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3 March 2017

Mr Sebastian Roberts
General Manager, Networks
2018–2022 Victorian Gas Access Arrangement Review
Australian Energy Regulator

Submitted by email: VicGAAR2018-22@aer.gov.au

Dear Mr Roberts

APA VTS Access Arrangement 2018–2022

The Australian Energy Market Operator (AEMO) welcomes the opportunity to comment on the APA VTS Australia (Operations) Pty Ltd (APA) proposed Access Arrangement for the Victorian Declared Transmission System to apply from 1 January 2018 to 31 December 2022. AEMO is the operator of the Victorian Declared Transmission System (DTS) and is therefore directly affected by the outcome of this consultation.

AEMO provides the attached submission on how the proposed Access Arrangement relates to demand forecasts, security of supply and operability of the DTS. As AEMO is currently forecasting a tight gas supply-demand balance in Victoria, with the prospect of reduced available supplies to adjoining states, a number of proposed augmentations must proceed as planned to avoid potential supply shortfalls.

Should you have any questions or wish to discuss this information further, please contact Luke Garland (Manager, Gas System Operations) on (03) 9609 8012 or luke.garland@aemo.com.au

Yours sincerely

Matthew Clemow

(Acting) Group Manager, Gas Real Time Operations

cc:

Attachment: AEMO Submission on APA 2018–2022 Access Arrangement Proposal

AEMO Submission on the APA 2018–2022 Access Arrangement Proposal

1. Demand Forecasts

There have been some material changes in recent months impacting the Gas Powered Generation (GPG) forecast figures produced for the *2016 National Gas Forecasting Report*[1] (NGFR) and the *2016 National Transmission Network Development Plan*[2] (NTNDP). AEMO has assessed and utilised updated Victorian GPG forecasts in both the *2017 Victorian Gas Planning Report* (VGPR) and the *2017 Gas Statement of Opportunities* (GSOO). Further detail and information on the assumptions used to derive the updated GPG forecast is provided in Chapter 2 of the 2017 VGPR.

AEMO's updated Victorian GPG forecast utilises the same methodology as the 2016 NTNDP. The NTNDP examines a pathway of generation retirements based on assumed financial viability and announced intentions to close coal powered plants at the end of their technical life. The inputs into this model have been adjusted based on two key recent events:

1. The announced Hazelwood Power Station closure on 31 March 2017; and,
2. The Government support package for the Portland Aluminium smelter.

The Victorian GPG consumption forecast from the 2017 VGPR, shown in Table 1, shows increases in 2017 and 2018 above the total GPG consumption in 2016 of 4.0 PJ. GPG demand is primarily driven by conditions in the electricity market. The projected increase from 2017 reflects the retirement of the Hazelwood Power Station.

Table 1 DTS connected Gas Powered Generation consumption forecast (PJ/year)

	2016	2017	2018	2019	2020	2021
GPG consumption	4.0 (actual)	18.8	20.5	12.9	8.5	9.6

GPG is forecast to play a key role in balancing the generation output from intermittent renewable energy sources and as a transitional role in the move towards a low carbon future. This role is expected to continue through 2019 to 2021, although to a lesser extent due to the forecast increase in large-scale renewable energy generation.

The major drivers of increased renewables generation are the Federal Government's Large-scale Renewable Energy Target (LRET) and the Victorian Renewable Energy Target (VRET) of 40 per cent renewables by 2025.

2. South West Pipeline (SWP) capacity expansion towards Port Campbell

An increase in the transportation capacity of the SWP towards Port Campbell is necessary to minimise the risk of winter gas supply shortages in Victoria. The Iona underground gas storage facility (UGS) needs to be refilled each summer so this is can supply during the following winter. This SWP constraint means that Iona UGS is unlikely to be sufficiently refilled for winter 2019 and every year thereafter:

- AEMO supports the project proposed by APA to increase the transportation capacity of the SWP towards Port Campbell (i.e. a westerly flow direction) to 139 TJ/d.

[1] http://www.aemo.com.au/Gas/National-planning-and-forecasting/National-Gas-Forecasting-Report
[2] http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/National-Transmission-Network-Development-Plan

- AEMO's position is that the option for increasing the SWP capacity towards Port Campbell to approximately 180 TJ/d, by utilising Brooklyn compressor unit 10, should be investigated further given this compressor is part of the existing DTS asset base.

The SWP capacity issue and its impact is discussed in detail in both the 2017 VGPR and the 2016 VGPR Update. AEMO has identified Iona UGS not being refilled for winter 2019 (and every following year) as a threat to system security, if the proposed augmentation does not proceed in a timely manner.

2.1. Identification of the SWP capacity constraint

In 2015 AEMO identified potential capacity constraints on the SWP transportation capacity towards Port Campbell, along with options for increasing this capacity. This information was presented to the Gas Wholesale Consultative Forum in August and October 2015.

When this capacity constraint eventuated during summer 2015/16, AEMO initiated and published the 2016 VGPR Update to highlight this issue along with other changes in the DTS which had occurred since the 2015 VGPR was published.

The SWP transportation capacity limitation identified in the 2016 VGPR Update restricts gas flows towards Port Campbell that are required for refilling the Iona UGS reservoirs. This constraint also reduces gas availability for export to South Australia via the SEA Gas Pipeline, and for GPG consumption at the Mortlake Power Station. This constraint was described as potentially worsening in the near future due to Port Campbell offshore production declines.

