



Port of Karumba Sustainable Development

Preliminary Business Case

January 2026



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Queensland Government Disclaimer

The Queensland Government supports the sustainable development of the Port of Karumba and recognises its strategic importance for the Gulf Savannah region. This work has been undertaken by consultants engaged by Gulf Savannah Development. The Queensland Government has not prosecuted the veracity of the information in this document, including cost estimates, and makes no representations as to the accuracy of that information.

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Executive Summary

Background and Purpose

Regional Economic Advisory Pty Ltd. (REA) and Civil IQ have been engaged by Gulf Savannah Development (GSD) to develop this Preliminary Business Case for the future sustainable development of the Port of Karumba (PoK).

The PoK is a critical regional asset, exporting zinc from the former Century Mine tailings retreatment operation, facilitating live cattle exports (historically), and the shipment of general cargo for the surrounding Gulf communities.

This Preliminary Business Case considers the financial viability of various development scenarios, the economic impacts through development and once operational, and the long-term socio-economic benefits it will provide to the Gulf Savannah community and increased exports from the North West Minerals Province.

To the extent possible within the available time and budget, this Preliminary Business Case should be regarded as a preliminary strategic investigation to explore progression to the next stage of investigation and planning. While this Preliminary Business Case is guided by the Queensland Government Project Assessment Framework (PAF) based on a preliminary evaluation, it should not be considered as meeting all of the requirements of the PAF and therefore is not strictly for investment purposes.

It should be noted that this Preliminary Business Case has been scoped and developed simultaneously with several active investigations by industry on potential resource developments in the region, which has required this preliminary investigation to remain agile and to change focus as the active industry investigations progress. For example, the economic impacts were partially reassessed late in this preliminary investigation (i.e., December 2025/January 2026) to address a redefined focus of Scenario 1. At the time of preparing this report, these industry investigations remain ongoing, and all reasonable efforts have been made to ensure this report accurately reflects the current position of the industry investigations.

The key outcome of this Preliminary Business Case is to deliver infrastructure works that enable the continued operation of the Port of Karumba to meet the needs of identified near-term developments seeking to utilise the PoK – while providing an understanding of the long-term benefits and opportunities unlocked through the strategic development of the PoK.

The findings of this Preliminary Business Case will be used by GSD and regional stakeholders to guide decision making, advocate for investment, and progress the sustainable development of this key strategic and economic asset.

Future Development Scenarios

Based on extensive consultation across the entire region, including with Councils, project proponents, Ports North and the broader project working group, the following future scenarios were developed to consider the sustainable development of the PoK:

- **The Base Case**

Considers the closure of Sibanye-Stillwater's (SSW's) zinc tailings operations as currently planned by FY2027 with no transition of the mine site, port infrastructure or assets to a new operator. These impacts not only result in significant rehabilitation costs (including the decommissioning of SSW supply chain assets at the mine site/processing, pipeline and at the PoK) to SSW but also preclude the future use of the SSW infrastructure to facilitate new resource developments. It is assumed that dredging will cease at the PoK without the major export user and financial contributor. This scenario serves as the baseline against which alternative future development options are considered and represents the opportunity cost of inaction.



■ Scenario 1 Transition to PhosOne

Considers the transition of SSW zinc tailings operations/infrastructure to the PhosOne project (1MT p.a. of phosphate extracted from the Paradise South Mine and processed at SSW's Century Mine, transported via a combination of new pipeline from the mine site to processing at Lawn Hill and the existing SSW slurry pipeline). The transition occurs after a circa 18-month closure period to refit the SSW facilities for the transport and processing of phosphate. PhosOne was declared by the State Government on 30 May 2025 to be a prescribed project. Scenario 1 also lays the foundation as key enabling infrastructure for potential future expansion of PoK.

■ Scenario 2 Regional Phosphate Supply Chain

Considers the potential for additional mining opportunities to utilise the PoK, given the investments made to unlock the PhosOne operations, increasing production to just under 2MT per annum. Additional throughput is unlocked in Scenario 2 through the Korella project (under assessment) and the restarting of Ardmore phosphate operations (noting that after Centrex went into voluntary administration, the project was acquired by PRL Global, previously Ardmore exported via a combination of road and rail to the Port of Townsville).

■ Scenario 3 Long-Term Sustainable Development

Explores the longer-term/diversified economic development opportunities which could be unlocked through the PoK. Developments included within Scenario 3 include:

- The regional phosphate supply chain established in Scenario 2 potentially expanded to other operators.
- Expanded irrigated and dryland cropping (cotton, chickpeas, grains) and associated regional processing for export via the PoK.
- Establishment of a small cruise ship industry through the PoK, expanding and diversifying the regional tourism offer.
- Development of import facilities to service local needs and key inputs (e.g. sulphuric acid) for the regional mining industry.

Key projects, capital and operational items across the scenarios considered in this Preliminary Business Case are summarised in the table below.

Table ES-1: Scenarios Summary

Projects	Base Case	Scenario 1	Scenario 2	Scenario 3	Timing (FY)	Direct Project Capital	Additional Supply Chain Capital ¹	PoK p.a. Throughput (Full Production)	Annual Turnover (\$2025/26)
Phosphate									
PhosOne		✓	✓	✓	Cons: 2027 Ops: 2029	\$700M	PoK Dredging: \$15.0M	1MT	\$450M
Korella			✓	✓	Cons: 2029 ² Ops: 2031	Allowance: \$30M	Laydown Area: \$35M Common User Facility – Export: \$70M Barge Handling Facilities: \$17.5M	0.2MT applied to export via PoK (total reported potential production 2.25MT)	\$90M



Projects	Base Case	Scenario 1	Scenario 2	Scenario 3	Timing (FY)	Direct Project Capital	Additional Supply Chain Capital ¹	PoK p.a. Throughput (Full Production)	Annual Turnover (\$2025/26)
							Road Upgrades: \$335.8M		
Ardmore			✓	✓	Cons: 2029 Ops: 2031	Allowance: \$20M	Road Upgrades: \$5.4M	0.65MT	\$281M
Other Opportunities									
Regional Agricultural Expansion				✓	Roads: Cons 2030/2031 Agri: Cons: 2032 Ops: 2035	Gilbert River Dam \$1.1B On Farm Capital: 1.25B Cotton Gin: \$42M	Gilbert River Bridge and embankment raise: \$100M Norman River Crossing of Gulf Developmental Road: \$100M	200k bales cotton 116kT chickpea 260kT Grains	Cotton: \$137M ³ Chickpeas: \$99M Grains: \$109M
Small Cruise Ship Tourism				✓	Cons: 2036 Ops: 2037	N/A	Passenger terminal and linking bus terminal: \$7M	12,880 visitors (4 ships/month over 9 months @avg. 80 PAX) ⁴	Visitor Spend: \$3M
Regional Imports				✓	Cons: 2029 Ops: 2031	N/A	Import Wharf: \$60M	100 – 500kt Elemental Sulphur p.a.	Considered from a port revenue perspective

Notes: ¹ Additional supply chain costs are only included with the first project within the scenarios to utilise the infrastructure (see Appendix B for further details). ² Consultation with the Chatham Rock Phosphate indicates the project could potentially occur earlier and that the modelled timeframes should be considered conservative. ³ Includes ginning returns of \$80/bale in addition to grower returns. ⁴ Aspirational long-term industry target.

Source: REA

Key Findings

Financial Appraisal

A preliminary financial appraisal was undertaken for key potential costs involving the PoK and broader potential State Government input into the supply chain:

Port Costs

To achieve cost recovery (annual nominal operating costs and 20-year recovery of initial dredging capital with no return on capital) requires an annualised payment of:

- \$6.6 million in Scenario 1 (PhosOne operations). This equates to a cost of \$7.6 per tonne of projected phosphate shipped over the 20-year analysis (incorporating initial capital development time and ramping up of operations to 1MT p.a.).
- \$7.2 million in Scenario 2 (Regional Phosphate Supply Chain) equating to an average cost of \$4.7 per tonne of phosphate across PhosOne, Ardmore, and Korella (initial production).



- \$11.1 million in Scenario 3 (Long-Term Sustainable Development) equating to an average cost of \$4.5 per tonne of imports/exports (or cubic metre for cotton exports).

Noting that Ports North is required to act commercially and dredging costs are funded by end users, this preliminary investigation has shown that subsidisation of the initial capital dredging costs between 25% and 75% would have a modest impact on cost recovery outcomes, reducing payments by up to \$600,000 per year.

While the nature of this subsidy has not been explored in detail, it is noted that new incentives were introduced under the Mount Isa Transition Fund to reduce access charges on the Mount Isa-Townsville rail line, providing significant savings for emerging rock phosphate producers. In February 2026, the Queensland Government also announced a four year, 10% subsidy on rail access charges for Mount Isa Line users to strengthen freight corridors and grow the North Queensland economy. A similar subsidy could be explored for phosphate exports through Karumba to diversify and strengthen Gulf supply chains and the North West Queensland economy.

Table ES-2: PoK Financial Appraisal Results (20 Years Beginning FY2027)

Capital Subsidy	0%	25%	75%
Costs p.a. (\$M)			
Scenario 1	\$6.6	\$6.4	\$6.0
Scenario 2	\$7.2	\$7.0	\$6.6
Scenario 3	\$11.1	\$10.9	\$10.5
Costs \$ Per Tonne/Cubic Metre Exported			
Scenario 1	\$7.6	\$7.3	\$6.9
Scenario 2	\$4.7	\$4.6	\$4.3
Scenario 3	\$4.5	\$4.4	\$4.2

Source: REA

■ Road Access Costs

Road access costs to PoK were initially scoped as being in-scope for Scenario 1 (Transition to PhosOne) and were modelled for all scenarios. However, at the time of preparing this report, road access to PoK was no longer in scope for Scenario 1. Due to the ongoing active industry investigations of resource projects in the region, and the importance of potential road upgrades to sustainable development of PoK in all scenarios, road upgrade and maintenance costs are still included in the preliminary investigation; however, they have been removed from the financial and economic analysis of Scenario 1.

Road upgrade and maintenance costs were assessed over the 20-year analysis at nominal discount rates of 0%, 4%, 6% and 10% and are presented in Table ES-3. Of note:

- Costs over 20 years equate to circa \$400 million to support the regional phosphate export supply chain (Scenario 2), rising to just under \$640 million for Scenario 3 with the inclusion of the Norman River Crossing of Gulf Developmental Road and Gilbert River Bridge raising (central 6% discount rate).
- This equates to a (levelised) per tonne exported cost from around \$23 to \$72 across the scenarios and depending on the discount rate applied.
- The mix of road upgrades are roughly evenly split between Local Government (at level causeway crossings, bridges and/or culverts) and State assets under Scenario 2. The mix changes to approximately 70/30 State/Local assets with the inclusion of the Norman River Crossing of Gulf Developmental Road and Gilbert River Bridge raising in Scenario 3. These road upgrades may also require Australian Government funding contribution under State-Federal funding obligations.



- While the estimated road costs have been assessed at a high level within the scope of the preliminary business case, they have not been subject to the more detailed financial analysis and modelling that is required by PAF projects.

Table ES-3: Net Present Value (NPV) Of Road and Bridge Upgrade Costs (20 Years)

Discount Rate	Scenario 1	Scenario 2	Scenario 3
NPV Total Costs (\$M)			
0%	N/A	\$453	\$718
4%	N/A	\$415	\$658
6%	N/A	\$402	\$637
10%	N/A	\$381	\$605
Cost Per Tonne			
0%	N/A	\$34.3	\$22.9
4%	N/A	\$45.2	\$28.8
6%	N/A	\$54.1	\$34.6
10%	N/A	\$71.5	\$44.3
Road Ownership			
DTMR	N/A	50.2%	68.6%
Local Government	N/A	49.8%	31.4%

Source: REA

The projected volumes (haulage rates will exceed 10,000 tonnes per year for a local government road and 50,000 tonnes per year for a state-controlled road) for each resource project within the scenarios will trigger requirements to compensate the public road authority for costs related to the road use through a road compensation agreement.

Economic Impact Assessment

Between FY 2027 and 2046, the scenarios are projected to **increase economic activity from the construction and operation of the resource, agricultural and tourism projects.**

- The estimated lift to **Gross Regional Product (GRP)** (applying a 6% real discount rate) over 20 years equates to:
 - Scenario 1 Transition to PhosOne: \$624 million (across Queensland these impacts increase to almost \$1 billion).
 - Scenario 2 Regional Phosphate Supply Chain: \$1.1 billion (across Queensland these impacts increase to \$1.6 billion).
 - Scenario 3 Long-Term Sustainable Development: \$1.8 billion (across Queensland these impacts increase to \$2.8 billion).

