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victorian transmission system

supplementary capital expenditure submission

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Contents

Figures and Tables

Abbreviations

AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
APA VTS	APA VTS Australia (Operations) Pty Ltd & APA VTS Australia (NSW) Pty Ltd
d	Day
EBSS	Efficiency Benefit Sharing Scheme
GJ	Gigajoule
GPG	Gas Powered Generation
GSOO	Gas Statement of Opportunity
NGFR	(AEMO) National Gas Forecasting Report
NGR	National Gas Rules
PJ	Petajoule (1PJ=1,000,000GJ)
PRS	Pressure Reduction Station
PS	Power Station
PTRM	Post-Tax Revenue Model
SWP	South West Pipeline
TAB	Tax Asset Base
TJ	Terajoule (1TJ=1,000GJ)
UGS	Underground Gas Storage
VGPR	Victorian Gas Planning Report
VNI	Victorian Northern Interconnect
VNIE	Victorian Northern Interconnect Expansion
VTS	Victorian Transmission System
WORM	Western Outer Ring Main
WTS	Western Transmission System

Summary

This is a supplementary submission to the access arrangement revision proposal for the Victorian Transmission System (VTS) lodged with the Australian Energy Regulator (AER) on 3 January 2017 (January AA proposal).

This submission sets out revisions to the January AA proposal necessary to include a new capital expenditure project, the Western Outer Ring Main (WORM), into the access arrangement. This necessarily involves changes to the capital and operating expenditure forecasts, with flow on implications for revenues and tariffs.

Since submission the January AA proposal, APA VTS and the AER have also identified a number of errors in that proposal. At the AER's request, these are corrected in the values presented in this submission and accompanying models.

Capital and operating expenditure

The WORM project is proposed to address a forecast tightening of the gas supply demand balance in Victoria, South Australia and NSW, leading to an increasing risk of supply shortfalls in the gas and electricity markets. Capacity limitations within the system, brought about by changes to gas supply arrangements, as well as the expected operation of peak gas powered generation, are likely to lead to inadequate refilling of the Iona Underground Storage (UGS) facility outside winter due to capacity limitations on the South West Pipeline (SWP).

The proposed WORM project, in conjunction with proposed reconfiguration works at Brooklyn Compressor Station and Winchelsea Compressor, will increase capacity for refill of Iona UGS. The WORM project also provides some additional eastbound capacity for injections into the VTS, as well as providing the following system wide benefits:

- Security of supply, increasing gas flows across the system 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);
- Operational benefits, where gas is able to flow interchangeably between the east and the west of the system, providing for better linepack

balancing, support for sudden operation of gas powered generation, and improved conditions for gas on gas competition;

- Reduced reliance on the Brooklyn Compressor station, which is an aged, congested site that has limited opportunities for expansion; and
- Provision of future growth of the system.

The total forecast expenditure on the WORM project is $126.7m ($real 2017). This includes $26.7m of expenditure proposed in the January AA proposal to pre-purchase the easement for the WORM in the forecast period.

Construction of the WORM in the forecast period means that some projects previously forecast to be completed within the 2018-22 period will not be required. These amount to a total of $2.5m ($real 2017)over the period.

Following commissioning of the WORM in late 2020, APA VTS expects to incur additional operating expenditure of $200 thousand per annum ($real 2017). This includes easement management and compressor maintenance associated with the new facilities installed as part of the WORM.

APA VTS has also revised forecast capital and operating expenditure to correct errors in line with its responses to AER Information Requests 2 and 6.

These revisions to the January AA proposal lead to total capital and operating expenditure for the period as set out in the following table.

Forecast capital and operating expenditure for the VTS (real 2017 $m)

$m real 2017	2018	2019	2020	2021	2022	Total
Capital expenditure	77.71	71.92	73.73	17.79	14.92	**256.07**
Operating expenditure	34.29	30.23	29.17	29.12	27.25	**150.06**

Rate of return

The proposed revised access arrangement includes a post-tax cost of equity of 8.5 per cent, a pre-tax cost of debt of 7.47 per cent, for a post-tax vanilla WACC of 7.88 per cent. This is unchanged from the January AA proposal.

Demand forecast

APA VTS does not propose any changes to forecast GPG volumes under 1-in-2 or 1-in-20 peak demand conditions at this stage. Importantly, the construction of the WORM, while it increases capacity of the VTS, does not drive additional volumes in relation to refill or GPG. The WORM instead ensures the availability of capacity for Iona UGS refill to ensure security of supply in winter in the face of potential increased GPG operation that may interrupt refill capacity across the summer.

Forecast revenue requirement

The revised forecast revenue for each year of the access arrangement period, including all the elements of the proposal, is set out in the following table.

$m nominal	2018	2019	2020	2021	2022
Return on capital	79.49	84.58	89.11	93.74	93.29
Regulatory depreciation	16.90	19.55	21.65	25.60	23.65
Corporate tax allowance	34.97	31.46	30.96	31.52	30.10
Incentive mechanisms	0.00	0.00	0.00	0.00	0.00
Operating costs	4.47	4.86	5.27	4.67	3.60
Total	**135.84**	**140.45**	**146.98**	**155.54**	**150.64**
Smoothed revenue requirement	**130.89**	**137.42**	**145.62**	**154.41**	**163.95**
X factors tariff revenue (%)	**79.49**	**84.58**	**89.11**	**93.74**	**93.29**

Tariff outcomes

Completion of the WORM project within the forecast period has an impact on tariffs for the period.

As the WORM represents a new pipeline, APA VTS established a new asset zone for the WORM in the tariff model for the proposed easement purchase. Once completed, the WORM becomes part of the broader system of pipelines and facilities for gas supply from Iona/Port Campbell to the Hub, and beyond to Northern Victoria. In line with the cost allocation methodology described in the January AA proposal, the WORM expenditure

is therefore allocated to all withdrawal zones that use the flow path incorporating the WORM, in proportion to volume. This includes the cross system tariff, as well as withdrawals at Port Campbell (but not, for example, flows to the Western Transmission System that are matched to Port Campbell injections).

On average the transport charges for a volume class customer (consuming 60 GJ per annum) in the Metropolitan area will increase by less than 3c/GJ in 2018 compared to APA VTS's January AA proposal. This equates to less than a $2.00 increase in the annual bill.

1 Introduction

This is a supplementary submission to the access arrangement revision proposal for the Victorian Transmission System (VTS) lodged with the Australian Energy Regulator (AER) on 3 January 2017 (January AA proposal).

1.1 Revisions to access arrangement to accommodate the Western Outer Ring Main project

This submission sets out revisions to the January AA proposal necessary to include a new capital expenditure project, the Western Outer Ring Main (WORM), into the access arrangement. This necessarily involves changes to the capital and operating expenditure forecasts, with flow on implications for revenues and tariffs.

Through Information Requests 9 and 10, the AER have asked APA VTS to provide it with this update to the January AA proposal. These information requests are provided with this supplementary submission at Attachment A, with cross references to where specific questions in those requests are addressed in this submission.

1.2 Additional revisions

Since submission the January AA proposal, APA VTS and the AER have also identified a number of errors in that proposal. That the AER's request, these are corrected in this submission and accompanying models. These corrections relate to:

- Corrected values for some forecast capital expenditure projects;
- The treatment of inflation in the roll forward model and the Post Tax Revenue Model; and
- The calculation of operating expenditure allowances for passive linepack and spares.

Where relevant, these are identified in this submission.

1.3 Elements of supplementary submission

Along with this submission, and in line with the AER's Information Request, APA VTS is also submitting revised models for:

- Capital expenditure
- Operating expenditure
- Roll Forward Model
- Post Tax Revenue Model
- Tariff Model
- Price Control Model

As a package this supplementary submission updates elements included in the January AA proposal as requested by the AER.