Since the publication of the 2016 VGPR Update, the announcement of the Hazelwood Power Station closure has significantly increased AEMO's system security concerns. AEMO expects the Laverton North Power Station (LNPS) to run more often following the Hazelwood closure. This has already been observed during summer 2016/17. When LNPS operates it directly reduces the SWP transportation capacity (1 TJ reduction in SWP capacity for every 1 TJ of gas used by LNPS) towards Port Campbell where Iona UGS withdraws gas. This is due to the pipework configuration at Brooklyn, described in further detail in the 2017 VGPR.

As gas production in Victoria continues to decline, the potential consequences of low storage inventory prior to winter include frequent curtailment, mandatory restrictions and load shedding within the National Electricity Market (NEM), if gas supplies cannot support the increased GPG requirements post Hazelwood closure.

Under rule 79 of the National Gas Rules (NGR), capital expenditure is justifiable if the capital expenditure is necessary:

> *(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 (as distinct from projected demand that is dependent on an expansion of pipeline capacity);*

AEMO considers that expenditure to expand the SWP capacity towards Port Campbell meets these requirements. Without this augmentation, Iona UGS is unlikely to be refilled by winter 2019, which is expected to result in gas supply shortfalls to Victoria during that winter.

The Victorian *Gas Safety Act 1997* requires gas companies to minimise the obvious public safety risks that would arise in these circumstances. Section 32 states:

> *"A gas company must manage and operate each of its facilities to minimise as far as practicable the hazards and risks to the safety of the public and customers arising from interruptions to the conveyance or supply of gas."*

The proposed augmentation will enable the DTS to better support Iona UGS withdrawals and LNPS generation at the same time.

2.2. Non-availability of Brooklyn compressor unit 10

While AEMO strongly supports the proposed augmentation to connect Brooklyn compressors 11 and 12 directly to the Brooklyn to Lara Pipeline (BLP), it also considers that further work is required to make Brooklyn compressor 10 consistently available. APA does not make compressor 10 available to AEMO unless both compressor 11 and 12 are unavailable.

Brooklyn compressor 10 was included in the 2013–17 Access Arrangement. It received maintenance and upgrade funding including the cooler replacement during summer 2015/16.

The APA–AEMO Service Envelope Agreement (SEA) also includes references to Brooklyn compressor unit 10. The SEA was included in the package of information submitted to the AER by APA as two documents:

- The SEA including legal terms and conditions of the agreement: "APA VTS - SD - APAVTS&AEMO - Service Envelope Agreement - 20120321 - Public.pdf"
- An updated description of the assets in the DTS: "APA VTS - SD - APAVTS&AEMO - Service Envelope Agreement Revision - 29130813 - Public.pdf"

The second of those documents, at page 28, describes the Brooklyn Compressor Station as having only two Centaur compressors, but units 10, 11, and 12 are all Centaur machines (units 8 and 9 are the Saturn units). Page 52 of the SEA states that one of these Brooklyn Centaur units could be relocated as it is only provided as spare capacity.

AEMO acknowledges that there are issues to address regarding the operation of Brooklyn compressor unit 10. The compressor has wet seals, nitrogen oxide (NOx) emission levels and noise which need to be addressed.

APA has already proposed in the 2018–22 Access Arrangement to address oil management due to the wet seals on some of the compressors in the DTS. Oil removal through the use of liquid/gas coalescer filters is accepted gas industry technology that is used by gas facilities connected to the DTS.

AEMO's comments on oil removal and gas quality monitoring plans are included in further detail in Section 10 – Gas Quality.

2.3. Greater increase in SWP transportation capacity towards Port Campbell using Brooklyn compressor unit 10

AEMO requests that APA and the AER consider the proposal described as Option 4 within the 2016 VGPR Update. This option uses all three Centaur compressors at Brooklyn to provide greater certainty that Iona UGS will be refilled prior to each winter.

Option 4 increases the SWP capacity towards Port Campbell from 104 TJ/d to 180 TJ/d on a 300 TJ/d system demand day. This is approximately 40 TJ/d of additional capacity above

APA's proposed augmentation (using only Brooklyn units 11 and 12) that would increase capacity to approximately 139 TJ/d.

As noted in the section above, this option would require addressing the compressor 10 oil removal, NOx emissions and noise concerns.

2.4. Western Outer Ring Main (WORM) easement

AEMO believes that securing the Western Outer Ring Main (WORM) easement is prudent infrastructure planning which allows the WORM to be built within the next access arrangement period, if not sooner.

The WORM provides a number of system security, capacity and operability benefits to the DTS. These include:

1. Increased SWP transportation capacity from the Port Campbell gas facilities towards Melbourne that would:
    a. Result in increased security of supply to Melbourne in the event of a supply interruption from Longford.
    b. Address the separation of the DTS that currently does not allow gas from Port Campbell to physically supply demand in the Northern Zone and the Longford to Melbourne Pipeline including the (Eastern) Outer Ring Main.

       The consequences of this separation were evident on 1 October 2016 during a six hour unplanned outage of the Longford Gas Plant, which included AEMO issuing a notice of a threat to system security and an intervention in the Victorian Declared Wholesale Gas Market (DWGM). Curtailments in northern Victoria, outer-eastern Melbourne and Gippsland would have been required had the outage persisted, despite additional gas supply being available from Port Campbell.