GRP impacts are projected to peak on reaching full operations in Scenario 2 (2032), while in Scenarios 1 and 3 impacts to Queensland are projected to peak through the construction phase (for mine/ agricultural irrigation water storage, on-farm, and bridge/road works) while regional activity peaks with full production achieved.



Each of the scenarios generates substantial construction and ongoing employment:

- **Scenario 1 Transition to PhosOne**

2,967 Full Time Equivalent (FTE) person years over the 20-year analysis¹ (306 in the region with 2,661 person years generated across Queensland incorporating broader supply chains and FIFO arrangements).

- **Scenario 2 Regional Phosphate Supply Chain**

4,644 FTE person years over the 20-year analysis (490 in the region with 4,154 person years generated across Queensland incorporating FIFO arrangements).

- **Scenario 3 Long-Term Sustainable Development**

9,829 FTE person years over the 20-year analysis (1,226 in the region with 8,603 person years generated across Queensland incorporating FIFO arrangements).

Peak labour requirements are estimated at 469 – 526 (in 2027) under Scenarios 1 and 2, respectively, and 1,171 (in 2032) under Scenario 3, coinciding with projected peak construction activity.

Despite the majority of economic activity occurring in the regional economy, the employment impact is mostly generated across broader Queensland (with the projects drawing significant labour from the wider State labour pool). However, given the region's population and labour force, local labour demand will represent a materially significant increase.

For the rest of Australia, the employment impacts are negative for the entire analysis period, with labour drawn to the region/Queensland to facilitate project delivery and operations.

The Major Project Pipeline Report commissioned by Regional Development Australia Townsville North West Queensland (REA, 2024) identified acute skilled trade labour shortages in the region, as well as significant unskilled and semiskilled labour demands, which will place more pressure on key infrastructure, especially housing. Further analysis of employment impacts should be considered within the Detailed Business Case.

Cost Benefit Analysis

The preliminary Cost Benefit Analysis (CBA) assessed the following costs and benefits:

- **Costs**

- Capital Costs.
- Ongoing operational/maintenance costs.
- Environmental costs associated with dredging and project operations.

- **Benefits**

- Economic activity unlocked through the scenarios to the State of Queensland.
- Residual value of long-life infrastructure.

Results of the CBA are summarised in Table ES-4 below. At the chosen central discount rate of 6%:

- **Scenario 1:** Returns a NPV of \$104.8 million with a Benefit Cost Ratio (BCR) of 1.1 (indicating a present value return of \$1.1 for every dollar of cost) and an Internal Rate of Return (IRR) of 8.0%.

¹ Directly and indirectly.



- **Scenario 2:** Returns a NPV of \$190.1 million with a BCR of 1.1 (indicating a present value return of \$1.1 for every dollar of cost) and an IRR of 7.9%.
- **Scenario 3:** Returns a NPV of -\$262.5 million with a BCR of 0.9 (indicating a present value return of \$0.9 for every dollar of cost) and an IRR of 4.7%.

The CBA highlights that both Scenarios 1 and 2 deliver net socioeconomic benefits to the State of Queensland compared to the Base Case (though not at the higher 10% discount rate). Scenario 2 returns the highest NPV, with substantial further benefits from new mining operations unlocked due to the increased infrastructure investment over Scenario 1.

Scenario 3 returns the largest gross Present Value of Benefits, of around \$3.3 billion at a 6% discount rate. These benefits are subject to substantially higher costs, causing the project to fall below break-even, with a BCR of 0.9.

Table ES.4: CBA Results

Discount Rate	PV Costs (\$M)	PV Benefits (\$M)	NPV (\$M)	BCR
Scenario 1				
4%	\$948.0	\$1,193.3	\$245.4	1.26
6%	\$908.2	\$1,012.9	\$104.8	1.12
10%	\$848.3	\$764.9	-\$83.4	0.9
Scenario 2				
4%	\$1,513.3	\$1,965.6	\$452.3	1.30
6%	\$1,455.2	\$1,645.3	\$190.1	1.13
10%	\$1,366.3	\$1,205.2	-\$161.1	0.88
Scenario 3				
4%	\$3,887.5	\$4,070.1	\$182.6	1.05
6%	\$3,560.0	\$3,297.5	-\$262.5	0.93
10%	\$3,041.4	\$2,267.9	-\$773.4	0.75

Source: REA

The following key factors were not quantified in the CBA. These factors are overall highly positive and would improve the net position of the scenarios vs. the Base Case if they were included:

- Utilising existing infrastructure and avoiding decommissioning of SSW assets under the Base Case: Will result in the loss of circa \$2 billion (historical value established in 1999) in assets to the region, in addition to the financial cost of decommissioning. The loss of these key productive assets would not only result in substantial financial costs but also preclude their use in future developments. The area around SSW's Lawn Hill site remains highly prospective, with global mining companies continuing to invest significantly in exploration for high value resource commodities in the surrounding area. With several regional and state government strategies emphasising investment in infrastructure to support industry growth and diversification, utilising rather than decommissioning existing infrastructure could strategically accelerate new investment while maximising the value of previous resource developments.
- Flow on benefits of infrastructure investments for other industries: Increased port depth will support other key regional industries (notably fishing) by allowing all tide access to fishing fleets operating from Karumba and development of cropping exports. Other identified investments, including in a local slipway and boat maintenance facilities to enhance regional capacity, would also greatly benefit from both the infrastructure and increased activity associated with the scenarios.



- Benefits of an increase in business confidence: Each of the future scenarios will underpin business and investment confidence in the GSD region and likely support future rounds of investment as a key growth catalyst. Investment in the Scenarios will underpin the current period of growth in the Gulf Savannah region and support sustainable economic development.
- Increased community benefits and social amenity: The scenarios will underpin continued significant payments to local Council's and traditional owners, which will underpin a broad range of benefits to the regional community. Under the Base Case, these payments would cease, notably increasing the potential burden on other ratepayers and State/Federal funding sources. The Scenarios will also underpin employment and population growth, as well as demand for services and social infrastructure:
- Development will increase demand for local housing for key workers, which will likely require additional investment. Worker housing will need to be considered within the accommodation strategy for individual project proponents.
- Potential additional operational and compliance requirements: Including the implementation of Biosecurity Australia services to enable agricultural exports via the PoK under the Long-Term Sustainable Development (Scenario 3).

Outcome

This Preliminary Business Case has assessed the potential future opportunities for the strategic development of the PoK. This has included:

- The near-term extension of operations through the transition of SSW zinc tailings processing to North West Phosphate and Sibanye-Stillwater's PhosOne joint venture producing 1MT p.a. of phosphate.
- Medium-term regional phosphate projects.
- Facilitating longer-term agricultural, tourism, and import demand through the port.

All of the scenarios assessed are shown to have potential socio-economic merit for the region and the broader State of Queensland (though they are sensitive to the discount rate applied and the variability of key costs and commodity prices). The critical service needs include maintaining and expanding the channel dredging and key road/bridge upgrades to enable and enhance access to the port for key producers.

The main hurdles to realising the sustainable development of the PoK revolve around the private sector operators' capacity to pay for dredging and road/bridge upgrades, given the profitability of phosphate (a typically high volume, lower value commodity), and broadacre agriculture.

Therefore, appropriate funding subsidy will likely be required to unlock the development potential of the PoK – this analysis indicates that a similar level of subsidy (equivalent to \$10/tonne) as offered to junior phosphate users along the Mount Isa to Townsville line would substantially underpin the viability of the supply chain, including channel dredging and road upgrades/maintenance. The scope and specifics of a subsidised funding model should be considered within the Detailed Business Case.

The Preliminary Business Case has also identified the substantial opportunity costs of inaction (under the Base Case Scenario), which results in the loss of billions in productive infrastructure (associated with SSW operations) – and the currently most cost-effective way to export via the port year-round. The loss of pipeline, processing, export, and other operational infrastructure will impact not only the current PhosOne opportunity but also future development opportunities in the region.

As the dredging and road infrastructure also support communities and residents in the Cape and North West Queensland, the lost opportunities also include broader socio-economic impacts on Indigenous communities (i.e. the Gulf Communities Agreement), Councils (loss of a large rate payer which adversely affects their commercial viability), general community and businesses (continued isolation in wet season leading to diminished liveability and commercial viability).



Recommendations

It is recommended that the strategic development of the PoK move to a detailed assessment², with a focus on an investment ready analysis of development requirements to support Scenario 1: Transition to PhosOne operations.

In addition to being the most progressed scenario and having the advantage of utilising the existing SSW infrastructure, the channel dredging to enable Scenario 1 will also support the future realisation of the broader industry opportunities identified in Scenarios 2 and 3. In turn, the realisation of additional projects over time beyond PhosOne are shown to spread the cost recovery burden and financial sustainability of the PoK based supply chain.

However, to realise this broader vision, the continuation of the current supply chain through the Scenario 1 transition is the critical first step. The detailed assessment will benefit from the completion of the Ports North dredging options investigations currently underway, underpinning cost certainty in the financial commitments required from all parties.

Key aspects to be considered within the detailed assessment include:

- Provision and review of current maintenance dredging permits and environmental authorities with the State and Federal Government.
- Confirmation and agreement of maintenance dredging declared depths and requirements, including all approvals in coordination with Ports North, associated key stakeholders, and State and Federal Government requirements and legislation.
- Confirmation and agreement of capital dredging depths and requirements in coordination with Ports North, associated key stakeholders, and State and Federal Government requirements and legislation.
- Provision and review of current environmental activities, including seagrass, water, sediment, turtles and dugongs, and biosecurity.
- Development of significant State and Federal Government environmental assessments and approvals.
- Confirmation and agreement of shipping and vessel sizes for all Port of Karumba activities.
- Confirmation and agreement of road vehicle sizes and frequency, and traffic impact assessments.
- Targeted geotechnical investigations, factual and interpretative reporting for Port of Karumba laydown area, material sources and quarries, and road locations.
- Assessment and verification of road networks and accurate determination of scopes for unsealed and sealed roads, including condition assessments, reconstruction, widening, raising, geometry, causeways, and culverts/bridges (noting that current plans for PhosOne do not include road transport of Phosphate). No allowance in the Preliminary Business Case has been made for raising at grade crossings, culverts, bridges etc. throughout.
- Determination of agreed standard for flood immunity, or lesser agreed flood immunity with the Department of Transport and Main Roads (DTMR), Local Government and key stakeholders as required.
- Undertake flood modelling for agreed crossings and floodplains to determine flood immunity requirements and proposed raising and widening of roads, culverts, causeways, bridges etc.
- Documentation of assumptions and limitations associated with the development of engineering, infrastructure and cost estimates.
- Subject to available funding, investigation of current and alternative models for future port operations that may not require extensive dredging.

The detailed assessment will benefit from further consultation with DTMR and the results of analysis currently underway, including Ports North's Dredging Options analysis, the PhosOne Bankable Feasibility Study, and Avenir

² Either a Detailed Business Case under the Queensland PAF, or an alternative framework suitable to support an informed investment decision.



Makatea Pty Ltd/Chatham Rock Phosphate's feasibility works to provide certainty on key modelling inputs and the viability of underlying operations.



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Chapter 1

Introduction



1 Introduction

1.1 Background and Purpose

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This Preliminary Business Case considers the financial viability of various development options, the economic impacts through development and once operational, and the long-term socio-economic benefits it will provide to the Gulf Savannah community and increased exports from the North West Minerals Province.

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The findings of this Preliminary Business Case will be used by GSD and regional stakeholders to guide decision-making, advocate for investment and progress the sustainable development of this key strategic and economic asset.

1.2 Structure and Approach

The remainder of this Preliminary Business Case is structured as follows:

- Chapter 2** Provides a brief overview of the PoK and the GSD regional economy to provide context for the business case.
- Chapter 3** Undertakes a market assessment of the various development opportunities that could utilise the PoK.
- Chapter 4** Summarises the key stakeholder consultation undertaken for this business case.
- Chapter 5** Provides a summary of the potential development scenarios and key infrastructure investments required to unlock activity through the PoK.
- Chapter 6** Provides a high-level financial appraisal of the identified development options.
- Chapter 7** Provides an Economic Impact Assessment (EIA) of the development options, considering the direct and flow-on impacts during development and once operational over 20 years.
- Chapter 8** Provides a Cost Benefit Assessment (CBA) of the development options, considering the net socio-economic impacts of the project over a 20-year period.



Chapter 9 Summarises the key findings of the business case and next steps to progress the sustainable development of the PoK.

