Business Case – Capital Expenditure (Capex)

South West Pipeline Expansion – Winchelsea 2nd Unit

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))

1 Project Approvals

TABLE 1: BUSINESS CASE – PROJECT APPROVALS

Prepared By	Sheila Krishnan, Manager Asset Capacity Planning
Reviewed By	Scott Young, Manager Regulatory Nives Matosin, Manager Regulatory
Approved By	Mark Fothergill, General Manager Infrastructure Engineering

2 Project Overview

TABLE 2: BUSINESS CASE – PROJECT OVERVIEW

Description of Issue/Project	AEMO's Gas Statement of Opportunities (GSOO 2022) and Victorian Gas Planning Report (VGPR 2022) have predicted a risk of shortfall in gas supplies in the Victorian Transmission System (VTS) to meet winter demands as early as 2023. This shortfall is driven by the declining gas supplies from Longford. APA had previously submitted to the AER a proposal to expand the South West Pipeline (SWP) with two new compressors, that is, at Stonehaven and Pirron, to allow up to 570 TJ/d of gas from Lochard's Underground Gas Storage (UGS) facility to be injected into the VTS[1]. Iona's injection capacity is currently 530 TJ/d but is constrained by the SWP to 447 TJ/d. Once the Western Outer Ring Main (WORM) is completed in May 2023, Iona will be able to inject up to 476 TJ/d[2] into the VTS. Lochard had achieved FID in December 2020 to further increase their injection capacity to 570 TJ/d by 1 January 2023. The installation of Stonehaven and Pirron compressors would increase the SWP capacity to allow Iona to inject up to 570 TJ/d into the SWP during the winter peak period. However, this project could only be completed after winter 2023, that is, 2024 and 2025 for Stonehaven and Pirron, respectively. Due to risk of supply shortfall in winter 2023, APA was approached by the Victorian Government and AEMO to investigate possibility of a fast-tracked solution to install a second compressor at Winchelsea before winter 2023. The Winchelsea compressor site has provisions for a future second unit to be installed. The availability of space for a second compressor substantially shortens the time required for design, engineering and approvals. While the schedule is very tight, APA has established that the installation of a second compressor at Winchelsea before winter 2023 is possible.

1 APA business case "South West Pipeline Expansion – 570 TJ/d, submitted to the AER on 1 Dec 2021

2 Updated Iona injection capacity into the SWP as per Victoria Gas Planning Report (VGPR), March 2022.

	APA is proposing to install a second Taurus 60 (5.6 MW) compressor at Winchelsea which will increase Iona's injection capacity to 517 TJ/d, that is, 41 TJ/d (from post WORM 476 TJ/d) of additional gas supply capacity to the VTS during the winter peak period.
Options Considered	Option 1: Do Nothing. Option 2: Install second Taurus 60 (5.6 MW) compression at Winchelsea. Option 3: Install Centaur 50 (using the WORM 4.5 MW compressor) as the second compressor at Winchelsea.
Proposed Solution	The Preferred Solution (Option 2) is to install a second Taurus 60 compressor at Winchelsea operating in series (tandem) configuration with the existing compressor. The series configuration would provide the increase in capacity and also increased reliability.
Estimated Cost	Capital expenditure forecast to be $60.01 million ($37.2 million in CY2022 and $22.81 million in CY2023). Operating expenditure of $250,000 per annum starting in CY2023.
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 investment in the South West Pipeline for a number of years. The stakeholders affected by this project are: • Australian Energy Market Operator (AEMO) • Victorian Market Participants • Lochard Energy.
Customer & consumer benefits	Victorians are Australia's biggest users of natural gas for heating, hot water, and cooking. The investment in a second Winchelsea compressor will ensure that consumers will have a reliable and safe supply of gas to meet their needs, particularly during winter. **The proposed second compressor at Winchelsea is necessary to maintain security of supply during the potential gas shortfall predicted by AEMO starting in winter 2023.** Reducing the risk of gas shortfalls will help to ensure Victorian households have gas available to meet their needs and in particular heating needs during winter 2023. Victorian businesses, in particular, those who rely on gas for heating processes, will benefit from with reduced risk of interruptions to gas supply and to their operations.

3 Background

AEMO's Gas Statement of Opportunities (GSOO 2022) and Victorian Gas Planning Report (VGPR 2022) updated the forecast of supply-demand in the Southern States in March 2022. The supply forecast continues to trend down driven by declining gas supplies from Longford. The updated forecast took into account APA's Eastern Grid expansions on the Moomba Sydney Pipeline and South West Queensland Pipeline. Port Kembla LNG Terminal (PKGT) which was expected to be constructed by 2023 has been reclassified as an "anticipated" project due to its lack of announced Final Investment Decision (FID) and delayed to winter 2024.

In December 2021, APA submitted a proposal to the AER, as part of the VTS Access Arrangement 2023-2027, to augment the South West Pipeline (SWP) by installing two compressor stations, that is, at Stonehaven and Pirron. The compressors could only be installed after Winter 2023, that is, Stonehaven in 2024 and Pirron in 2025.

Due to the changes in circumstances AEMO was predicting a worsening in gas supplies for Victoria. APA was approached by the Victorian Government and AEMO to urgently investigate possibility of a fast-tracked solution to install a second compressor at Winchelsea before winter 2023.

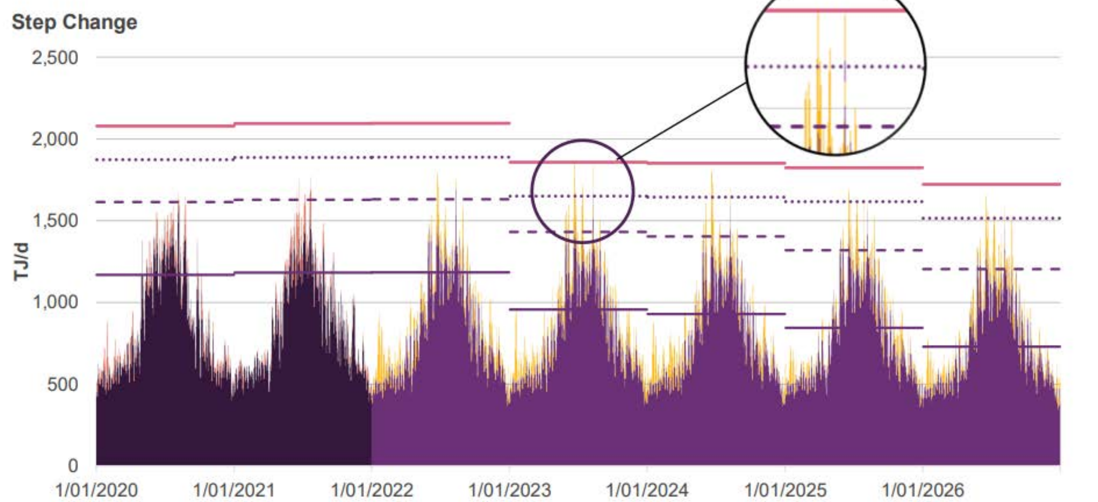
APA's original proposal could not be constructed before Winter 2023 and taking on board the concerns raised by the Victorian Government and AEMO, APA urgently investigated a potential fast-tracked solution of installing a second compressor unit at Winchelsea before Winter 2023. APA has established that installing a second compressor unit at Winchelsea before Winter 2023 is possible, though the schedule would be very tight. The Winchelsea compressor site has provision for the installation of a future second unit. No land purchase is required and the time for planning, design, engineering and approvals is expected to be significantly reduced.

