Business Case – Capital Expenditure (Capex)

South West Pipeline Westernhaul Expansion

Service Provider: APA VTS Australia (Operations) Pty Limited
Asset: Victorian Transmission System (VTS) (i.e. APA GasNet System as defined under the Service Envelope Agreement (SEA))
Business Case: Number 505

1 Project Approvals

TABLE 1: BUSINESS CASE – PROJECT APPROVALS

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Reviewed By	Sheila Krishnan, *Manager Asset Capacity Planning, APA Group*
Approved By	Mark Fothergill, *General Manager Infrastructure Strategy and Engineering, APA Group*

2 Project Overview

TABLE 2: BUSINESS CASE – PROJECT OVERVIEW

Description of Issue/Project	To outline the business case to increase the South West Pipeline (SWP) capacity to refill the Iona Underground Storage facility due to declining gas production and increasing net withdrawal at Port Campbell. A transportation capacity limitation has been identified within the 2016 AEMO Victorian Gas Planning Review (VGPR) report for westernhaul gas flows on the SWP in refilling the Lochard Iona Underground Gas storage (UGS) facility. The Lochard storage facility plays an important role in supplementing gas supplies to Victoria in the winter months. To adequately fulfil this role, the storage facility needs to be full at the start of winter. The gradually declining Port Campbell production plant is resulting in increasing net gas withdrawals at Iona to inject into storage and/or flow in the SEAS Gas pipeline to South Australia. The current westernhaul SWP capacity is 102 TJ/d in summer and 60 TJ/d at the shoulder period. Storage customers typically transport gas to the storage facility during the summer months. Due to the increasing withdrawal volume requirements to refill Iona (refill tends to occur over a shorter period, and therefore requires more peak facility), it is forecasted that the withdrawal flows at Iona would exceed the SWP westernhaul capacity during the peak summer period from 2018. The capacity constraint would result in risk to the system security for the Declared Wholesale Gas Market (DWGM) because storage customers were not able to adequately replenish their storage at the Lochard Iona facility and therefore unable to reinject their stored gas into the VTS during peak demand days or when called upon by AEMO for security of the system. APA has reviewed the constraints identified by AEMO and submits capital expenditure for inclusion in the 2018-2022 Access Arrangement to remove the constraint. APA has consulted with AEMO and Lochard on the capacity issues and various options to increase the westernhaul capacity of the SWP have been analysed.

Options Considered	Option 1: Do Nothing. (a) Lower the set point at Iona to enable marginally more flow (b) Utilise existing capacity outside the congested summer peak periods (c) Using other storage facilities and supply sources to supplement winter demand Option 2: Reconfiguration of the Brooklyn compressor site to enable available compression to be redirected to the SWP, hence increasing flow to Iona. In conjunction with this modification, Winchelsea compressor will be made bi-directional to increase the capacity. The incremental capacity developed is 48 TJ/d, that is, from the current 102 TJ/d to 150 TJ/d. The capex for this option is **$3.4 m ($2016)**. Option 3: Installation of Stonehaven compressor. This option increases the SWP westbound capacity from 102 TJ/d to 130 TJ/d. Combined with option 2, the westernhaul capacity can be increased to 163 TJ/d. Stonehaven compressor also has the added benefit of increasing the eastbound capacity from Iona to Brooklyn by 30 TJ/d, that is, from the current 429 TJ/d to 459 TJ/d. The cost to install a compressor at Stonehaven is in the order of $35 m. Other options were analysed but were not considered prudent. The options are the Western Outer Ring Main project (more costly when compared to option 3) and the utilisation of the Brooklyn Unit 10 (introduces operational issues: wet seals, high NOx and noise).
Proposed Solution	**The Preferred Solution is Option 2: Brooklyn Compressor Station Reconfiguration and Winchelsea Compressor bi-directional works – most cost effective to address immediate needs.**
Estimated Cost	**$3.4 million ($2016)**
Consistency with the National Gas Rules (NGR)	APA VTS considers that the above presented capital project meets the criteria of Rule 79(2)(c)(ii) and (iv), that is, the South West Pipeline investment is required for integrity of services, and to maintain the capacity to meet existing levels of demand for services, hence the capital expenditure is justified as conforming capital expenditure.
Stakeholder Engagement	APA has had regular engagement with stakeholders related to this project for a number of years. The stakeholders effected by this project are: • Australian Energy Market Operator (AEMO) • Victorian Market Participants • Lochard Energy