1.3 Assumptions and Limitations

In developing this business case, REA and Civil IQ acknowledge the following assumptions and limitations:

- **Macroeconomic and Industry Uncertainty**

The resources industry (and agricultural/aquaculture/tourism industries which may utilise the PoK into the future) are volatile by nature, particularly in rural/remote areas like the Gulf Savannah region. Current uncertainty, including global conflicts and the imposition of trade tariffs by the US on key commodities, has a substantial impact on the viability of projects and the overall market/economic outlook. REA has made all efforts to capture the current market status; however, we note the potential for rapid change.

Likewise, the construction industry's operating environment is currently subject to notable uncertainty and challenges, including rapid price increases across the supply chain (with risks often borne by the lead contractor due to fixed-cost pricing models) and acute labour shortages. Capital costs are identified as one of the significant factors in the development of the PoK.

- **Limitations of Desktop Data**

This analysis utilises a broad range of desktop data sources, including the Australian Bureau of Statistics (ABS), Queensland Government Statisticians Office (QGSO), Tourism Research Australia (TRA), and published consulting and company reports. We note the limitations of desktop data sources, particularly for rural and remote communities. Where possible, the project team has verified the available data through consultation with community, government and industry stakeholders.

- **Timing and Costs are Subject to Change**

Delivering major projects, particularly in rural/regional areas, is challenging and subject to a broad range of economic/market/industry, strategic/political, planning/regulatory, and environmental/weather factors, which will influence the likelihood and timing of delivery and have substantial implications for demand through the PoK.

- **Limitations in Meeting the Queensland Government (Preliminary Evaluation) PAF**

This Preliminary Business Case follows the PAF preliminary evaluation structure. However, REA and Civil IQ acknowledge that aspects generally expected of a preliminary evaluation under the PAF (including a Traffic Impact Assessment (TIA) for proposed road transport upgrades, holistic flood mapping analysis to understand the broader impacts and benefits of transport upgrades, and risk-adjusted (P50) capital cost estimates and long term lifecycle costs for all existing and new infrastructure) are not addressed. Due to available funding and timeframes, these items are beyond the scope of this assessment.

- **Limitations of Computable General Equilibrium (CGE) Modelling**

CGE modelling utilises a broad range of assumptions to simulate how the construction of the major project pipeline will impact the regional economy, which are largely based on neoclassical economic theory. Refer to Section 7.1 for further details on the CGE modelling methodology applied.

Despite these notable limitations, this Preliminary Business Case aims to provide a robust initial evaluation of the opportunities, financial sustainability and economic benefits which could be unlocked through the strategic development of the PoK.



Chapter 2

Project Context

2 Project Context

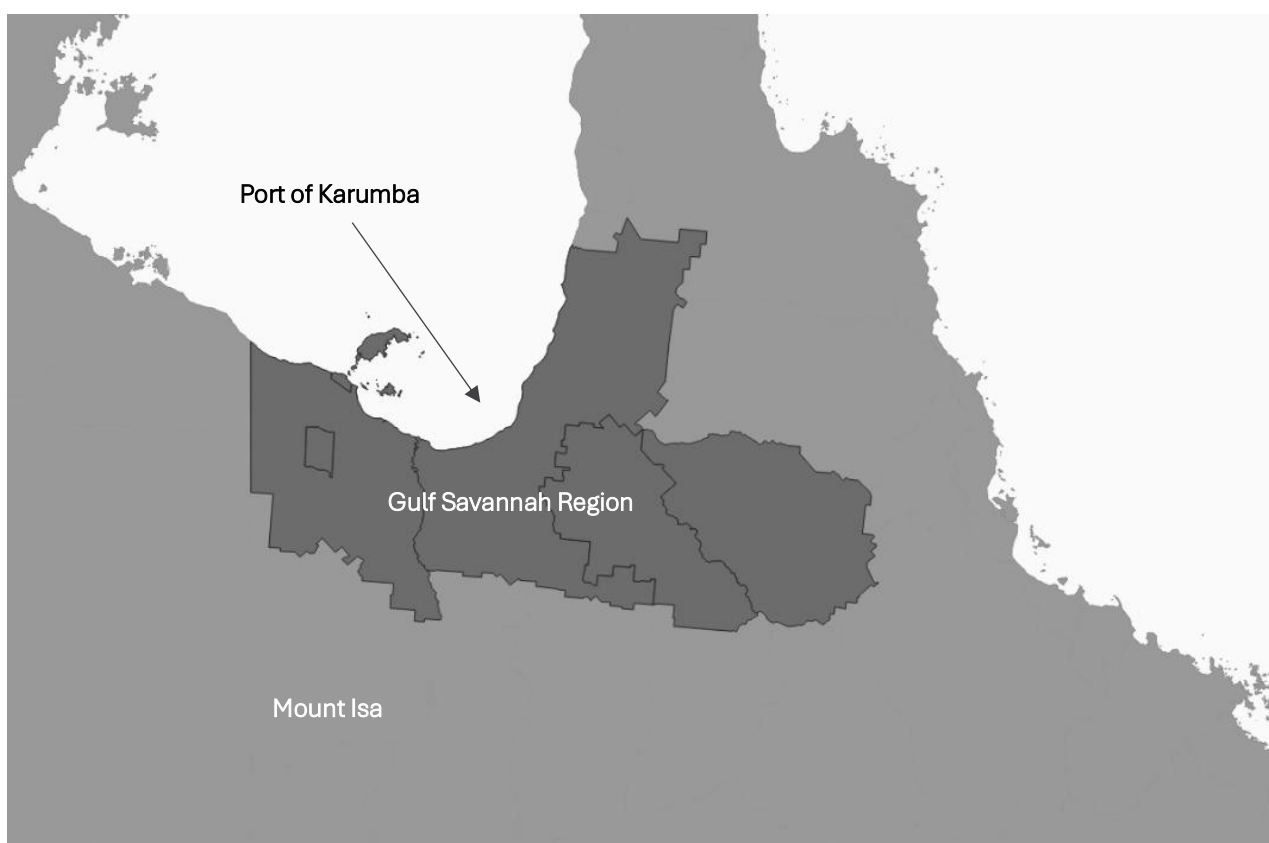
The following sections provide a brief overview of the Gulf Savannah region and the PoK, giving context for the Preliminary Business Case.

2.1 Gulf Savannah Region

The Gulf Savannah region stretches from Etheridge in the east along the Gulf of Carpentaria to the Northern Territory border, encompassing the following six Local Government Areas (LGAs):

- Burke.
- Croydon.
- Etheridge.
- Carpentaria.
- Doomadgee.
- Mornington Island.

Figure 2-1: Gulf Savannah Region



Source: REA



Key aspects of the Gulf Savannah regional economy include:

▪ **A significant regional economy driven by mining, fishing, and agriculture**

- The region forms part of the North West Minerals Province (NWMP), and has significant deposits of lead, zinc, copper, and phosphate.
- Mining employment has recovered notably since the closure of the original Century Mine with the processing of tailings operation.
- Growth in the agriculture, forestry and fishing sector has been a key driver of regional economic growth in the post-COVID period.

▪ **A notable outback tourism destination**

The region draws over 100,000 overnight visitors annually and forms part of the key Savannah Way tourism route between Broome and Cairns. Regional visitation has yet to fully recover back to pre-pandemic levels, with high costs and strong seasonality key constraints.

▪ **A varied demographic that has experienced significant periods of population decline**

- The region has returned to positive population growth since 2022 after a decade of continuous decline (bottoming at a 1.6% decline in 2016 following the closure of Century Mine the year earlier).
- The region's demographics vary significantly, with older populations in the agricultural centres of Croydon and Etheridge, and very young demographics in the First Nations communities of Doomadgee and Mornington Island.
- Overall, the region has a high representation of First Nations Australians (54% of the population identify as Aboriginal and/or Torres Strait Islander compared to 4.6% across Queensland). Supporting the Gulf communities will be key to advancing regional/state/federal objectives for engagement with and opportunities for First Nations people.

▪ **A need for supporting industries**

Health care, education, and professional services are all well below broader state and regional averages as a share of the local employment. The remote region is heavily reliant on imports of food, retail items and services.

Headline socioeconomic statistics for the Gulf Savannah region are presented in Table 2-1 below. Refer to Appendix A for the full situational analysis undertaken as part of this Preliminary Business Case.

Table 2-1: Gulf Savannah Region Socioeconomic Indicators

Indicator (Date)	Value	Five Year Growth
Gross Regional Product (2023-24)	\$992 million	+9.3% p.a.
Population (2024)	6,230	+0.4% p.a.
Average Age (2021)	34	+1 year
Tourist Visitation (Avg 2021-2024)	104,000 overnight visitors	-8.2% compared to pre-COVID average visitation (2016-2019)
Unemployment Rate (Dec 2024)	14.0%	N/A (regions not reported consistently)
Labour Force (Dec 2024)	2,596	N/A (regions not reported consistently)



Indicator (Date)	Value	Five Year Growth
Key Employment Industries (% of Employment by Place of Work, 2021)	Agriculture, Forestry and Fishing (21.7% of employment)	Agriculture, Forestry and Fishing (5.7% p.a.)
	Public Administration and Safety (15.2%)	Public Administration and Safety (-2.1% p.a.)
	Education and Training (9.3%)	Education and Training (-2.3% p.a.)
	Mining (9.2%)	Mining (48.0% p.a.)

Source: QGSO (2025), ABS (2022), NIEIR (2025)

2.2 Port of Karumba

The PoK is located at the mouth of the Norman River in the south-east corner of the Gulf of Carpentaria. It is managed by Ports North and has served remote Gulf communities since the late 1800s.

The PoK facilitates the export of zinc from the Sibanye-Stillwater (SSW) (former Century Mine) tailings retreatment operation. Zinc concentrates are transported to the PoK via a 304-kilometre underground slurry pipeline and are dewatered using SSW facilities at the port. Once dewatered, the mineral concentrate is transported via a transfer vessel to export ships anchored in a designated area 45 kilometres offshore in the Gulf of Carpentaria.

The SSW zinc tailings retreatment operation has a current estimated operational life to 2027, though the economic feasibility of further deposits is continuing to be assessed as potential stand-alone, life-extension projects. Under the current arrangement, Ports North will continue to maintain the channel depth over the lifetime of the tailings retreatment project.

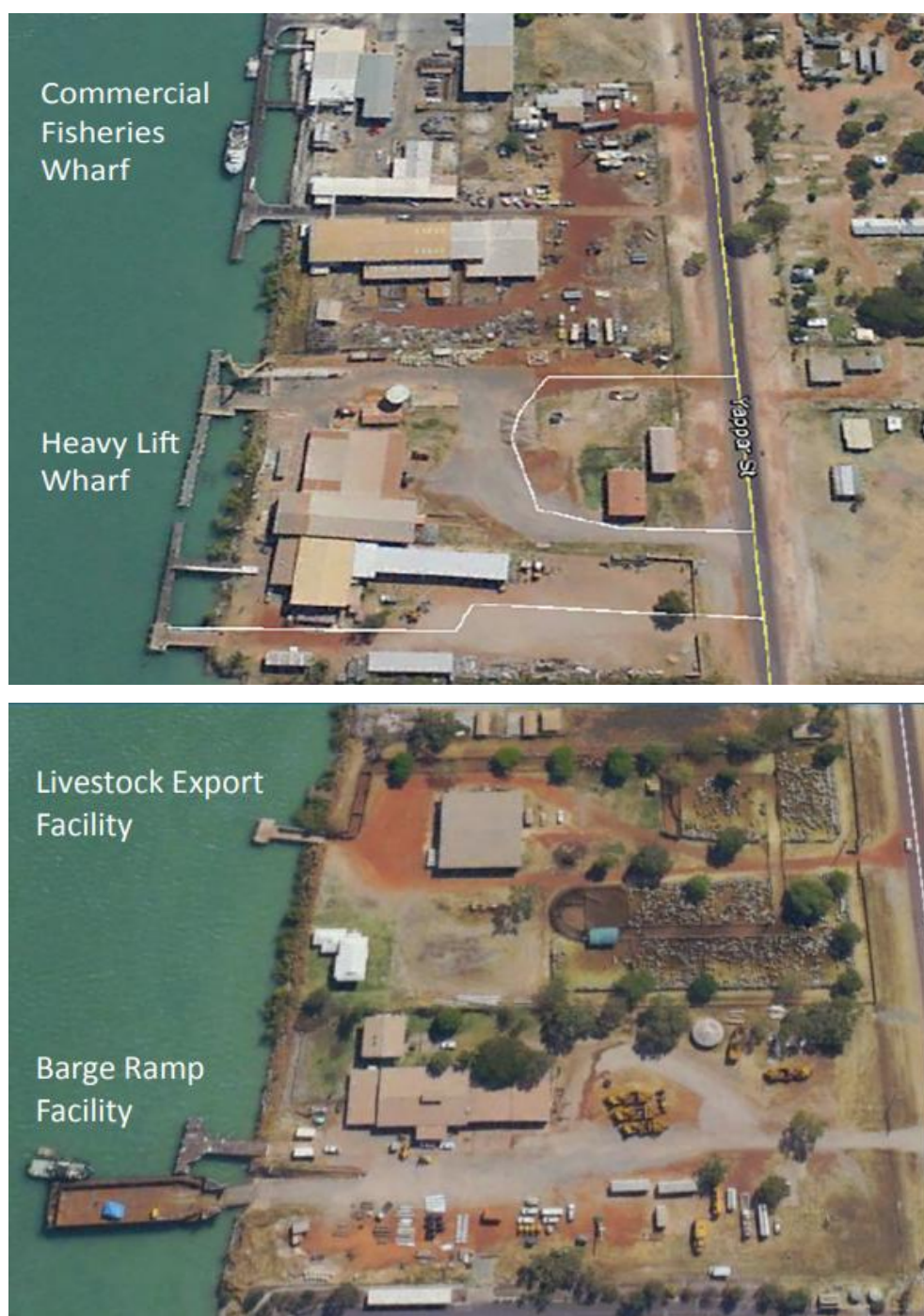
Other key roles of the PoK include historical live cattle exports and the shipment of general cargo for surrounding Gulf communities. The PoK serves as a transshipment port for the Port of Weipa and other Gulf communities, including Mornington Island, with refrigerated semi-trailers bringing goods north to Karumba for transshipment.