2 Services

APA VTS submits no further changes to services offered under the access arrangement.

3 Pipeline demand and utilisation

This chapter of the submission discusses pipeline demand and utilisation in relation to the business case for the WORM.

3.1 Iona Underground Storage Facility

3.1.1 Current Iona capacity and VTS constraints

Current Iona Underground Gas Storage facility capacity and usage

The Iona Underground Gas Storage (UGS) facility has a storage reservoir capacity of 26PJ. The current facility capacity for injection into the VTS is 435 TJ/day, including Casino production. The injection capacity into the storage reservoirs is 153 TJ/day.

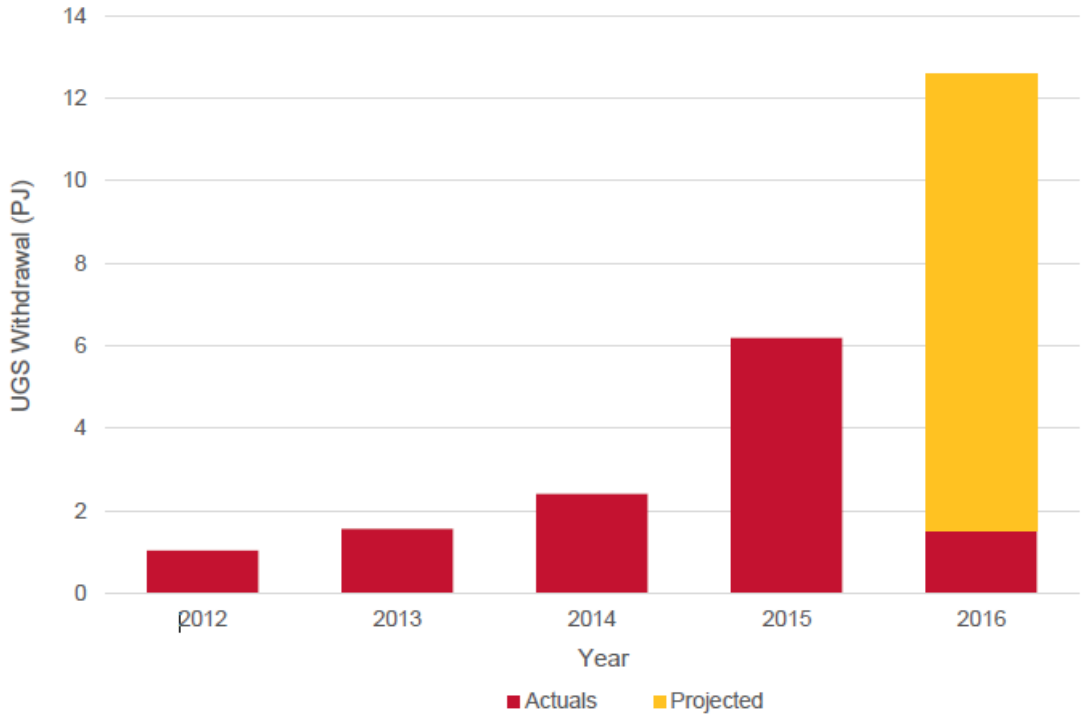
The Iona UGS is generally refilled over summer. In previous years, this process has been relatively orderly, with refill volumes coming from Port Campbell, with the remainder sourced from the VTS on a steady basis over the summer.

In more recent years, declines in Port Campbell production has meant that additional gas volumes have been sourced from the VTS (largely from Longford), putting increasing pressure on capacity in the South West Pipeline (SWP) to deliver those volumes. This trend is shown the graphic from Australian Energy Market Operator's (AEMO's) 2016 Victorian Gas Planning Report (VGPR) Update, reproduced at Figure 3-1 below.

APA VTS also understands that shippers are increasingly facing difficulties in gaining gas supply at acceptable prices, and there is limited availability of swing services from producers.[1] This means that shippers are seeking opportunities within the VTS to source lower cost gas when it comes available, increasing the need for peak storage injection capacity to be able to park that gas within storage when the opportunity arises.

[1] Consortium of VTS Users 2017, *Submission to the Australian Energy Regulator re APA VTS Access Arrangement 2018-2022*, 3 March, p 7

Figure 3-1 – Iona Underground Gas Storage net South West Pipeline withdrawal quantity, 2012-16[2]



Importantly, this change in shipper gas contracting behaviour is a change in the timing of refill, not the overall volumes. The same amount of gas is ultimately transported; however it is transported over a shorter period of time, increasing the peak capacity needs for refill.

These factors combined are putting increased pressure on refill for the Iona UGS, shortening the window for refill, increasing the need for peak refill capacity.

Current VTS capacity for refill

The current capacity of the SWP for summer injections into Iona UGS is 104TJ/day. This capacity is contingent on conditions within the VTS, most principally the operation of certain Gas Powered Generation (GPG) such as

[2] AEMO 2016, VGPR Update, p 18

the Laverton North Power Station (PS) which can impact SWP refill capacity across summer.

The summer period (being generally a lower demand period in Victoria) is also a period for planned outages for production facilities, the Iona UGS and VTS plant for maintenance. This further shortens the window for refill, and at times constraining SWP westbound capacity to below the headline 104TJ/day of available capacity.

3.1.2 Proposed expansions to Iona UGS facility

Lochard Energy has informed AEMO of expansion plans for the Iona UGS. 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.

Lochard Energy has also indicated a proposal to further increase Iona UGS withdrawal capacity from 440TJ/day to 570TJ/day and refill capacity from 173TJ/day to 250 TJ/day by the end of 2019.

Note that Lochard does not propose an increase in storage reservoir capacity as part of these expansions – these are increases in the pace of refill and withdrawal, not volume.[3] As a result, APA VTS does not propose any changes to forecast refill volumes arising from these possible expansions to Iona refill and injection capacity, or from expansion of the VTS to support faster refill.

3.2 Proposed augmentation of the VTS

3.2.1 Reconfiguration of the Brooklyn Compressor Station and Winchelsea bidirectionality – January AA proposal

APA VTS proposed an augmentation of the SWP in its January AA proposal involving reconfiguration of the Brooklyn Compressor Station and Winchelsea bidirectionality to increase the westbound capacity of the SWP to 147TJ/day.[4]

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[3] APA VTS has sought and received direct confirmation of this from Lochard Energy.

[4] APA VTS's January AA proposal included an anticipated SWP westbound capacity to be achieved by the Brooklyn Compressor Station reconfiguration and Winchelsea bidirectionality works of a total of 150TJ/day. This number has subsequently been revised downward as a

This amount was considered adequate at the time as it closely matched the capacity Iona UGS's injection capacity into the storage of 153 TJ/day, and forecast shortfalls in refill (from the 2016 VGPR Update) were of very limited duration and, following the augmentation, appeared to be able to be addressed by minor changes in the pattern of refill towards more refill during the shoulder period.

No eastbound SWP capacity expansion was proposed in the January AA proposal. APA VTS was unable to identify a conforming capital expenditure project for eastbound capacity expansion on the basis of available information.

3.2.2 Western Outer Ring Main project – supplementary submission

Changing market/policy conditions

AEMO released the Gas Statement of Opportunity (GSOO) document in March 2017 which identified a tightening of the 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 2017 VGPR stated that inadequate refilling of the Iona UGS facility outside winter due to capacity limitations on the SWP will increase the risk of shortfall in meeting gas supply in the VTS from winter 2018.