Gas Supply – Demand Forecast

Two demand scenarios, Step Change and Progressive Change, were presented in the GSOO (2022) to demonstrate gas supply adequacy against South Eastern Australian demand. The Step Change scenario assumes that a rapid change with gas demand predicted to decline with significant electrification of users switching from gas to electricity. Progressive Change is based on a slower transformation and gas consumption closer to historical levels. Figure 1 below is extracted from the GSOO 2022 (Figure 34, page 60) which graphically shows the supply-demand forecasted Southern States.

The key outcome is that gas supply adequacy remains tight in the near term in both scenarios. Gas supply shortfalls could be narrowly avoided in Winter 2023 if the Step Change scenario took effect quickly:

Figure 34 Actual and forecast daily gas demand, *Step Change* (top) and *Progressive Change* (bottom), and production capability in south-eastern regions with existing and committed projects only, 2020-26 (TJ/d)



However, if transformation was at a slower pace, (Progressive Change Scenario), then there would be a risk of gas shortfalls under 1 in 20 year demand conditions, as soon as winter 2023.

While the risks could be reduced through management of gas generation operations outside peak time or even curtailment, the risk could be increased if there was delay in committed supply projects.

In Figure 1 below (AEMO GSOO Figures 4 & 34), AEMO is forecasting significant reliance on Newcastle and Dandenong LNG,[3] with the curtailments predicted in the Progressive Change scenario of up to 40 TJ/d on peak days in winter 2023.

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3 Noting AEMO's concerns about the low level of contracted capacity in the Dandenong LNG facility.

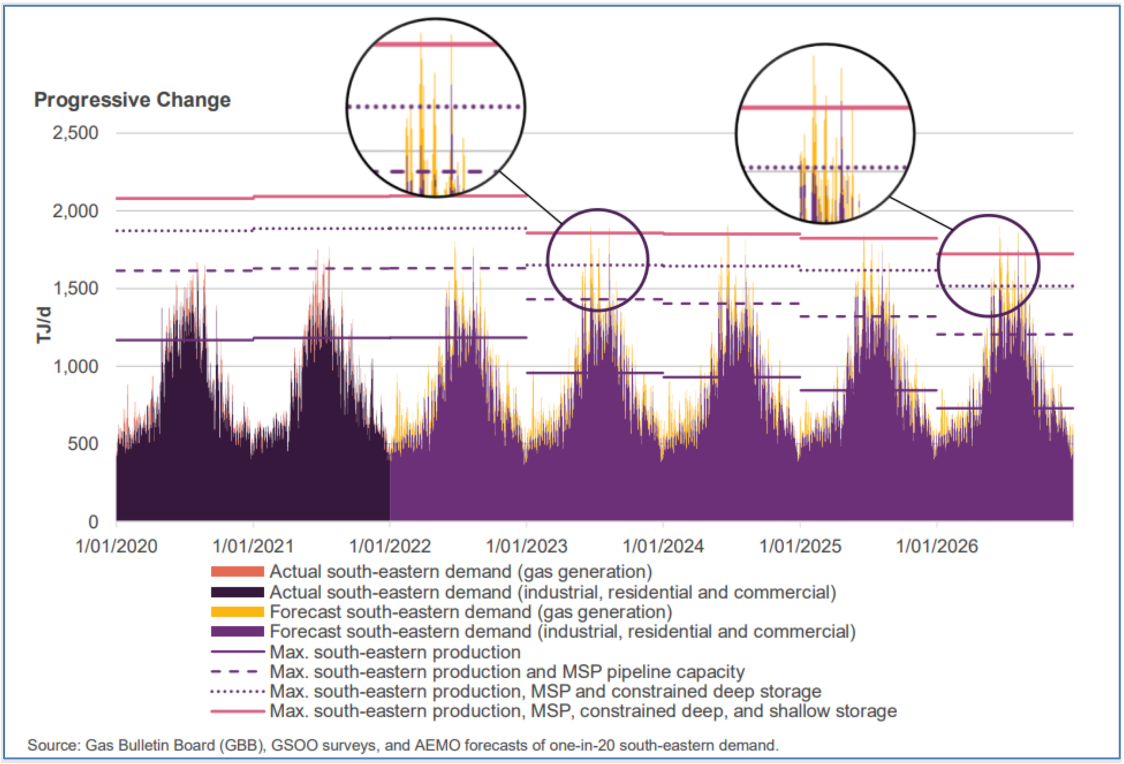


Figure 1: Forecast Supply-Demand 2021-2025, source GSOO 2022

South West Pipeline Capacity and Port Campbell/Iona

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 Victorian demand periods, the SWP transports gas from Melbourne to Port Campbell to refill the Lochard Energy's 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.

Lochard Energy's Iona gas production and underground storage facilities have a standing injection capacity of 530TJ/d which is shared between two delivery points, that is, VTS and SEA Gas Pipeline. Currently, Iona injection into the VTS is constrained to 447 TJ/d[4] due to the capacity of the SWP. Once the Western Outer Ring Main (WORM) is completed in 2023, Iona will be able to inject up to 476[5] TJ/d into the VTS, which is still well short of their capacity of 530 TJ/d.

Lochard achieved Financial Investment Decision (FID) in December 2020 to commit to further increasing their injection capacity to 570 TJ/d and an increase of storage capacity to ~25 PJ by 1 January 2023.[6] Without expansion of the SWP, the additional gas available cannot be accessed, particularly during a shortfall of gas supplies in the VTS during winter peak periods.

4 The difference between Iona injection capacity and SWP capacity is approximately 18 TJ/d. Iona injection supplies west to the Western Transmission System (18 TJ/d in winter peak conditions) and east towards Melbourne. For example, for the expansion case where Iona injection capacity is increased to 517 TJ/d, the SWP capacity is 499 TJ/d.

