



**Ports, Power & Pipes: Infrastructure  
Requirements for South Australian Iron Ore  
Operators.**

November 2018

**South Australian Chamber of Mines & Energy**

*The leading industry body representing the resources sector in South Australia*

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## 1. Introduction

This paper has been prepared following discussions with the Hon. Stephan Knoll, Minister for Transport, Infrastructure & Local Government about development of minerals port infrastructure in South Australia.

SACOME has undertaken extensive work to understand the infrastructure requirements of its membership. This work comprises industry forums hosted by SACOME, discussions with South Australian political and departmental representatives, and ongoing liaison with SACOME members through our industry committees and other meetings.

These activities informed SACOME's lobbying efforts at the 2018 South Australian General Election and our subsequent conversations with both State and Commonwealth Governments.

In its 2018 State Election Priorities document, SACOME called for all political parties and independents to:

*Facilitate the development of critical port infrastructure, including development of a deep water, 'capesize' port to increase South Australian export capacity and drive efficiency across the resources supply chain.*

*SACOME calls for all political stakeholders to implement regulatory, funding and other necessary approvals that will enable the prompt development of port infrastructure projects.*

The SA Liberal Party (now Marshall Government) at the March 2018 Election committed to assessing development of a grain/minerals port on Eyre Peninsula via Infrastructure SA 'to ensure the optimum location for this facility'.

SACOME advised members of this policy commitment by the Marshall Government in the context of advancing development of a minerals port. The commitment was welcomed by member companies, though the majority of operators stated that the location of a port development should not be presupposed.

SACOME undertook further consultation with members to better scope the range of issues relevant to development of a deepwater port in South Australia.

It became clear during this consultation that port infrastructure was only one part of the broader infrastructure requirements for South Australian minerals operators and that this proposition was more complex than previously thought.

Feedback from members was that a deepwater port was only needed by iron ore operators and only at export volumes of 15 million tonnes per annum (mtpa) and greater.

The key learning from this exercise was that there was no immediate need by existing iron ore producers for a deepwater port and that this need wouldn't materialise until approximately 2030 on current projected production.

Iron Road (who are not a SACOME member) intend to develop a deepwater port at Cape Hardy as a core component of their Central Eyre Iron project. While not a producer of iron ore at present, they are the only operator to have an immediate need for a deepwater port, subject to the Central Eyre Iron project moving to the development phase.

Iron Road have the most advanced project in terms of approvals and listing on the Infrastructure Australia priority list, however, they are still in the process of securing capital as a prerequisite for advancing their project activity.

The other significant outcome of consultation relates to the infrastructure requirements needed to develop iron ore projects in the Braemar. Port infrastructure is one of several infrastructure needs requiring development to unlock the mineral wealth in this part of the State, with power and water also critically important to project development. SACOME has worked to provide an overview of its consultation process; and a clearer understanding of iron ore operators' suite of infrastructure requirements to assist the Minister for Infrastructure in reaching a decision on how to proceed with port development as well as other infrastructure relevant to development of South Australia iron ore projects.

## **2. Key Messages from SACOME Member Consultation on Port Requirements**

SACOME sourced feedback from member companies through its 'Ports of Tomorrow Forum' held in February 2018 and through SACOME Infrastructure Committee meetings/workshops.

A summary of key messages from SACOME's consultation with member companies is as follows:

- The ports issue is relevant to iron ore export only, with export volume being a central consideration. Export volumes will determine the viability of existing infrastructure as well as future infrastructure requirements.
- The question is one of transshipping vs deep-water and the timing around which transshipping becomes unviable and deepwater is required. Transshipping is cost effective up to approximately 15mtpa of volume.
- There are several 'frontrunner' ports that could meet deepwater requirements, namely: Cape Hardy, Whyalla, Port Bonython and Myponie Point.

