEA))
Business Case: Number 506

## 2 Project Approvals

**TABLE 1:** BUSINESS CASE – PROJECT APPROVALS

| | |
|---|---|
| **Prepared By** | Daniel Tucci, *Senior Concept Engineer, APA Group* |
| **Reviewed By** | Sheila Krishnan, *Manager Asset Capacity Planning, APA Group* |
| **Approved By** | Mark Fothergill, *General Manager Infrastructure Strategy and Engineering, APA Group* |

## 3 Project Overview

**TABLE 2:** BUSINESS CASE – PROJECT OVERVIEW

| | |
|---|---|
| **Description of Issue/Project** | This business case submission for the WORM is in response to significant new information made available in the release of AEMO's Gas Statement of Opportunity (GSOO) document and Victoria Gas Planning Report (VGPR) in March 2017.<br><br>In January 2017, APA submitted a proposal to the AER to augment the SWP by reconfiguration of Brooklyn compression and making Winchelsea compressor station bi-directional. This would increase the capacity of the SWP for UGS refilling from 102 TJ/d to 150 TJ/d. (refer to Business Case 505 – SWP Expansion). However, this may not be sufficient in light of the new information made available in the GSOO and VGPR. Furthermore, this augmentation does not create any additional capacity from Port Campbell to Melbourne. **APA is now submitting the full WORM proposal to the AER for increased capacity to and from Port Campbell to address security of supply concerns arising from increased system volatility leading to uncertainty in relation to UGS refill, as well as supporting peak GPG requirements in the VTS.**<br><br>The Western Outer Ring Main (WORM) project is the missing link in the VTS configuration which brings many benefits to the VTS. Due to the low pressure inner ring mains around Melbourne, there is a limitation on how much the South West Pipeline can bring gas from Port Campbell or to Port Campbell though Melbourne. With the WORM, there would be an alternative route for gas from Port Campbell to flow into the Northern and Gippsland regions, higher refilling rate for UGS, better linepack management (particularly for expected increase in peak GPG operation) and increased security of supply in the event of Longford or Port Campbell outages.<br><br>A short 8.3 km section of the WORM was already laid between Rockbank and Plumpton in 2012. To complete the WORM, a 49.3 km x 500 mm diameter pipeline interconnection between Plumpton and Wollert would be required. A compressor station and regulating station at Wollert will enable gas to be transferred east-west across Melbourne. |
| **Options Considered** | The following options have been considered:<br>1. Option 1: Do nothing. Secure WORM easement (as per Business Case 504) and Reconfigure Brooklyn Compressor Station and Winchelsea Bidirectional Work (as per Business Case 505)<br>2. Option 2: Construct the WORM project |
| **Proposed Solution** | The Preferred Solution is Option 2. |
| **Estimated Cost** | **$122.4 million (excluding GST).** |

| | |
|---|---|
| **Consistency with the National Gas Rules (NGR)** | **The above presented capital project meets the criteria of Rule 79(2c) i and ii, that is, the capital expenditure is necessary to maintain the safety and integrity of services. Consistent** with the requirements of Rule 79 of the National Gas Rules, APA considers that the capital expenditure is such as would be incurred by a prudent service provider acting efficiently, in accordance with accepted good industry practice, to achieve the lowest sustainable cost of providing services (Rule 79(1)(a)). |
| **Stakeholder Engagement** | APA has had regular engagement with stakeholders related to this project for a number of years. The stakeholders effected by this project are:<br>• Australian Energy Market Operator<br>• Lochard Underground Storage and Shippers |

# 4 Background

## 4.1 The Victorian Transmission System

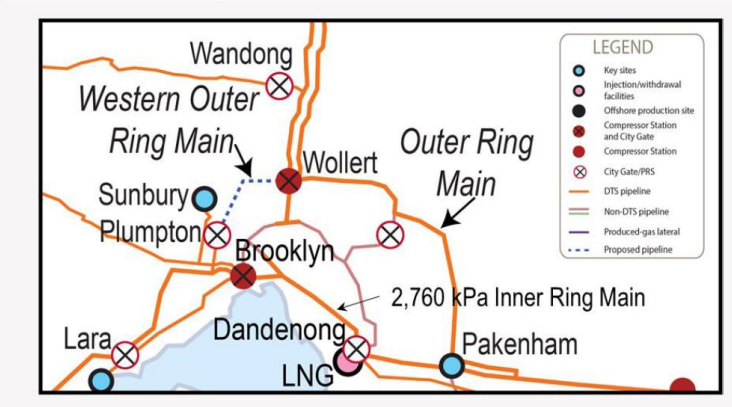
The Victorian Transmission system has three main branches. They are:

- The Longford Melbourne Pipeline (LMP) which lies between Melbourne and South Eastern Victoria;
- The Victorian Northern Interconnect (VNI) which lies between Wollert just north of Melbourne and the NSW border; and
- The South West Pipeline (SWP) which lies between Melbourne and South Western Victoria.

The LMP and the VNI are linked by the high pressure Outer Ring Main. The Outer Ring Main is a 93.1 km long 750mm pipeline with a MAOP of 6890 kPag. This provides the ability to send gas under high pressure between these pipelines.

There is no equivalent link between either the VNI and the SWP or the LMP and the SWP. Sending gas between these non linked pipelines involves using the lower pressure Melbourne network, and this limits the amount of gas that can be moved across Victoria in these directions. This is shown in the map excerpt of the VTS below.

**Figure 23 Proposed WORM pipeline**



## 4.2 Natural Gas Storage Facilities

Victoria has two major natural gas storage facilities, Iona Underground Storage Facility and Dandenong LNG Storage Facility[1]. Of these two the more significant in terms of capacity is the Iona Storage Facility with a total storage capacity of 26 PJ (compared to 0.7 for Dandenong LNG).

AEMO states that Victoria relies on Iona UGS to meet winter maximum gas demand. Failure to refill Iona UGS during summer 2018–19 may result in Victorian gas supply shortfalls during winter 2019 and beyond.[2]

Lochard Energy owns the Iona Underground Storage Facility. Located near the town of Port Campbell in Victoria the Iona Underground Storage facility uses a depleted gas field to store natural gas. The storage facility is connected to the SWP. Currently, the SWP capacity to refill UGS is 104 TJ/d. The injection capacity from Iona Underground Storage Facility into the SWP is 412TJ/day.