Facilities

The PoK incorporates the dewatering and storage facility for the SSW operations. A privately owned barge ramp and associated consolidation area are available for use for project logistics shipments. Other facilities in the port provide for general cargo, fuel and fisheries' products (notably, these facilities are also privately owned and are not on Ports North land).

Because of the isolation of the port, there are significant areas of land directly adjacent to the port facilities and across Yappar Street for the storage of project freight. There are also several sheds available for covered storage of equipment.

Figure 2-2: PoK Facilities



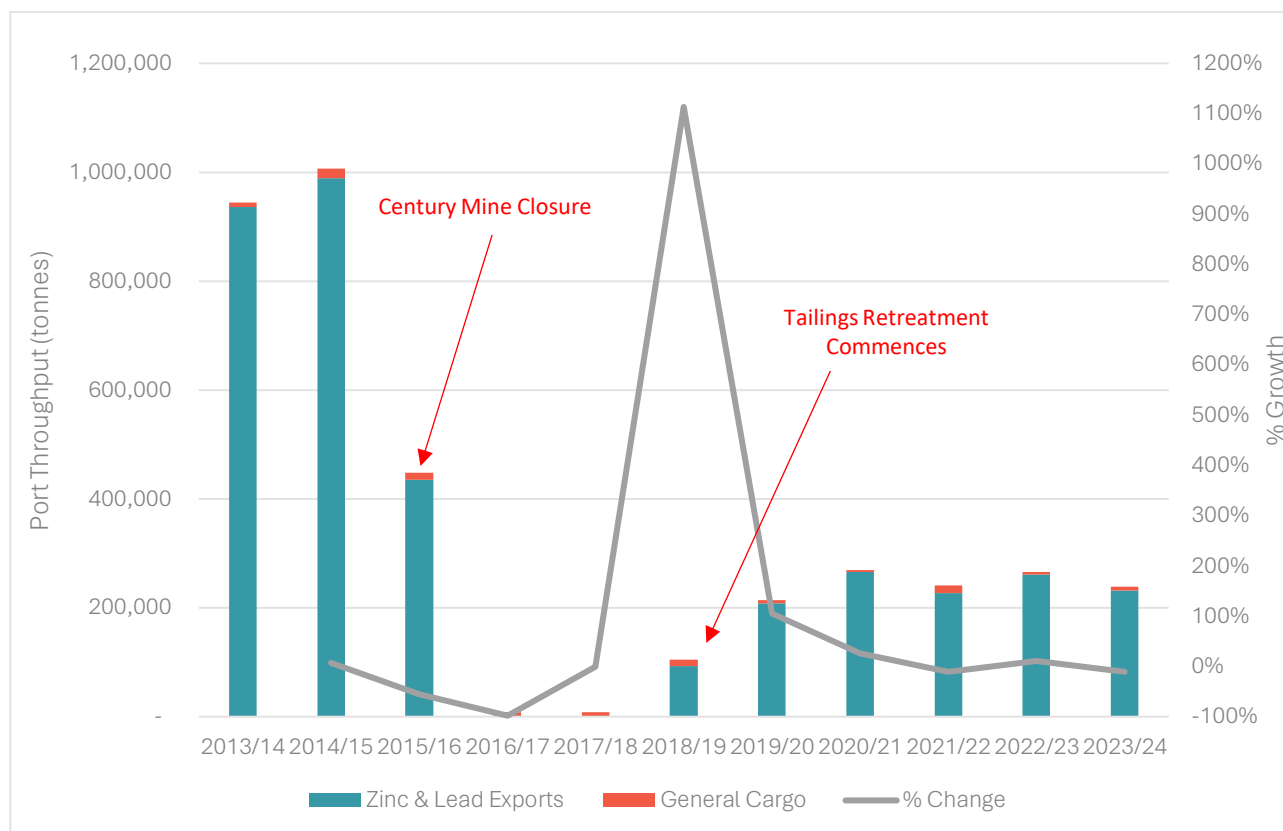
Source: Ports North

Trade Volumes and Mix

Volumes through the PoK have declined significantly since the initial closure of Century Mine operations in 2015, which was previously one of the world's largest zinc operations, with an annual throughput of circa 1 million tonnes. The current tailings preprocessing operations have recovered volumes to around 25% of previous levels.



Figure 2-3: PoK Trade Volumes



Source Ports North

2.3 Key Outcome Sought

The key outcome of this Preliminary Business Case is to deliver infrastructure works that enable the continued operation of the Port of Karumba at a level sufficient to meet the needs of identified near term developments seeking to utilise the PoK – while providing an understanding of the long-term benefits and opportunities unlocked through the strategic development of the PoK.

Project Highlight



Project

Sibanye-Stillwater (SSW)

Area of Interest

Regional Development

Sector

Mining and Metal Processing

Image

Sibanye-Stillwater (SSW)

Project Overview

SSW is a multinational mining and metals processing group with a diverse portfolio of operations, projects and investments across five continents. SSW took over ownership and operations of the Century zinc tailings retreatment operation in 2023 through the acquisition of New Century Resources Ltd (now Sibanye Stillwater Australia Operations Pty Ltd).

The tailings operations include ownership of the:

- Lawn Hill mine.
- Processing infrastructure.
- Workers camp.
- Air strip.
- 304km slurry pipeline to the PoK.
- Dewatering and export facilities at the PoK.

The operation remains the largest tailings retreatment operation in Australia and ranks among the top 15 global zinc producers worldwide. The operation produces circa 250,000 tonnes of zinc per annum and employs a workforce of 254 employees and contractors. The operations have a reported all-in sustaining cost of US\$1,975/tZn (as of December 2023).

As of 31 December 2023, Century had an attributable Mineral Resource of 3,002 million pounds of zinc (at 3.8%) and an attributable Mineral Reserve of 1,726 million pounds of zinc (at 3.0%) with an expected operational life to 2027.

SSW infrastructure at Lawn Hill, slurry pipe and Karumba are critical regional assets that support minerals exports through Karumba and could be used for future resource developments. However, under the mining leases (ML90045 and ML90058), these assets must be removed once mining activity ceases. This is the base case under this Preliminary Business Case. With significant regional resource exploration and development underway, the removal of these assets would have significant lost opportunity costs for future developments. The PhosOne bankable feasibility study, which is due in early 2026, will guide future decision-making about potential utilisation of this infrastructure.



Chapter 3

Development Opportunities



3 Development Opportunities

The following chapter outlines the potential development opportunities that could be unlocked through the PoK.

3.1 Previous Literature

Extensive research has been undertaken by GSD (2025a,b) to identify the strategic opportunities and constraints facing the region. Broadly, these opportunities fit into the mining, tourism, agriculture and fisheries industries, with the constraints of these opportunities having significant overlap, particularly regarding infrastructure and seasonal transport constraints.

Table 3-1: Outcomes of Previous Literature

Industry	Opportunities	Constraints
Mining	- Zinc throughput from Century Mine was a significant reason for development around the PoK. With its imminent closure, other opportunities, including phosphate, zinc, copper, and natural gas have the potential to fill the gap left by Century Mine and allow for a smooth economic transition for the region.	- Constraints to developing these opportunities include the seasonality of road access, general road quality, port and channel depth, available labour, energy access and cost, and variable revenue from commodity prices.
Tourism	- Tourism is based around the outback experience and the Savannah Way, with most tourists being self-drive. Fishing and marine activities form a key part of this experience with many tourists basing their activities out of Karumba owing to its favourable access to the Gulf and facilities. - Outside of the wet season, demand often outstrips supply for port and boat ramp facilities with a large influx of tourists. Accommodation and other industries in the tourism sector are frequently at maximum capacity over this period.	- The tourism industry is subject to strong seasonality with road access to Karumba frequently being cut due to wet season conditions. Flow rates through the Norman River also make mooring of yachts and tourist boats difficult in the wet season and a lack of hardstand facilities compound this issue. The lack of hardstand and slipway facilities means boats travel to Cairns for maintenance. - Perceptions around access and risk further impact travel plans (beyond actual closures), which are often made well in advance for the long stay/self-drive market.
Agriculture	- Agricultural opportunities have predominantly been centred around beef cattle, including live cattle export from the PoK in the past. Emerging opportunities exist in both food and fibre, particularly broadacre cropping and cotton.	- Constraints for the region include the seasonal weather conditions and effects on transport, irregular water availability, labour availability and lack of infrastructure for processing of raw agricultural output (i.e. a cotton gin).
Fisheries	- Karumba hosts a fishing fleet with a focus on barramundi and prawns. The PoK is the only port in the Southern Gulf with export facilities. - In addition to the above opportunities, the port also acts as an important transport node for communities and mining operations in the Southern Gulf, Groote Eylandt and Cape York. Again, a major constraint is the susceptibility of infrastructure to seasonal weather conditions.	- Seasonal weather conditions and a lack of maintenance facilities, including slipways and hardstand areas add to the difficulty of operating in the Gulf. - Commercial fishers, particularly barramundi fishers, compete with recreational fishers and charter boats. Congestion of facilities at peak tourism season is an issue.

Source: GSD (2025a,b)



3.2 Legislative and Approval Requirements

Major infrastructure developments such as those in this Preliminary Business Case are likely to require legislative approvals across all three tiers of government, with State Government approvals being the most comprehensive (triggering planning, transport, environmental, land tenure, and mining legislative instruments).

To inform a future Detailed Business Case, it will be essential to prepare tailored approvals plans for each development scenario taken forward. These plans should identify project-specific approval triggers and associated regulatory costs and timeframes. This will support more accurate risk assessment and allow the comparative evaluation of each option's deliverability, enabling government and project proponents to better manage uncertainty, secure early agency engagement, and optimise sequencing for approvals and project works.

A non-exhaustive list of key items of legislation and regulations relevant to the PoK development scenarios is provided in Table 3-2. This table offers an overview of potential legislative requirements and approval triggers; however, additional regulatory instruments may also apply depending on the specific scope, location, and staging of future works.

As referenced earlier, as this Preliminary Business Case is a preliminary (strategic) investigation to explore progression to the next stage of investigation and planning, and while it is guided by the Queensland Government PAF based on a preliminary evaluation, these legislative and approval requirements are not detailed as extensively as required in the PAF.

Table 3-2: Key Legislation and Subordinate Regulation

Legislation/Regulation	Relevance
Native Title Act 1993 (Cth) & Native Title (Qld) Act 1993	Applies to any works proposed on land or waters where native title has not been extinguished (e.g. unallocated State land, some leasehold tenures). Future use of the slurry pipeline, spoil sites, or port-side land may require Indigenous Land Use Agreements (ILUAs).
Environment Protection and Biodiversity Conservation Act 1999 (Cth)	An EPBC referral may be required where dredging or port works are likely to significantly impact Matters of National Environmental Significance (MNES), including marine species, wetlands, migratory birds, or nationally significant heritage or scenic landscapes.
Aboriginal and Torres Strait Islander Heritage Protection Act 1994 (Cth) & Aboriginal Cultural Heritage Act 2003 (Qld)	All project activities are subject to the cultural heritage duty of care. A Cultural Heritage Management Plan (CHMP) may be required for ground-disturbing works, particularly along the pipeline corridor, port expansion areas, or new access routes.
Land Act 1994 (Qld)	Governs the use and allocation of state land, including road corridors, unallocated state land, tidal land, and port leases. Relevant for dredge spoil sites, tenure amendments, access upgrades, and any expansion beyond existing lease boundaries. May trigger the need for tenure conversion, road opening, or trustee lease arrangements.
Mineral Resources Act 1989 (Qld)	Governs mining tenure, conditions of operation, and rehabilitation. Relevant to the repurposing of the Century Mine infrastructure (e.g. slurry pipeline), transfer of tenure, and any new mining activities that may feed into the PoK supply chain.
Environmental Protection Act 1994 (Qld)	This act is central to environmental regulation across both the port and mine components of the project. It governs the requirement for Environmental Authorities (EAs) for Environmentally Relevant Activities (ERAs). In addition, for mine rehabilitation or reuse of the slurry pipeline, proponents may need to amend existing mining EAs or submit new Progressive Rehabilitation and Closure (PRC) plans.