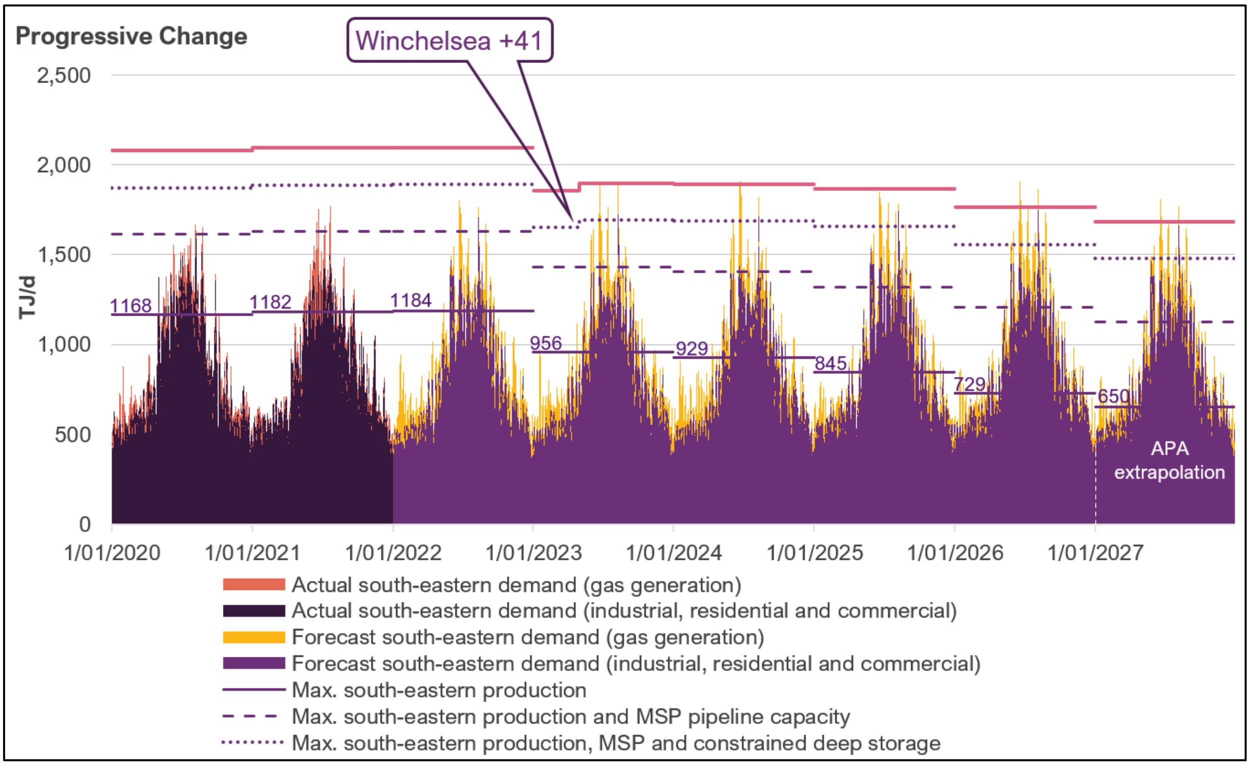
5 The capacity has been revised in VGPR 2022 with updated demand distribution and profiles in the model and Iona injection pressure increased from 9500 kPag, to 9700 kPag.

6 Communications from Lochard Energy "20210803 Letter to APA on Iona expansion capacity".

In additions to Lochard, there are two other production facilities which can deliver gas to the Victorian Declared Wholesale Gas Market (DWGM) - Origin Otway Gas Plant and Cooper Energy-Mitsui Group's Minerva Gas Plant (being developed). These gas production facilities could also provide additional gas into to the SWP but without augmentation of the SWP, it will not be possible to access any additional gas from these sources.

Due to the urgency to mitigate the risk of supply shortfall in Winter 2023, APA will only be able to expand the SWP with one compressor unit at Winchelsea, hence will not meet Iona's 570 TJ/d injection capacity, as proposed in the previous business case.

Even with the expansion of the SWP with the Winchelsea compressor from 2023, there still remains scope for shortfalls, significant reliance on LNG, and curtailment in the outer years of the access arrangement period:[7]



APA will engage with stakeholders and the AER to reconsider its proposal for further expansion of the SWP in the context of the revised proposal for the 2023-27 access arrangement.

4 Risk Assessment

The National Gas Rules lists the following justifiable methods for Capital Expenditure[8];

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

[7] APA's 2027 extrapolation is based on max south-eastern production of 650TJ/day (consistent with the AEMO 2022 Winter Readiness Plan), and 5% reductions in residential, commercial, industrial and GPG demand relative to 2026 levels.

[8] NGR 79 New capital expenditure criteria

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).

This investment would qualify as conforming capital expenditure under clauses ii and iv above.

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.*")

The Victorian legislative framework imposes obligations on network operators and owners that relate to the continuity of gas supply.

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.

5 Options Considered

Several options were considered to increase the South West Pipeline injections into the VTS are as follows:

5.1 Option 1 – Do Nothing /No Capital Expenditure Option

APA does not submit any capital expenditure for expansion on the SWP. There is a threat to system security to the VTS with a shortfall of gas supplies from winter 2023.

AEMO will need to take short-term operational measures to reduce the threat, such as, controlled interruption/curtailment of demand during peak periods and management of GPG operations in the VTS. In outer years, AEMO's GSOO forecasts curtailment of industrial, commercial or residential loads.

To mitigate the risk of shortfall over time, there would be reliance on gas supplies from outside Victoria, such as, ECG expansion Stage 3 (including expansion of the Young to Culcairn Victorian Interconnect), PKGT or within Victoria with LNG Import terminals, that is, Viva Energy and Vopak (both around the Geelong area and have not reached FID). None of these projects have announced FID.

The Do Nothing solution is not acceptable to VTS system security if the supply shortfall is significantly higher than predicted.

5.2 Option 2 – Winchelsea Taurus 60 (5.6 MW) 2nd Unit

APA installed a single Taurus 60 (5.6 MW) unit compressor at Winchelsea compressor in 2014 as part of the Victorian Northern Interconnect Expansion (VNIE) to access more gas from the Iona Underground

Storage. Currently with a single compressor unit, Iona's injection into the SWP is 447 TJ/d. After the completion of the WORM in 2023, the Iona gas storage facility will be able to inject up to 476 TJ/d[9].

Installing a second compressor unit at Winchelsea will further increase Iona's injection capacity. A fast-tracked installation of a second unit at Winchelsea for Winter 2023 is possible because the Winchelsea site has already provisions for a second unit to be installed in the future. Hence, this reduces time to purchase land, conduct design, engineering and secure approvals.