## 4.3 The Western Outer Ring Main

The Western Outer Ring Main (WORM) project was initiated over 10 years ago by APA. The project at that stage was known as the Brooklyn to Wollert Loop project which had a slightly increased scope to the current WORM project as it is known today.

APA submitted a proposal for the full Western Outer Ring Main (WORM) project including option analysis in the 2013-2017 Access Arrangement period. While not approving the WORM at that time, the AER stated in their Final Decision that the completion of the outer ring main around Melbourne "to have merit from a technical perspective and in the future, prove to be a prudent response to the augmentation needs of the VTS in the longer term".

Based on information available at the time, in January 2017, APA submitted a proposal for the easement acquisition for the WORM for the VTS Access Arrangement 2018-2022 period (refer to Business Case 504 – Western Outer Ring Main easement). The easement acquisition was proposed taking into account the fact that access and securing easements will become increasingly difficult and more expensive over time with urban growth along the route.

## 4.4 March 2017 Update

A number of changes have occurred since APA VTS submitted its access arrangement revision submission.

### 4.4.1 2017 Gas Statement of Opportunity and 2017 Victorian Gas Planning Report Released

AEMO released the Gas Statement of Opportunity (GSOO) document in March 2017 which identified a tightening of gas supply demand balance in Victoria, South Australia and NSW, leading to an increasing risk of supply shortfalls in the gas and electricity markets. AEMO's VGPR 2017 stated that inadequate refilling the Port Campbell UGS system outside winter due to capacity limitations on the South West Pipeline (SWP) will increase the risk of shortfall in meeting gas supply in the VTS from winter 2018.

With the closure of Hazelwood Power Station, AEMO forecast that Laverton GPG may run more often[3]. The gas consumption of Laverton GPG has a direct impact on the ability to use the SWP to refill UGS. If UGS is not refilled adequately, it would result in increasing risk of shortfalls in gas supply in Victoria as soon as winter 2018. AEMO has identified this as a threat to the system security in the VTS.

In light of the new information in the GSOO, VGPR and public submissions (from AEMO and particularly from the UGS facility owner Lochard Energy, who is proposing to increase UGS storage) calling for more capacity to refill UGS and also to increase capacity towards Melbourne. APA is now submitting a proposal for the full WORM to be built within the 2018-2022 Access Arrangement period due to the tightening of the gas supply demand in Victoria from winter 2018.

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[1] CORE ENERGY GROUP, GAS STORAGE FACILITIES EASTERN AND SOUTH EASTERN AUSTRALIA, FEBRUARY 2015, P9
[2] AEMO, GSOO, MARCH 2017 P7
[3] AEMO, GSOO, MARCH 2017 P5

APA is committed to manage the transition period prior to WORM completion, to minimise risk to system security in the VTS from winter 2018.

### 4.4.2 Iona Underground Storage

Lochard Energy has informed AEMO of expansion plans. These plans are a committed reservoir withdrawal capacity increase from 390TJ/day to 440TJ/day, and increased injection capacity from 153TJ/day to 173TJ/day during 2017.

They have also indicated a proposal to further increase withdrawal capacity from 440TJ/day to 570TJ/day and refill capacity from 173TJ/day to 250 TJ/day by the end of 2019.

### 4.4.3 SA electricity and gas Issues

The South Australian Government has announced the "Our Energy Plan". Included in the plan is an announcement to construct a gas fired electricity generator up to 250MW.

The plan will also build on the "The Plan for Accelerating Exploration" (PACE) grant-supported projects are estimated to generate $198 million in prospective expenditure. The State Government pledged to provide an extra $24 million for a second round of funding to incentivise companies to extract even more gas and create more jobs.

A new PACE Royalties Return Scheme was also announce to provide 10 per cent of royalties to landowners whose property overlies a petroleum field which is brought into production.

### 4.4.4 Turnbull gas intervention

Following a meeting with the Prime Minister, it is reported that the major east coast gas companies have given the Federal Government a guarantee they will make gas available to meet domestic demands.

## 4.5 Brooklyn Compressor Station Unit 10

APA is currently undertaking the necessary work and applications for approvals to make Brooklyn Compressor Station 10 (BCS10) available for operation to support UGS refill. This is an interim solution.

BCS10 currently is outside the Service Envelope Agreement (that is, it does not currently contribute to the Service Envelope Capacity) and only operated under emergency conditions. The compressor is wet seal, hence will introduce liquids/oils into the pipeline when operated. It also has NOx/SOx issues which will have environmental impact on clean air emissions. APA requires environmental and gas market exemptions to be able to operate BCS10 in its current state.

BCS10 operated with both BCS11 and BCS12 will increase the SWP capacity to Port Campbell to 148 TJ/d. This will immediately remove any SWP capacity constraints in refilling Port Campbell WUGS.

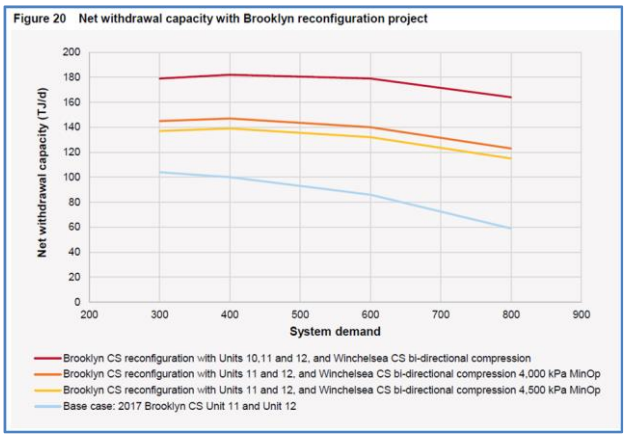
Given the environmental and operational issues associated with BCS10 it is not a long term solution to the issues of capacity at Port Campbell. Installation of a new dry seal compressor at Brooklyn which is compatible with environmental obligations that would support a long term license to operate would be more expensive and provides less flexibility than the reconfiguration of the Brooklyn and Winchelsea compressor stations (business case 505).

## 4.6 Reconfiguration of the Brooklyn and Winchelsea Compressor Stations

APA submitted this project in Business Case 505 as part of our access arrangement submission.