Critically, between the submission of the January AA proposal and March 2017 when AEMO's GSOO and VGPR were released, a number of market changes occurred that increased uncertainty in relation to forecast gas demand across south eastern Australia, mostly impacting expectations for GPG, including:

- South Australian electricity and gas supply issues, and resulting SA Government intervention in the market; and
- Federal Government intervention in the gas market through a producer gas supply guarantee, and more recently the imposition of export constraints on gas if certain conditions are met.

result of AEMO modelling of capacity to 147TJ/day, assuming a concurrent reduction in Winchelsea compressor station inlet pressure to 4000 kPa.

In this time the market has also experienced the shutdown of the Hazelwood generator.[5] The Portland Aluminium smelter, a major user of electricity, also announced that it had secured arrangements to allow its continued operation, where under some forecasts it had previously been assumed to close.

Proposed augmentation

The proposed WORM project, in conjunction with proposed reconfiguration works at Brooklyn Compressor Station and Winchelsea compressor, will increase capacity for refill of Iona UGS.

The proposed WORM project, in conjunction with the Brooklyn Compressor Station reconfiguration and Winchelsea bidirectionality work, will increase the capacity of the SWP towards Iona UGS by 116TJ/day in the following tranches:

- Brooklyn Compressor Station reconfiguration and Winchelsea bidirectionality work: from 104TJ/day[6] to 147TJ/day in early 2018; and
- WORM project from 147TJ/day to 220TJ/day by end 2020.

The WORM project also provides some additional eastbound capacity for injections into the VTS. The WORM project will increase the capacity of the SWP towards Melbourne by 22TJ/day, to 435TJ/day[7].

These capacity increases are set out in Table 3-1 below.

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[5] While this was known at the time of the AEMO and APA VTS forecasts, the compounding impacts of other factors are also relevant to how this change will impact GPG demand.

[6] The capacity of the SWP towards Melbourne was listed in the January AA proposal as 102TJ/day. AEMO has since revised its forecast of 1-in-20 demand in the VTS and subsequently increased the current available withdrawal capacity of the SWP to 104TJ/day. The incremental capacity delivered by the Brooklyn Compressor Station reconfiguration and Winchelsea bidirectionality work, and the WORM is therefore added to this revised capacity number to achieve a total withdrawal capacity of 220TJ/day.

[7] The capacity of the SWP towards Melbourne was listed in the January AA proposal as 429TJ/day. AEMO has since revised its forecast of 1-in-20 demand in the VTS and subsequently reduced the current available injection capacity of the SWP to 413TJ/day. The incremental capacity delivered by the WORM is therefore added to this revised capacity number to achieve a total injection capacity of 435TJ/day.

Table 3-1 – South West Pipeline capacity before and after augmentation (TJ/day)

Pipeline TJ/day	Current capacity	Augmented capacity
South West Pipeline – flows towards Melbourne	413	435
South West Pipeline – flows away from Melbourne	104	220

3.3 Implications for APA VTS's January AA demand proposal

Residential and commercial demand

APA VTS does not propose any changes to the demand forecast for residential or commercial demand (volumes or peak) resulting from the revisions to the access arrangement to incorporate the WORM project.

The provision of new capacity via the WORM will not impact residential or commercial load (volumes, average or peak flows).

Industrial demand

The provision of new capacity via the WORM will not impact Industrial demand in the VTS (volumes, average or peak flows).

In its January AA proposal, APA VTS adopted the AEMO forecast of industrial (Tariff-D) demand from its 2016 National Gas Forecasting Report (NGFR). As noted in that proposal, considering the gas price forecasts included in the NGFR and AEMO's stated supply concerns (which will not be investigated until the development of the 2017 GSOO[8]), APA VTS adopted the AEMO "Weak" forecast for industrial demand for the purposes of this access arrangement revision.[9]

APA VTS has reviewed its industrial demand forecast against the forecasts released by AEMO in March 2017.

[8] AEMO 2016, *NGFR*, pp 8, 25

[9] Note that AEMO considers the Neutral, Weak and Strong scenarios are all credible [NGFR p 8]

These revised AEMO forecasts appear to validate APA VTS's decision to adopt AEMO's "Weak" industrial demand forecast as set out in the 2016 NGFR. Indeed, it would appear that any further revision to this forecast by AEMO to include the continued operation of Portland Aluminium (a scenario not anticipated in the currently available AEMO forecasts due to timing) would see further depression of these industrial demand numbers due to the expected price impacts for energy[10] arising from this load in the current very tight supply/demand conditions.

APA VTS does not propose any changes to the demand forecast for industrial demand (volumes or peak) resulting from the revisions to the access arrangement to incorporate the WORM project (the subject of this proposal).

APA VTS does note, however, that it stated that its industrial demand forecast may be reviewed following the AER's draft decision to update for any industrial closures since this lodgement of the proposal.[11]

Gas-fired Power Generation

The GPG forecast impacts the VTS access arrangement in two separate areas:

- Total volume and 1-in-2 peak demand – relevant to tariff setting; and
- 1-in-20 peak demand – relevant to capacity planning and augmentations.

The WORM project is driven by changing gas demand patterns and flow paths. Factors contributing to this are declining production at Port Campbell, meaning more gas is sourced from Longford for Iona UGS refill. Another factor is an expectation of increased GPG demand across the south eastern states due to tightness on the electricity market brought on, amongst other things, by the closure of the Hazelwood power station.

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[10] Caused by the cascading impact on both electricity and gas pricing, driven by the continuation of the Portland Aluminium smelter and the Hazelwood closure, with the combined electricity production shortfall and increased demand being at least partially met by GPG in tight gas supply conditions.

[11] APA VTS 2017, *Victorian Transmission System: Access arrangement submission*; 3 January, p 31

While there is a view suggesting increased GPG generation in the short term at least, the location of that generation is highly sensitive to modelling. Very small changes in input costs (gas prices) and electricity demand can influence to amount of GPG dispatched, and its location. The feedback loop between gas prices, electricity prices and short and long term demand is highly complex and recent changes to the policy environment (for example the SA and Federal government interventions) have not been integrated into demand models by AEMO or APA VTS due to their very recent timing and resulting lack of policy detail in implementation.

The expectation for increased GPG utilisation in the energy mix is likely to involve 'ultra-peak' operation. This type of operation, in particular in the VTS where generators do not contract for capacity, is very difficult to predict, and in any case does not drive significant gas volumes.

This type of peak operation is critical, however, in considering capacity needed to support GPG, as well as to ensure adequate capacity for Iona UGS refill across the summer. A key driver for the conclusion that the WORM was needed in the forecast period was specifically to ensure an adequate window for refill in light of uncertainty in relation to the timing and direction of GPG operation. Further, the WORM significantly increases system readiness for unanticipated GPG operation within a day. This is an appropriate approach to adopt for planning purposes, which considers possible demand configurations and considers the implications of this.

The potential for a credible demand configuration, involving frequent operation of the Laverton North PS that diverts gas from Iona UGS refill in an ever shortening refill window, is a credible outcome that drives the need for expansion. Planning for this newly identified possibility, however, does not mean that APA VTS's volume forecasts require revision. The location of GPG load, and its duration, is highly uncertain, and GPG volumes could arise from GPG within or outside of the VTS.

APA VTS maintains that its GPG forecast included in the January AA proposal that was provided for the purpose of tariff setting, remains the best GPG forecast available at this time.[12] This supplementary proposal to construct the

[12] It is noteworthy that, in contrast to AEMO's VGPR forecasts, the APA VTS GPG forecast features 1) the Hazelwood closure; 2) the Portland Aluminium continuation; and 3) dispatch of VTS-connected GPG in preference to non VTS-connected GPG.