- Key operational considerations for a deepwater port are that it must be: multiuser; open access; and have connections to road and rail.
- The most significant factors in progressing development were identified as: approvals; customers; and funding/capital. All frontrunner ports tick some (but not all) of these boxes, with this being an impediment to progress.
- Consideration should also be given to the relative needs of the agricultural sector versus that of the resources sector. While the agricultural sector is seeking to overcome monopolies in port access through competition, the resources sector's concern is to achieve greater export volumes and associated economies of scale.
- Transshipment is the best existing option available and would remain so for the foreseeable future. There is a need to map the point at which transshipping becomes incapable of meeting export volume requirements; and alongside aspirational industry growth strategies such as the South Australian Magnetite Strategy.
- It was identified that the only company who requires an immediate deep-water port for their projected tonnages at present is Iron Road, however, this project is not yet operational.
- Operators in the Braemar province (Magnetite Mines, Minotaur, Havilah) may require a deep-water option in the future, though development of the province is also predicated on water, power, rail. Development of slurry pipeline infrastructure can also be added to this list, though not necessarily as prerequisite to drive development. These issues are discussed in greater detail at 4. below.
- Carpentaria is differentiated from the requirement of new power and water infrastructure as it has access to this in NSW. Further, Carpentaria plan to rail ~10mtpa to Port Pirie or Whyalla for transshipment and is in active negotiations for access to these ports.
- CU River and SIMEC/GFG intend to use transshipment for the next 8-10 years.
- SIMEC/GFG have indicated they have no need for a deepwater solution and will continue to use transshipping out of their Whyalla port.
- Transshipping is seen as non-viable out of Whyalla around the 17-18mtpa mark. Once exports reach this volume, a deepwater solution will need to be identified and implemented.
- As identified at 3.1 below, SIMEC/GFG have undertaken scoping work to map the infrastructure requirements and associated cost for increased exports out of Whyalla.

Given SIMEC/GFG have opened Whyalla to third party access since taking ownership, it offers a potential export solution subject to demand and necessary upgrades.

- BHP have stated they will continue to export products out of Port Adelaide.
- No operating mines require deep-water at this point, but improvements to transshipment would be welcomed.
- Braemar operators identified Wallaroo/Myponie Point as an option given available rail links but could also use Whyalla if it were to become available. Carpentaria have identified transshipping via Port Pirie as their preferred option. A slurry pipeline from Wallaroo is identified as a longer term preference for all future Braemar producers, however, transshipment provides the best short-term option.
- Availability of rail links and access to an existing rail corridor are a key consideration in moving product to export. Whyalla and Wallaroo have these.<sup>1</sup>
- Port Bonython makes sense as a future deep-water port location. It did not proceed due to a lack of volume and a drop in the iron ore price. 20 mtpa is seen as the volume necessary to make Port Bonython viable. Any development at Port Bonython will need to overcome community and environmental issues including factors such as opposition from local shack owners and proximity to cuttlefish breeding grounds.

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<sup>1</sup> Advice from members is that the rail link from Snowtown to Wallaroo has been decommissioned and would require a significant upgrade and/or full replacement to become operational again. The rail corridor remains intact which reduces land access risks considerably, however, both the Myponie Point and Port Havilah greenfields port development options would need new rail corridors established to the respective locations - diversions from the current rail spur.

In Port Havilah's case this would require ~52km existing rail corridor and 11km new rail corridor.

Linkages to Myponie Point would comprises ~27km existing and would require ~35km of new track. It is a dual gauge line - both standard and broad - but nothing currently moves along the track west of the Snowtown silos. The track was closed in the mid-1990s then reopened in the late 1990s for a few years to accommodate a tourist rail service. It was closed again in 2009 after a prolonged dry period coupled with excessive heat caused damage to a number of lengths of track' in both the Wallaroo and Bute areas.

It has laid dormant ever since and apparently has severe buckles in sections. The cost to repair the existing rail would most likely be equal to or greater than full replacement. The rail embankment may also need to be repaired.

The benefits are not the rail infrastructure - only the corridor.

### 3. Current & Potential Production across SACOME Member Companies

The extent of the iron ore resource in South Australia is already well-understood by the South Australian Government and industry at approximately 14 billion tonnes of identified resources.