The reconfiguration of Brooklyn Unit 11 and 12 compressors to compress directly into the Brooklyn to Lara pipeline increases the capacity of the SWP to refill UGS. Winchelsea Compressor (currently only compressing towards Melbourne) would be made bi-directional in order to compress towards Port Campbell. The SWP capacity to refill UGS would be increased from 104 TJ/d to 147 TJ/d[4]. See the extract from VGPR 2017 in Figure 1 below (orange line).

Figure 1: SWP Westernhaul Capacity with Brooklyn reconfiguration and Winchelsea works (extract from VGPR 2017)




The works will take approximately 12 months to be completed and would be in place by summer 2017/18. Hence, it will alleviate risk of shortfall in gas supply from winter 2019. These works are still necessary to manage the capacity shortfall in the refilling of UGS until the WORM is completed and beyond that time.

The cost of this project is $3.5 m.

## 5 Risk Assessment

The reliability of gas supply refers to the continuity of supply to customers. An unplanned loss of supply (or interruption) to a customer in any circumstance is regarded by the ESV as a potentially dangerous and undesirable event. "*Unless gas supply to a customer is safely isolated and reinstated after an interruption, there is always the possibility of gas escapes at those few appliances which have had their supply interrupted and which do not have flame failure devices fitted*"[5]. According to Energy Safe Victoria this is a circumstance which presents a risk to public safety and must be avoided.

Rule 79(2)(c) of the National Gas Rules lists the following justifiable methods for Capital Expenditure[6];

i. to maintain and improve the safety of services; or

ii. to maintain the integrity of services; or

iii. to comply with a regulatory obligation or requirement; or

iv. to maintain the service provider's capacity to meet levels of demand for services existing at the time the capital expenditure is incurred

[4] AEMO's VGPR March 2017 modelling with new forecast revised the SWP westernhaul capacity to 104 TJ/d (previously 102 TJ/d). With the new forecast, Brooklyn reconfiguration and Winchelsea compressor bi-directional works results in a westernhaul capacity up to 147 TJ/d (previously 150 TJ/d).

[5] ESV – Natural Gas Safety Report (Produced by the Office of Gas Safety the predecessor to ESV.)

[6] NGR 79 New capital expenditure criteria

The WORM project meets the criteria of Rule 79(2)(c)(i), (ii) and (iv), that is, the capital expenditure is necessary to maintain the safety and integrity of services associated with demand that exists at the time the capital expenditure is incurred.

Route and Construction

There are a number of routes considered to complete the WORM project. The route presented in this business case represented the most likely route for the WORM. The proposed route is nearly 12 km longer than the shortest route option considered. However, this route is likely to be the most cost effective and accessible route, taking into account urban encroachment and environmental considerations.

In terms of construction, the proposed project is of routine nature to APA. The risk is mainly related to factors that are outside APA control, particularly in built-up environment where placement of pipeline underground may be constrained by other utilities, and controlling parties.

Construction costs. Proposed project is of routine nature to APA. The risk is mainly related to factors that are outside APA control, particularly in urban environment where placement of pipeline underground may be constrained by other utilities, and controlling parties.

Technical. All construction work would be completed by technically proven contractors, to APA's engineering design and specifications. All construction processes will be overseen by APA.

Operation. The new mains and associated facilities will be operated in accordance with APA's standard management practices for assets of this type. APA has a suitably qualified and experienced workforce in Victoria to perform this type of operation.

Regulatory. This investment should be regarded as complying with Rule 79(2) (c) (i) and (ii), and therefore is conforming capital expenditure.

# 6 Options Considered

Several options were considered, which include:

## Option 1: – Do Nothing. Secure WORM Easement (refer Business Case 504) and Reconfigure Brooklyn Compressor Station and Winchelsea Bidirectional Work (as per Business Case 505)

This not an acceptable option as it does not address increasing the SWP westernhaul capacity to refill UGS to reduce the risk to system security in the VTS from winter 2018, or provide the other system security and operational benefits available from construction of the WORM.

If the WORM project is not approved for 2018-22, APA maintains that securing the WORM easement and the reconfiguration of the Brooklyn Compressor Station and Winchelsea Bi-directional work all remain prudent investments for Access Arrangement period 2018-2022.

## Option 2: – Full WORM Project

The WORM project consists of the following stages:

- Stage 1: 8.3 km x 500 mm Rockbank to Plumpton – Completed 2012

This project was completed in 2012 and the main purpose of the timing of this project was to remove an immediate capacity constraint on the Sunbury lateral. The pipeline was sized to 500 mm in order to be extended to form the WORM.

- Stage 2: 49.3 km (approx.) x 500 mm Wollert to Plumpton

The pipeline will complete the WORM project. Included in this Stage is:

  - Installation of additional compression (WCS6 – Centaur 50) at Wollert Compressor Station (CS) 'B' allowing compression from Pakenham to Wollert pipeline (existing connection) to the new WORM (new connection).
  - A new interconnecting Pressure Reduction Station at Wollert connecting the Brooklyn Lara Pipeline (BLP) to the Pakenham-Wollert Pipeline.

There were four routes considered for the WORM. Refer to Business Case 504 for the securement of easements for the WORM. Option 4 route has been chosen as the most likely route as it avoids the urban encroachment (refer to Attachment 1 and 2 for WORM routes).

The total project cost for Stage 2 is $122.4m. Note, this includes the expenditure on easements that makes up Business case 504.

If the WORM is undertaken, approximately $2.3m of capital expenditure submitted in the SIB budget for upgrade of control systems and balance of plant for BCS10 (refer Business Case 204) will not be needed.