Legislation/Regulation	Relevance
Environmental Offsets Act 2014 (Qld)	Establishes the framework for imposing and delivering environmental offsets where significant residual impacts are likely to occur on prescribed environmental matters.
Planning Act 2016 (Qld) & Planning Regulation 2017	The planning and regulation act governs land use components of development and operational works outside port land, particularly for new freight infrastructure, phosphate processing facilities, accommodation camps, or warehousing. Interacts with the <i>Transport Infrastructure Act</i> and provides for the Assessment Manager function of Ports in respect of development and operational works on strategic port land and port tidal waters, including coastal structures, ERA's and related building works.
Building Act 1975	Regulates the design, construction, and certification of buildings and structures in Queensland. While not a major driver of strategic approvals, this Act is relevant to: - Port-side buildings. - Temporary or permanent accommodation. - Infrastructure such as retaining walls, storage tanks, or loading platforms.
Transport Infrastructure Act 1994 (Qld)	Applies to development on or adjacent to port land. Coordination with Department of Transport and Main Roads (DTMR) may be required for road transport modelling, infrastructure agreements, and potentially road impact assessments. Applicable to port operations and development.
Coastal Protection and Management Act 1995 (Qld)	Regulates development in the coastal zone, including dredging, land reclamation, and tidal works. Relevant to the PoK for any capital dredging, shoreline works, or spoil placement, particularly where activities occur within erosion-prone areas or coastal management districts.
Fisheries Act 1994 (Qld)	Regulates activities within waterways and declared fish habitat areas, impacts to fisheries habitat or resources, and some tidal works. These approvals often require ecological surveys, resource allocations, and offsetting measures.
State Development and Public Works Organisation Act 1971 (Qld)	Enables the Queensland Coordinator-General to declare a project as a Coordinated Project, streamlining approval processes and integrating environmental and planning assessments across agencies. Scenario 3, which includes cruise facilities, import/export functions, agricultural freight, and multi-user infrastructure, may qualify. A Coordinated Project declaration would: - Establish a clear approvals framework. - Coordinate input from multiple agencies. - Potentially replace the need for certain local or state approvals. - Provide greater certainty for investors and staged delivery.
Marine Parks Act 2004 (Qld)	Regulates activities within Queensland Marine Parks, such as the Great Barrier Reef Coast Marine Park (GBRMP). While Karumba is outside the GBRMP boundaries, confirmation is required to ensure that no part of the dredge footprint or access infrastructure intersects with a zoned marine park area or marine reserves.
Vegetation Management Act 1999 (Qld)	Regulates the clearing of regulated vegetation, particularly remnant regional ecosystems on leasehold or freehold land. It applies where new access roads, spoil sites, or logistics infrastructure extend into vegetated areas not previously disturbed. Depending on vegetation type and conservation status, a clearing permit and assessment of environmental values may be required.



Legislation/Regulation	Relevance
Nature Conservation Act 1992 (Qld)	Dredging, vegetation clearing, road construction, or inland infrastructure may impact protected flora or fauna, or occur near conservation areas or wildlife habitat. Desktop surveys and site-specific surveys may be required to determine impacts and permit requirements.
Transport Operations (Maritime Safety) Act	The main piece of maritime safety legislation in Queensland has a primary goal to ensure a balance between regulating the maritime industry for safety and supporting its efficiency and development. The Act imposes general safety obligations on ship owners, masters, designers, builders, and surveyors, who must ensure ships are safe, seaworthy, and properly equipped.
Maritime Safety Queensland Port Procedures Manual for Karumba	Defines the standard procedures to be followed in the pilotage area of the port. It provides the information and guidelines to assist ship's masters, owners, and agents of vessels arriving at and traversing the area. It provides details of the services and the regulations and procedures to be observed.
Other Plans and Policies	- Local Government Planning Scheme - Environmental Protection and Biodiversity Conservation Act, Environmental Offsets Policy 2013 - Environmental Protection Policies (EPP) - Environmentally Relevant Activities (ERA) - North West Regional Plan (NWRP) - Fish habitat policies - National Assessment Guidelines for Dredging - Queensland Biosecurity Strategy - Queensland Coastal Plan - State Development Assessment Provisions (SDAP) - State Planning Policy - State Planning Regulatory Provisions - Gulf Water Plan

Source: REA

Critical regulatory and approval considerations to realise the sustainable development of the PoK identified at this preliminary stage include:

▪ **Renegotiation of Council and First Nations land use agreements**

The historic Gulf Communities Agreement (GCA) was signed in 1997 and represents a comprehensive Agreement about land use and benefit-sharing between four Native Title Groups (Waanyi, Mingginda, Gkuthaarn and Kukatj), the Mining Company developing Century Mine and the State of Queensland, the terms of which are reviewed every five years. The transition to alternative uses (particularly lower value commodities such as phosphate) will require a substantial revision of terms, with current multi-million dollar annual payments being made by SSW to traditional owners.

The SSW operations currently form a substantial portion of the local Council rates bases across Gulf communities (totalling \$2-3 million per annum).

▪ **Potential capital dredging to restart operations of >1MT p.a.**

The PoK would require expanded dredging works to enable all tides transshipping for greater commodity volumes. Dredging contract services for the continued maintenance dredging of the POK are currently subject to detailed review and market sounding by Ports North.



- **Triggering of notifiable road user agreement protocols**

New mining operations seeking road transport of 10,000 tonnes p.a. or more via local government roads and 50,000+ tonnes via state-controlled roads will require notifiable road user agreements, which will include compensation for road upgrades and maintenance proportional to the impacts caused by the transport of mining product³.

- **Release of additional irrigation water under the Gulf Water Plan**

The Gulf Water Plan is currently under review due to increasing demands for water to support regional development, including access to critical minerals. The Queensland Government is currently reviewing the initial round of feedback on a new water plan, with the revised plan expected to be released by 2027.

3.3 Strategic Alignment

The strategic development of the PoK aligns with key regional, State and Federal strategies, which should be considered within the planning and approval requirements.

The Queensland Government has several strategic goals related to the North West, particularly regarding mineral exploration and economic diversification. The Strategic Blueprint for the North West's three strategic priorities:

- Continued resources sector development.
- Diversification of the regional economy and employment.
- Working with business and community to deliver integrated and appropriate services.

The increase in capacity of the Port of Karumba and retention of the SSW pipeline will help to deliver on these strategic goals. These two components also fulfil many of the initiatives within the North West Queensland Economic Diversification Strategy, particularly:

- Maximise the regional economic benefits of private sector projects.
- Strengthen economic development planning across the province.
- Support common user infrastructure opportunities.
- Support development of a critical minerals industry (including secondary prospectivity).
- Build the capacity of businesses and entrepreneurs to respond to market opportunities.

The Federal Government has two major strategic priorities directly tied to increased capacity at the Port of Karumba and the SSW Pipeline. The Closing the Gap Targets are of particular importance to the Gulf Savannah Region, given that 54% of the population is of Aboriginal and Torres Strait heritage; the relevance to the capacity expansion of the Port of Karumba and the SSW Pipeline is the significant economic and job opportunities that this could generate, in addition to the continuation of key payments to traditional owners. With current activities already contributing significantly to the economic prospects of the First Nations peoples of the Gulf, the loss of the supply chain would represent a substantial setback to Closing the Gap in this region, particularly Target 8 (Strong economic participation and development of Aboriginal and Torres Strait Islander people and communities). In addition, the Port services many of the communities in the Gulf, including Mornington Island, with the viability of the Port and its operating capacity being supported by the dredging and operational activity of the resources supply chain.

Federal Government strategies acknowledge the significant role it must play in enabling infrastructure, e.g. the Resourcing Australia's Prosperity Roadmap (2024–34) highlights the Government's role in enabling a strong

³ As identified in the Mineral and Energy Resources (Common Provisions) Act (2014) and DTMR's Guide to Traffic Impact Assessment.



resource sector. As mentioned, the Port of Karumba supports several other Gulf communities through transshipping.

The Strategic development of the PoK aligns with the current Northern Australia Action Plan (2024-29) with Policy Priority Area 2: Infrastructure to Unlock Growth, highlighting the need for key strategic road upgrades to support access and the development of common user infrastructure in regional areas, which will help build northern Australia's economic sustainability.

There are also notable aspects of the SSW supply chain and PoK that fit into Queensland's economic strategic direction and Australia's geopolitical strategy:

- Development of phosphate production capabilities is essential for Australia's agriculture industry as a net importer, particularly broadacre and horticulture production and Far North Queensland cattle production (noted for low phosphorus pastures).
- The region has large, quality deposits of phosphorite with domestic and export potential, as well as other prospective critical and strategic mineral deposits (copper, zinc, lead, iron, vanadium), rare earths, and lead and iron.
- Although live cattle are no longer exported through the Port, there is potential for longer-term agricultural development to be exported through the port, with production supporting both domestic and international food security.

3.4 Market Assessments

The following section considers the market perspective for various opportunities that could utilise the PoK.

Mining

Post SSW operations, the GSD region remains highly prospective for new resource production. The majority of advanced regional opportunities revolve around phosphate to the south near Cloncurry, Aeon Metals copper/cobalt project to the North West in Burke Shire near the Northern Territory border, and various less advanced copper, silver, lead and zinc projects.

Notably, major global mining operators, including Rio Tinto and Anglo American, are undertaking multimillion-dollar exploration programs around the SSW Lawn Hill mine site, which may uncover additional regional opportunities.

A key short-term, realistic opportunity is the PhosOne joint venture between North West Phosphate and SSW, which proposes to transport 1MT p.a. from the Paradise South mine site in Cloncurry Shire to Lawn Hill for processing (via a newly constructed pipeline) and then transported via the existing SSW slurry pipeline to the PoK.

We note that the PhosOne Paradise South mine has proposed production of 2MT, though only 1MT p.a. is currently proposed to utilise the PoK supply chain.



Other potential mine developments which are understood to be considering export options via the PoK include:

- **Avenir Makatea Pty Ltd/Chatham Rock Phosphate's Korella Phosphate Project**

Which is currently negotiating with Ports North for the lease of port side land at the PoK to enable the export of 200,000 tonnes per annum of lump phosphate. The port side land will enable the delivery of phosphate by road to the on-ground storage area. Up to 30,000 tonnes of storage is planned, with product then conveyed to barges for movement from the port by tugs to vessels anchored in deep water in the Gulf of Carpentaria.

- **Centrex's Ardmore Mine**

Prior to entering voluntary administration in early 2025 (due to uneconomic logistics costs), Centrex was understood to be interested in exploring potential export options via the PoK. Centrex was in the process of finalising the Stage 1.5 expansion, which would increase annual throughput to over 600,000 tonnes of phosphate.

- **Aeon Metals' Walford Creek Copper/Cobalt Project**

Has considered transport to Lawn Hill for processing and utilisation of the Century pipeline to the PoK, along with alternative logistics solutions via Mount Isa.

- **Avinera's Wonarah Phosphate Project**

Based in the Northern Territory (circa 300km east of Tennant Creek), Avinera is reportedly considering export options via the PoK in addition to Port of Darwin/Port of Bing Bong.

Operation of the Ardmore project was taken over by PRL Global in late 2025 and is currently exporting via the Port of Townsville. The opportunity has been retained within this Preliminary Business Case (developed prior to PRL's purchase) for illustrative purposes, though we note that PRL does not currently propose to utilise the PoK.

The region also has notable natural gas resources, including the MacArthur basin and the offshore Bamaga Basin (offshore from Weipa), currently being explored by Gulf Energy. We note that no gas proponents were engaged in the development of this Preliminary Business Case, though it remains a substantial medium to longer term development opportunity for the region.