This understanding is set out in documents such as:

- *Developing South Australia's Magnetite Strategy Directions Paper*<sup>2</sup> published by the former Department of State Development (DSD) in 2017;
- *Iron Ore in South Australia* published by the Investment Attraction Agency in January 2016<sup>3</sup>;
- *Business case: Solutions to bulk mineral export infrastructure on Spencer Gulf*<sup>4</sup> prepared by the Resources Infrastructure Taskforce in September 2015; and
- *Regional Mining & Infrastructure Plan (RMIP)*<sup>5</sup> published by the former Department of State Development (DSD) in June 2014.

South Australia presently has two companies that are producing iron ore, namely SIMEC Mining/GFG Alliance and CU River Mining Australia, however, there are several companies in the Braemar province with resources and with significant potential to expand iron ore production in South Australia.

These Braemar operators have identified several infrastructure issues relevant to facilitating development of their projects. The infrastructure requirements of Braemar operators are addressed in detail in section 4 below.

In progressing discussions about production and port infrastructure requirements with member companies; and through involvement in initiatives like the Magnetite Strategy Working Group, it is apparent that current and potential production volumes have not substantially changed since 2015.

The table below has been extracted from the Developing South Australia's Magnetite Strategy (at page 9) and, despite the data being from 2015, still provides a useful overview of iron ore projects, as well as existing and potential production across the State.

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<sup>2</sup>[http://minerals.statedevelopment.sa.gov.au/\\_data/assets/pdf\\_file/0004/287527/Magnetite\\_Strategy\\_Paper.pdf](http://minerals.statedevelopment.sa.gov.au/_data/assets/pdf_file/0004/287527/Magnetite_Strategy_Paper.pdf)

<sup>3</sup><https://invest.sa.gov.au/wp-content/uploads/2016/07/PDAC-MASTER-Iron-Ore-Jan16.pdf>

<sup>4</sup><https://rit.statedevelopment.sa.gov.au/upload/resource%20infrastructure%20taskforce/rit-business-case.pdf?t=1538006400023>

<sup>5</sup>[http://infrastructure.sa.gov.au/\\_data/assets/pdf\\_file/0011/132797/Regional\\_Mining\\_and\\_Infrastructure\\_Plan.pdf](http://infrastructure.sa.gov.au/_data/assets/pdf_file/0011/132797/Regional_Mining_and_Infrastructure_Plan.pdf)

### Operational mines and major projects in the pipeline

Owner	Arrium Ltd	Cu-River Mining Australia P/L	Iron Road Ltd	Magnetite Mines Ltd	Havilah Resources Ltd	Carpentaria Exploration Ltd
Name	Middleback Ranges (operating mine)	Mt Woods Magnetite Project (operating mine)	Central Eyre Iron Project (major project)	Mawson Iron Project (major project)	Maldorky	Hawsons Project
Region	Eyre Peninsula	Far North	Eyre Peninsula	Braemar	Braemar	Western NSW
Total resource	179 million tonnes	569 million tonnes	4.5 billion tonnes	2.7 billion tonnes	147 million tonnes	1.8 billion tonnes
In-situ Fe Grade (%)	35	27.1	15.5	18.2	30.1	15
Projected Concentrate Fe Grade – DTR (%)	67	68.5	67	67	67	70
Projected Production Rate (million tonnes per annum)	1.8 (current)	0.9 (current) +4.5 (projected)	21.5	25	2.4	10
Life of mine (years)	10	20	25	25	26	26
Major infrastructure required	Existing	Existing	Railway, deep sea port	Slurry pipeline, floating port	Haul road to rail line Port	Slurry pipeline to rail line Port Development

SACOME member companies listed in the above table are SIMEC Mining/GFG (formerly Arrium), CU River Mining, Magnetite Mines, Havilah Resources and Carpentaria Exploration.

In relation to the table above, Magnetite Mines have advised that it should be updated to reflect its full JORC 2012 tonnage of ~3.9 billion tonnes at a projected production rate of 5-10mtpa; and infrastructure requirements comprising a 275kV powerline, borefield and water pipeline, and augmentation of existing rail and port infrastructure.

Minotaur Exploration is also a SACOME member but is not listed in the table above. Its estimated resource is ~12.5mtpa (dry) magnetite concentrate plus ~2.5 (dry) hematite concentrate across a 25 year mine life located in the Braemar region. Minotaur have ~1.5 billion tonne of iron ore resource across their portfolio.