       During the industrial action at the Longford Gas Plant from early 2015 through to late 2016 the complete loss of gas supply from Longford was also considered to be a credible scenario.
2. Increased system security including:
    a. Increased linepack closer to Melbourne improves the capacity of the DTS to manage variable gas demand.
    b. Increased capacity to support Victorian GPG demand, which also tends to peak during the morning and evening when residential gas demand peaks. As shown in Table 1, Victorian GPG consumption is forecast to increase from 4.0 PJ in 2016 to 18.8 PJ in 2017.
3. Increased SWP transportation capacity towards Port Campbell to support:
    a. Refilling the Iona UGS reservoirs as production at Port Campbell declines. This issue is discussed further in the 2017 VGPR, noting that AEMO has identified this issue to be a threat to system security.
    b. Increased gas flows to South Australia via the SEA Gas Pipeline due to declining Port Campbell production and an alternative to gas supply from the Moomba Gas Plant and the Queensland LNG producers.

c. Reduced fuel gas consumption and compressor maintenance costs for flows from Longford to Port Campbell (refer to section 3.3 for further information).

4. The possible reduction or removal of compression from the Brooklyn site that would:
    a. Reduce the hazard profile of the site, which is near housing.
    b. Reduce compressor maintenance costs as set out in the previous point.

3. Brooklyn Compressor Station upgrades

The Brooklyn Compressor Station (CS) is one of the two most utilised compressor stations within the DTS. The other site is the Wollert CS which supports exports to New South Wales via the Victorian Northern Interconnect (VNI). Brooklyn CS is a critical site as it is the only way to supply gas to Ballarat on a peak winter day (otherwise curtailment would be required).

In its Access Arrangement submission, APA states that:

> *"The main role today for gas compression at the site is for peak compression to Ballarat, supply to the North Laverton GPG (Snowy) and supply of Longford gas to western Victoria when Otway gas facilities are not injecting into the system."*

In fact approximately 85% of the compressor operating hours for the Brooklyn CS during 2016 were to transport gas to Port Campbell via the SWP.

As discussed in section 3.3 of this submission, any future investment at Brooklyn CS should be undertaken in a way that is consistent with the long term plan for this facility and therefore its remaining life.

3.1. Brooklyn CS cooler replacement project

The cooling water heat exchangers used as coolers for Brooklyn compressors 10 and 11 were replaced between October 2015 and February 2016. The cooling water heat exchangers were replaced with air cooled heat exchangers due to corrosion and legionella concerns.

APA initially proposed to undertake this project by taking both compressors 10 and 11 out of service at the same time. This was not acceptable to AEMO due to the disruption this was expected to cause to the refilling of the Iona UGS reservoirs and the operation of LNPS.

At least three times per year, AEMO chairs a Victorian Gas Maintenance Coordination Workshop. The purpose of the workshop is to identify overlapping maintenance that may cause a threat to system security, and reschedule this maintenance. This workshop is attended by all facility operators and APA. Minutes are issued for each meeting.

At the 20 August 2014 meeting, APA advised AEMO (and the other facility operators at the workshop) that the Brooklyn CS heat exchanger replacement project was planned for September to December 2015. During this meeting AEMO raised concerns around having only one Brooklyn CS compressor (unit 12) available for four months. It was minuted that AEMO and APA would continue to work on this issue.

During the further discussions on this issue, APA maintained that the installation of a temporary cooler on unit 10 or 11 was not possible. The letter AEMO sent to APA on 8 May 2015 (included in APA's 2018–22 Access Arrangement submission) was intended to provide APA formal justification of the additional expenditure for the AER. APA had been progressing the tender documentation for the project with the requirement to maintain two compressors known.

In its 2018–22 Access Arrangement submission, APA made a number of statements about the cooler replacement project that call for clarification or response by AEMO.

- APA: "AEMO, as pipeline operator, delayed commencement of the site works (see letter dated 8 May 2015)."
    - AEMO Response: At the 20 August 2014 maintenance coordination workshop APA advised that the Brooklyn CS heat exchanger replacement project was planned for September to December 2015.
    - As noted in the 8 May 2015 letter, APA then sought to combine this work with a full station outage of three days duration to replace isolation valves on units 10 and 11.
    - A full outage of the Brooklyn Compressor Station cannot be supported in September due to the requirement to support Ballarat peak day demand that can occur during September. This resulted in the full station outage, and therefore the start of the cooler replacement works, needing to be delayed by one month.
- APA: "AEMO constrained the window of the site works to a shorter time period (see letter dated 8 May 2015) which resulted in higher construction contractor's bids for the work."
    - AEMO Response: As noted above, the initial project duration was four months, September to December 2015. As stated on page 3 of the 8 May 2015 letter, the project duration remained four months, from October 2015 until at least January 2016.
    - The project had to be accelerated when it was established that the coolers on both unit 10 and 11 were too corroded to be used with the temporary cooler. This meant that both compressors had to be removed from service.
    - This resulted in only unit 12 being available to maintain system security along the SWP, BLP and the Western Transmission System (WTS) when there were no injections into the DTS at Port Campbell (which is usual outside of winter).
    - If unit 12 had failed, AEMO would have been required to issue a notice of a threat to system security and schedule out of merit order injections at Port Campbell. AEMO would have sought payment of DTS service provider uplift from APA had this occurred.
    - The removal of unit 10 and 11 from service resulted in substantial disruption to the refilling of the Iona UGS reservoirs and generation capacity at LNPS. Units 8 and 9 are too small to support Iona UGS refilling.
- APA: "AEMO required APA VTS to maintain either Brooklyn compressor station Unit 10 or 11 to be available for use during the entire construction period (see letter dated 8 May 2015). This reduced the construction efficiencies that could be gained from delivering two units concurrently."
    - AEMO Response: In the 8 May 2015 letter, AEMO agreed to only run unit 11 (which was supposed to operate with a temporary cooler) between 6pm and 6am when there would be no construction activity (and assuming unit 12 was available).