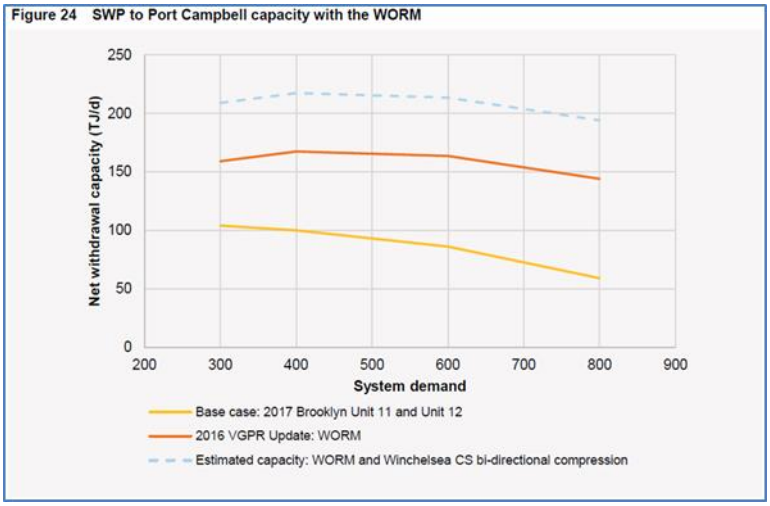
There are several benefits for customers of the VTS arising from the removal of current constraints through the construction of the WORM. These are:

1. **Unlocking Capacity to and from Port Campbell**

The WORM would be able to move the higher volumes of gas from the South West Pipeline, hence unlocking the supply capacity to and from Port Campbell.

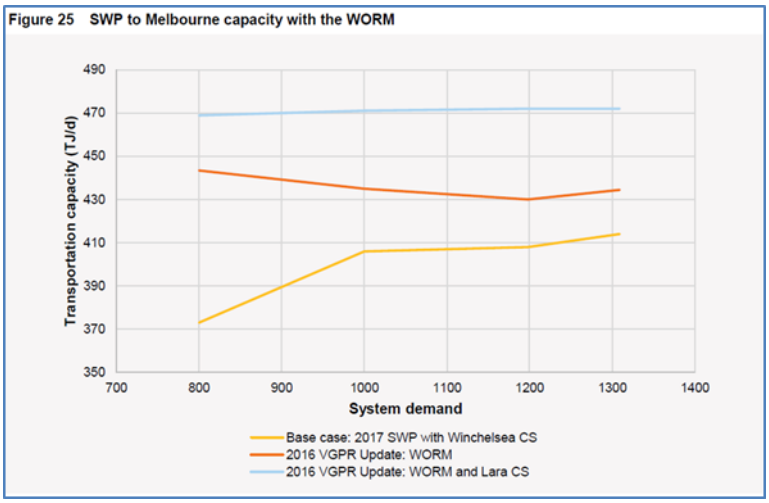
With the WORM, the capacity for refilling UGS would be increased from 148 TJ/d[7] to 220 TJ/d (Refer to VGPR 2016). This augmentation substantially increases the ability to refill the Iona Storage facility in line with the proposals. The Iona Storage facility has committed capacity for an expansion to support refill of 173TJ/d and a proposal to further increase capacity to 250TJ/d.

Figure 2: SWP Westernhaul Capacity with WORM (extract from VGPR 2017)




Currently the SWP pipeline has an easternhaul capacity of 412 TJ/d (refer Figure 3 below) with Winchelsea compressor in operation. The WORM increases the capacity eastbound toward Melbourne by 23 TJ/d, that is, from current 412 TJ/d to 435 TJ/d. Further compression at Stonehaven on the South West Pipeline at a later date could increase capacity to over 470 TJ/d. (refer to Figure 3 below). Iona Underground Storage have a proposal to increase capacity from 440TJ/day to 570TJ/day.

Figure 3: SWP Easternhaul Capacity with WORM (extract from VGPR 2017)




## 2. Security of Supply

In the event of loss of supply from any of the Market scheduled gas trains at Longford, Port Campbell (UGS, Otway or Minerva) or Pakenham (Lang Lang), it would be possible for alternate supplies to be scheduled. Flow constraints

[7] Assuming the reconfiguration of Brooklyn and Winchelsea compressor stations has been undertaken.

on either South West Pipeline/Brooklyn Lara Pipeline or Eastern systems are removed with the WORM. For example, gas from the UGS or from the north from Culcairn would be able to respond with additional shortfall volumes should a supply issue occur at Longford, and vice-versa.

In October 2016, a 6 hour unplanned outage of the Longford Gas Plant caused AEMO to issue a notice of a threat to system security. If the outage had persisted, curtailments in northern and eastern Victoria would have been required. There was sufficient gas at Port Campbell but due to the current system configuration, that gas could not be transferred from Port Campbell. With the WORM, gas can be transported to and from Port Campbell, hence reducing the risk to system security during Longford plant outages.

## 3. Operational Benefits of the WORM

A direct connection between the WORM and the Pakenham to Wollert pipeline would allow gas to flow interchangeably between the east and west systems with fixed operating set points and without direct operator intervention. The VTS will therefore be able to operate within a tighter band of operation than is currently achieved. AEMO currently manages linepack with stop/start operation at Brooklyn and Wollert Compressor Stations and Brooklyn City Gate. Current practices to move gas out of the South West Pipeline/Brooklyn Lara Pipeline is to change the set points at the Brooklyn, Wollert and Dandenong regulator stations.

Once the WORM project is completed, the operation of major supply Pressure Reduction Stations (PRS) stations at Dandenong, Brooklyn and Wollert would be set at fixed outlet pressure, including Brooklyn and Lara supplying the Geelong pipeline. Wollert becomes a hub managing transfers across the Pakenham-Wollert-Rockbank systems and balances linepack in the VTS.

With the WORM in place, there will be better management of the VTS. Currently, the VTS operates within a tight band of linepack. The WORM creates additional “storage” or buffer, hence having the following benefits:

- Linepack Balancing: The capability of balancing linepack across the Western/Northern/Eastern systems using the WORM and Wollert compressor hub reduces the risk of Longford or Port Campbell plant trip due to a high pressure constraint (e.g. in early morning) in the supplying Longford or Port Campbell pipelines. High operating pressures presently at both Longford and Port Campbell are required in order to meet peak loads.

- Gas Powered Generation readiness: Management of linepack depletion due to short-term operation of Gas Powered Generation in the first half of the gas day becomes easier with the facility to transfer gas across the WORM as required, matching the available supply to the demand location. Operation of the Geelong pipeline at 5000 kPag typical pressure (fixed nominal setpoints at Lara and Brooklyn) allows Gas Powered Generation at North Laverton to be capable of immediate operation (whether gas is sourced from either Longford or Port Campbell), unlike the current operating position where system pressures may need to be adjusted or compressors started to permit the Gas Powered Generators to operate. Similarly, Gas Powered Generation at Somerton would be capable of immediate operation, unlike current operations when Wollert is periodically shut down to facilitate SWP/BLP flows via Brooklyn.