Carpentaria Resources have advised that the South Australian infrastructure requirement for their project is either port development in Port Pirie, or access to the Whyalla port. The slurry pipeline referenced in the above table is a 50km pipeline wholly located in NSW.

### Iron Ore Producers – Current & Projected Production + Port Requirements

The significant point to be made in relation to existing iron ore producers is that they have no immediate or medium-term need for a deepwater port. While a future need for a deepwater option remains, transshipment options out of existing ports significantly de-risks projects and greatly reduces capex.

Neither SIMEC or CU River see deepwater as necessary for their operations under export tonnages of 15mtpa. Neither company has projected these tonnages to be reached before 2030.

A summary of current production volumes and port requirements for iron ore producers is as follows:

### **SIMEC/GFG**

- Currently exporting iron ore in Cape Vessels via transshipment from Whyalla Port at a rate of **~8-9 mtpa**.
- Annual import volumes of **~1.4mtpa**.
- SIMEC intends to continue transshipping out of Whyalla Port over the medium term with no stated plans to increase export volumes over this period.
- Several expansion studies for the Whyalla Port have been undertaken most notably in 2015 (jointly with the State Government) and independently in 2016 by Advisian/Argonaut.
- The joint work with the State Government produced a Concept Master Plan with potential layouts supporting staged development to handle a range of export and import materials. In terms of bulk mineral exports expansion concepts in increments of 5mtpa up to 20mtpa via transshipping were developed.
- These studies generally considered development based on staged expansion driven by third party business across a range of materials both imported and exported.
- The Master Plan specifies the possible infrastructure augmentation/improvements and site areas potentially available for an expansion of the Whyalla Port while minimising interference with GFG's Liberty OneSteel and SIMEC Mining operations.
- GFG Alliance is currently engaged in direct negotiation with potential third-party customers evaluating both export and import opportunities and evaluating staged expansion opportunities and required investment.
- GFG's modelling of the estimated capital investment to support incremental bulk export capacity increases is set out below:

+1-3 mtpa	\$0 - no required investment
+3-7 mtpa	\$10 million – rail holding lines
+7-10 mtpa	\$41 million - shed extensions
+10-15 mtpa	\$220 million – duplicate rail/tip pocket/sheds/loader/berth

### CU River Mining

- CU River exported ~**1mtpa** in 2016/17 via container shipments from Port Adelaide.
- CU River have stated that its current production profile is **15mtpa by 2030**.
- CU River have stated that they have no requirement for a deepwater port until at least 2030, and only if their production exceeds 15mtpa by 2030.
- While CU River is currently assessing various options for its export pathway, its preference is to secure its own privately-owned transshipment port.
- CU River is currently involved in direct negotiations with potential third-party customers and evaluating expansion opportunities.

#### 4. Infrastructure Requirements of Braemar Province Operators

SACOME member companies operating in the Braemar are:

- Havilah Resources Ltd. (SA)
- Magnetite Mines Ltd. (SA)
- Minotaur Exploration Ltd. (SA)
- Carpentaria Exploration Ltd. (NSW)

Braemar province operators represent the potential for a significant increase in the State's iron ore production and a genuine opportunity for state economic development.

Fully realised, the Braemar province has the potential to become South Australia's own Pilbara given the vast quantity of proven and high-quality resource located within the region.

Carpentaria have advised that their Hawsons project is differentiated from that of other Braemar operations and their issues are addressed separately at 4.1 below.

Consultation with Braemar operators revealed that, while port infrastructure was a key requirement for their projects, access to power and water were also critically important to development.

Projects in the Braemar are subject to a 'chicken and egg' problem in the sense that they needed to resolve infrastructure issues to attract capital but need capital to resolve infrastructure issues.

Iron ore prices will also be an important determiner of project economics.

This prompts questions about the sort of circuit breaker required to unlock the economic potential of the Braemar and naturally leads to discussion about what the role of government might be. The South Australian Magnetite Strategy provides a framework for exploring options in this regard.