- This was a reasonable attempt to reduce the impact on the project, noting that this mode of operation would still have reduced the SWP daily transportation capacity to Port Campbell.

- APA: “Unit 11 aftercooler failed during normal operation. This required significant expediting effort in order to satisfy AEMO demands of having at least one unit available (see letter dated 8 May 2015).”
    - AEMO Response: It is not an acceptable outcome from a system security perspective to rely on a single compressor unit (12) to maintain supply to the SWP, BLP and WTS. The SEA requires two Centaur compressors to be made available at Brooklyn.
    - Unit 11 failed when it was connected to the temporary cooler due to corrosion of the heat exchanger tubes.
- APA: “A temporary water cooler and treatment plant was required to be constructed and maintained during the works - this was not anticipated at the time of business case and estimate development.”
    - AEMO Response: APA appears not to have factored in the system security implications of relying on only compressor unit 12 to maintain supply to the SWP, BLP and WTS.

3.2. Brooklyn CS upgrade project

AEMO is concerned about the age and reliability of some of the Brooklyn compressors. APA proposed to address this through Business Case Number 204 – Brooklyn CS Upgrade.

The Brooklyn Compressor Station Upgrade project includes;

- Safety and Process Control systems
- Unit 8, 9, 10, and 11 unit control systems
- Unit 8, 9, 10, and 11 ventilation system
- Unit 8, 9, 10, and 11 fuel gas
- Unit 8, 9, 10, and 11 exhaust stack replacement

Consistent with the concerns raised in section 2.2 regarding the availability of unit 10, AEMO does require further information from APA to understand whether the proposed work on unit 10 will result in this compressor being made available to AEMO to operate.

AEMO also notes that this is a very different option to the originally proposed augmentation of the Brooklyn Compressor Station that was included in the 2008–12 APA Access Arrangement. This access arrangement contained details for a redeveloped Brooklyn Station with four Centaurs (11, 12, 13 and 14) and the decommissioning of the older units (8, 9 and 10)[3]. This proposal received approval for capital expenditure of $49.57 million[4], but it did not proceed.

[3] https://www.aer.gov.au/system/files/GasNet%20-%20Access%20Arrangement%20Submission%20Schedules%20and%20Attachments%20-%2014%20May%202007.pdf

[4] https://www.aer.gov.au/system/files/Final%20Approval%20-%20Revised%20Access%20Arrangement%20by%20GasNet%20Australia%20for%20Principal%20Transmission%20System.pdf

The total cost of the works under Business Case Number 204 – Brooklyn CS Upgrade is $25 million, with only a five year investment life. This compares very unfavourably with the works approved in the 2008–12 Access Arrangement.

AEMO's view is that alternative options to this work should be considered.

3.3. Brooklyn CS vs. the WORM project

The compression requirements at Brooklyn depend on whether the WORM proceeds. APA noted in its 2013–17 APA Access Arrangement[5] submission that the level of expenditure on Brooklyn is highly dependent on what other augmentations are considered. If the WORM proceeds, less compression would be required at Brooklyn and the three older units (8, 9, and 10) could be decommissioned with no need for replacement.

If the WORM is to be built, AEMO's view is that units 8 and 9 should be decommissioned and not upgraded. This would leave the three remaining Centaurs units (10, 11, and 12) as the duty compressors on site.

If the WORM is not built then the original proposal 2008–12 Access Arrangement proposal for four Centaurs at Brooklyn needs to be reconsidered. As set out in section 3.4 below, AEMO's view is that four Centaurs at Brooklyn is inferior to the WORM, particularly given the substantially higher fuel gas and compressor running costs for Brooklyn compression towards Port Campbell vs. the WORM.

AEMO notes that this is the third successive access arrangement review to consider capital works requirements at the Brooklyn CS and SWP transportation capacity towards Port Campbell. As indicated in the 2017 VGPR, appropriate investment needs to commence in 2018 to minimise the risk of gas shortages and meet the long term system security requirements of the DTS.

AEMO's position is that there should be a consistent, agreed medium to long term strategic plan for increasing the capacity of the SWP and the DTS more broadly. The aim should be to:

- Ensure system security is maintained by adding capacity before it results in a threat to system security; and
- Prevent costly capital investment and unnecessary expenditure on maintaining assets that are at end of life.

3.4. How the WORM works

The current method of transporting gas from Longford to Port Campbell is very inefficient. Gas flows along the Longford to Melbourne Pipeline to Dandenong City Gate (DCG). During the summer the pipeline pressure is approximately 5,500 kPa. At DCG 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 to 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 DCG). A compressor at Wollert would boost the gas pressure up to 10,200

[5] https://www.aer.gov.au/system/files/Compressor%20Strategy%202012%20-%20FINAL%20Redacted.pdf

kPa to flow around the 500mm diameter WORM. The WORM would connect into the BLP, which would enable gas to flow to Port Campbell via the SWP. Bi-directional compression at Lara or Stonehaven would assist this flow along with making the Winchelsea compressor bi-directional.