3 Background

The South West Pipeline (SWP) is a bi-directional pipeline that is used to supply gas from the gas plants at Port Campbell (including the Iona Underground Storage facility) to Melbourne. During low demand periods, the SWP transports gas from Melbourne to Port Campbell to refill the Iona Underground Storage reservoirs and to flow to South Australia via the SEA Gas Pipeline. The stored gas is reinjected into the Victorian Transmission System (VTS) during the winter peak period to manage the supply and demand in the pipeline system.

The westernhaul standing capacity is currently 102TJ/d in the summer period and decreases to 60 TJ/d during the shoulder period. Compressors at Brooklyn (Unit 11 and Unit 12 via the Brooklyn Corio Pipeline) are operated to achieve westernhaul capacity. Due to shipper requests for increased capacity from Iona to Melbourne, APA VTS installed a compressor at Winchelsea on the SWP in 2013-2017 access arrangement period. The Winchelsea compressor increased the SWP easternhaul capacity by 62TJ/d, augmenting the standing capacity to 429TJ/d. However, no additional westernhaul transport capacity was secured.

Three main gas production facilities at Port Campbell are located in the south west region and it is also the interconnection point for the SEA Gas pipeline which transports natural gas to Adelaide and other small demand points. The three production facilities can deliver gas to the Victorian Declared Wholesale Gas Market (DWGM) and also to the Adelaide Short Term Trading Market (STTM) and their standing capacities (ref AEMO Gas Bulletin Board) are described below:

- BHPP's Minerva Gas Plant had an expected life of 10 years and contained estimated "proven" and "probable" gas reserves of 319 PJ, at time of approval. It has been operating for 11 years. Although its initial injection capacity was 150 TJ/d, the plant has a current reported standing capacity of 43 TJ/d which can either be delivered directly to the SEA Gas pipeline or to the VTS via the SEA Gas injection point into the SWP. The facility usually undergoes maintenance during the months of November to March (summer period) resulting in a 28 day annual outage of capacity.

- The Origin Otway Gas Plant – has an injection capacity of 205TJ/d and can deliver directly into the VTS via the SEA Gas injection point and into the SWP (with a current injection capacity of 200TJ/d, again there is no physical connection between

the Origin plant and VTS - the plant injection is via the SEA Gas injection point). The plant carries out maintenance annually and is typically scheduled for the summer period resulting in a curtailed delivery capacity of 100TJ/d. The Origin facility is also directly connected to the SEA Gas Pipeline and the Mortlake pipeline that supplies the Origin Energy Mortlake Gas Powered generator, which at full capacity can consume up to 100TJ/d.

- Lochard Energy's Iona gas production and underground storage facilities standing injection capacity of 443TJ/d is shared between two delivery points, SEA Gas Pipeline and the VTS. The Lochard facility standing withdrawal capacity from the SWP is 155TJ/d. Lochard cannot take gas from SEA Gas for the purposes of refilling their storage reservoirs. The SWP withdrawal capacity of 102TJ/d to the Lochard Iona does not match the refill capacity for Iona (155TJ/d). Lochard undertakes facility maintenance of approximately 28 days per annum which is typically scheduled over the summer period which can affect the net refill availability of the facility when considered with the maintenance outages of the Esso Longford facility, where the bulk of refill gas originates from.