Havilah, Magnetite Mines and Minotaur have identified the following infrastructure 'hurdles' to project development, in order of importance:

- 1) Power;
- 2) Water;
- 3) Port; and
- 4) Rail (transport from mine to port).

These infrastructure requirements were likened to 'dominoes' in the sense that once the first issue was resolved, the others would need to be resolved rapidly in successive order.

Furthermore, advice is that they would likely be resolved independently after the fall of the first major 'domino'.

The economic development challenge for South Australian projects in the Braemar lies in getting the first project operational - a 'first mover' - which itself is dependent on the necessary infrastructure being in place to drive project development. Without this, the Braemar's economic potential remains locked in place.

Access to grid power is a fundamental issue shared by these operators. It is an essential factor in powering mine operations, particularly for highly energy-intensive ore beneficiation processes. Given that ore from the Braemar is not direct shipping ore (DSO), beneficiation is necessary to achieve the quality/grade of ore required by the market. Water is a critical but secondary requirement to power given its importance as an operational input.

The potential power demand for South Australian projects in the Braemar is an estimated 300-400MW per annum assuming full production. This power demand is scalable depending on levels of export.

South Australian Braemar operators have advised SACOME that if a power solution is found, this will solve metallurgical and beneficiation issues allowing for ore processing, which will in turn require a path to market for processed ore.

The proposed interconnector between South Australia and New South Wales presents an opportunity to build electricity infrastructure that would assist project development in the Braemar, however, this possibility is not contemplated as part of Electranet's South Australian Energy Transformation – RIT-T process. Given the significance and expense of this infrastructure, SACOME encourages further exploration of possible options to support project development in the Braemar by the South Australian Government.

#### **4.1 Infrastructure Requirements for Carpentaria Resources**

Carpentaria's Hawsons project is located in New South Wales, 60 kilometres South-West of Broken Hill close the SA/NSW border. Carpentaria describes their project as "the most advanced of the Braemar projects" and has delivered a positive prefeasibility study, as well as having attracted support from Japanese trading house, Mitsui.

Carpentaria do not have the same water and power requirements as other Braemar operators due to the project being located in NSW and having identified technically and financially feasible solutions in NSW. Carpentaria plan to export via South Australia given their project's proximity to South Australian port options versus those available in NSW.

Carpentaria has proposed Port Pirie as the preferred export solution for their project and have undertaken a detailed prefeasibility study in this regard. Carpentaria have also identified the Whyalla port as a second competitive transshipping export option.

The decision about its preferred port option will be made following a detailed feasibility study, planned to begin in 2019. Carpentaria and Flinders Ports identified in 2015 that Port Pirie was a suitable location for a 20mtpa transshipment operation.

Carpentaria proposes export of 10mtpa over 30 years, with these tonnages available to support a cape size port facility in South Australia.

## **4.2 A Path to Market for the Braemar – Ports, Rail & Pipes**

### **Port Bonython**

Braemar operators (excluding Carpentaria) have identified Port Bonython as their preferred deepwater port option.

Port Bonython is a realistic option for a large volume shipping port given it is:

- Already deepwater and thus requires no dredging;
- Benefits from a completed Environmental Impact Statement (EIS), meaning a major approval component has already been resolved.
- The EIS and Development Application (DA) processes comprise the most significant part of the approvals regime. Given these combined approvals processes can take up to 3 years, resolution of the EIS is a comparative advantage for development of Port Bonython.
- Has access to rail (and road) linkages, though noting that an additional 27.5km rail spur and 6km balloon loop would need to be constructed to link the existing rail network with the port.
- Provides a scalable option in that the water reaches depths of 10m approximately 200m offshore. As such, there is no need for a long jetty at Port Bonython to facilitate transshipment as a first option, moving to a deepwater option as export tonnages increase.
- Has available land for construction of other necessary landside infrastructure (i.e. materials handling and storage).

- The fact that it is owned by the South Australian Government is seen as a plus by operators as they see that competing priorities would be managed equitably.

### **Port Pirie & Whyalla**

- Further to 4.1 above, Carpentaria have indicated either Port Pirie or the Whyalla port as potentially suitable to meet export requirements for their Hawsons project.