During the 2015/16 financial year the Brooklyn compressors consumed approximately 331 TJ of fuel gas. Brooklyn CS had the DTS's highest contribution to AEMO's reporting under the National Greenhouse and Energy Reporting Scheme (NGERS).

At a wholesale gas price of $8.50/GJ, 311 TJ of fuel gas translates to a cost of approximately $2.8 million per year for market participants. As the quantity of gas transported from Longford to Port Campbell increases, and if gas prices continue to increase, this fuel gas cost will also continue to increase.

With the installation of the WORM, compression will still be required to transport gas to Port Campbell, but this will be less than half the fuel gas that is currently required to transport gas using Brooklyn compression.

The WORM could also increase the SWP transportation capacity towards Port Campbell to approximately 300 TJ/d during summer if sufficient compression capacity was provided at Wollert.

4. Gas Quality

AEMO supports prudent investment by APA to meet its gas quality management compliance obligations.

The composition of Victorian gas supplies varies by production facility based on the sources of gas processed at each facility. AEMO has recently published an update of the AEMO Gas Quality Standard and Monitoring Guidelines.

Figure 2 Relationship between Legislation and AEMO documents

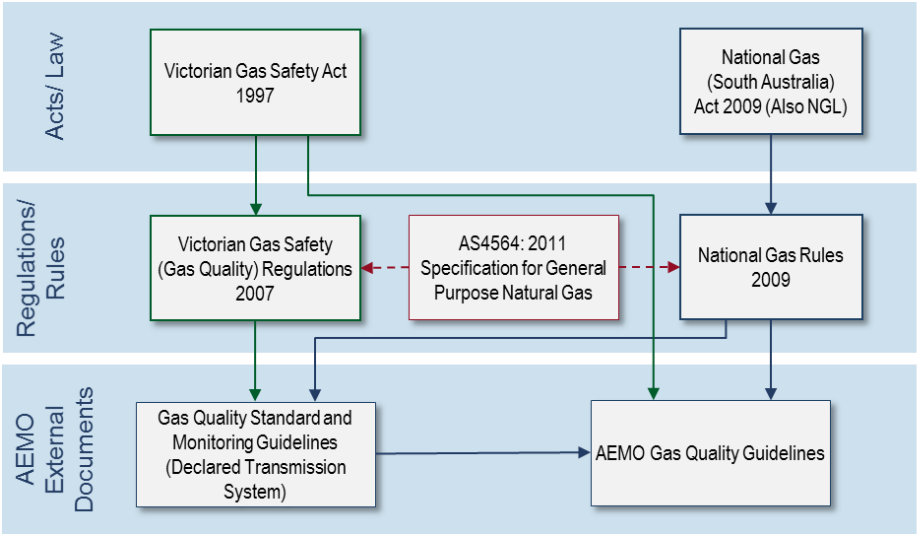

Figure 2 demonstrates the relationship between legislation, regulations, the NGR and the AEMO documentation relating to Gas Quality. Under rule 288, a gas quality monitoring system and gas quality monitoring plan is required at every injection point, and at any other point necessary for AEMO to monitor the quality of gas injected into and withdrawn from the DTS.

4.1. Oil management and monitoring requirements

The Australian Standard (AS) 4564 for oil in natural gas has an informative limit of 20 millilitres (ml) per TJ. The limit is an acknowledgment that, while undesirable, it is almost inevitable that some lubricating oil will escape from filters and coalescers downstream from compressors and other facilities. The limit is intended to restrict oil accumulation to manageable quantities and provide guidance for the design of oil separation equipment at compression facilities.

Within the DTS, Brooklyn compressors 8, 9, and 10, and Wollert compressors 1, 2, and 3 (which is also known as Wollert "A" Compressor Station) are all wet seal compressors. Wet seal means that oil is used in the compressor seals, some of which will pass into the natural gas being compressed.

On 23 November 2016 AEMO requested APA to provide a gas quality monitoring plan for the wet seal compressors at the Brooklyn Compressor Station and the Wollert "A" Compressor Station. APA intends to return the Wollert A compressors to service and add them back into the SEA for AEMO to operate as part of Phase B of the Victorian Northern Interconnect Expansion Project.

APA submitted Business Case Number 260 - Liquids Management, which AEMO understands is intended to address the removal of compressor oil. It proposes to install oil removal equipment at "Brooklyn and Pakenham". In AEMO's view, this business case needs revision to include installation of oil removal equipment on all DTS wet seal compressors.

The submission includes a letter from Energy Safe Victoria (ESV) dated 27 March 2006, in which ESV highlights the requirement for APA to comply with the Victorian Gas Safety (Gas Quality) Regulations with respect to oil concentrations in natural gas. In this letter, ESV proposed that APA undertake new capital expenditure to add filters /coalescers to compressors or to use only dry seal compressors.

The AER should also consider whether the oil removal equipment planned for Pakenham is the responsibility of the operator of the Lang Lang Gas Plant or whether the cost of this oil removal equipment should be socialised across all users of the DTS.

AEMO considers that capital expenditure for oil removal projects meets the NGR rule 79 requirement. The applicable regulatory obligation is the Victorian Gas Safety (Gas Quality) Regulations.

4.2. Culcairn gas quality monitoring system

On 18 April 2016 and then again on 10 October 2016, AEMO requested a Gas Quality Monitoring Plan from APA for the Culcairn Injection Point into the DTS.