WORM is instead driven by the difference between the planning forecast that must consider credible contingencies to ensure security of supply, and volume forecasts for tariff purposes that consider likely average outcomes.

In summary, APA VTS does not propose any changes to forecast GPG volumes 1-in-2 or 1-in-20 peak demand at this stage. Importantly, the construction of the WORM, while it increases capacity of the VTS, does not drive additional volumes in relation to refill or GPG. The WORM instead ensures the availability of capacity for Iona UGS refill in the face of potential increased GPG operation that may interrupt refill capacity across the summer leading to ensure security of supply for winter demand. It also supports unanticipated GPG operation within a day.

4 Pipeline asset management planning

APA VTS provides no update to this chapter arising from the revisions to the access arrangement to incorporate the WORM project.

5 Capital expenditure

This chapter sets out the rationale for completing the WORM project within the proposed access arrangement period, as well as any consequential changes to the capital expenditure forecasts arising from the inclusion of the WORM project.

Values set out in this supplementary submission also reflect corrections to a number of projects identified with the AER in response to AER Information Request 2.

5.1 Western Outer Ring Main

5.1.1 Overview of proposed project

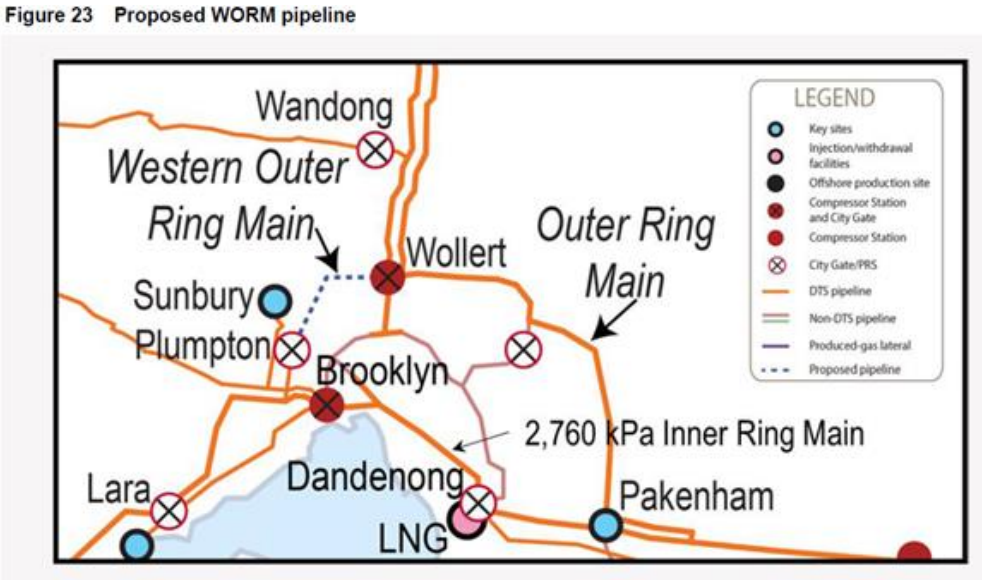
The Victorian Transmission system has three main branches. They are:

- 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 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 in Figure 5-1 below.

Figure 5-1 – Diagram of VTS showing proposed Western Outer Ring Main



The WORM project involves two stages:

- Stage 1 – Pipeline: 8.3km x 500mm Rockbank to Plumpton; and
- Stage 2 –
    - Pipeline: 49.3km (approx.) x 500mm Wollert to Plumpton
    - Compression: Additional Centaur 50 at Wollert Compressor Station B allocating compression from Pakenham to Wollert pipeline (existing connection) to the new WORM (new connection)
    - Regulator: A new interconnecting Pressure Reduction Station at Wollert connecting the Brooklyn Lara Pipeline (BLP) to the Pakenham-Wollert Pipeline

Stage 1 was completed in 2012 (AA3). The completion of stage 1 in 2012 was needed to support winter pressures in the Sunbury and Ballarat regions. The Sunbury loop was sized to enable it to become the first leg of the future WORM at a minor additional incremental cost. This decision was endorsed by the AER in its draft decision (and confirmed in the final) with the following discussion:

> *A consequence […] was a decision to address the constraints in the Sunbury and Ballarat areas through the construction of the Sunbury Loop at a cost of $13.5 million ($2012) as a first stage in completing the proposed WORM project. This expenditure replaced the proposed works on compressors 11, 13 and 14 at the Brooklyn Compressor Station. The AER considers APA GasNet's decision to alleviate the constraints in the Sunbury and Ballarat areas by developing the Sunbury Loop to be prudent.*[13]

APA VTS proposes to complete Stage 2 of the WORM project in the forecast period.

The WORM project, completed in conjunction with the reconfiguration of Brooklyn and Winchelsea Compressor Station proposed in the January AA proposal, will deliver additional capacity in line with Table 5-1 below.

Table 5-1 – South West Pipeline capacity following expansion (TJ/day)

Capacity TJ/day	East	West
Current capacity	413	104
After Brooklyn and Winchelsea Compressor Station reconfiguration	413	147
After WORM	435	220

Total forecast expenditure on the WORM project is set out in Table 5-2 below.

Table 5-2 – Western Outer Ring Main project (real 2017 $m)

$m real 2017	2018	2019	2020	2021	2022	Total
Capex	23.7	44.2	58.8	-	-	126.7

[13] Australian Energy Regulator 2012, *Access arrangement draft decision: APA GasNet Australia (Operations) Pty Ltd 2013-17, Part 2*, September, p 59

5.1.2 *Prior consideration of the WORM project*

The WORM project was first conceived over 10 years ago by APA VTS. 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 VTS submitted a proposal for the full WORM project including option analysis for 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".[14]

It is worth noting that, at the time of the AER's draft and final decisions on the WORM for the previous period, there were no identified concerns with summer refill capacity of the Iona UGS. Constraints on summer refill, such that there are concerns whether Iona UGS can be refilled at its current capacity over a summer, is a very new phenomenon, and is driven by changing gas supply and shipper refill patterns, as discussed in more detail in section 3.1 above.

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 accessing and securing easements will become increasingly difficult and more expensive over time with urban growth along the route.

5.1.3 *Rationale for proposing WORM project within the forecast period*

Ensuring adequate capacity for refill of Iona UGS

AEMO released the 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 2017 VGPR stated that inadequate refilling of

[14] Australian Energy Regulatory 2013, *Access arrangement draft decision: APA GasNet Australia (Operations) Pty Ltd, 2013-17, Part 2: Attachments*, March, p 56

the Iona UGS system outside winter due to capacity limitations on the 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[15]. The gas consumption of Laverton North PS 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 system security in the VTS.

The proposed WORM project, in conjunction with proposed reconfiguration works at Brooklyn Compressor Station and Winchelsea compressor, will increase capacity for refill of Iona UGS. A key aspect of the WORM that supports refill is that it provides for bypass of the Laverton North PS.

The Laverton North PS is situated at an offtake on the Brooklyn Corio Pipeline. When Laverton North PS runs, it diverts gas from Iona UGS refill on a one-to-one basis. As the window for refill tightens due to the limited availability of gas, this diversion of capacity increasingly puts adequate refill of Iona UGS at risk. In an environment where there is potential for Laverton North PS to operate more frequently across the summer, adequate summer refill can become more uncertain. One possibility is the curtailment of Laverton North PS to support refill, however this could have significant implications for electricity supply.