- Gas-on-gas competition: Ability to maintain gas contracts with the assurance that any surplus gas supply can be physically injected into the VTS, even in periods of low system demand.

## 4. Reducing reliance on Brooklyn Compressor station site

The Brooklyn compressors are currently used to refill the Port Campbell Underground Storage facility and also to maintain capacity on the Brooklyn to Ballarat and Geelong systems. The construction of the WORM reduces the reliance on the Brooklyn compressor site both operationally and for future growth in capacity on the VTS. Brooklyn is not the optimal location in terms of capacity expansion of the VTS and the site is heavily congested making augmentations technically difficult and therefore expensive.

With the WORM, one compressor unit at Wollert would increase the capacity into the Underground Storage facility by over 100 TJ/d with 1030 TJ/d injections at Longford (and over 150 TJ/d with 750 TJ/d injections at Longford). The increased capacity to the Underground Storage facility is achieved with considerably less than half the compression

required compared to using two or more compressors at Brooklyn. Greater package efficiency (lower fuel per volume of gas moved) is achievable by compressing at Wollert into the WORM as available suction pressure from the Pakenham to Wollert pipeline is significantly higher than the Melbourne pressure.

The WORM also has the impact of reducing fuel gas consumption and compressor maintenance costs to manage flows between Longford and Port Campbell. There will be less reliance on Brooklyn compressors to compress gas towards Port Campbell. The VGPR noted that in 2015/16 the Brooklyn compressor station used 331TJ of fuel gas. With the WORM AEMO is estimating that half that amount will be required.

### 5. Future Growth

The WORM does provide capacity for the VTS for future growth. APA estimates that the WORM would be required for growth (in addition to the current system security benefits) by 2025.

The WORM route may provide an offtake point for mains extensions to Kalkallo and also provides future connection provisions for new custody transfer meter (CTM) stations for Network Operators at Tullamarine and Mickleham.

In combination with the Winchelsea compressor, the WORM provides the additional capacity to support growth such as new Gas Powered Generation. For example, the WORM could support Wollert CCGT (500MW to 1500MW), Newport CCGT, Truganina OCGT (360MW), LaTrobe Valley (2000MW). The WORM also supports gas exports to Culcairn by removing the constraint of western flow.

**Summary of Cost/Benefit Analysis**

Option 2 is the preferred solution.

**TABLE 4:** SUMMARY OF COST/BENEFIT ANALYSIS

| Option | Benefits (Risk Reduction) | Costs |
|---|---|---|
| Option 1: Do Nothing<br>Secure WORM Easement (Business Case 504) and Reconfigure Brooklyn Compressor Station and Winchelsea Bidirectional Work (as per Business Case 505) | Nil | **Capex $26m + $3.5m**<br>WORM easement and Reconfiguration of Brooklyn Compressor Station and Winchelsea Bidirectional work only.<br>No additional capacity to and from Melbourne in this Access period. |
| Option 2: WORM | Increases refilling of UGS from 150 TJ/d up to 220 TJ/d<br>Increases capacity toward Melbourne by 23 TJ/d i.e., total 435 TJ/d.<br>Flexibility to increase easternhaul capacity further by installation of a second compressor on the SWP. | **Capex: $122.4 m**<br>Construction Period 3 years |

Operating Cost

Annual expenditure to operate and maintain the WORM pipeline and Wollert unit 6 compressor have been estimated to be in the order of $196 thousand per annum. This operating expenditure increase is estimated as incremental expenditure to the base opex and will form a step change to the APA VTS System opex budgets.

The requirement for conforming capital expenditure specified in Rule 79(1) is that the capital expenditure must be such as would be incurred by a prudent service provider acting efficiently, in accordance with accepted good industry practice, to achieve the lowest sustainable cost of providing services.

APA has systems and procedures guiding the development the capital projects from Concept through to the Delivery phase. For most capital projects over $1m, design and procurement will be carried in-house and the delivery/construction phase will be tendered. If there is a constraint in resources, then the design and procurement

could also be tendered out under an EPC Process. APA has preferred third party partners who are drawn upon to supplement any shortfall in engineering resources.

### 6.1.1 Consistency with the National Gas Rules

#### Rule 79(2)

The requirements for justification of conforming capital expenditure specified in Rule 79(2) are as follows:

The capital expenditure must be justifiable on one of the following grounds;

a. The overall economic value of the expenditure is positive, or

b. The present value of the expected incremental revenue to be generated as a result of the expenditure exceeds the present value of the capital expenditure, or

c. The capital expenditure is necessary;

i. To maintain and improve the safety of services, or

ii. To maintain integrity of services, or

iii. To comply with regulatory obligation or requirement, or

iv. To maintain the service provider's capacity to meet levels of demand for services existing at the time the capital expenditure is incurred (as distinct from projected demand that is dependent on an expansion of pipeline capacity); or

d. The capital expenditure is an aggregate amount divisible into two parts, one referable to incremental services and the other referable to a purpose referred to in paragraph "c", and the former is justifiable under paragraph "b" and the latter under paragraph "c".

The above presented capital project meets the criteria of Rule 79(2)(c)(i), (ii) and (iv), that is, the capital expenditure is necessary to maintain the safety and integrity of services associated with demand that exists at the time the capital expenditure is incurred.

#### Rule 79(1)

Consistent with the requirements of Rule 79 of the National Gas Rules, APA considers that the capital expenditure is:

- Prudent – The expenditure is necessary in order to maintain and improve the safety of services and maintain the integrity of services to customers and personnel and is of a nature that a prudent service provider would incur.
- Efficient – All expenditure would be undertaken consistent with APA procurement policies which require competitive procurement for all delivery/construction work.
- Consistent with accepted and good industry practice – Addressing the risks associated security of supply is accepted as good industry practice.
- To achieve the lowest sustainable cost of delivering pipeline services – The sustainable delivery of services includes reducing risks to as low as reasonably practicable and maintaining reliability of supply.