APA proposed to address this in Business Case Number 224 - Culcairn Gas Quality Monitoring. In this business case, APA stated:

> *"Installing the Gas Quality Monitoring System will ensure compliance with the NGR and associated Regulations, it will ensure the risk of curtailment on non-compliance grounds is averted. It will also ensure the DTS assets are protected from potential damage due to off spec gas."*

Inadequate gas quality monitoring creates a risk to public safety that is becoming more material with increasing diversification of gas supply sources. Over the last three winters AEMO has seen large quantities of gas injected into the DTS at Culcairn on peak winter days.

As the interconnected East Coast gas markets continue to evolve, the likelihood of unconventional gas or coal seam gas being supplied to the DTS increases. Potential sources of gas include Queensland, the Cooper Basin or Narrabri.

AEMO considers the installation of a new gas quality monitoring system at Culcairn is necessary for APA to comply with its regulatory obligations, and to minimise the associated public and property risks.

5. Warragul Looping

This project has received funding in the 2008–12 APA Access Arrangement[6] and the 2013–2017 APA Access Arrangement[7] but APA has not proceeded with this investment.

AEMO again supports this project as part of the 2018–22 APA Access Arrangement. APA has proposed to have the lateral looping in service by winter 2020. AEMO's forecasting indicates that curtailment of a Tariff D customer in Warragul may be required if a peak day occurs during winter 2019. AEMO considers this to be a threat to system security.

5.1. Warragul pressure breach incident

On the morning of 22 July 2014 the pressure at Warragul breached the minimum connection pressure. This occurred due to a high instantaneous flow rate (~8.3 kscm/h) at Warragul. The pressure dropped to 1,292 kPa which was below the contractual pressure of 1,400 kPa.

At the time of this incident, AEMO did not have control of the Dandenong Terminal Station backup regulators (also referred to as the Lurgi Pipeline backup regulators) under the SEA. This meant AEMO could not adjust the regulator setpoint to prevent the pressure breach occurring.

APA has since given AEMO control of this facility. Since this incident, AEMO regularly needs to increase the regulator setpoint at the end of the evening peak to support the high morning peak demand at Warragul.

While varying this setpoint supports Warragul load, it reduces the effective capacity of the Longford to Melbourne Pipeline (LMP) and increases the likelihood of peak shaving LNG being required during a winter evening peak.

This issue was foreseen in the 2013–2017 APA Access Arrangement proposal, where APA stated:

> *"Based on an updated 10 year growth forecast for the Warragul City Gate provided to APA GasNet by the relevant distribution network service provider, APA GasNet has identified a need to augment the Warragul lateral by winter 2014 to meet forecast increases in industrial loads in the area. Without augmentation, the Warragul City Gate would breach the required minimum connection pressure of 1400 kPa at the custody transfer meter."*

[6] https://www.aer.gov.au/system/files/GasNet%20-%20Access%20Arrangement%20Information%20-%2014%20May%202007.pdf

[7] https://www.aer.gov.au/system/files/APA%20GasNet%20submission%20-%20public%20-%20March%202012.pdf

5.2. Temporary minimum delivery pressure reduction for Warragul

APA, AEMO and Australian Gas Networks (AGN) have worked together since the incident to determine that a lower contractual pressure of 1,150 kPa could be supported temporarily until the Warragul network's demand increases further.