Table 3-3: Regional Mining Operations

Operation	Proponent	Location	Commodity	Annual Throughput
Included Projects				
PhosOne	North West Phosphate Limited and Sibanye Stillwater Australia Operations Joint Venture	130km northwest of Mount Isa	Phosphate	2MT at mine, 1MT via the PoK
Korella Phosphate Project	Avenir Makatea Pty Ltd/Chatham Rock Phosphate	160km southeast of Mount Isa	Phosphate (yellow phosphorus - used in the production of thermal grade phosphoric acid (purified phosphoric acid) for use in Lithium-Iron-Phosphate batteries).	2.25MT (0.2MT p.a. currently being negotiated through Port of Karumba)



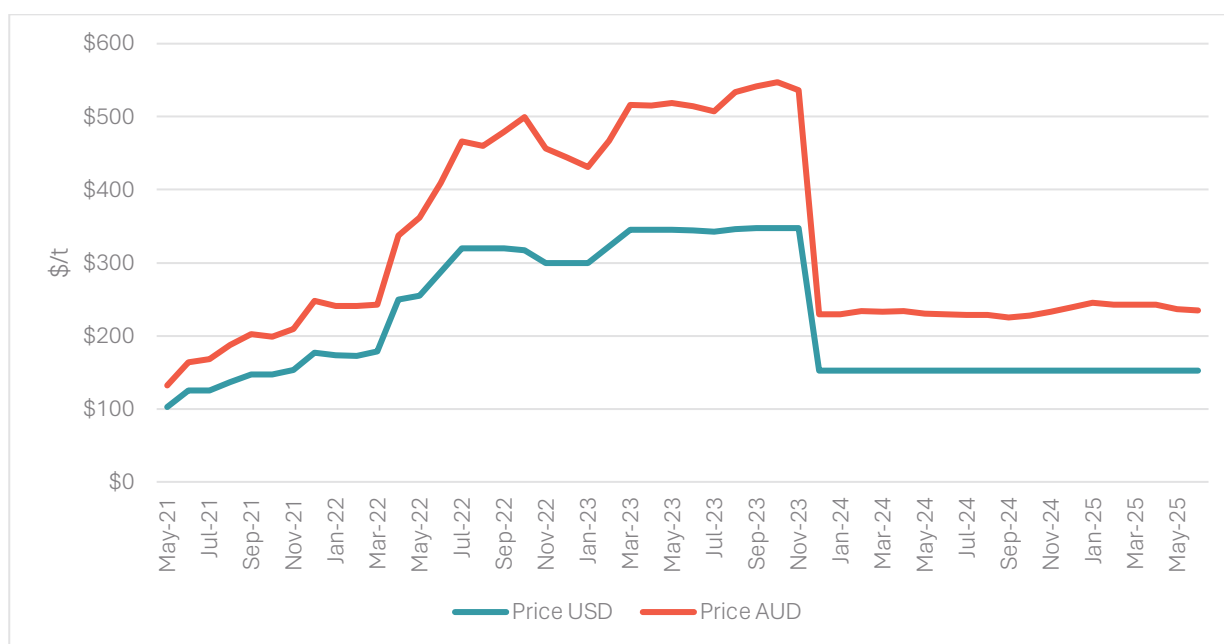
Operation	Proponent	Location	Commodity	Annual Throughput
Ardmore	Centrex/PRL Ardmore	120km south of Mount Isa	Phosphate	0.6MT
Other Potential Projects				
Wonarah Phosphate Project	Avenira Limited	300km east of Tennant Creek	Phosphate	Mine Management Plan lodged for 1.2MT extraction
Walford Creek	Aeon Metals Limited	340km north northwest of Mount Isa	Copper/Cobalt	Under Assessment

Source: REA

Identified short-medium term resource opportunities are closely tied to phosphate production, which has experienced strong but volatile market conditions over recent years. After peaking at \$US350/t in late 2023, driven by strong demand and disruption in global supply due to the war in Ukraine (both Russia and Ukraine being major world suppliers of fertiliser and grains), prices have since retreated to around US\$150/tonne (approx. AUD\$230/tonne). Prices are quoted based on the Moroccan Phosphate Rock price, which as a major producer and holder of phosphate reserves, heavily influences the world price.

Overall, the forward outlook remains positive, with global demand for agri-produce increasing (utilising phosphate-based fertilisers) and new markets emerging (such as yellow phosphorus in the production of lithium-iron-phosphorus batteries). However, the nature of phosphate mining as a relatively lower value bulk commodity, which is subject to significant price volatility, leaves operators susceptible to supply chain costs and market movements.

Figure 3-1: Morocco Phosphate Rock Price

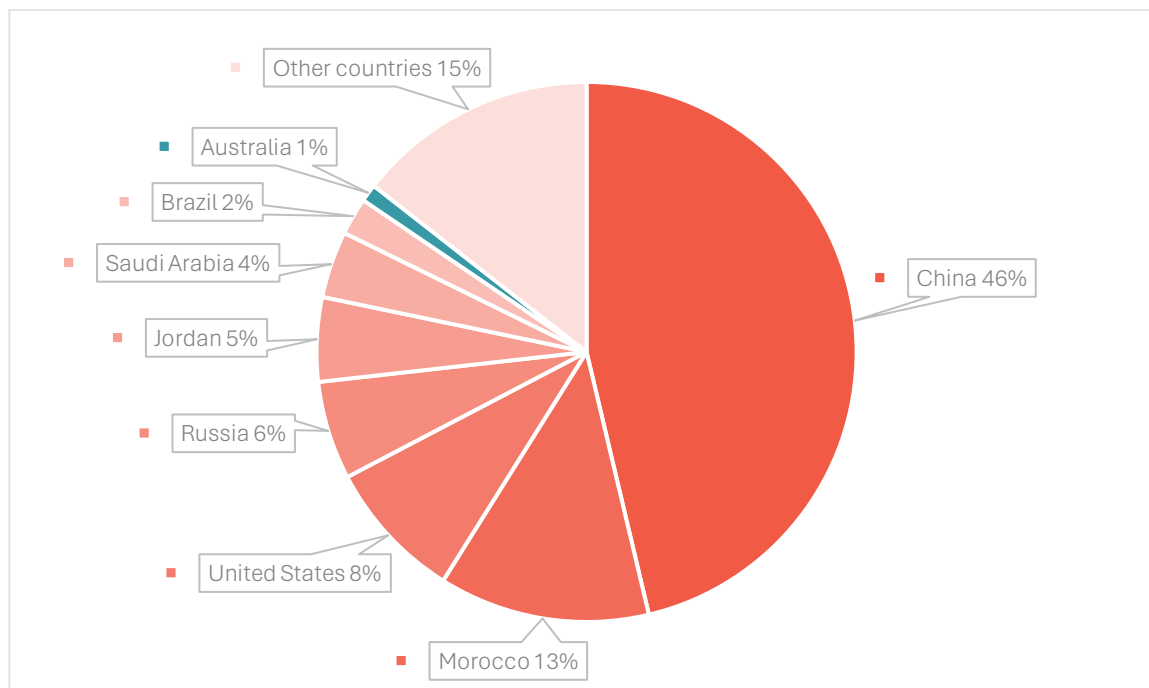


Source: World Bank

Global rock phosphate production in 2024 was estimated at 240 million tonnes by the United States Geological Survey. Between 2022 and 2024, global phosphate production increased by 2.6% per annum, and is projected to continue growing at roughly 1.7% per annum by the USGS. This reflects the trend of increasing investment and number of projects in the phosphate space, which is expected to continue in future as more planned projects come online. This expansion of supply will act as a downward force on the price of phosphate, opposing the increased demand identified above.



Figure 3-2: Global Rock Phosphate Production by Country, 2024



Source: USGS (2025), REA

Project Highlight



Project

Centrex Ardmore

Area of Interest

Regional Development

Sector

Phosphate Mining

Image

Centrex

Project Overview

The Centrex Ardmore phosphate project operated for three years, exporting high grade phosphate via the Port of Townsville. Ardmore is an open-cut mining operation that was considered low-cost with a low strip ratio of 5.6. The ore was crushed and beneficiated on-site. The Stage 1.5 expansion increased the capacity of the operations from 200,000 to over 600,000 tonnes per annum (upgrades of non-processing infrastructure and improved drying/tailings capacity) at a cost of \$17.5 million. The operations supported around 150 direct jobs.

However, due to the fall in phosphate prices and increased logistics costs on the Mount Isa-Townsville line, Centrex entered voluntary administration in March 2025 (previous company reports had estimated all-in sustaining costs at A\$160-\$180-tonne of phosphate concentrate). The project has been acquired by PRL Global (during the development of this Preliminary Business Case) and is exporting phosphate through Port of Townsville. PRL does not intend to export through Karumba, and this project has been retained in this analysis for illustrative purposes.

The mine asset remains of significant quality, producing a >34.5% P₂O₅ concentrate, which by all metrics is considered a premium concentrate by international standards. In response to Ardmore entering insolvency, the Queensland Government, through Queensland Rail, is offering start-up businesses on the Mount Isa line, including the rock phosphate industry, an innovative pricing structure that provides savings on rail access charges.

The offer will lower the cost of entry for accessing the rail network. The rail charges from Queensland Rail only form part of the rail cost, with trains on the line operated by Aurizon (which was privatised in 2010). When Centrex went into administration, it owed Aurizon over \$16 million in unpaid rail and logistics fees (much of which related to minimum contract charges enforced due to insufficient volumes).

The high costs of transport and logistics for NWMP miners place significant pressure on the commercial viability of operations. Investigating complementary export supply chains like the PoK could potentially reduce transport/logistics costs, especially for products destined for Asian markets (being geographically closer both to the port and destination market and providing increased volumes with which to cost recover PoK operations).



Agriculture

The agricultural industry has been the key driving force of the region's recent growth phase, with the uptake of broadacre dryland and irrigated cropping (cotton, grains, chickpeas) alongside the region's traditional extensive cattle grazing operations. Robust demand from Asia for key commodities (including chickpeas, mung and soybeans) is underpinning a strong medium-term outlook despite challenges, including climate and trade uncertainty (Agrifutures Australia, 2025).

The region's extensive beef cattle grazing operations are increasingly being supplemented by more intensive dryland and irrigated cropping. Currently, the region has circa 64,000 ha under cropping, and this is growing rapidly year-on-year (around 11,000 ha per annum). The region has significant potential for large scale irrigated cropping with proposals by RDA (2024) indicating potential for 100 ha of dryland and 50,000 ha of irrigated cropping in the region and a Detailed Business Case by Jacobs (2020) highlighting that Green Hills Dam is technically feasible and could deliver 130 GL of water entitlements per year to the fertile soils that run along the Gilbert River downstream of the dam, a total area of 17,900 ha.

The Gulf Water Plan is currently under review and will identify the best ways to allocate and manage water within the region, as well as look at ways to unlock more water for agriculture and critical minerals.

Key regional crops under production and/or investigation include cotton, chickpeas, sorghum (grain and forage), and peanuts.

Agricultural prices remain robust and on a long-term upward trend despite coming back significantly from the post-COVID and Russia's invasion of Ukraine peaks in 2022-2023.

Figure 3-3: RBA Rural Commodity Price Index (2023-24=100)



Source: RBA

Fishing

Karumba is a major fishing hub with key target species including Barramundi, Mackerel, King Salmon and (Tiger, Banana, Endeavour) Prawns. Several commercial fishing operations are based out of Karumba (there are 84 N3 commercial fishing licences in the Gulf, with 59 of those being used by fishers), with the largest fleet being operated by Raptis, including 14 vessels and a mothership operating in the region.



The industry is subject to a level of uncertainty with the introduction of five additional gillnet-free zones in the Gulf of Carpentaria aiming to strengthen protection measures for at-risk species:

- Northern Gulf of Carpentaria, all waters within the defined area from Boyd Point north to Cape York.
- Western Gulf of Carpentaria, all waters within the defined area from the border with the Northern Territory east to Point Parker, including N3 waters around the Wellesley Islands.
- Norman River, all waters within the defined area, including the Norman River and associated tributaries.
- Pormpuraaw, all waters within the defined area from north of Balurga Creek to south of the Chapman River.
- Topsy Creek, all waters within the defined area between north of the South Mitchell River to south of Horse Creek.

The Queensland Government is considering a ban on gillnet fishing in key catchments, including the Flinders River, Mitchell River, Kirke River, and the areas around Mornington Island.

While the fishing industry is not directly incorporated into this business case for the PoK, its operations would be supported by the continuation/expansion of the channel dredging and should be further analysed in the next stage of investigation of PoK's sustainable development.

Aquaculture

In addition to wild caught fishing, the Gulf-Savannah region has been shown to have potential for large scale aquaculture production (including pond aquaculture for barramundi and high value crustaceans identified in the North West Queensland Strategic Development Study (AEC Group, 2014)).