### 6.1.2 Forecast Cost Breakdown

The capital and operating costs for Option 2 is detailed in the Table below in 2016 dollars.

**TABLE 5.1:** CAPEX/OPEX SPLIT

| | 2018 | 2019 | 2020 | 2021 | 2022 | Total |
|---|---|---|---|---|---|---|
| Capex (WORM) | $22.88 m | $42.65 m | $56.86 m | | - | **$122.4 m** |
| **Total** | **$22.88 m** | **$42.65 m** | **$56.86 m** | | **-** | **$122.4 m** |
| | | | | | | |
| OPEX | | | | $196.0 k | $196.0 k | **$196.0k** |

**TABLE 5.2:** PROJECT COST ESTIMATE, BY COST

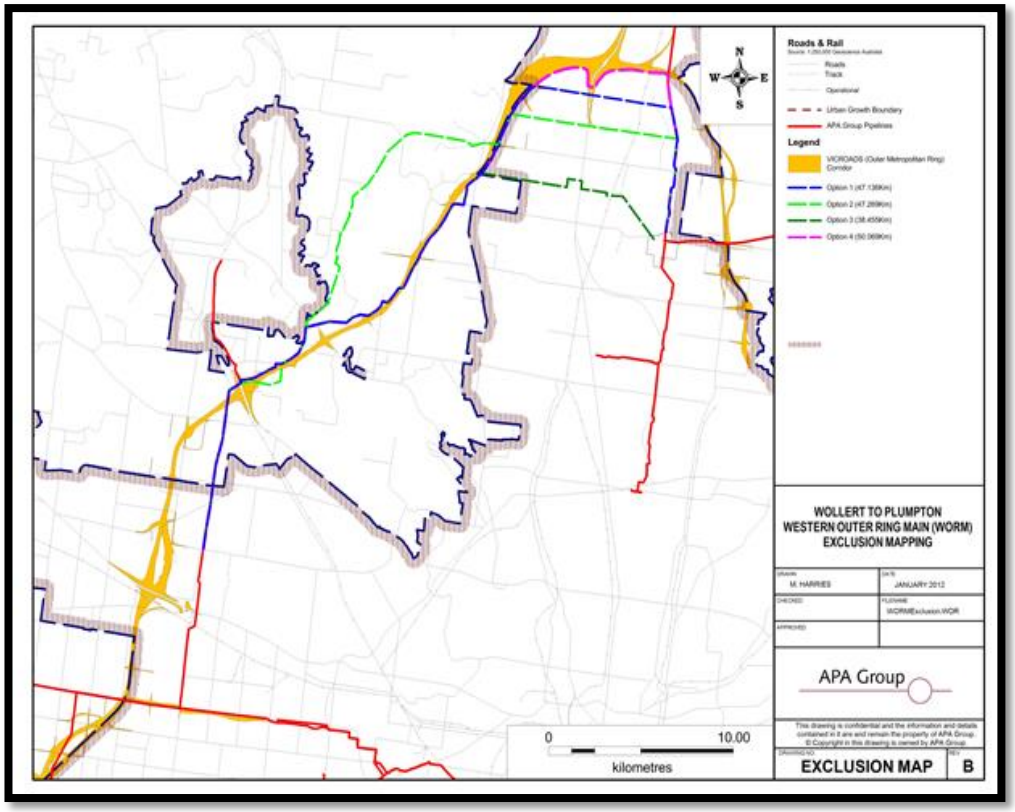
| WORM Pipeline + Compressor and Regulator | 2018 | 2019 | 2020 | 2021 | 2022 | Total |
|---|---|---|---|---|---|---|
| Project Management, Design, Commissioning | $3.32 m | $5.61 m | $3.39 m | - | - | **$12.31 m** |
| Land & Approvals | $13.02 m | $13.02 m | - | - | - | **$26.04 m** |
| Procurement | $6.54 m | $20.65 m | $0.29 m | - | - | **$27.49 m** |
| Construction | - | $3.37 m | $53.18 m | - | - | **$56.55 m** |
| **Total** | $22.88 m | $42.65 m | $56.86 m | | | **$122.4 m** |

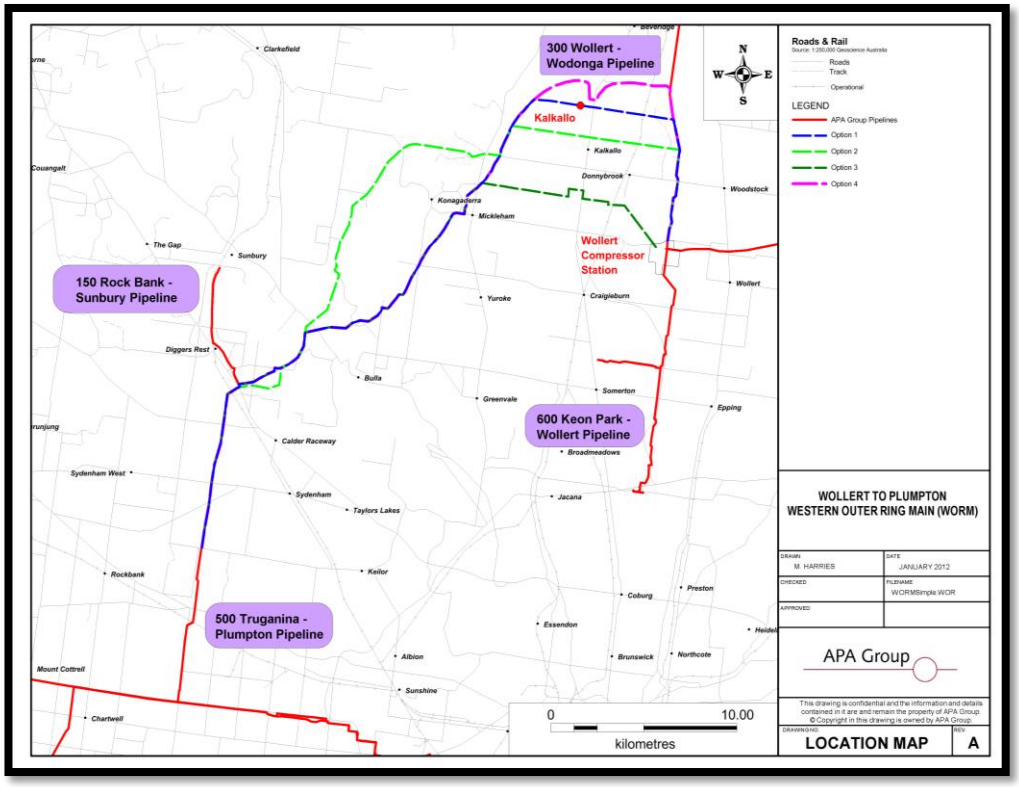
| WORM Pipeline | 2018 | 2019 | 2020 | 2021 | 2022 | Total |
|---|---|---|---|---|---|---|
| Project Management, Design, Commissioning | $1.63 m | $1.63 m | $0.95m | | - | **$4.21 m** |
| Land & Approvals | $13.01 m | $13.02 m | | | - | **$26.03 m** |
| Procurement | $1.19 m | $14.28 m | | | - | **$15.47 m** |
| Construction | - | | $47.78 m | | - | **$47.78 m** |
| **Total** | $15.83 m | $28.93 m | $48.73 m | | | **$93.49 m** |