Figure 3 Warragul pressure versus instantaneous flow

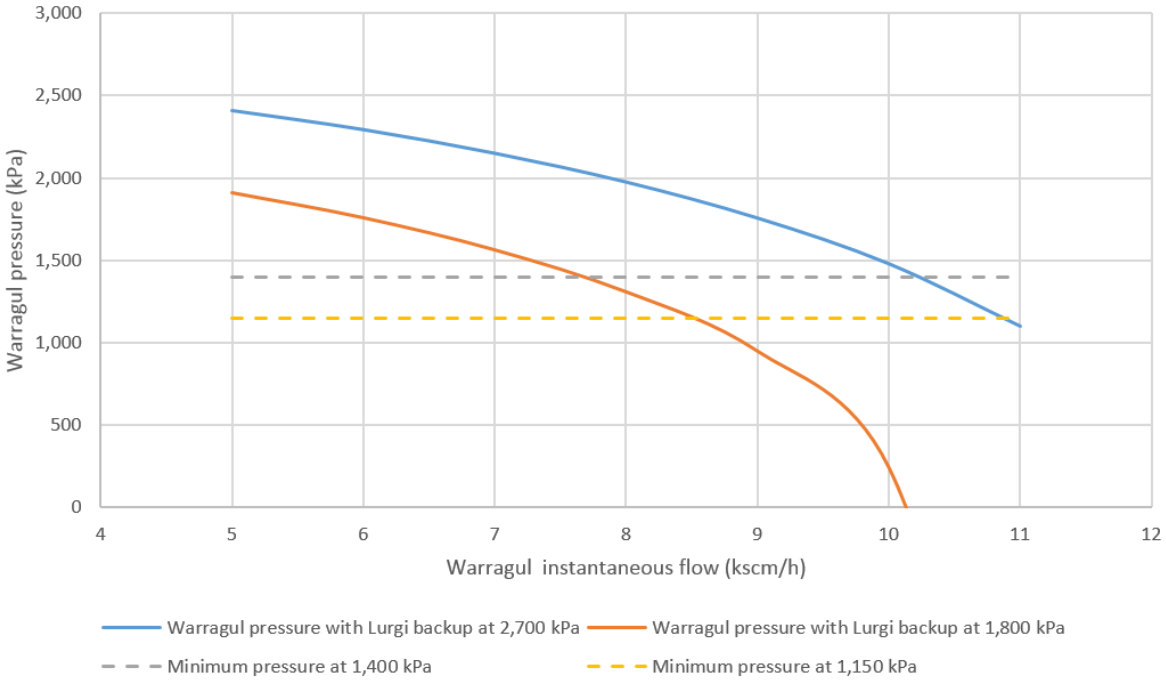

Figure 3 displays the relationship between the delivery pressure at Warragul, the instantaneous demand of Warragul and the Lurgi Pipeline back-up regulator setpoint (which is located at the Dandenong Terminal Station end of the Lurgi Pipeline). The forecast load is provided in the 2017 VGPR and it suggests that the Warragul instantaneous flow could cause a pressure breach of the reduced contractual pressure (1,150 kPa) from winter 2019.

If a peak day occurs in 2019 and the system augmentation is not completed:

- If AEMO forecasts that supply cannot be maintained to Warragul, AEMO would issue a notice of threat to system security and curtail Tariff D load in Warragul to maintain system security.
- If the peak demand is unforecast, Warragul minimum pressure will be breached, creating potential public safety issues due to air ingress into the distribution network.

APA proposed to address this through Business Case Number 501 – Warragul Looping – with looping in service by winter 2020. For further information regarding the Warragul Looping, please refer to either the 2016 VGPR which contained augmentation options or 2017 VGPR for updated forecasting information.

6. Urban Encroachment / Safety Management – High Consequence Areas

APA must ensure that its pipelines are operating in accordance with AS2885 and, where this is not the case, take steps to bring the pipeline back into compliance. In principle, AEMO supports all projects that reduce the risks to public safety and meet the safety requirements under applicable standards and regulations.

APA has included Business Case Number 230 - Encroachment High Consequence - in its Access Arrangement submission. AEMO understands that this work is to address urban encroachment on pipeline corridors.

The information contained in this business case does not include a specific solution for each affected pipeline. The overall proposal states;

> *"The affected pipelines as described above require either protection slabbing, pressure reduction within capacity constraints or a combination of both in order to satisfy the requirements of the Safety Case, AS2885, the Pipelines Act and Regulations and the Gas Safety Act and Regulations."*

AEMO supports all slabbing components of the business case but greater detail is required on the intended pressure reduction.

DTS pipeline transportation capacities are very sensitive to pressure changes. Reducing the Maximum Allowable Operating Pressure (MAOP) of the three pipelines included in the business case will have an impact on transportation capacity.

Large reductions in pipeline transportation capacity will impact system security if replacement pipeline capacity is not provided. This could result in another threat to system security.

6.1. Project 1: T24 Brooklyn to Corio Pipeline (BCP)

A reduction in the BCP MAOP will impact the SWP transportation capacity to and from Port Campbell. AEMO has completed initial modelling that provides an indicative impact on SWP capacities if the BCP MAOP is reduced down to 5,100 kPa, as discussed in the APA business case. Accurate capacity modelling that is used for DWGM scheduling purposes will take additional time. AEMO has not yet completed this modelling.

The reduction in the SWP capacity from Port Campbell to Melbourne is estimated to be less than 2 TJ/d. The reduction in SWP capacity toward Port Campbell is larger. The SWP withdrawal capacity at Port Campbell (for refilling the Iona UGS reservoirs) is estimated to reduce from 104 TJ/d to approximately 60 TJ/d.

This would have a substantial impact on refilling the Iona UGS reservoirs. As explained in the 2017 VGPR and earlier in this submission, failure to sufficiently refill Iona UGS is a threat to system security. This is due to the impact this would have on Victorian winter gas supplies. Low Iona UGS inventory would also be expected to impact the NEM and gas supply to South Australia via the SEA Gas Pipeline.

The increased community safety sought through the BCP pressure reduction will also decrease community safety as a result of winter gas supply shortages. This appears to be in conflict with the Victorian Gas Safety Act 1997 regarding the avoidance of interruptions to the conveyance or supply of gas.

This risk can be avoided by immediately implementing the Brooklyn CS project to connect units 11 and 12 directly to the BLP. This will enable the BCP to operate at a lower pressure without impacting winter gas supplies.

6.2. Project 2: T74 Wollert to Wodonga Pipeline (T74)

The VNI Expansion project is almost complete. The project will result in a new 400mm 10,200 kPa MAOP pipeline (known as the T119) for transporting gas to and from NSW via Culcairn.

The Euroa and Springhurst compressor stations have effectively been moved from the older 300mm T74 pipeline onto the new T119 pipeline as part of this project. There are three Pressure Reduction Stations (PRS) that enable gas to flow from the T119 into the T74 to pipeline to maintain supply to northern Victoria on peak demand days. The PRSs are located at Euroa, Glenrowan and Barnawartha.

The T74 has one section at the Melbourne end of the pipeline rated at 8,800 kPa MAOP. The remainder of the pipeline is rated at 7,400 kPa MAOP. Reducing the T74 MAOP below 7,400 kPa would reduce the VNI transportation export capacity.

AEMO has not yet completed accurate modelling, with the T119 and the above mentioned PRSs. Reducing the T74 MAOP below 7,400 kPa is not expected to impact the import capacity.