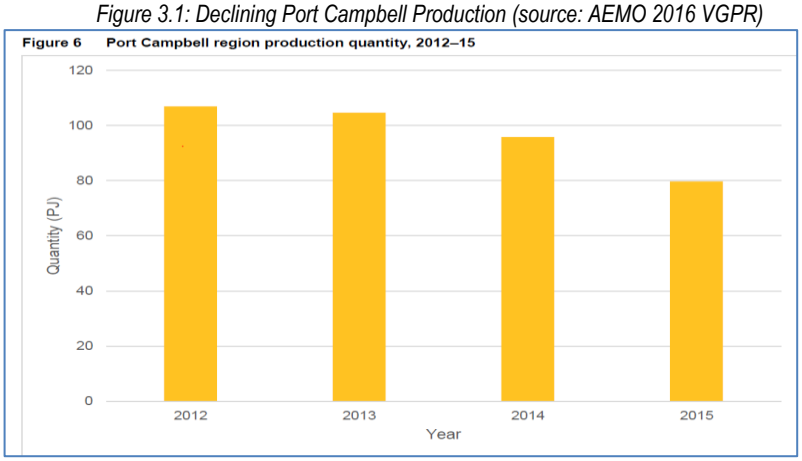
AEMO reported the potential for constrained flows on the SWP towards Port Campbell at the Gas Wholesale Consultative Forum in August-October 2015 and subsequently published the issue in the 2016 Victorian Gas Planning Review (VGPR) report.

The constraint is driven by

- Steady decline in Port Campbell production since 2012
- Increasing net withdrawal from the SWP at Port Campbell.
- Increase in demand in the VTS south west region.

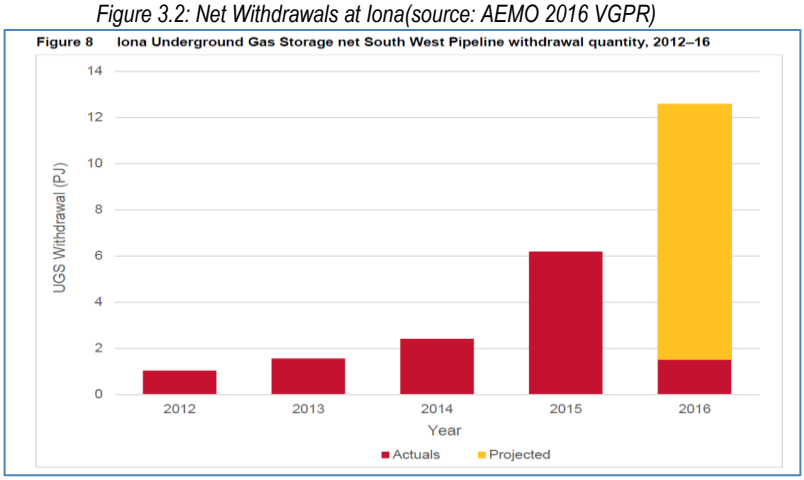
Figures 3.1 and 3.2 are extracts from the VGPR showing the declining Port Campbell production and increasing net SWP withdrawals at Iona.

Figure 3.1: Declining Port Campbell Production (source: AEMO 2016 VGPR)



Note: Port Campbell production is expected to be around 60 PJ for 2016. In 2017, there would be a step increase with new fields at Otway (i.e. Halladale/Speculant fields) in production. However, it is expected that Port Campbell production will then decline from 2018.

Figure 3.2: Net Withdrawals at Iona(source: AEMO 2016 VGPR)



Note: Actual net SWP withdrawals as at November 2016 from January 2016 is in the order of 10 PJ with forecast for an additional 1-2 PJ by the end of the year.

Forecast SWP net withdrawals at Iona UGS for 2016 are over 10 PJ, which is approximately half of the Iona UGS reservoir capacity.