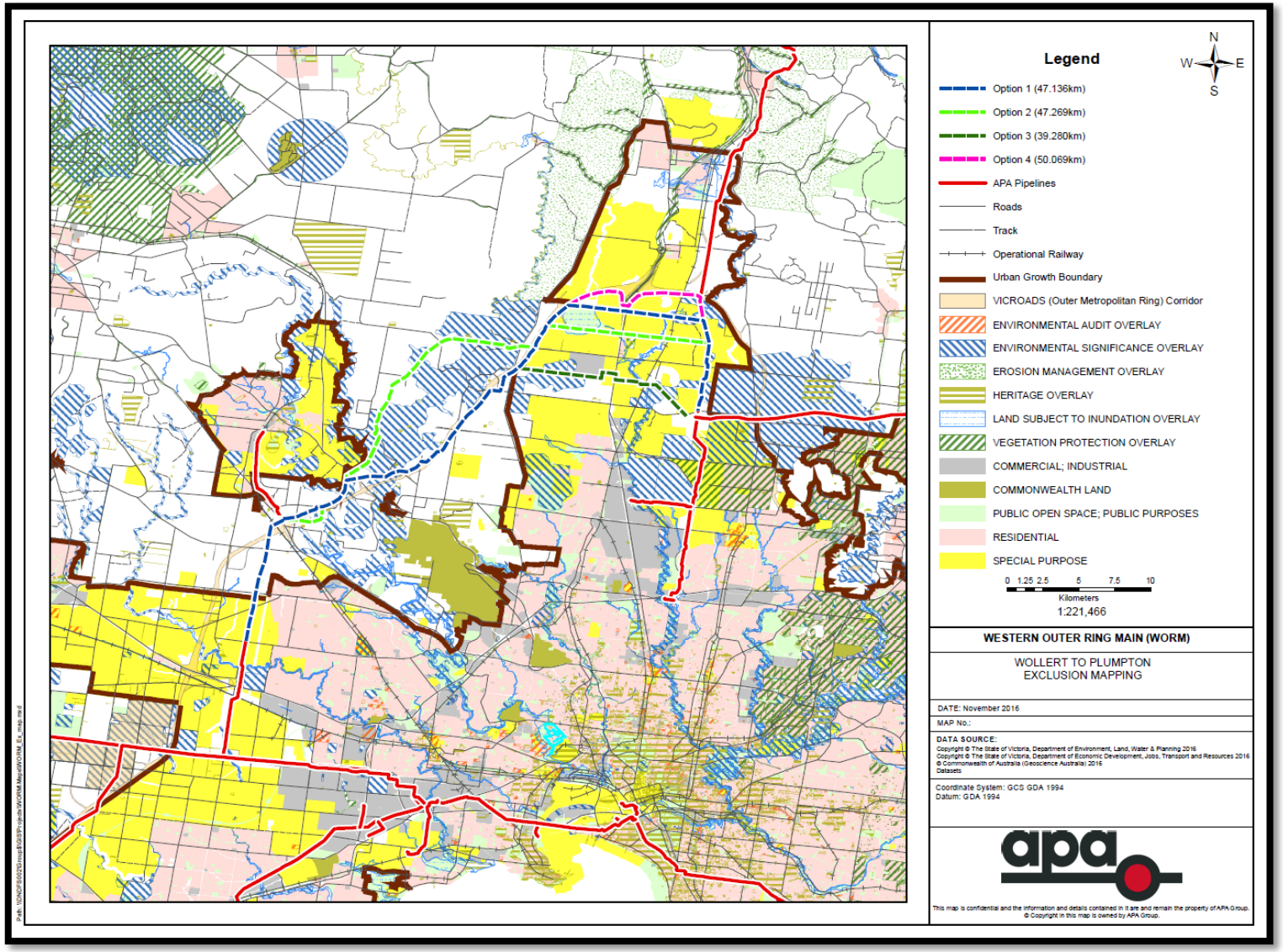
| WORM Compressor | 2018 | 2019 | 2020 | 2021 | 2022 | Total |
|---|---|---|---|---|---|---|
| Project Management, Design, Commissioning | $1.68 m | $3.37 m | $1.96 m | | - | **$7.01 m** |
| Land & Approvals | $0.01 m | | | | - | **$0.01 m** |
| Procurement | $5.35m | $5.35 m | | | - | **$10.71 m** |
| Construction | - | $3.37 m | $4.22 m | | - | **$7.58 m** |
| **Total** | $7.04 m | $12.09 m | $6.18 m | | | **$25.31 m** |

| WORM Regulator | 2018 | 2019 | 2020 | 2021 | 2022 | Total |
|---|---|---|---|---|---|---|
| Project Management, Design, Commissioning | | $0.61 m | $0.48 m | | - | **$1.09 m** |
| Land & Approvals | | $0.01 m | | | - | **$0.01 m** |
| Procurement | | $1.02 m | $0.29 m | | - | **$1.31 m** |
| Construction | | | $1.19 m | | - | **$1.19 m** |
| **Total** | | $1.64 m | $1.96 m | | | **$3.60 m** |