6.3. Project 3: Brooklyn to Lara Pipeline (BLP)

The BLP is a relatively new pipeline with a 10,200 kPa MAOP that was commissioned in 2008. Despite this, APA has indicated that an MAOP reduction down to 8,000 kPa would still leave the BLP as a rupture pipeline within the urban boundary.

A reduction in the BLP MAOP to 8,000 kPa would materially impact the SWP transportation capacity towards Melbourne, and could therefore impact winter gas supplies. The pressure reduction would not impact the SWP transportation capacity in the other direction (towards Port Campbell), even with Brooklyn compressors 11 and 12 connected to the BLP, as the compressors have an MAOP of 7,400 kPa.

AEMO's position is for the MAOP of the BLP to remain unchanged and for slabbing to be progressed as the preferred method of remediation.

7. Actuate mainline valves in high consequence areas

AEMO shares APA's safety concerns and supports Business Case Number 250 – Actuation of MLV in Dandenong to West Melbourne Pipeline (T16). If a rupture incident occurred on this pipeline, neither APA nor AEMO could remotely close the isolation valves along this pipeline.

If an emergency situation was to occur within the Melbourne Metro region, there would be a delay between the incident and the closing of a manual line valve by APA field technicians. This delay could be extended if the technicians are prevented from accessing the line valves during an emergency.

AEMO notes there have been a number of "near miss" incidents in the DTS over recent years. These include an unauthorised directional driller impacting the Longford to Melbourne Pipeline (LMP) on 1 September 2014 (which required the pipeline pressure to be temporarily reduced). More recently, an unauthorised directional driller narrowly missed the VNI at Glenrowan on 20 February 2017.

AEMO would support a future expansion of this program beyond the T16 Pipeline to include the LMP, BCP and VNI.

8. Iona Compressor Station control system automation upgrade

Over the last year AEMO has reported operability issues with the Iona CS site to APA. AEMO has not been provided with the appropriate control schemes to operate these compressors. APA has proposed to address this through Business Case Number 236 – Iona CS Automation. AEMO fully supports this project.

The Iona CS is located in Port Campbell at the connection point between the SWP and the Western Transmission System (WTS). It has two compressors that are used to compress gas towards Portland along the WTS when the SWP is in net withdrawal mode, which causes a low inlet pressure into the WTS.

These compressors usually run during the shoulder seasons when gas is being withdrawn from the SWP at Port Campbell for refilling Iona UGS. During these times there is still higher demand on the WTS that requires Iona compression to support. Reliability of the Iona compressors is critical during these times as the weather in south-west Victoria can be much cooler than the metropolitan Melbourne (where most of the DTS demand is located).

At these times AEMO needs to carefully monitor and manage this localised demand. A failure of both of these compressors during the shoulder season would result in AEMO curtailing SWP withdrawals at Port Campbell.

If WTS demand was high while both compressors were not available and none of the Port Campbell facilities were injecting gas, AEMO would need to issue a notice of a threat to system security to schedule injections into the SWP at Port Campbell to support WTS demand.

The Iona compressors are not usually needed during winter when gas is usually being injected into the SWP at Port Campbell, or during the summer when the demand on the WTS is lower. Over the last two years the Iona CS has been increasingly utilised due to reduced Port Campbell production and increased withdrawals from the SWP.

Iona UGS withdrawals are expected to increase further, so the utilisation of the Iona CS is also expected to increase.

9. Lara CG controls upgrade

AEMO has had a procedural workaround in place for four years to manage a control issue at this site. Gas Operations Engineers in the AEMO Control Room are required to manually control the site to prevent the Lara GG heater from overheating.

APA proposed to address this through Business Case Number 247 – Lara CG controls. AEMO supports the APA selected option of addressing the control and heating operability issues.

AEMO utilises this site for two main purposes, to maximise the SWP transportation capacity and for overnight linepack balancing to reduce fuel gas consumption at Brooklyn.

As Lara CG increases the SWP transportation capacity towards Melbourne, AEMO supports the upgrade option as demolition of the site would reduce the capacity of the SWP.

10. Plumpton PRS upgrade

AEMO has reported control issues with the Plumpton PRS to APA. The PRS supplies higher pressure gas from the BLP to Sunbury during winter. It is a mechanical PRS with no remote control possible via the control system. There has been a number of events when the

Plumpton PRS has failed to properly control pressure below the MAOP of the Sunbury Lateral.

The pressure in the BLP varies during the day as pipeline linepack is used to support Melbourne demand. When the pressure in the BLP reduces below the Plumpton PRS setpoint, the PRS regulator valves fully open (due to the low inlet pressure). When the BLP pressure increases to above the Plumpton PRS set point the PRS regulator can fail to control the pressure in the Sunbury Lateral to below the MAOP. This requires manual intervention by the AEMO Gas Operations Engineers.

The Plumpton PRS also reduces SWP export capacity during the shoulder period due to it supplying compressed gas from the BLP into the Sunbury Lateral. Compression of the Sunbury gas supply is not necessary during lower demand periods but the Plumpton PRS cannot be remotely controlled. APA has advised AEMO that it is unable to justify the cost of reconfiguring the site manually each year prior to winter if the PRS was to be manually closed for the summer.

AEMO understood that APA would be submitting a business case to upgrade the Plumpton PRS in this Access Arrangement period, to address the pressure control issue, and to enable it to be opened and closed remotely using the AEMO control system.

A project is required during the 2018–22 Access Arrangement period to address this safety and operability issue.