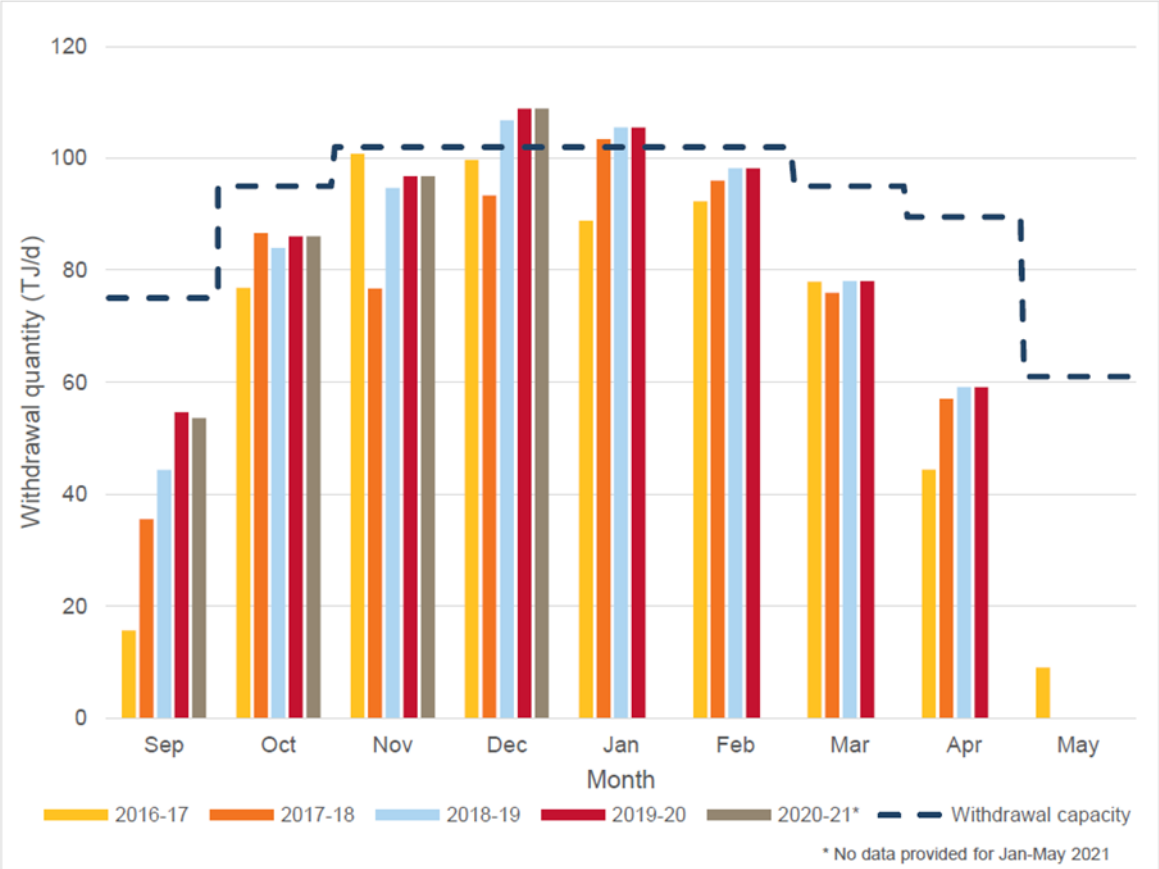
AEMO also published the forecasted withdrawal capacity in the VGPR, as shown in Figure 3-3.

The average projected daily withdrawal quantity on the SWP from 2016–17 to 2020–21 shows that:

- The current SWP withdrawal capacity (using BCS units 11 and 12) is expected to be sufficient to support forecast withdrawals during 2016 and 2017. Note: There was an operational constraint at Brooklyn in early 2016. The cooler upgrade works over a period of 2 months constrained capacity to refill Iona during that period.
- From 2018, SWP withdrawals are expected to be above pipeline capacity during December and January. Increasing amounts of gas are expected to be withdrawn from the SWP during the shoulder months, particularly September and April. However, the storage customers may not be able refill during that period due to other demand commitments/priorities at that time of year.

Figure 3.3 Forecasted Withdrawal Capacity (source AEMO 2016 VGPR)

Figure 9 South West Pipeline projected daily withdrawal quantity[26], September – May



These projected higher SWP withdrawals assume that sufficient gas is supplied into the VTS. Plant outages (including planned Longford Gas Plant and Iona UGS outages), summer GPG demand, and other equipment outages (such as planned and unplanned compressor outages) could result in insufficient supply being available for transport to Port Campbell to meet the requirements of market participants, including the refilling of the Iona UGS reservoirs.

Recently ENGIE has proposed the removal of the Hazelwood Power Station from the National Electricity Market (NEM) and electricity supply issues in South Australia have caused system issues within NEM. AEMO has recently released it remodeled NEM supply in light of this closure and other policy and market developments, and with that remodeled the use of Gas Powered generators within the system. AEMO is forecasting increased utilisation of the Mortlake Power Station, which takes supply from the SEA Gas Pipeline, thereby increasing its gas demand. This will impact Iona gas storage refill, requiring more gas to be replenished particularly during the summer period from sources such as Longford Gas Plant.