Some increased capacity for SWP injections into VTS

The WORM project provides some additional capacity for injections into the VTS from Port Campbell. While not the primary driver for the WORM, additional capacity does restore eastbound capacity recently eroded by changes in AEMO's peak capacity forecast.[16]

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

[15] Australian Energy Market Operator 2017, Gas Statement of Opportunities, March, p7

[16] The eastbound capacity of the SWP was projected to be 429TJ/day in 2018. Changes to the AEMO peak day forecast have reduced this to 413TJ/day.

Lang), it would be possible for alternate supplies to be scheduled. Flow constraints on either South West Pipeline/Brooklyn Lara Pipeline or Eastern systems are removed with the WORM. For example, gas from the Iona 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.

Operational benefits

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 GPG 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 GPG 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, GPG 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.

Reducing reliance on Brooklyn Compressor station site

The Brooklyn compressors are currently used to refill the Iona UGS 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 Iona UGS 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 Iona UGS 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 over the life of the compressor to manage flows between Longford and Port Campbell.[17] 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.

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 on western flow.

5.2 Consequential changes to capital expenditure forecast

As a result of the inclusion of the WORM in forecast capital expenditure there has been a reduction in the need to undertake additional work at Brooklyn Compressor Station.

Once the Brooklyn Compressor Station reconfiguration is completed Brooklyn Compressor Station Unit 10 once again becomes a backup unit to the station and in light of the reconfiguration the need to undertake additional capital expenditure of the type identified for the other compressors is not

[17] Note that fuel gas is charged directly to Market Participants by AEMO. While this is a saving for market participants, that saving will not be reflected in VTS tariffs. More detail on this is at section 8.1.2 of this submission.

needed in the forecast access arrangement period. The avoided capital expenditure amounts to $2.5m ($real 2017).

The Iona compressor station aftercooler upgrade is forecast in the January AA proposal to occur in 2021. Increased refill flows brings forward the need to complete these works to 2018. The aftercooler, as the name suggests, cools gas after it exits the compressors. Currently the aftercooler is insufficiently sized for the output of Iona Compressor Station. This results in a pressure fall as the gas goes through the aftercooler or the potential injection into the Western Transmission System of gas at temperatures higher than the appropriate standard.

Utilisation of the Iona compressors is a function of the refill of the Iona UGS facility. The Iona compressors are required to maintain pressures into the Western Transmission System when Iona storage refill reduces pressures entering that system. APA VTS was able to delay this project as the required operation of the Iona compressor station was less than forecast at the time of the last access arrangement.

However, consistent with the new information from AEMO and other sources, the changes to storage refill will require harder and more frequent running of the Iona Compressor Station. As a result the limitations of the aftercooler are expected to be encountered more frequently, with greater severity, than has been the case in recent years. This may affect the ability of APA to maintain pressures into the Western Transmission System. This project is supported by AEMO.[18]

5.3 Projects identified as being avoided by the WORM in the 2012 proposal

In 2012, APA VTS proposed the WORM as part of its access arrangement proposal and identified a number of projects that would need to be undertaken, or that would be more expensive to complete, in the absence of the WORM. These included projects to ensure the continued safe and reliable operation of the pipeline.

APA VTS identified the following projects:

1. Sunbury Loop;

[18] AEMO, Victorian Gas Planning Report, March 2017, p 85.

2. BCS Station Isolation and Loading valves;
3. BCS Gas Engine Alternator (generator) upgrade;
4. Wollert CS A instrumentation;
5. Iona CS aftercooler upgrade;
6. BCS Ballarat Filter; and
7. Kalkallo Lateral.

These projects were identified as being impacted by the WORM on the basis of forecast pipeline and system flows at the time. Importantly, the business case for the WORM, and associated avoided projects, did not contemplate constrained westbound capacity on the SWP – it was focused on security of supply for the system on the assumption that significant gas was flowing from Port Campbell. This is relevant as the primary role of the Brooklyn Compressor Station is to support gas pressures west of Brooklyn.

In the last access arrangement revision proposal, APA GasNet anticipated a significantly reduced role for the Brooklyn Compressor Station, with only unit 12 remaining in service, removing from service units 8, 9, 10 and 11. This drove much of the avoided expenditure.

In contrast to system conditions in 2012, westbound flows are now a primary concern, meaning that the Brooklyn Compressor Station has an ongoing role in supporting gas pressures west of the station. This means that some projects identified as unnecessary 5 years ago are now still required.

In addition, some of the works identified as avoidable were essential safety upgrades that were needed as the AER did not approved the WORM project at the time.

While the reliance on Brooklyn Compressor Station is reduced in the presence of the WORM, it still retains a role in ensuring adequate supply on the VTS. The post WORM role of Brooklyn Compressor Station is particularly important to:

- provide a peak (top-up) services to refill Iona;
- support localised gas load demand (eg Sunbury Loop) and connected GPG in the area (eg Laverton North PS, Newport PS); and

- a backup service for whenever the WORM and/or Wollert new Unit 6 are out for maintenance or services disrupted.

In respect of the 2012 'avoided' project list above, the following explanations are provided.

Projects 1 and 2 have been completed. The Sunbury loop (Phase 1 of the WORM) avoided more expensive additional compression at Brooklyn Compressor Station to support winter gas demand at Sunbury. After the completion of the WORM the Sunbury Loop will continue to be utilised to provide gas to the Sunbury Region. As noted in the January AA proposal, the Isolation and Loading Valves were necessary to maintain the safety and reliability of the compressor station. This was made more important by the load imposed on Brooklyn Compressor Station in the absence of the WORM but still remains important in the presence of the WORM.

Projects 3 and 4 are currently under construction. The upgraded BCS generator will be used to service the Brooklyn Compressor Station, Brooklyn Corio Pipeline, Brooklyn Lara Pipeline and the Brooklyn Ballan City Gate. Similar to project 2 this refurbishment was made more urgent by the additional requirements on the Brooklyn compressor station in the absence of the WORM but the generator is needed for the reliable ongoing operation of these facilities even in the presence of the WORM. The Wollert Compressor Station A will be needed to compress into the T74 pipeline at MAOP, once the T74 and Victorian Northern Interconnect Expansion are separated in mid-2017. The instrumentation refurbishment is necessary to ensure the ongoing reliable operation of Wollert Compressor Station A even in the presence of the WORM.

As noted above, the Iona compressor station aftercooler work (Project 5) has been brought forward as a result of increased refill volumes.

BCS Ballarat Filter (Project 6) related to the oil seals on units 8 and 9. AEMO operates them less, and they are performing better, so this work is not needed, however this outcome of not directly because of the WORM.

Kalkallo Lateral (Project 7) was proposed to address supply issues at Kalkallo. The savings in relation to this project related to a lower-cost pipeline solution available after the construction of the WORM. The supply issues have been resolved by a solution implemented in the distribution network and therefore is not currently required.

5.4 Other changes to capital expenditure

In an email to the AER on 22 February 2017 APA VTS identified a number of projects that had been included in the forecast capital in the January AA proposal despite having been determined by internal review to no longer be necessary in the forecast period. On 23 February APA VTS supplied the AER with a revised capital expenditure model reflecting the removal of these projects from the forecast. This had a net impact of reducing forecast capital expenditure by $10.4m ($2017).

The accompanying capital expenditure model also excludes these projects from the forecast capital expenditure.

5.5 Total forecast capital expenditure

Table 5-3 below sets out the revised forecast capital expenditure by driver reflecting changes to the forecast described above.

Table 5-3 – Forecast Capital Expenditure by driver (real 2017 $m)

$m real 2017	2018	2019	2020	2021	2022	Total
Augmentation	44.4	49.7	60.9	-	-	155.1
Refurbishment and Upgrade	29.1	18.6	9.5	14.2	12.6	84.1
Non-System	4.2	3.6	3.3	3.6	2.3	16.9
Total	**77.7**	**71.9**	**73.7**	**17.8**	**14.9**	**256.1**

6 Capital base

This chapter of the supplementary submission updates tables relevant to calculating the capital base to take account of the revisions to the January AA proposal.