The increase in capacity will depend upon whether the units are installed in a series or parallel configuration. The reason for looking into to both configuration options is not only to determine how much capacity is developed for two units operating together but also how one unit will operate by itself. It is envisaged that a single unit operation would cover normal winter days with the second unit put into operation for winter peak days. Therefore, it is necessary to maintain a single unit operation as efficiently as possible (as per current performance), especially if re-staging of the existing unit has to be conducted to allow two unit operations.

Parallel Configuration

In parallel configuration (one unit next to each other), the Iona's injection capacity increase would be 52 TJ/d, that is, an increase from 476 TJ/d to 528 TJ/d.

In parallel configuration, each unit would receive half the flow through the station. Re-staging would be required for the existing compressor to avoid high recycling due to lower flows (refer Appendix B, Figure B2). APA has sought advice from Solar Turbines to find a suitable wheeling for re-staging of the existing compressor to suit both two unit and single unit operations.

With a new re-staged compressor for parallel operation, the capacity of 528 TJ/d expansion for two-unit operation is achieved (refer Appendix B4). However, due to the low efficiency operating regime of the new wheeling for single unit flows, the capacity of operating a single unit is significantly reduced from 476 TJ/d to as low as 415 TJ/d (refer Appendix B Figure B5). This means that two units would have to be operated to achieve the capacity of the current single unit. Without compression (free flow), Iona's injection capacity is around 400 TJ/d (post WORM), therefore, capacity developed for a single re-staged unit would be minimum. Operating at what is termed the "stonewall" region of the compressor wheelmap is highly inefficient and very sensitive to low linepack operating conditions.

Series Configuration

In series configuration (new unit in tandem with existing unit), the Iona injection capacity increase would be 41 TJ/d, that is an increase from 476 TJ/d to 517 TJ/d.

The series configuration will not require any re-wheeling of the existing unit. The new unit will be staged similar to that of the existing unit. Series operation reduces the capacity by 11 TJ/d compared to parallel operation because the compressors would be operating in a lower efficiency region of the compressor wheelmap due to higher flows through the units (refer Appendix B Figure B3).

However, because there is no re-staging of the existing unit, the capacity of single unit operations will be maintained at its current 476 TJ/d. Each unit will provide a full backup of the other when one is down for maintenance.

While re-filling of Iona underground storage is not a driver in this business case, the new unit will be installed to allow bi-directional functionality. Refilling Iona will be over 300 TJ/d during summer with the WORM, hence there is already high capacity without the new unit. However, the new unit will provide the backup to the existing unit, hence an increase to system security.

APA considers a series configuration a better solution than a parallel configuration because it is envisaged that a single unit would operate more often to cover normal winter flows and the second unit would only be operated to cover the winter peak days. The new unit would not only develop up to 41 TJ/d of capacity

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[9] The capacity of 447 TJ/d (pre-WORM project) and 476 TJ/d (post WORM project) are based on modelling in the AEMO Victorian Gas Planning Report (VGPR) March 2022 for an Iona injection maximum pressure of 9700 kPag and updated demand distribution and profile assumptions. Previous VGPR 2021 of 468 TJ/d (post WORM) was based on Iona 9500 kPag.

but will also provide a high level of redundancy to the existing unit, hence an increase in system security to the VTS.

The capacities for the two configurations are detailed in Table 1 below.

Table 1: Capacity *Winchelsea for Parallel and Series Configuration (Two and Single units)*

Configuration on the SWP	**Units Operating**	**Iona Injection Capacity (TJ/d)**	**South West Pipeline Capacity[10] (TJ/d)**	**Commentary**
Current Existing Winchelsea Taurus 60	Single Unit	476	458	The capacity of 476 TJ/d quoted is after the Western Outer Ring Main is constructed and maximum pressure at Iona 9700 kPag.
2nd unit Winchelsea Taurus 60 **Series** Configuration	Two units operating	517	499	No re-staging of the existing compressor required. The new unit will have a similar wheeling to that of the existing unit. There is 11 TJ/d lower capacity compared to the parallel operation below is due operating on slightly lower compressor efficiency because of full flow through each unit.
	Single Unit operating	476	458	As there is no change to the wheeling, there is no change in capacity when one unit in operations. Each unit will be a full back up of each other should one unit be out of operation for maintenance.
2nd unit Winchelsea Taurus 60 **Parallel** Configuration	Two units operating	528	510	Re-staging of the existing Winchelsea required. With two units running, the lower flow through existing unit will result in high recycling and re-staging the unit for a lower flow, high head performance would resolve the issue.
	Single Unit operating	415[11]	397	The re-staged unit will operate at a lower compressor efficiency. Hence compared to the existing wheeling where one unit can provide 476 TJ/d Iona injections, two (re-wheeled) units would have to be operated to provide similar capacity. There is a significant reduced level of redundancy/backup should one unit be out of operation for maintenance.

10 The difference between Iona injection capacity and SWP capacity is approximately 18 TJ/d. Iona injection supplies west to the Western Transmission System (18 TJ/d in winter peak conditions) and east towards Melbourne. For example, for the expansion case where Iona injection capacity is increased to 517 TJ/d, the SWP capacity is 499TJ/d. All capacities are based on a 1 in 20 winter peak demand condition.

11 Based on a wheelmap suitable for two-unit operation provided by Solar Turbines.

Configuration on the SWP	Units Operating	Iona Injection Capacity (TJ/d)	South West Pipeline Capacity[10] (TJ/d)	Commentary
				Finding an optimal wheel to cover both single and two units operating in parallel could not be achieved without compromise to each other's capacity.

Refer to Appendix B for current and re-staged wheel maps. The wheel maps show where the operating points lie for each configuration for the flow and head developed by the compressor. The optimal operating region of the wheelmap is ideally in the centre where it has the highest efficiency.

Figure 2 below shows AEMO's GSOO Progressive Change scenario adjusted with the capacity developed by the second Taurus 60 installation in a series configuration. The capacity expansion of 41 TJ/d will mitigate the shortfall from Winter 2023 to Winter 2025. By Winter 2026, further expansions, such as East Coast Grid Stage 2, would be required meet the shortfalls during winter peak.