This new planning information has only recently been released (December 2016), and APA has not had opportunity to evaluate it fully. APA has used data referenced from the AEMO 2016 Victorian Planning report along with the AEMO Gas Bulletin Board to substantiate the current position on this evaluation. It is expected that the new planning information will provide further support for this project.

At this stage, the augmentation to the SWP is to provide capacity to enable more gas from other sources (e.g. Longford) to flow to Iona. In particular, the augmentation will provide capacity at a higher rate during the summer period to replenish the underground storage facility. Without augmentation, there is system security risk to the VTS in terms of insufficient gas to meet winter peak demands.

4 . Risk Assessment

The National Gas Rules lists the following justifiable methods for Capital Expenditure[1];

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).

As the Gas Industry Act and the Gas Safety Act (Part 2 (ESV), Section 9, "Objectives of ESV under this Act are (a) to ensure the safety of the conveyance, sale, supply, measurement, control and use of gas; …" and Part 3 (Gas Safety), Section 32 "General duties of gas companies. A gas company must manage and operate each of its facilities to minimise as far as practicable—…(c) the hazards and risks to the safety of the public and customers arising from— (i) interruptions to the conveyance or supply of gas; and (ii) the reinstatement of an interrupted gas supply.") imposes obligations on network operators and owners that relate to the continuity of gas supply, it is APA's belief that all points therefore justify Capital Expenditure required to ensure gas supply to customers at Corio and the Geelong network are maintained.

Construction. The project is of routine nature to APA VTS. The risk is mainly related to factors that are outside APA VTS control, particularly land heritage issues and delays due to weather conditions.

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

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

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

[1] NGR 79 New capital expenditure criteria

5 Options Considered

Several options were considered to increase the South West Pipeline westernhaul capacity or injections into the facility, which include:

5.1 Option 1 – Do Nothing /No Capital Expenditure Option

There are a number of ways to increase the westernhaul capacity of the SWP without any capital expenditure;

Option 1a: Reduction of Iona minimum operational pressure from 4,500 kPa to 4,200 kPa

The current minimum operating pressure at Iona can be lowered to 4200 kPa which will increase the SWP capacity by 5 TJ/d, that is, from 102 TJ/d to 107 TJ/d. AEMO is currently investigating this operational change, with APA, and facility operators at the Iona Close Proximity Points (CPP).

Option 1b: Use existing capacity outside peak periods

With reference to the AEMO 2016 VGPR, there is adequate capacity to provide storage refill services for Lochard for the provision of security gas services to the DWGM in the short term. In the medium term, there may be capacity if storage participants shifted their refill activities to the summer shoulder, avoiding the summer congestion. It is estimated that up to 4PJ of additional refill could be achieved by maximising the capacity in the shoulder periods.

However, storage participants may not be able to store gas during the shoulder period due to other gas commitments and demand priorities. During shoulder periods, gas is also more likely to be injected into the system to manage demand rather than for storage. This means that the scope for non-summer injections may be limited.

Option 1c: Other Storage Facilities

There are other storage service providers in Victoria, as well as competing sources of supply, which may be able to meet the market demand with no additional capital expenditure.

These facilities include:

- Dandenong LNG facility – maximum standing injection capacity of 60TJ/d (firm capacity rates)
- VicHub – Eastern Gas Pipeline 120TJ/d
- TasHub – Tasmanian Gas Pipeline 120TJ/d
- NSW Interconnect (Culcairn injections into VTS) - 125TJ/d

However, these facilities provide capacity during the winter peak period to supplement any winter shortfalls from Iona. For example, injections from NSW via the Interconnect may not be available if the Uranquinty Power Station is operating or if there are gas exports through Culcairn for LNG in Queensland. Similarly for the TasHub, the flow is only available if there is no gas-fired power generation running in Tasmania. The Dandenong facilities are already used to manage linepack and peak shaving during winter peak, hence they are operating at capacity.

5.2 Option 2 – Brooklyn Compressor Reconfiguration + Winchelsea Bi-directional Works

Option 2 comprises two components, that is, the

a) reconfiguration of the Brooklyn Compressor Station alone; and
b) Winchelsea compressor station bi-directional works in conjunction with Brooklyn Compressor Station reconfiguration.