While this supplementary submission is limited to changes to the January AA proposal necessary to incorporate the WORM project, the AER asked APA VTS to use, as a base, the latest models that it had been provided with. As a result, APA VTS has used a version of the RFM as a basis including corrections to the calculation of the RFM as set out in AER Information Request 5.

6.1 Opening capital base for the access arrangement period

The capital base has been rolled forward in accordance with the provision of Rule 77(2). The opening capital base for the access arrangement period is shown in Table 6-1 below.

Table 6-1 – Capital base roll forward 2013-2017 ($m nominal)

$m nominal	2013	2014	2015	2016	2017
Opening capital base	635.86	646.92	763.75	849.64	944.67
Plus conforming capex	15.92	127.31	97.56	108.55	71.31
Plus speculative capex	0	0	0	0	0
Plus reused redundant assets	0	0	0	0	0
Less depreciation	-12.80	-26.48	-30.49	-33.58	-30.07
Plus indexation	7.95	16.18	18.87	20.10	22.67
Less redundant assets	0	0	0	0	0
Less disposals	-0.01	-0.18	-0.04	-0.04	-0.07
Closing capital base	**646.92**	**763.75**	**849.64**	**944.67**	**1,008.51**

6.2 Projected capital base for the access arrangement period

6.2.1 *Forecast capital expenditure*

Forecast capital expenditure is summarised in Table 6-2 below.

Table 6-2 – Forecast capital expenditure ($m 2017)

$m real 2017	2018	2019	2020	2021	2022	Total
Capital expenditure	77.71	71.92	73.73	17.79	14.92	256.07

6.2.2 *Non-conforming capital expenditure*

Disposals or redundant assets

APA VTS does not anticipate any additional disposals or redundant assets associated with the WORM project.

Importantly, Brooklyn Compressor Station will remain in operation to support winter gas pressures to the Geelong and Ballarat regions, as well as the summer GPG load for the Laverton North PS.

6.2.3 *Projected capital base over the period*

The projected capital base has been rolled forward in accordance with the provisions of Rule 78, as shown in Table 6-3.

Table 6-3 – Capital base roll forward 2018-2022 ($m nominal)

$m nominal	2018	2019	2020	2021	2022
Opening capital base	1008.51	1035.86	1054.81	1073.63	1026.28
Plus conforming capex	81.52	76.96	80.47	19.80	16.94
Plus speculative capex	0.00	0.00	0.00	0.00	0.00
Plus reused redundant assets	0.00	0.00	0.00	0.00	0.00
Less depreciation	74.34	78.73	82.73	88.63	89.12
Plus indexation	20.17	20.72	21.10	21.47	20.53
Less redundant assets	0.00	0.00	0.00	0.00	0.00
Less disposals	0.00	0.00	0.00	0.00	0.00
Closing capital base	**1035.86**	**1054.81**	**1073.63**	**1026.28**	**974.63**

6.3 Tax Asset Base

The TAB roll forward is shown in Table 6-4, and the forecast TAB is shown in Table 6-5.

Table 6-4 – Tax Asset Base roll forward 2013-2017 ($m nominal)

$m nominal	2013	2014	2015	2026	2017
Opening TAB	228.95	224.13	345.37	417.75	497.79
net additions	3.98	139.30	94.00	103.00	69.07
tax depreciation	-8.80	-18.06	-21.62	-22.96	-23.67
Closing TAB	**224.13**	**345.37**	**417.75**	**497.79**	**543.18**

Table 6-5 – Forecast Tax Asset Base ($m nominal)

$m nominal	2018	2019	2020	2021	2022
Opening TAB	543.18	562.13	561.78	673.87	640.34
net additions	54.72	38.95	154.04	16.44	18.34
tax depreciation	-35.78	-39.29	-41.96	-49.96	-51.49
Closing TAB	**562.13**	**561.78**	**673.87**	**640.34**	**607.19**

7 Rate of Return and value of imputation credits

APA VTS provides no update to this chapter arising from the revisions to the access arrangement to incorporate the WORM project.

8 Operating expenditure

This chapter sets out consequential changes to operating expenditure associated with the WORM project.

It also reflects corrections to the calculation of the allowance for passive linepack and spares advised to the AER in response to Information Request 6.

8.1 Step and scope changes

8.1.1 Western Outer Ring Main

In its January AA proposal, APA VTS proposed a scope change associated with the procurement of the easement for the WORM in advance of the construction of the western outer ring main. There would be a small amount of additional operating expenditure associated with maintenance and protection of the easement land of $25 thousand per annum.

This supplementary submission involves full construction of the WORM in the forecast period. As a result, the scope change needs to be extended to also include additional operating expenditure in relation to the new pipeline, compressor and Pressure Regulating Station (PRS) associated with the WORM.

Table 8-1 below sets out the forecast operating expenditure associated with these projects.

Table 8-1 – Operating expenditure associated with forecast capital expenditure (real 2017 $000)

$000 real 2017	2018	2019	2020	2021	2022	Total
WORM pipeline				33.5	33.5	**67.0**
Wollert Unit 6				161.8	161.8	**323.6**
Rockbank PRS				4.7	4.7	**9.3**
Total				**200**	**200**	**399.9**

The WORM pipeline operating expenditure covers a range of activities, most noticeably easement maintenance, third party inspections and cathodic protection unit inspections.

The Wollert Unit 6 operating expenditure also covers a range of ongoing maintenance and operation activities including purchase costs of electricity, electrical parts and instrumentation, valve fittings, regulator parts and field support from the compressor manufacturer.

The PRS operating expenditure comprises ongoing operations and maintenance expenditure including control system spare parts, regulator spare parts and instrumentation repairs and parts.

8.1.2 Reductions in fuel gas consumption

The WORM project reduces reliance on compression into the Brooklyn Lara Pipeline in the summer. Due to the compressor and pipeline configuration, summer compression to support Iona refill is relatively inefficient as the Brooklyn compressors have been primarily set up to support winter gas pressures.

AEMO noted the following in its 2017 VGPR:

> *The current method of transporting gas from Longford to Port Campbell is very inefficient. Gas flows along the Longford to Melbourne Pipeline to Dandenong CG. During the summer the pipeline pressure is approximately 5,500 kPa. At Dandenong CG, the pressure has to be reduced to 2,760 kPa to flow through the low pressure transmission network from Dandenong to Brooklyn. At Brooklyn, the gas is recompressed to approximately 6,500 kPa (which is limited by the capacity of the Brooklyn compressors) to flow along the BCP, BLP, and SWP towards Port Campbell.*
>
> *With the WORM, gas would flow from Longford to Wollert via the existing (Eastern) Outer Ring Main. At Wollert, the pressure during summer would be approximately 5,500 kPa (similar to that at Dandenong CG). A compressor at Wollert would boost the gas pressure up to 10,200 kPa to flow around the 500 mm diameter WORM. The WORM would connect into the BLP, which would enable gas to flow to Port Campbell via the SWP.*[19]

AEMO identified that it expected there to be savings in compressor fuel associated with the WORM of approximately $1.4 million per year. This estimate includes assumptions related to the wholesale gas price at which

[19] AEMO 2017, *Victorian Gas Planning Report*, March, p 56

fuel gas is procured, and the actual level of compressor operation, which can vary significantly year-on-year.

While these expected savings are real, it is important to note that fuel gas costs are not incurred by APA VTS, so these expected savings are not relevant to APA VTS's supplementary proposal.