## Attachment 1: Route Option Overview Map




Legend
N
W
E
S
Option 1 (47.136km)
Option 2 (47.269km)
Option 3 (39.280km)
Option 4 (50.069km)
APA Pipelines
Roads
Track
Operational Railway
Urban Growth Boundary
VICROADS (Outer Metropolitan Ring) Corridor
ENVIRONMENTAL AUDIT OVERLAY
ENVIRONMENTAL SIGNIFICANCE OVERLAY
EROSION MANAGEMENT OVERLAY
HERITAGE OVERLAY
LAND SUBJECT TO INUNDATION OVERLAY
VEGETATION PROTECTION OVERLAY
COMMERCIAL; INDUSTRIAL
COMMONWEALTH LAND
PUBLIC OPEN SPACE; PUBLIC PURPOSES
RESIDENTIAL
SPECIAL PURPOSE
0 1.25 2.5 5 7.5 10
Kilometers
1:221,466
WESTERN OUTER RING MAIN (WORM)
WOLLERT TO PLUMPTON
EXCLUSION MAPPING
DATE: November 2016
MAP No.:
DATA SOURCE:
Coordinate System: GCS GDA 1994
Datum: GDA 1994
This map is confidential and the information and details contained in it are and remain the property of APA Group.
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## Attachment 2 – WORM Preliminary Route and Land Description (Option 4)

The pipeline consists of approximately in total an additional 50 km of 500mm NB pipeline partially laid in existing easement (approximately 8km, Wollert to Wodonga Pipeline) and the rest in greenfield easement. Three intermediate mainline valves are required, as well as pig traps and hot taps at Wollert and Plumpton.

The topography of the preferred route is generally flat, however a number of very steep gullies exist at creek crossings (Deep Creek, Emu Creek and Jackson's Creek). It is estimated that 250 trench breakers are required. Surface ground conditions reveal basalt plains on part of the route. The remainder of the route is a combination of sedimentary/siltstone/gravel/sand with the odd section of basalt. In total there are 6 major waterway crossings. All creek crossings will need to be open cut due to basalt.

Preliminary design has indicated there will be 22 road bores, including extensive bores under the Western Ring Road, Deer Park By-Pass, Western Freeway, Calder Highway and Hume Highway. In addition there will be 3 railway bore crossings and 5 road open cuts.

Construction within road pavement is expected for approximately 1900 metres. Roads affected are Fitzgerald Road, Fairbairn Road, Boundary Road and Westside Drive.

Environmental issues are likely to include the following:

- Native grasslands – protected ecological communities and associated habitat for protected species.
- Crossings of the Merri Creek may be opposed by community groups (e.g. Friends of the Merri Creek) given their opposition to a previous pipeline crossing of the creek in relation to protection of the Growling Grass Frog.
- Noise, dust and access near residential homes along proposed route.

There will be a requirement for offsets of losses of native vegetation and habitat compensation (within the urban growth zone) in relation to impacts on native vegetation. An amount has been included for offsets however environmental field studies would need to be carried to accurately determine the exposure.

There is likely to be Crown Land along the route that will be subject to Native Title. A full historical title search needs to be carried out followed by a referral to Native Title Services Victoria to conclusively establish whether or not native title exists. As it is likely an allowance has been made on the assumption that Native Title does exist on the route.

There will be one local aboriginal group dealing with Cultural Heritage. An allowance has been made for the negotiation of a Cultural Heritage Management Plan with the group. Until field surveys are undertaken to assess potential cultural heritage places an accurate cost of the likely extent of work is difficult to quantify.

The chosen pipeline route will be a mix of existing pipeline easement and greenfields easement. As with the Brooklyn Lara project, the greenfields section will affect Green Wedge zoned land that is currently experiencing a dramatic upwards movement in market sale prices as a result of land speculation. In addition, the land parcels vary greatly in size and land value per hectare. Until the final route is chosen and environmental studies completed an accurate estimate of the cost of easement acquisition cannot be finalised. The estimate provided has used an "average" amount for land value and also includes consideration for compulsory acquisition of a number of easements. In addition to the easement acquisition, APA will be required to negotiate additional temporary workspace with private landowners.

***Pipeline Route Alternatives***

The following are alternative pipeline routes that were considered:

### (a) The High Voltage Electricity Transmission Line

An electricity transmission line is located roughly parallel to the gas pipeline route for the majority of the route. Being an overhead lineal infrastructure however, its alignment follows land contours that are not possible to follow with a buried pipeline. For approximately 20.5 kms, the route runs within escarpments, with the towers located on high

ground. There are also critical construction and operational safety issues to overcome when running a lineal steel pipeline parallel to high voltage transmission lines.

### (b) Railway lines

The rail routes are not located in areas where they could be of practical benefit to the pipeline route. In addition, the rail authorities will generally not allow high pressure gas pipelines to run parallel within their land.

### (c) The Hume Freeway or another Major Arterial Road.

Like railways, VicRoads will generally not allow infrastructure similar to gas transmission pipelines to run within freeways or major arterial roads. This option was explored during route selection of the Brooklyn Lara Pipeline.

### (d) Other Cross Country Routes

A new pipeline route to the west of Melton and north and west of Sunbury.

This route would give reasonable certainty that there would not be any changes to planning zones or land use beyond the year 2015. The length of this pipeline would be 105 kms, with 63 kms of Greenfield easement.

### (e) Utilising green wedge areas within Melbourne Airport flight paths.

There is reasonable certainty that development will continue to be restricted along the flight paths of Melbourne Airport. The pipeline route already crosses one of the flight paths. It is not practical to use the flight paths to a greater extent. To reach the flight path the pipeline alignment would need to cross the Organ Pipes National Park and encounter severe escarpments or pass through areas of Sydenham and neighbouring areas that are already under development. A route utilising flight paths to a greater extent would result in about the same length and would still encounter development.

## Appendix 3: References

1. APA Business Case 504 – “Western Outer Ring Main (WORM) easements”, Dec 2016
2. APA Business Case 505 – “South West Pipeline Westernhaul Expansion”, Dec 2016
3. APA Business Case 204 – “Brooklyn CS Upgrade”, Dec 2016
4. “Victorian Gas Planning Review” March 2017, Chapter 5, AEMO publication
5. “Gas Statement of Opportunity” March 2017, AEMO publication