<u>Option 2a: Reconfiguration of Brooklyn Compression Station Works alone</u>

The proposed reconfiguration of the Brooklyn Compressor Station would involve connecting the Ballarat station outlet piping into the Brooklyn Lara Pipeline (BLP) via a new classbreak skid, enabling concurrent compression into Brooklyn Corio Pipeline (BCP) and BLP at different pressures. Removing compression to Geelong (i.e. BCP) demand would increase the amount of gas that units 11 and 12 can transport to Iona directly into the BLP, while reducing fuel gas consumption (not borne by APA VTS) and marginally reducing maintenance costs at the Brooklyn Compressor Station (as unnecessary compression to Geelong/BCP can be avoided).

The proposed augmentation would be expected to include the following construction and system changes:

- Approximately 120 metres of buried DN300 pipework to connect the class break skid to the BLP.

- A pressure protection system (classbreak skid) (as BLP pipeline MAOP is 10,200 kPag vs Brooklyn BCP/BBP MAOP is 7390 kPag).
- Hot-tap connection onto DN200 buried Brooklyn Ballarat Pipeline (BBP) piping and piping to connect the DN300 class break skid.
- Actuation of existing BBP isolation valve(s).
- Isolation of the DN250 bypass from the DN450 inner ring main (T16) and installation of actuated loading valve.
- Supervisory Control and Data Acquisition (SCADA) and system control logic to select between BBP and BLP.

Geelong and Ballarat are regions which usually do not require compression outside of winter. The proposed reconfiguration would retain the ability for Ballarat demand to be supported using the BBP City Gate as required, or for Geelong demand to be supported using BCP City Gate or Lara SWP City Gate as required, while retaining the flexibility to utilise compressors to support Geelong (e.g. Brooklyn Compressor Station unit 11 parallel mode to support GPG demand). No changes are required to Brooklyn Compressor Station compressor station control logic.

Option 2a would increase SWP withdrawal capacity from 102 TJ/d to 132 TJ/d on a 300 TJ/d (summer) system demand day, that is, an increase of 30 TJ/d. The cost of the reconfiguration of Brooklyn Compressor Station is $2 m.

Option 2b: Include Winchelsea Compressor Bi-directional Works.

Winchelsea compressor bi-directional works by itself will not achieve any significant increase to SWP capacity. The compressor station is located closer to Iona and with low suction pressures from Brooklyn, is unable to provide more capacity. However, coupled with the Brooklyn reconfiguration works in Option 2a, the SWP westernhaul capacity can be increased from 102 TJ/d to 150 TJ/d, that is 18 TJ/d more capacity than with Option 2a alone.

The Winchelsea compressor station currently has provision to make it a bi-directional compressor. The cost of this work is $1.5 m.

The total capital cost for Option 2a and Option 2b combined is $3.4 m, which will increase the capacity from 102 TJ/d to 150 TJ/d. This would satisfy longer term needs for refilling Iona, and closely match SWP capacity to the refill capacity of the storage facility (155TJ/day).

5.3 Option 3 –Stonehaven Compressor

With the installation of Stonehaven compressor station on the SWP, the capacity increase on the SWP westernhaul would be 28 TJ/d, that is, from 102 TJ/d to 130 TJ/d. The cost to install a Centaur 50 compressor at Stonehaven is in the order of $35 m.

In order for compression to be effective on the SWP, the reconfiguration at Brooklyn and Winchelsea in Option 2 could be implemented in conjunction with Stonehaven. This will provide higher pressure at Brooklyn, which in turn will increase the compression capability of the Stonehaven and Winchelsea compressors. The capacity increase would be 61 TJ/d, that is, a total SWP westernhaul capacity of 163 TJ/d capacity.

Stonehaven has the added benefit that if installed for bi-directional flow, will increase the easternhaul capacity of the SWP by 30 TJ/d with Winchelsea compressor station. The current SWP easternhaul capacity will be increased from 429 TJ/d to 459 TJ/d. At this point in time, APA VTS has not received any committed requests for more easternhaul capacity on the SWP.