### **Pipelines**

Operators have also raised slurry pipelines as a means of moving product to port, with pipelines providing an efficient means of transporting ore to market. A prerequisite for slurry pipelines is access to water at mine site. It should be added that all operators are focused on the on existing infrastructure and the development thereof at this stage, with pipelines being a lower order priority.

The available resource and potential volume of exports from the Braemar as a region and with regard to combined levels of potential production across all operators suggest that a deepwater port is the logical solution if the full value of the province is to be realised.

### **4.3 Potential Economic and Royalty Value of the Braemar**

Braemar operators have undertaken preliminary assessment of the potential value of royalties from their projects.

In doing so they have assumed iron ore royalties based on 10mtpa production at export prices ranged from A\$50-100/tonne at a 5% royalty rate across four projects (i.e. a total 40mtpa).

This has yielded the following estimates:

- Low scenario: \$50/tonne @ 40mtpa = \$100m/pa
- High scenario: \$100/tonne @ 40mtpa = \$200m/pa

The potential royalty returns from the Braemar clearly frame the state economic development opportunities arising from resolving infrastructure hurdles.

The potential economic returns for developing the Braemar are significant, with the experience of operators in the Pilbara providing guidance.

Rio Tinto commissioned an independent analysis of its WA operations by ACIL Allen Consulting, showing they generated \$27.3 billion for the State's economy in 2016-17, with this figure representing ~12 per cent of the State's gross domestic product.<sup>6</sup>

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<sup>6</sup> <https://thewest.com.au/business/mining/rio-tinto-claims-a-27b-47400-job-boost-to-wa-economy-ng-b881004566z>

## 5. Summary of Key Findings

SACOME was pleased to undertake this exercise and provide advice to the Minister for Transport, Infrastructure & Local Government.

The key findings are summarised as follows:

- The need for a deepwater minerals port is limited to iron ore production given it is the only commodity traded at volumes requiring this scale of export.
- There is no immediate need for a deepwater port by operators presently producing iron ore as they have no near or medium-term plans to produce at such volumes. This does not discount the fact that development of deepwater capabilities would be a significant enabler of project development.
- These operators will continue to use transshipping options until at least 2030 on current projections.
- The Whyalla port provides immediate third-party transshipping options and SIMEC/GFG have mapped future development requirements for increased export volumes.
- Port Pirie provides another potential transshipping option, with the Port Pirie Council and Regional Development Australia – Yorke & Mid North having previously commissioned the *Preliminary Assessment of a Strategic Port Expansion Option – Port Pirie*<sup>7</sup> to build the case for such an approach. Multiple companies have considered Port Pirie as a viable option for their projects.
- The Braemar province represents significant opportunities to develop a ‘Pilbara’-like, high volume iron ore region in South Australia and would change the timeframes for requiring a deepwater port. The Braemar differs from the Pilbara in that Braemar concentrate will be High Grade/Low Impurity for life of mine rather than Diminishing Grade/Rising Impurity as is the case with Pilbara direct shipping ore (DSO).
- Developing the Braemar requires resolving a suite of infrastructure issues. Should the Braemar be developed and higher-order infrastructure issues be resolved, it would be a necessary step to build a deepwater port given the potential export volumes from this region.
- Braemar operators (excluding Carpentaria) have expressed a preference for development of a deepwater port at Port Bonython.

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<sup>7</sup> <https://www.pirie.sa.gov.au/webdata/resources/files/Strategic%20Port%20Expansion.pdf>

- Carpentaria Resources have identified both Port Pirie and the Whyalla port as viable export solutions. Further, Carpentaria have clearly stated that their project's power and water requirements have been resolved.
- Development of a deepwater port would be an investment in state economic development and would resolve a major infrastructure bottleneck for high volume iron ore export for South Australia, as well as unlock opportunities for other existing/potential operators.
- Consideration should be given to how the South Australian Government could assist with investment in 'first-order' infrastructure like power and water in the Braemar province.

SACOME welcomes the opportunity to continue discussions with the Minister on this important infrastructure and state economic development issue.