As described in APA GasNet's revision submission to the AER for the 2013-17 access arrangement period, the regulatory approach to fuel gas changed midway through the 2008-12 access arrangement period. From 1 January 2009, AEMO took over supply of fuel gas from APA GasNet. From that date, APA GasNet ceased to receive an allowance in its forecast operating expenditure for fuel gas. No allowance was sought or granted in the 2013-17 access arrangement period, or has been sought for the forecast 2018-22 period.

AEMO now directly charges Market Participants for fuel gas through the linepack account established under Rule 241. This means that shippers will benefit from reduced fuel gas costs associated with the WORM, but this benefit will be delivered through reductions in a charge that is separate from the regulated tariffs charged by APA VTS in respect of use of the VTS.

8.1.3 Operating expenditure associated with Brooklyn Compressor Station

The WORM is expected to reduce the load on Brooklyn Compressor Station so the compressors will be required to operate for less hours (noting that the compressor operation is controlled by AEMO). Maintenance on compressors is undertaken either based on hours of operation or for lower operated compressors is based on time since last maintenance. This is similar to recommended maintenance on cars being based on kilometres travelled or time. No significant scheduled maintenance activities at Brooklyn Compressor Station have been included in the operating expenditure forecast for the access arrangement period following completion of the WORM in 2020.

8.2 Total controllable operating expenditure

Total controllable operating expenditure by category (excluding debt raising costs, EBSS additions/deductions, other allowances) over the access arrangement period is set out in Table 8-2 below.

Table 8-2 – Total controllable operating expenditure forecast (excluding debt raising costs and other allowances) (real 2017 $m)

$m real 2017	2018	2019	2020	2021	2022	Total
Operating Expenditure	34.29	30.23	29.17	29.12	27.25	**150.06**

8.3 Calculation of allowances for passive linepack and spares

Operating expenditure has also been adjusted to reflect errors identified in response to AER Information Request 6.

8.4 Total operating expenditure including allowances

Table 8-3 below is a summary table showing total operating costs, including controllable operating costs described above, as well as all allowances.

Table 8-3 – Total operating expenditure including allowances (real 2017 $m)

$m real 2017	2018	2019	2020	2021	2022	Total
Controllable operating expenditure	25.65	25.74	25.74	26.74	26.93	130.81
Debt raising costs	0.06	0.06	0.07	0.07	0.07	0.32
EBSS adjustments	8.33	4.18	3.11	2.06	0.00	17.68
Other allowances	0.24	0.25	0.25	0.26	0.26	1.27
Total	**34.29**	**30.24**	**29.17**	**29.12**	**27.26**	**150.08**

9 Total revenue

This chapter of the supplementary submission updates tables relevant to calculating total revenue to take account of the revisions to the January AA proposal as discussed above. To be clear, these revisions are limited to those necessary to:

- Incorporate the WORM project, and associated revisions to the forecast capital and operating expenditure allowance, made necessary by the WORM;
- Correction of errors identified by the AER in relation to the calculation of inflation, impacting both the roll forward model and therefore the opening capital base for the forecast period, and the treatment of inflation within the PTRM; and
- Correction of an error identified by APA VTS, and advised to the AER, in the calculation of allowances for passive linepack and spares, impacting forecast operating expenditure.

9.1 Return on capital

The return on the projected capital base is calculated as the regulatory asset base multiplied by the weighted average cost of capital, as shown in Table 9-1 below.

Table 9-1 – Return on capital (nominal $m)

$m nominal	2018	2019	2020	2021	2022
Regulated asset base	1008.51	1035.86	1054.81	1073.63	1026.28
WACC	7.88%	7.88%	7.88%	7.88%	7.88%
Return on Capital	79.49	81.65	83.14	84.62	80.89

9.2 Return of capital

Forecast regulatory depreciation as set out in Table 9-2.

Table 9-2 – Forecast depreciation over the access arrangement period (nominal $m)

$m nominal	2018	2019	2020	2021	2022
Straight line depreciation	37.07	41.01	44.26	49.39	47.32
Indexation	20.17	21.46	22.61	23.79	23.67
Regulatory depreciation	16.90	19.55	21.65	25.60	23.65

9.3 Corporate income tax

Corporate income tax is calculated in the financial model accompanying this submission at Attachment B. APA VTS's corporate income tax allowance is set out in Table 9-3 below.

Table 9-3 – Forecast corporate tax allowance (nominal $m)

$m nominal	2018	2019	2020	2021	2022
Corporate tax allowance	4.47	4.86	5.27	4.67	3.60

9.4 Operating expenditure

Forecast operating expenditure including the effect of the Efficiency Benefit Sharing Scheme, is set out in Table 9-4.

Table 9-4 – Operating expenditure (nominal $m)

$m nominal	2018	2019	2020	2021	2022
Operating expenditure	34.97	31.46	30.96	31.52	30.10

9.5 Total revenue requirement

In summary, these components derive the total revenue requirement, as shown in Table 9-5.

Table 9-5 – Total revenue requirement (nominal $m)

$m nominal	2018	2019	2020	2021	2022
Return on capital	79.49	84.58	89.11	93.74	93.29
Return of capital	16.90	19.55	21.65	25.60	23.65
plus operating and maintenance	34.97	31.46	30.96	31.52	30.10
plus revenue adjustments	0.00	0.00	0.00	0.00	0.00
plus net tax allowance	4.47	4.86	5.27	4.67	3.60
Building block revenue requirement	**135.84**	**140.45**	**146.98**	**155.54**	**150.64**
Smoothed revenue requirement	**130.89**	**137.42**	**145.62**	**154.41**	**163.95**

(smoothed revenue requirement from Price Control Model)

10 Revenue allocation and tariffs

This chapter describes how the WORM capital expenditure has been allocated to tariffs, and the overall impact to tariffs.

10.1 Cost allocation methodology

Expenditure associated with the WORM project has been included in the tariff model using the same cost allocation methodologies set out in the January AA proposal.

As the WORM represents a new pipeline, APA VTS established a new asset zone for the WORM in the tariff model for the proposed easement purchase. In this supplementary submission, the easement purchase costs have been replaced in the tariff model with the full costs of WORM construction within the period.

Once completed, the WORM becomes part of the broader system of pipelines and facilities for gas supply from Iona/Port Campbell to the Hub, and beyond to Northern Victoria. In line with the cost allocation methodology described in the January AA proposal, the WORM expenditure is therefore allocated to all withdrawal zones that use the flow path incorporating the WORM, in proportion to volume. This includes the cross system tariff, as well as withdrawals at Port Campbell (but not, for example, flows to the Western Transmission System that are matched to Port Campbell injections).

10.2 Revised tariffs

The WORM project has an immaterial impact on tariffs, with some falling very slights, and others rising very slightly. Some changes to key 2018 tariffs compared to the January AA proposal are as follows:

	Metro South East Metro North West	Geelong
Tariff V (60 GJ pa)	2.2c/GJ $1.33 per year	2.9c/GJ $1.75 per year
Tariff D (500 GJ pa)	1.9c/GJ $9.35 per year	3.4c/GJ $16.90 per year

Tariff tables from the access arrangement are set out below with revised tariff values. The table names and numbers reflect those in the access arrangement.