5.4 Option 4 – Using BCS 10, 11 and 12.

This option uses all three Brooklyn Compressor Station Centaur units (10, 11 and 12) to increase the SWP capacity by 67 TJ/d, that is, from 102 TJ/d to 169 TJ/d.

Brooklyn Compressor Station Unit 10 is a wet seal compressor, hence there will be increased risk of liquids into the pipeline. There are NOx issues with this unit. Running three units at Brooklyn will also increase noise levels at the site. The Energy Safe Victoria and EPA approvals would be required to address the noise and gas quality issues. Currently Unit 10 is only used in a backup situation and it is outside the Service Envelope Agreement.

Using Unit 10 as a duty compressor rather than a backup is not currently acceptable. The capital expenditure to convert Unit 10 to a dry seal compressor and address the noise and gas quality issues, would incur capex over $8 m.

5.5 Option 5 – Western Outer Ring Main (WORM) Project

This project requires a construction of a 50 km main between Wollert and Rockbank and installation of a compressor station and pressure regulating station at Wollert. The WORM would enable more gas flows from Melbourne into Brooklyn, increased the westernhaul capacity by 66 TJ/d, that is, from 102 TJ/d to 168 TJ/d. The WORM has system wide benefits such as, security of supply during Longford/Iona outage, linepack management and provision for growth to the VTS. It also avoids any works around the already congested Brooklyn Compressor station site. It is expected that changing demand in the VTS will drive the need for the WORM in the medium term.

The WORM would require capital expenditure of over $100 m. This capital expenditure, while it will become necessary in the future due to steadily increasing VTS demand, is not the most cost effective way to achieve additional westernhaul SWP capacity and cannot be justified on the basis of this case alone.

5.6 Summary of Cost/Benefit Analysis

The cost/benefits of the SWP Westernhaul Expansion Project are outlined in the table below.

TABLE 5.3: SUMMARY OF COST/BENEFIT ANALYSIS

Option	Benefits (Risk Reduction)	Costs
Option 1 Do Nothing Options	• No capital expenditure required • Only 5 TJ/d additional capacity, hence insufficient for longer term requirements if Iona pressure is reduced from 4500 kPa to 4200 kPa.	• Capex: $0 m • Unreliable (alternative sources) and not prudent for longer term needs.
Option 2 a) Reconfiguration of Brooklyn Compressor Station to allow direct compression of units 11 and 12 into the BLP.	• Provides additional 30 TJ/d capacity during summer period to Iona • Relatively low cost compared to other options. • Flexible design as gas can be directed to BLP and/or BCP • Reduced unnecessary compression of flows to Geelong, freeing up compressor capacity for flows to Iona.	• Capex: $2 m • U11 and U12 is required to maintain additional 30 TJ/d flow. No compression is required to Geelong (and BBP) during summer time. However, if Laverton GPG is running during summer, then U12 will be required to support that flow, hence reducing the capacity to Iona. • U10 could be used to support flow to Iona with Unit 11, however, U10 is a wet seal compressor and currently operated only as a backup compressor
2b) Winchelsea Bi-directional works	• Provides required 48 TJ/d additional capacity when combined with Option 2a during summer period to Iona. • Winchelsea compressor had been installed with provision for future bi-directional operation.	• Capex $1.4 m
Option 3 Stonehaven Compressor and reconfiguration at Brooklyn and Winchelsea (Options 2a and 2b)	• Provides 61 TJ/d additional capacity to Iona. • Increases SWP eastbound capacity to Melbourne by 30 TJ/d (in 1:20 winter peak) • Second compressor on the SWP provide security of supply to Winchelsea compressor	• Capex: $35m • More costly option per incremental TJ achieved. • While having easternhaul benefits, currently no committed requests for more easternhaul capacity.
Option 4 Operation with BCS Units 10, 11 and 12	• Provides 67 TJ/d additional capacity to Iona using three compressors.	• Capex: $8 m • Wet seal U10 will need to be addressed i.e. converted to dry seal compressors • U10 is outside Service Envelope Agreement and currently only considered as a back-up. • Noise issues operating U10 with U11 and U12. • U10's NOx emissions currently exceed criteria. • ESV and EPA approvals required to address noise, gas quality issues • Inefficient compression configuration as Geelong flow will be compressed unnecessarily during summer time.
Option 5 Construction of the Western Outer Ring Main (WORM).	• Provides 66 TJ/d additional capacity to Iona • Security of supply during Longford/Iona outage • Accesses more Iona flows to Melbourne • Provision of capacity for growth (beyond 10 years)	• Capex: over $100m • Expensive option.