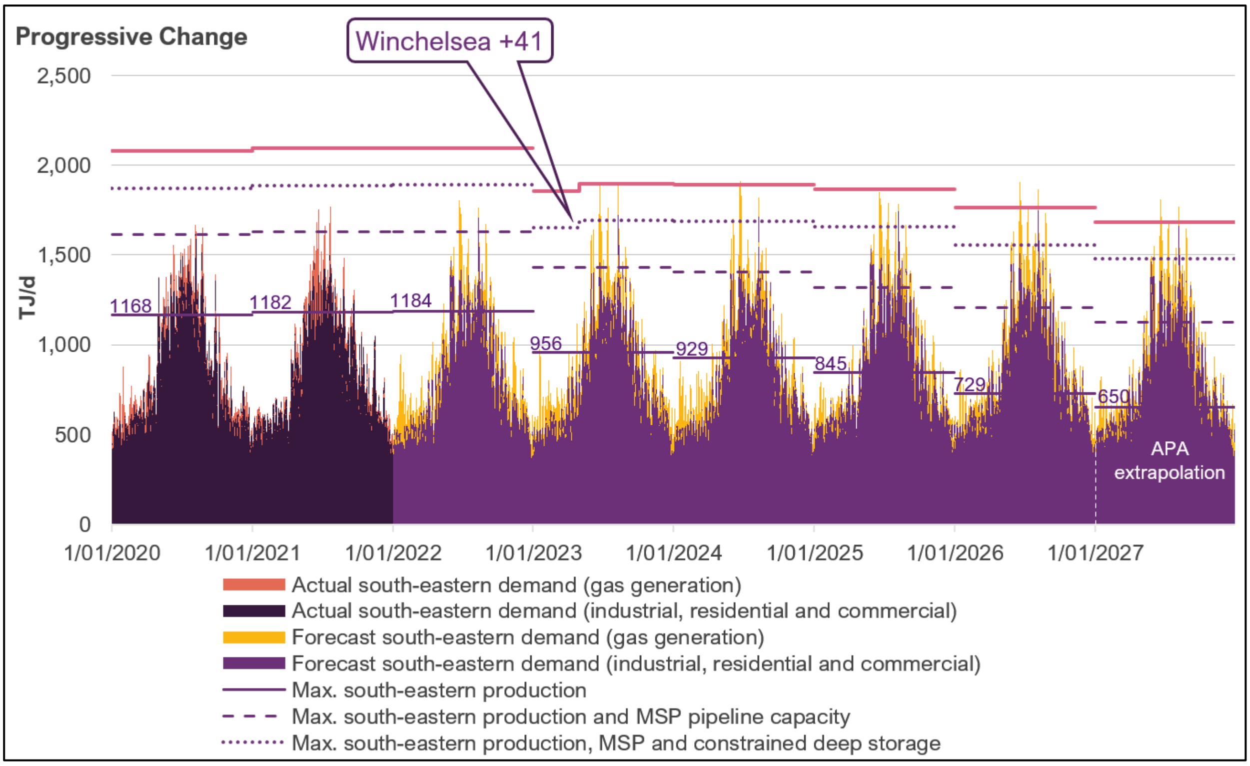


Figure 2: Progressive Scenario Adjusted with 41 TJ/d Winchelsea 2nd unit

5.3 Option 3 –Centaur 50 (4.5 MW WORM unit) as 2nd Unit

APA also investigated the option to divert the Centaur 50 WORM unit which has recently arrived in Australia as a second unit at Winchelsea.

Similar to the Taurus 60 option, capacity for two configurations were determined, that is, parallel and series. In general, a Centaur 50 compressor generally provides lower capacity than installing a Taurus 60 unit due to its lower available power.

Parallel Configuration

The Centaur 50 compressor has a suitable wheeling if it was operated in parallel with the existing Taurus 60 unit (Appendix C Figure C1). However, the Taurus 60 unit would need to be re-wheeled as the low flows (station flows split between Centaur 50 and Taurus 60). This would result in high recycling in the unit (refer Appendix C Figure C2).

Capacity developed for a re-staged Taurus 60 with the Centaur 50 in parallel is 511 TJ/d. Compared to Option 2 (two Taurus 60s in parallel), there is a reduction of 17 TJ/d in Iona injection capacity.

For single unit operation, the Centaur 50 wheeling would be unsuitable, operating in a very low efficiency operating region of the compressor due to high flow through the single unit (refer Appendix C, Figure C5). However, re-staging of the Centaur 50 for single unit operation is not recommended as it would negatively affect the capacity of the two units operating.

The re-staged Taurus 60 would provide around 415 TJ/d[12] for single unit operations, compared to current 476 TJ/d. Hence the Centaur 50 and re-staged Taurus 60 would need to be operated together to achieve the same capacity of a single unit. The Centaur 50 will not provide any back-up to the Taurus 60 unit in single unit operations.

Series Configuration

In series operation, the existing Taurus 60 in this case would not be required to be re-staged. Hence it will maintain its current capacity for a single unit operation. However, the Centaur 50 would have to be re-staged, due to the high flows going through that unit (refer Appendix C, Figure C3).

The Iona injection capacity for two units in series is 500 TJ/d, which is 17 TJ/d lower than Option 2 (two Taurus 60 in series). As there is very low capacity development for series configuration (+ 24 TJ/d), this configuration is not considered to be efficient.

Table 2 below details the capacity developed for the combinations of operating units.

Table 2: Centaur 50 as Second Unit

Configuration on the SWP	**Units Operating**	**Iona Injection Capacity (TJ/d)**	**South West Pipeline Capacity[13] (TJ/d)**	**Commentary**
Current Existing Winchelsea Taurus 60	Single Unit	476	458	The capacity of 476 TJ/d quoted is after the Western Outer Ring Main is constructed and maximum pressure at Iona 9700 kPag.
2nd unit Centaur 50 **Parallel** Configuration	Two units operating	511	493	Installing two units in parallel will require re-staging of the existing T60 unit. With two units running, the lower flow through existing unit will result in high recycling. Re-staging the unit for a lower flow, high head performance would resolve the issue. No re-stage is required for C50 as WORM wheel is suitable for two unit operation.

12 The capacity could be as low as 415 TJ/d at this low efficiency operating region of the wheel-map and sensitive to fluctuation in operating linepack conditions.

13 The difference between Iona injection capacity and SWP capacity is approximately 18 TJ/d. Iona injection supplies west to the Western Transmission System (18 TJ/d in winter peak conditions) and east towards Melbourne. For example, for the expansion case where Iona injection capacity is increased to 517 TJ/d, the SWP capacity is 499TJ/d. All capacities are based on a 1 in 20 winter peak demand condition.