The region has notable skills in aquaculture, including the Les Wilson Barramundi Discovery Centre at Karumba, the only hatchery in the world to breed the Southern Gulf strain of Barramundi.

Aquaculture provides the potential to add diversity and sustainability to the region's established fishing industry, though a more detailed feasibility assessment is required to understand its full potential and any ties to export via the PoK.

Tourism

The Gulf Savannah region is a notable outback tourism destination and part of the Savannah Way tourism route. The region has a host of natural attractions, including Boodjamulla (Lawn Hill) National Park, Gulf of Carpentaria Marine Park, Undara Volcanic National Park, and the Riversleigh Fossil Site.

The First Nations communities of Doomadgee and Mornington Island, and the Indigenous people in Burke and Carpentaria, are known for their rich cultural heritage and internationally acclaimed artworks, in addition to the region's unique natural assets. Other notable regional attractions include geological wonders and gold fossicking in Etheridge Shire and built attractions, including the Les Wilson Barramundi Discovery Centre at Karumba, and some of the best camping and fishing experiences in Australia.

Visitation to the region is highly seasonal, with 80% of visitors to the Gulf Savannah arriving between April and October (GSD, Savannah Way & TTNQ, 2024) during the cooler months and avoiding the summer monsoon.

Post COVID, the region has attracted approximately 105,000 overnight visitors p.a. who stayed over 535,000 nights with >90% of visitation being domestic travellers. Estimated average visitation has remained modestly below pre-COVID levels (-8% for visitors and -15% for nights), with cost-of-living pressures and the reopening of international travel options impacting the domestic visitor market.

Domestic visitors have greatly increased expenditure in the region (>60% increase in spend per night) in the post COVID period, consistent with the significant cost increases over the period and a shift away from traditional long-stay grey nomad visitors towards a shorter-term and higher yield visitor.



Table 3-4: Gulf Savannah Region Tourist Visitation (Calendar Year)

Indicator	Pre COVID Avg (2016-2019)		Post COVID Avg (2021-2024) ¹	
	Domestic	International	Domestic	International
Visitors ('000)	107	6	99	5
Visitor Nights ('000)	576	56	488	48
Avg Stay (Nights)	5	9	5	10
Avg Spend Per Trip	\$620	\$883	\$916	\$770
Avg Spend Per Night	\$115	\$94	\$186	\$74

Note: ¹ International visitation is based on the average of two years (2023-2024) due to data limitations during and post COVID

Source: TRA (2025)

Key infrastructure constraints within the tourism sector include:

- Periodic road closures, with travellers acutely sensitive to disruptions, and the region potentially losing out on visitation due to news of road closures and concentrating visitation within the winter months.
- Power infrastructure, with the 22Kv connection to the National Electricity Market (NEM) being insufficient for dense commercial uses.
- Telecommunications infrastructure, including mobile access and associated safety/quality of life impacts.

The establishment of small cruise ship tourism through the PoK is identified as an opportunity to extend and diversify the regional tourism industry and offer. Tourism infrastructure and industry growth is a key avenue to create and sustain employment and improve the liveability of the region. Western Australia is an example of a developing cruise industry in the wider region, including smaller vessels operating through Broome and the Kimberleys.

Import Opportunities

The GSD region, and Karumba specifically, is highly import dependent for food, fuel and other essentials, which are typically brought in via road (or emergency via air if roads are closed). Investments within the PoK may unlock opportunities for the importation of goods, which could result in substantially improved reliability and lower costs.

Food and fuel resilience and high transport costs are key issues facing the Gulf Savannah region. For example, the Gulf Savannah region consumes 250 million litres of fuel per annum (Mirabou Energy, 2023), which is mostly trucked into the region. During the wet season, fuel supply can be limited or non-existent. Food supply can also be restricted during the wet season. PoK import infrastructure and storage facilities, together with improved road infrastructure, could significantly improve regional resilience, from food to fuel resilience, community to industry, and reduce the cost of living and costs of doing business in the region.

Estimated regional imports (utilising transaction table analysis) are presented in the table below. A detailed analysis of regional import demand is recommended to be undertaken within the Detailed Business Case.

Table 3-5: Gulf Savannah Regional Imports (2021-22)

Rank	Sector	Regional Imports By Sector (\$M)
1	Construction Services	\$406
2	Health Care Services	\$298
3	Retail Trade	\$269
4	Food and Beverage Services	\$227
5	Public Administration and Regulatory Services	\$217

Source: ABS (2024), REA



The potential for establishing imports via the PoK has been considered from an infrastructure perspective by Civil IQ (see Appendix B). Given the substantial costs of establishment, development would likely require a broader industry driver to underpin development.

The current area of broader regional need is sulphuric acid, a key input into many existing mining-related operations in Queensland's North West and North East Mineral Provinces (the largest being Phosphate Hill fertiliser operations near Cloncurry).

Current demand for sulphuric acid is predominantly met by domestic production as a by-product of copper and zinc smelters located in Mount Isa and Townsville. Glencore's Mount Isa Mines Copper Smelter contributes 47% of the total current local sulphuric acid production capacity to the Queensland market (CRU International, 2023).

The Glencore Mount Isa Mine copper operation and copper concentrator closes in July 2025. Glencore expects the copper smelter to operate until 2030 subject to approval of additional capital investment (under negotiations with the State Government as of the time of writing and subject to significant uncertainty).

To meet the projected supply gap for operating and probable projects through seaborne trade alone, imports of sulphur would need to reach approximately 500 ktpa by 2027 and grow to approximately 900 ktpa by 2031.

The Port of Townsville has a current sulphur import capacity of approximately 170 ktpa. After completion of the ongoing port expansion, the maximum import capacity is expected to be approximately 254 ktpa without additional investment in portside logistic upgrades.

These import levels remain circa 100kt short of demand even under CRU International's most conservative assessment (operating projects only), highlighting a potential market gap for the PoK to import sulphur (see "Regional Case Study: Regional Electricity & Energy Supply Proposal" on page 35).

3.5 Port of Karumba Supply Chain Comparison

The following section reviews the available supply chain and cost data for the PoK and available alternatives for regional supply chains to provide context for the strategic potential of the PoK.

Port of Karumba Supply Chain

The existing SSW (and prior Century) supply chain utilises a 304km underground slurry pipeline from the Lawn Hill Mine and Processing site in the Lower Gulf of Carpentaria directly to the dewatering facilities at the PoK.

Key aspects of the pipeline include (Goldsmith, 2014):

- 300NB x70 grade steel pipe.
- Pipewall thickness 8.4mm at Lawn Hill, 4.8mm at Karumba.
- HDPE liner nominally 7.5mm.
- 1.2km flanged strings.
- Minimal depth of 750mm.
- Directional drilling under all major rivers.
- 3x Wirth triplex diaphragm pump 8 ¾" x 14".
- 1.13MW VSD motors.
- Parallel arrangement.
- Discharge pressure – 20MPa (max).
- The pipeline has the capacity to operate continually at 270 -300 m³/hr.



Recovered ore is fed into a crusher, bringing pieces down to a size of approximately 100mm. After crushing, the ore is carried along a conveyor into the semi-autogenous grinding (SAG) mill, where it is broken down further and fed into a ball mill, where steel balls grind the ore into material about fifty-five microns in size⁴.

The concentrator at Lawn Hill is primarily a conventional grinding and froth flotation circuit, comprising one SAG Mill, two ball mills, 21 stirred mills and 79 flotation cells. Due to the particularly fine nature of the zinc in the ore and its silicate content, the ore must be ground using an ultrafine grinding process. This grinds the material to approximately six microns, which maximises the amount of zinc that is recovered.

Once processing in the flotation circuit is complete, the zinc concentrates are thickened into a slurry form that resembles a thick liquid or paste of about 37% solids. During this process, water is transferred to the water clarifier and then into the dam, where it is recycled. The zinc concentrate slurry itself is pumped to storage tanks in preparation for transfer to the PoK.

A single pump station at Lawn Hill pressurises the pipeline, propelling batches of zinc and lead concentrates to Karumba. Monitoring spools located at various lengths along the pipeline measure flow and pressure rates, with teams at Century's Lawn Hill and Karumba sites continuously monitoring pipeline operations. It takes about three days for a batch of concentrate to reach Karumba.

Once received at SSW's port facility at Karumba, the zinc and lead concentrates are dewatered and stockpiled prior to transfer to the MV Wunma, the transfer vessel is custom-built for operations on the shallow Norman River channel and Gulf waters. The MV Wunma then transports concentrate to export ships anchored in a designated area offshore.

Figure 3-4: Current SSW Supply Chain



Source: Rebelconnect.com.au

⁴ A micron is 1/1,000 of a millimetre.



This innovative solution was developed at significant capital cost (circa \$2 billion⁵ established in 1999) for a globally significant and profitable resource project. Key advantages of the slurry pipeline solution include:

- Overcomes some key regional logistics hurdles, such as road access during the monsoon and the need for intermodal transport (i.e. trucking from mine site to a rail loadout facility).
- Reduced supply chain distance to the port from potentially >1,200km (depending on mine location: 977km rail link from Mount Isa to Townsville) to 304km.
- Reduced shipping times to key Asian markets (3-4 days closer compared to Townsville via shipping routes) (Dalton, 2013).

The main limitations of the PoK-based supply chain are well understood and include:

- The shallowness of the port channel: With current tailings operations working on a tidal basis to limit dredging requirements.
- Access restrictions (no direct flights to Karumba and road closures during the monsoon season).
- Limited electricity capacity: SSW's PoK operations currently require circa 3MW of electricity with only 1MW of this being accessible via the grid (gap serviced through diesel generators). Future energy needs will quadruple if PoK minerals processing resumes at >1Mtpa under the PhosOne JV.
- Costs incurred with transshipment from the PoK to deepwater vessels (circa 40km).

Unlocking new development opportunities and increased volumes through the PoK is complex. New operations not utilising the SSW pipeline will reintroduce the need for extensive road transport⁶ and associated access constraints, while higher port volumes will necessitate operations on all tides and potential substantial capital requirements as trade and shipping volumes increase, as well as significantly increased electricity consumption. Development of renewable energy micro-grids as envisaged in the Regional Electricity and Energy Supply Proposal (Mirabou Energy/GSD, 2023) may be required to facilitate industry's access to reliable and affordable energy to support the sustainable development of the PoK (see "Regional Case Study: Regional Electricity & Energy Supply Proposal" on page 35).

Mount Isa to Townsville Supply Chain

The main alternative supply chain for resource producers is linking east to the Port of Townsville either via the Mount Isa rail line or via road along the Flinders Highway. As per the PoK, the Mount Isa to Townsville supply chain is itself subject to notable challenges.

The Mount Isa Rail Line is frequently touted by project operators as the most expensive rail network in Australia, with the high cost of using this network placing a considerable burden on mine operators (CRU International, 2024). The high costs are attributed to several factors:

- Underutilisation of rail capacity (4-5 MT p.a. vs. an 8-10MT capacity): Under the price recovery methodology, the underutilisation increases the freight costs for the remaining rail users (with operating costs recovered from a smaller throughput base).
- Slow travel sections (travel via rail is typically significantly longer than road – variable conditions of the rail line determining travel times).
- Short and poorly spaced passing sidings.
- High maintenance costs.

⁵ Value in historical dollars.

⁶ Potential rail solutions have been proposed previously by the proponents of Chatham Rock Phosphate and Carpentaria Rail but are not considered within the scope of this preliminary assessment.



- Common closure due to flooding and speed restrictions due to extreme heat.
- The narrow gauge limiting carrying capacity.
- Cost of back-hauling empty wagons.

Transport has increasingly been undertaken via road, using road trains typically carrying between 57 tonnes (in a twelve-axle A-double road train) to 82 tonnes (in an eighteen-axle A-triple road train). As with the rail line, the roads along the Mount Isa to Townsville supply chain are also regularly affected by wet weather, leading to closures.

High Level Cost Comparison

For illustrative purposes, high level supply chain costs are considered for road and rail options along the PoK - Mount Isa - Townsville supply chains based on operations from SSW at Lawn Hill.

We note the significant limitations of this analysis, given the confidential nature of rail contracts and the differing logistics needs of each individual project (this analysis assumes road transport to Mount Isa and then rail to the Port of Townsville as per the previous Centrex operation; it should be noted that accessing the rail line further east could notably reduce logistics costs):

- The associated dredging and transshipping costs associated with the PoK supply chain also need to be allowed for against the intermodal (road/rail) transport costs associated with transport via the Mount Isa line.
- Potential costs associated with access closures (and potential mitigation measures such as stockpiling) across the PoK and Mount Isa to Townsville supply chains will also notably impact operational viability.