	• Avoids and/or defers any capital works around the congested site at Brooklyn	

Brooklyn compression is the limiting factor to increase capacity on the SWP. By the reconfiguration of Brooklyn in Option 2, an increased amount of capacity can be achieved at a relatively low cost.

Winchelsea compressor on its own is relatively ineffective for westbound flow to Iona due to its location on the SWP i.e. too far downstream from Brooklyn. However, combined with debottlenecking Brooklyn (Option 2), this option is the most efficient in terms of capex spend per TJ/d developed.

APA is submitting the capital expenditure of $3.4 m to increase the SWP westernhaul capacity by 48 TJ/d. APA VTS considers that this option is prudent on the basis of available information as it ensures there is sufficient refill capacity to the Iona facility during peak period (summer).

While APA VTS considers that there may be scope to use capacity in the shoulder period to adequately refill the storage facility, there is some uncertainty over the availability of gas at this time to do so. Further, alternative gas supplies in winter may not be available. In light of the relatively low costs associated with the recommended project, APA VTS considers that proceeding with the project is appropriate and prudent to avoid the possibility of a winter gas supply shortfall in Victoria.

5.7 Consistency with the National Gas Rules

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

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

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

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

c. The capital expenditure is necessary;

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

ii. To maintain integrity of services, or

iii. To comply with regulatory obligation or requirement, or

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

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

APA considers that the above presented capital project meets the criteria of Rule 79(2)(c)(ii) and (iv), that is the project capital expenditure is necessary to maintain integrity of services, and to maintain the capacity to meet existing levels of demand for services, hence the capital expenditure is justified under Rule 79(2)(c)(ii) and (iv), as conforming for the purpose of its inclusion into the capital base of the APA VTS System.

5.8 Cost Breakdown

The capital and operating costs for the Project (as detailed in Option2) is detailed in the Table below in 2016 dollars.

TABLE 5.4: CAPEX/OPEX SPLIT

BCS Reconfiguration	2018	2019	2020	2021	2022	Total
Capex	$2.0 m	0	0	0	0	**$ 2.0 m**
Opex	0	0	0	0	0	**0**
Total	**$ 2.0 m**	**0**	**0**	**0**	**0**	**$2.0 m**

Winchelsea Bi-directional Works	2018	2019	2020	2021	2022	Total
Capex	$1.4 m	0	0	0	0	**$ 1.4 m**
Opex	0	0	0	0	0	**0**
Total	**$ 1.4 m**	**0**	**0**	**0**	**0**	**$1.4 m**

BCS Reconfiguration + Winchelsea Bi-directional Works	2018	2019	2020	2021	2022	Total
Capex	$3.4 m	0	0	0	0	**$ 3.4 m**
Opex	0	0	0	0	0	**0**
Total	**$ 3.4 m**	**0**	**0**	**0**	**0**	**$3.4 m**

The cost breakdowns are shown in the following tables

TABLE 5.5: PROJECT COST ESTIMATE, BY COST

BCS Reconfiguration	2018	2019	2020	2021	2022	Total
Project Management, Design, Commissioning	$0.5 m					**$0.5 m**
Land & Approvals	0					**0**
Procurement	$0.4 m					**$0.4 m**
Construction	$1.1 m					**$1.1 m**
Total	**$ 2.0 m**	**0**	**0**	**0**	**0**	**$2.0 m**

Winchelsea CS Bi-directional Works	2018	2019	2020	2021	2022	Total
Project Management, Design, Commissioning	$0.5 m					**$0.5 m**
Land & Approvals	0					**0**
Procurement	$ 0.7 m					**$ 0.70 m**
Construction	$0.2 m					**$0.2 m**
Total	**$1.4 m**	**0**	**0**	**0**	**0**	**$1.4 m**