Configuration on the SWP	Units Operating	Iona Injection Capacity (TJ/d)	South West Pipeline Capacity[13] (TJ/d)	Commentary
	Single Unit operating	415[14] (T60)	397	The existing T60 compressor had to be re-staged to operate with the C50. C50 requires re-staging for single unit operation. However, by re-staging the unit, it would affect the capacity of two unit operations, resulting in capacity less than 511 TJ/d, hence not recommended. In this case, by not re-staging C50, it will not provide any back up to the existing T60. Both units will have to be operated to develop capacity of a current single unit.
		Re-staged C50 required but will reduce capacity for two-unit operation.	N/A	
2nd unit as Centaur 50 **Series** Configuration	Two units operating	500	482	Installation in series configuration will not require any re-staging of the existing Taurus 60 compressor. The WORM Centaur 50 unit will have to be re-staged. Lowest developed capacity option.
	Single Unit operating	476 (T60)	382 (T60)	As there is no change to the wheeling for the T60, there is no change in capacity when one unit in operation. A re-staged C50 provides a level of backup to the Taurus 60.
		440 [15] (C50)	422 (C50)	

The WORM Centaur 50 option is considered less efficient than installing a new Taurus 60. The main reasons are as follows:

- The capacity developed is significant lower compared to a new Taurus 60 in both series and parallel configuration.
- The Centaur 50 provides less redundancy to the Taurus 60 unit under single unit operations.
- Long lead items, that is, aftercoolers would need to be procured, therefore the schedule to complete the project was not any faster.
- The WORM project is affected because another compressor would need to be procured for the WORM.
- More engineering required for a Centaur 50 than installing a similar Taurus 60 unit. The existing Winchelsea site has been designed to provide for a second identical Taurus 60 unit. The smaller Centaur 50 unit would require a redesign of the layout and orientation at Winchelsea. The piping

14 Based on wheeling suitable for two-unit operation provided by Solar Turbines.

15 Based on a theoretical re-staged compressor.

of the unit is also too small as it was designed for lower flows are Wollert. Hence, the additional engineering increases the risk of delaying the project to after winter 2023.

Conclusion

APA made the decision to purchase a new Taurus 60 similar to that of the existing unit to be installed in series configuration. Taurus 60 solution could be fast-tracked to be constructed before winter 2023.

5.4 Summary of Cost/Benefit Analysis

The cost/benefits of the SWP 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 Option	• No capital expenditure required. • Curtailment or capital expenditure outside the VTS to mitigate supply shortfall.	• Capex: $0 m • Risk of shortfall during winter peak demand from 2023.
Option 2a: **Recommended Option** Install a second Taurus 60 at Winchelsea in **series configuration**.	• Develops 41 TJ/d Iona injection capacity. • Two similar units in series (no re-staging) and full back-up to each other for single unit operation, hence increased system security to the VTS.	• Capex: $60.01 m ($1.46m/TJ) • Series operation is 11 TJ/d lower in capacity compared to parallel configuration. • Risk of redundant assets over time as VTS demand reduces with decarbonization initiatives.
Option 2b: Install a second Taurus 60 at Winchelsea in parallel configuration	• Develops 52 TJ/d Iona injection capacity, i.e. 11 TJ/d higher than series operations	• Capex: $60.01 m ($1.15m/TJ) • Not optimal for single unit operation and two units will need to run more often, hence increasing fuel and emission. Reduced reliability. • No increase to system security to the VTS as new unit does not provide backup to the existing unit under single unit operation. • Risk of redundant assets over time as VTS demand reduces with decarbonization initiatives.
Option 3 Install a Centaur 50 unit (WORM unit) at Winchelsea.	• C50 WORM compressor is already purchased and in Australia.	• Capex $ 56.0 m[16] ($2.33m/TJ) • Less capacity than installing a new T60. • Not optimal for single unit operation and two units will need to run more often, hence increasing fuel and emission. Reduced reliability. • No gain in schedule compared to a new T60 as long lead items such as aftercooler will need to be procured.

[16] Some cost saving compared to Taurus 60 as that the Centaur 50 does not include fast-tracked airfreight and is a cheaper machine compared to a new Taurus 60 unit. However, it will include costs for re-staging the existing Taurus unit and additional engineering.

		• Additional engineering increases the risk of delay to project to after winter 2023. • Affects the WORM project schedule. • Risk of redundant assets over time as VTS demand reduces with decarbonization initiatives.

6 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.

7 Cost Breakdown

The capital and operating costs for the Project (Option2) are detailed in the Table below in 2022 dollars. The cost estimate is based on the following:

- Actual costs for the Winchelsea Compression project completed in 2014 and allowance for CPI.
- Actual budget costs from vendors for the compressor unit and aftercoolers. The vendors stated at the time, these were budget only and will be subject to final detailed requirements which were not yet available. Whilst the scope was not complete, the budget pricing allows for current steel and other commodity pricing and exchange rates. APA has made some allowances for the expected additional scope during design development.
- Recent contractor and vendor pricing for other packages from recent similar projects underway or recently completed. APA are experiencing increased costs in all areas of construction and delivery due to external factors (commodity price increases, supply chain issues, COVID related workforce issues).
- Productivity allowances for work in a brownfield site. (2014 project was on a greenfield site)
- Allowance for additional expediting costs due to the tight timeframe for this project. This could include a requirement for airfreighting the compressor unit.

The estimate reflects the best estimate that can currently be developed given the emergency circumstances and the need to fast-track the project. The estimate will allow the project to proceed with sufficient funds to make the necessary decisions to keep it on schedule.

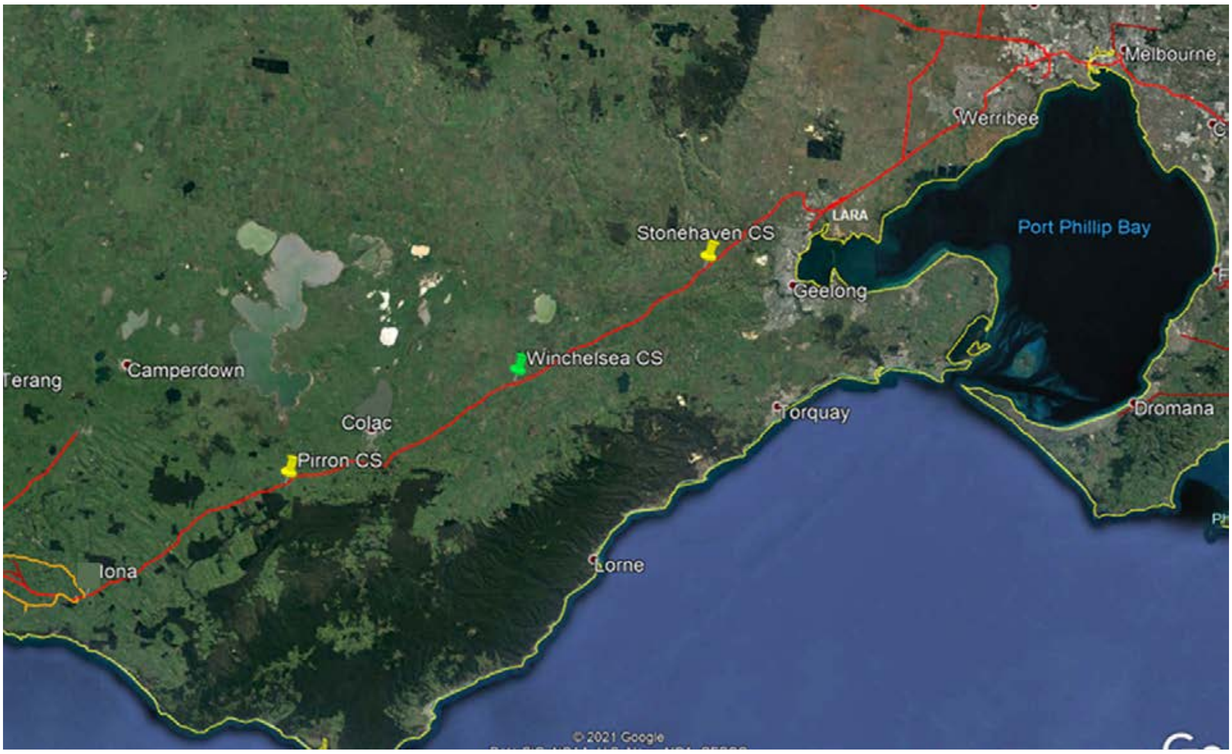
APA's approach will be to:

- Continue with ordering and expediting key long lead items to ensure the schedule is maintained. The orders for long lead items are based on existing compressor design and may result in additional costs if materials need to be modified.
- Continue detailed design. Additional long lead items could be ordered to allow for changes in scope following completion of detailed design.
- Engage sufficient resources to ensure that there are no bottlenecks through the project.
- Select contractors with past performance in delivery of similar projects, and approach contractors who were involved in unit 1 installation with preference to sole source where necessary to maintain schedule. This may involve a much shorter procurement process and/or agreeing to terms outside of APA's Precedent agreements (e.g. accepting weather risk).
- In parallel with this, update the project estimate and schedule to ensure APA have an accurate cost available based on a more mature design and firm vendor prices. APA expect this to be available late May 2022.

TABLE 7.1: PROJECT COST ESTIMATE, BY COST

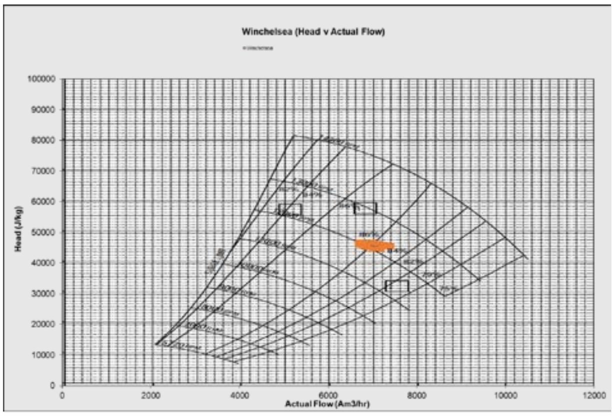
Winchelsea 2nd unit	2022	2023	2024	2025	2026	2027	Total
Capital Cost							
Project Management	4.28 m	3.93 m	0	0	0	0	**8.21 m**
Land & Approvals	2.45 m	0.53 m	0	0	0	0	**2.98 m**
Design	4.39 m	1.23 m	0	0	0	0	**5.62 m**
Procurement	17.12 m	2.56 m	0	0	0	0	**19.69 m**
Construction	8.57 m	13.91 m	0	0	0	0	**22.48 m**
Commissioning & Handover	0.39 m	0.64 m	0	0	0	0	**1.03 m**
Total Direct Costs	**37.20 m**	**22.81 m**	0	0	0	0	**60.01 m**
Overhead @ 6.91%	**2.57 m**	**1.58 m**	0	0	0	0	**4.15 m**
Total	**39.77 m**	**24.39 m**	0	0	0	0	**64.16 m**
Operating Cost ($m pa)		**0.25 m**	**0.25 m**	**0.25 m**	**0.25 m**	**0.25 m**	**$1.25 m**

Appendix A. Location of compressors sites on the South West Pipeline



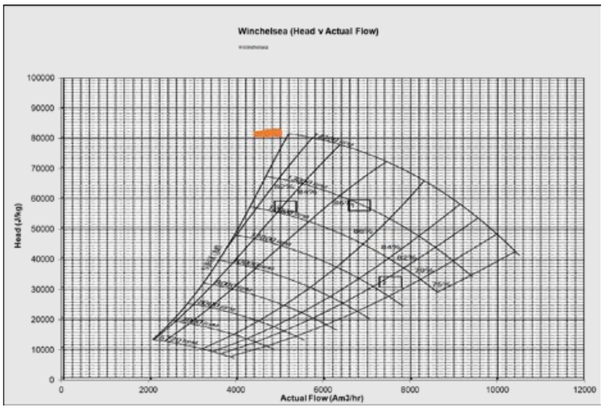
Appendix B: Option 2 New Taurus 60 unit

B1: Existing Single Taurus Unit (Current)



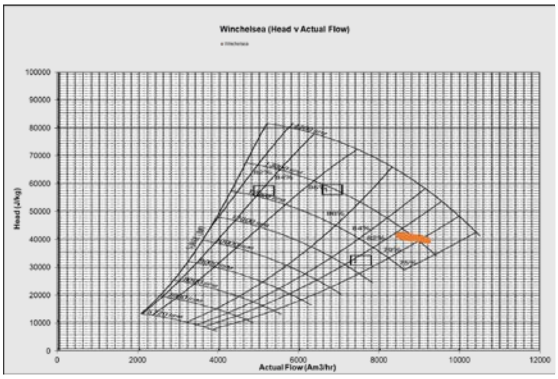
Operating point is in an optimal location of the wheelmap (that is, in the centre of wheel map with highest efficiency).

B2: Two Units in Parallel



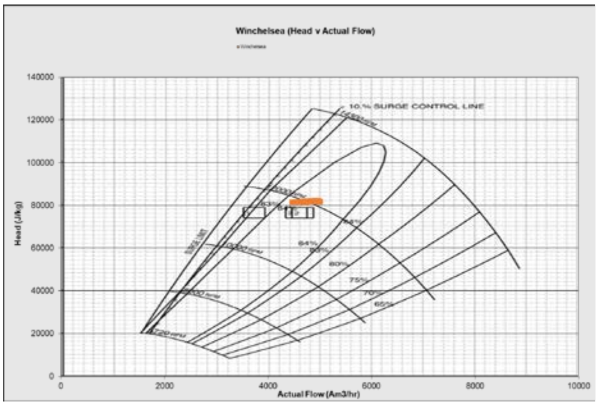
Operating points outside wheel map indicating that compressor needs to be re-wheeled.