A. 1 Injection Tariffs

(a) Injection at Longford Injection Zone

Matched Withdrawal Zone	Injection Tariff ($/GJ, for the 10 Day Injection Volume)	2019-2022 annual X-factor
All Withdrawal Zones except LaTrobe, Maryvale, Tyers, West Gippsland and Lurgi	2.1836	6
LaTrobe & Maryvale	0.4344	6
West Gippsland	1.3101	6
Tyers & Lurgi	0.6239	6

(b) Injection at Culcairn Injection Zone

Matched Withdrawal Zone	Injection Tariff ($/GJ, for the 10 Day Injection Volume)	2019-2022 annual X-factor
All Withdrawal Zones except Interconnect	1.3829	6
Interconnect	0.3408	6

(c) Injection at Port Campbell Injection Zone

Matched Withdrawal Zone	Injection Tariff ($/GJ, for the 10 Day Injection Volume)	2019-2022 annual X-factor
All Withdrawal Zones except Western, South West and SEAGas Pipeline	2.1841	6
Western and SEAGas	-	-

Pipeline		
South West	0.7804	6

(d) Injection at Pakenham Injection Zone

Matched Withdrawal Zone	Injection Tariff ($/GJ, for the 10 Day Injection Volume)	2019-2022 annual X-factor
All Zones	0.3520	6

(e) Injection at Dandenong Injection Zone

Matched Withdrawal Zone	Injection Tariff ($/GJ, for the 10 Day Injection Volume)	2019-2022 annual X-factor
All Zones	-	-

A.2 Withdrawal Tariffs

(a) Transmission Delivery Tariff

Subject to the exceptions in clauses A.3(b), A.3(c), A.3(d), A.3(e) and A.3(f) of this Schedule, the Withdrawal Tariffs are as follows:

Withdrawal Zone Number	Withdrawal Zone Name	Transmission delivery tariff D ($/GJ)	Transmission delivery tariff V ($/GJ)	2019-2022 annual X-factor
1	LaTrobe	0.1552	0.1524	6
2	West Gippsland	0.1925	0.2153	6
3	Lurgi	0.2298	0.2782	6
4	Metro North West	0.3506	0.3811	6
5	Calder	0.8009	1.0123	6
6	South Hume	0.3048	0.3714	6
7	Echuca	0.6595	1.1417	6

8	North Hume	0.8219	1.2488	6
9	Western	0.6537	0.9157	6
21	Warrnambool	0.1024	0.1725	0
22	Koroit	0.2157	0.6470	0
10	Murray Valley	0.6900	1.0430	6
11	Interconnect	0.8432	0.8432	6
13	South West	0.1527	0.1522	6
17	Wodonga	0.9306	1.6246	6
18	Tyers	0.2009	0.2022	6
19	Culcairn	1.0634	NA	0
20	Metro South East	0.3506	0.3811	6
24	Geelong	0.2592	0.3105	6
25	Maryvale	0.0593	NA	0

(b) System Export Tariff

Where a Connection Point in an Injection Zone services an export of gas from the VTS to a Connected Transmission Pipeline, gas Injected at that Injection Zone and Withdrawn through that Connection Point is subject to the System Export Tariff specified below, instead of the Withdrawal Tariff specified in clause A.3(a) of this Schedule.

Withdrawal Zone Number	Connected Transmission Pipeline Name	System Export Tariff ($/GJ)	2019-2022 annual X-factor
31	VicHub	0.0000	6
33	SEA Gas Pipeline	0.0205	6

(c) Transmission Refill Tariff

Where a Connection Point services a Storage Facility, all gas Withdrawn through that Connection Point is subject to the Transmission Refill Tariff

specified below, instead of the Withdrawal Tariff specified in clause A.3(a) of this Schedule.

Withdrawal Zone Number	Storage Facility Name	Transmission Refill tariff ($/GJ)	2019-2022 annual X-factor
23	LNG	0.0539	0
32	WUGS	0.0789	0

(d) Cross System Withdrawal Tariff

If:

(i) gas is Withdrawn at a Connection Point, other than a Connection Point servicing a Storage Facility, located on an Injection Pipeline other than the Interconnect Pipeline; and

(ii) that Withdrawal is a Matched Withdrawal with respect to an Injection Zone other than the Injection Zone for that Injection Pipeline,

then the Withdrawal is subject to the following Cross System Withdrawal Tariff in addition to the applicable Injection Tariff and Withdrawal Tariff.

Injection Pipeline	Cross System Withdrawal Tariff D ($/GJ)	Transmission delivery tariff V ($/GJ)	2019-2022 annual X-factor
All	0.1979	0.2288	6

(e) Matched Withdrawals - Culcairn

If a Withdrawal in one of the following Zones is a Matched Withdrawal relating to Injections in the Culcairn Zone, then the following Matched Withdrawal Tariffs apply instead of the tariffs described in clause A.3(a) of this Schedule:

Withdrawal Zone Number	Withdrawal Zone Name	Transmission delivery tariff D ($/GJ)	Transmission delivery tariff V ($/GJ)	2019-2022 annual X-factor
8	North Hume	0.3317	0.4504	6

11	Interconnect	0.000	NA	6
17	Wodonga	0.1813	0.2077	6

(f) Matched Withdrawals - Metro (South East)

If a Withdrawal in the Metro South East Zone is a Matched Withdrawal relating to Injections in the Pakenham Zone, then the following Matched Withdrawal Tariffs apply instead of the tariffs described in clause 1.3(a) of this Schedule:

Withdrawal Zone Number	Withdrawal Zone Name	Transmission delivery tariff D ($/GJ)	Transmission delivery tariff V ($/GJ)	2019-2022 annual X-factor
20	Metro South East	0.1654	0.1858	6

A AER Requests for information

This supplementary submission is lodged explicitly in response to two information requests from the AER as set out below.

A.1 AER Information request 9

AER Reference	IR009
Topic	Integration of WORM into access arrangement proposal
Date of response	15 May 2017
Public/Confidential	Public

9.1 Capex and opex savings

Please identify all the potential savings (i.e. reduction in both capex and opex in the 2018-22 AA) and other efficiencies that can be achieved if the WORM project proceeds

Please refer to details provided in sections 5.2 and 8.1 of this supplementary submission.

9.2 Implications for BCS projects

Please specifically address:

- whether the proposed Brooklyn compressor station upgrade in the 2018-22 AA is still necessary – if so why/what portion?
- can parts of the Brooklyn compressor station be decommissioned – if not, please provide specific detail of why not?
- Please explain divergence in views between now and 2012.

Please refer to details provided in sections 5.2 and 5.3.

9.3 Modelling to reflect revised capex and opex

Please provide revised capex and opex models, including the WORM and these savings and efficiencies

See models provided at Attachments B.1 and B.2

9.4 Revised PTRM

Please provide a revision to your proposed post-tax revenue model (PTRM) incorporating the new capex/opex

See Post Tax Revenue Model provided at Attachment B.4

9.5 Revised tariff model

Please provide a revised tariff model, explaining which zones (tariffs) are recovering the opex/capex associated with the WORM

See Tariff and Price Control Models provided at Attachments B.5 and B.6.

Latest versions of models

We confirm that we would like the WORM incorporated into the latest version of the models that we have been provided with.

See Roll forward model provided at Attachment B.3.

A.2 AER Information request 10

AER Reference	IR010
Topic	Revisions to demand forecast arising from the WORM project
Date of response	15 May 2017
Public/Confidential	Public

10.1 Impact of WORM on VTS demand

Please discuss the impact APA expects construction of the WORM to have on forecast VTS pipeline capacity, average flows, and peak flows for the 2018-22 AA period. In this discussion, please include comment on how APA expects the WORM to affect its forecast of Iona UGS refill volumes.

Please refer to details provided in chapter 3 of this supplementary submission.

10.2 Revised forecast

Please provide a revised forecast on VTS pipeline capacity, average flows, and peak flows for the 2018-22 AA period.

Please refer to discussion provided in chapter 3 of this supplementary submission.

B Supporting financial models