B3: Two Units in Series



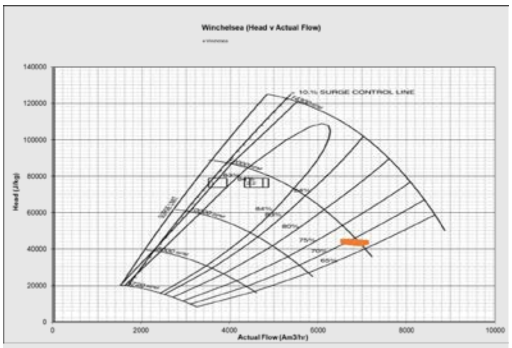
Operating points within wheelmap but in slightly less efficient region of the wheel map, hence reduction of 11 TJ/d capacity compared to parallel re-staged unit.

B4: Re-staged – Two Units in Parallel



Re-staged compressor. Operating points now within optimal location on the wheel map after re-staging.

B5: Re-staged – Single Unit operation (for Parallel Configuration)

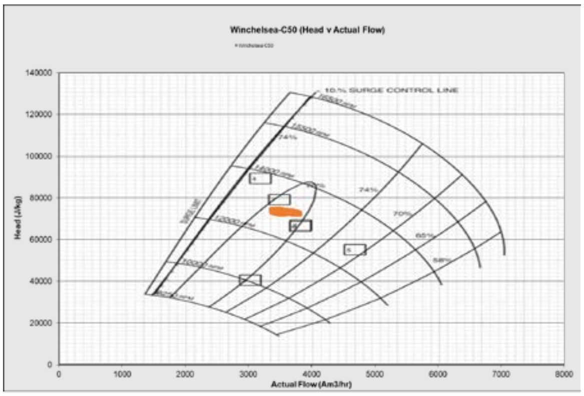


Operating point in very low efficiency region of wheelmap after re-staging. High sensitivity at this operating region to any fluctuation in operating conditions.

Appendix C: Option 3 Centaur 50 Unit

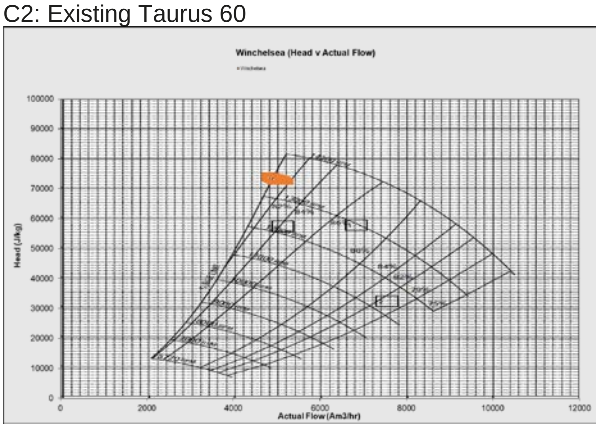
Two Unit Operations Parallel

C1: Centaur 50



Operating points in optimal location in wheel map.

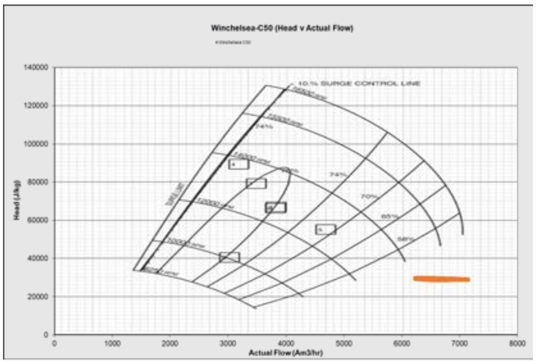
C2: Existing Taurus 60



Operating points on recycle region of wheelmap – hence T60 requires re-staging for parallel operation.

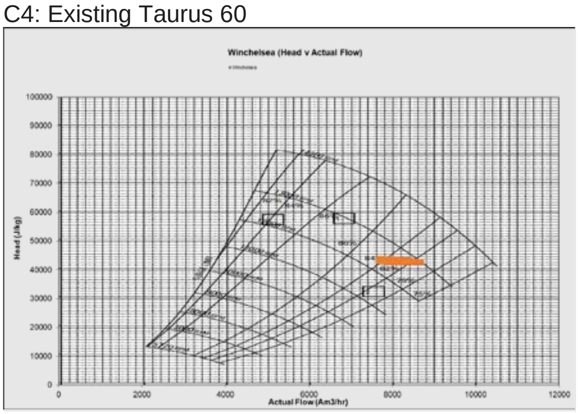
Two Unit Operations Series

C3: Centaur 50



Operating points outside wheelmap. Requires re-staging for series operation.

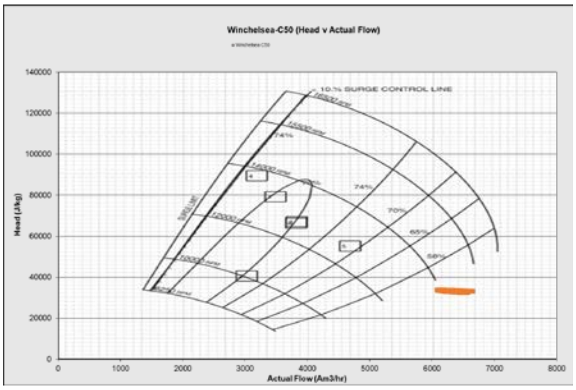
C4: Existing Taurus 60



Operating points within wheelmap and no re-staging required to existing unit.

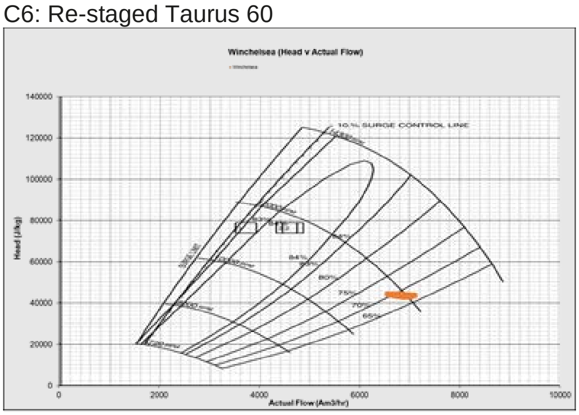
Single Unit Operation – Parallel Configuration

C5: Centaur 50



Operating points outside wheelmap and not suitable for single unit operations. Requires re-staging but will impact two unit operation.

C6: Re-staged Taurus 60



Operating point in very low efficiency region of wheelmap. High sensitivity at this operating region to any fluctuation in operating conditions.