In spite of these significant limitations, the analysis does highlight the potential savings that the proximity of PoK provides (circa \$50/tonne in savings from getting product to port) in the context of a high-volume, low-margin commodity such as phosphate. At current prices a \$50/tonne saving results in >20% margin increase.

Potential logistics cost savings using the PoK will be further verified and refined with proponents as further detail is sourced (including the PhosOne Bankable Feasibility Study and Ports North Dredging Options Study).

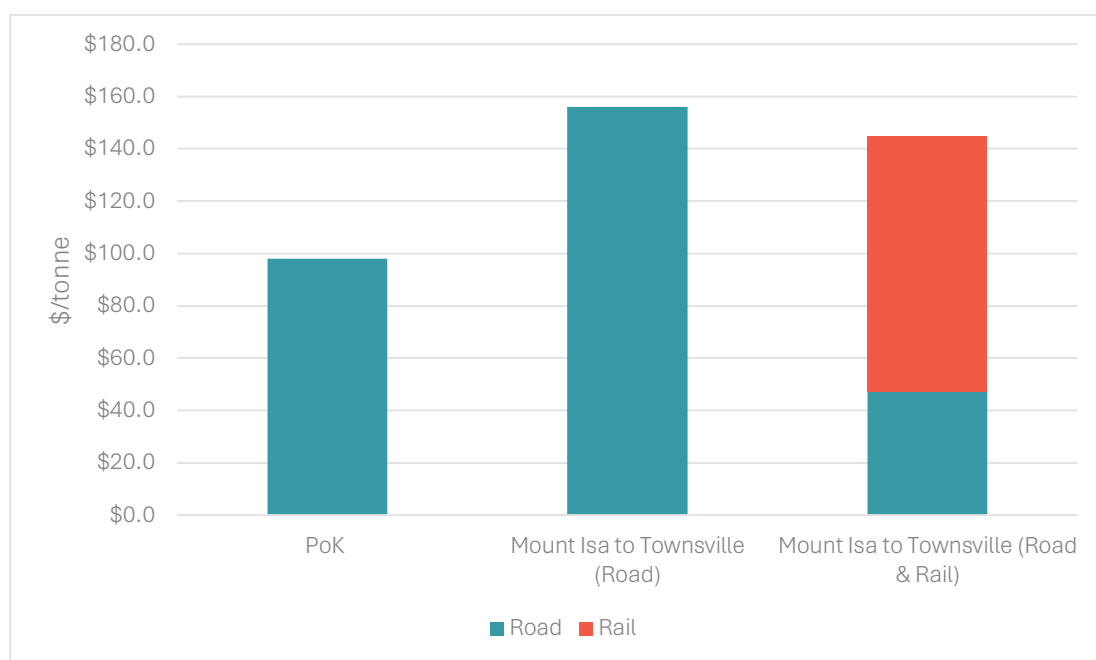
Table 3-6: High Level Transport Costs Comparison (Based on SSW Lawn Hill)

Factor	Assumption	Karumba (650km)	Townsville (1,200km Road/ 313km road + 977km rail)	Notes
Road Transport	Karumba 0.15\$/tkm Townsville 0.13\$/tkm	\$98/t	\$156/t	Excludes loading/port side costs
Rail Transport	Townsville 0.10\$/tkm (Requires circa 313km via road to load onto rail at Mount Isa (@0.15\$/tkm))	n/a	\$145/t	Assumes no minimum volume contract requirements

Source: L.E.K. Consulting Australia (2021), REA



Figure 3-5: Transport Cost Comparison



Source: REA

Project Highlight



Project

PhosOne

Area of Interest

Regional Development

Sector

Phosphate Mining

Image

NorthWest Phosphate

Project Overview

PhosOne is a joint venture between North West Phosphate Limited (NWP) and SSW.

PhosOne will mine phosphate from NWP's new Paradise South mine located about 130 kilometres northwest of Mount Isa, which will then be transported to SSW's Lawn Hill site for processing. An estimated 1MT p.a. of fine phosphate would be transported via a newly constructed pipeline from the mine site to SSW processing facilities for processing and then via the existing slurry pipeline to the PoK.

Additional processing of the concentrate will be carried out at the PoK before the phosphate rock concentrate is shipped to trade partners.

The PhosOne project was declared a prescribed project in May 2025. The joint venture partners are currently undertaking a Bankable Feasibility Study, which is expected to be completed in 2026.

Subject to the outcomes of the PhosOne Feasibility Study, this project would effectively utilise the existing SSW infrastructure at Lawn Hill, slurry pipe and Karumba, ensuring these critical regional assets would continue to support minerals exports through Karumba and strengthen the role of PoK as a commercially viable second major export pathway for the North West Minerals Province. The PhosOne JV would significantly mitigate the looming negative regional economic impacts that would result from SSW closure after FY 2027.

A per tonne subsidy to export phosphate through PoK, similar to the existing per tonne subsidy to export via the Mount Isa-Townsville rail line, would significantly underpin the viability of the supply chain through PoK.



Chapter 4

Market Sounding



4 Market Sounding

The following section summarises the outcomes of the stakeholder engagement process undertaken with project proponents, key service providers and other key stakeholders as part of the development of this Preliminary Business Case. The purpose of which is to market-sound the service need and development opportunities associated with the sustainable development of the PoK.

4.1 Consultation Approach

Market sounding was undertaken via:

- A three-day site visit (including SSW port operations and through the PoK), culminating in a half-day workshop with key stakeholders at Karumba from the 26th to 29th May 2025.
- One-on-one telephone consultations with identified stakeholders who were unable to make the workshop or have face-to-face interviews during the site visit.

Key lines of enquiry undertaken through the market sounding phase included:

- Supply chain opportunities for the PoK, including potential financial and strategic benefits of a supply chain utilising the PoK and potential commodities/volumes over time.
- Future synergies with the Port of Weipa, with Karumba potentially being the domestic and southern Gulf transport/logistics hub supporting Weipa as the international and Cape transport/logistics hub.
- Key bottlenecks and other limitations within the current supply chains.
- Key infrastructure requirements to unlock a new PoK supply chain.
- Barriers and risks to the development of the PoK, including legislative, approval and consent requirements, as well as environmental impacts/conditions (e.g. lead and contamination impacts on development/exports).
- Market outlook and other factors impacting development.

The consultee list was developed in collaboration with GSD and the project working group.

4.2 Market Sounding Outcomes

Key outcomes from the market sounding exercise and broader consultation are reported below based on the lines of enquiry.

Supply Chain Opportunities for the PoK

- Phosphate exports were identified as the key short-term supply chain opportunity for the PoK:
 - Continuing operations via PhosOne utilising the SSW infrastructure was identified as a critical first step to underpin the ongoing viability of regional operations. Losing the established infrastructure was seen as a major step backward for the GSD region and the entire NWMP.
 - Other potential opportunities included Chatham Rock (Korella), restarting of Ardmore exports through a new and shorter supply chain, and potentially bringing exports from Avinera's Wonarah Phosphate Project across from the Northern Territory to develop PoK as a commercially viable second export pathway for the North West Minerals Province.



- Agricultural opportunities were seen as a longer-term supporting opportunity, which would benefit from supply chain upgrades proposed for phosphate exports.
- Winter broadacre cropping would reduce risks of access restrictions to the PoK (i.e. not seeking to harvest/export during flood-prone times).
- Restarting of live cattle exports was seen as a significant benefit, but the lack of available small vessels to utilise the PoK (even with dredging for phosphate projects), portside infrastructure and industry commitment of guaranteed supply was identified as a major hurdle.
- Major investments in water and a supporting industry/infrastructure (e.g. a cotton gin) are required to support the development of the industry beyond the PoK.
- Cotton production is continuing to grow in the Gulf region and a preferred regional location for a cotton gin has previously been identified. Industry has indicated that a cotton gin needs to be central to large producers with significant water licences. Development of a cotton gin could strengthen PoK as an agriculture export hub as lint and cotton bales are exported to China for processing.
- Regional imports were identified as a major area of need to support growth, though it was acknowledged that there is a lack of fundamental data to underpin investment at this stage.
- A long-term opportunity to develop a small cruise ship industry in region.
- Major local industries (tourism, fishing) were seen as benefiting from the continuation/expansion of operations at the PoK. Other opportunities, such as investment in a slipway to enable expanded local repair and maintenance of fishing and other vessels were also considered.

Future Synergies with the Port of Weipa

Discussions were held regarding the potential for Karumba to have a greater role as a transshipment port for Weipa. Of note was the potential future operations of Rio Tinto at Weipa and the potential transition to the Kangwinan project, which would operate through the Amrun Port. Changes to mining operations around Weipa are expected to lead to a future transition for the township. Karumba could play a role in supporting Weipa's potential future transition.

The opportunity scoped by GSD with the Weipa Town Authority includes the potential development of a logistics 'hub and spoke' model where Port of Karumba is the Gulf/North West Queensland and lower Cape domestic logistics centre linking in with Port of Weipa as Cape York/Far North Queensland and upper Gulf international and domestic logistics centre. Weipa has underutilised port infrastructure, and this 'hub and spoke' concept approach to logistics management in the Gulf and Cape could help to overcome the limitations at the Port of Karumba and leverage the strengths of the Port of Weipa.

Weipa is a naturally deep international port with first and last port of entry rights for shipping, whereas Karumba is a naturally shallow port supporting Gulf communities and declining exports of zinc. This opportunity could strengthen regional Cape and Gulf resilience through the exploration of a 'hub and spoke' transport and logistics centre, with potential for regular barge operations between Weipa and Karumba linking the two transport and logistics hubs.

These opportunities should be further explored in a Detailed Business Case.

Key Bottlenecks and Other Limitations within the Current Supply Chains

Key limitations with current supply chains were identified by stakeholders as:

▪ Road Access

The Gilbert River Bridge and road links between Normanton and Karumba, and between Normanton and Cloncurry, during the wet season were repeatedly identified as points of need for Scenarios 2 and 3. While it was acknowledged that there would always be a level of seasonality to operations in the Gulf (seasonality is not



just be limited to flooding and road closures, but also subject to (dynamic) load restrictions during the wet season, for example, due to saturated pavements), strategic improvements in road and port access infrastructure could reduce the impacts of localised flooding and could assist in the strategic planning for operations during the wet season (e.g. stockpiling).

Road access requirements should be further explored in a Detailed Business Case to understand seasonal limitations and dynamic load restrictions during the wet season.

■ **Energy**

The current 22kv connection to Karumba was identified as inadequate for most commercial uses for both large and small businesses (the grid can only supply around a quarter of SSW's on-site needs). Future energy needs will quadruple if PoK minerals processing resumes at 1Mtpa+ under the PhosOne JV, which may not be able to be met through increased diesel generation. To meet significantly increased future electricity consumption, development of renewable energy micro-grids as envisaged in the Regional Electricity and Energy Supply Proposal (Mirabou Energy/GSD, 2023) may be required to facilitate regional industry's access to reliable and affordable energy to support the sustainable development of the PoK.

Energy requirements should be further explored in a Detailed Business Case.

■ **Telecommunications**

Communications outside of the key townships is limited, increasing operating costs and resulting in substantial safety risks.

■ **PoK Access**

The current 2.2M LAT dredging is reliant on tides and would be unable to facilitate expanded volumes of throughput.

■ **Flight Access**

The lack of direct flights to Karumba (which previously occurred under full Century operations) limits worker options and constrains regional operators.

Key Infrastructure Requirements to Unlock a New PoK Supply Chain

The key infrastructure requirements identified through the market sounding process included:

- Expanded dredging program to enable throughput >1MT p.a. through the PoK: A range of dredging levels and alternative options were discussed at a high level (noting that detailed investigation is being undertaken by Ports North).
- Common user infrastructure to support expanded phosphate exports from other operators
- Sealing of the remaining sections of road linking the phosphate mines around Cloncurry through to Normanton, and improved road and port access between Normanton and Karumba.
- Raising of the Gilbert River Bridge: Identified as a key access bottleneck, particularly for agricultural production coming from the Etheridge area.

A detailed analysis of supply chain infrastructure requirements for identified projects was undertaken as part of this study by Civil IQ (See Appendix B).

Barriers and Risks to the Development of the PoK

The transition from a high-value resource operation (zinc at approximately \$US3,500/tonne) to a lower-value bulk commodity (phosphate at circa US\$150/tonne) was seen as the major inhibitor to development.



Many of the agreements and costs (port agreement, Council rates, First Nations land use) were established under the original Century project and are identified as potentially beyond the capacity of PhosOne/the additional proponents in the area's capacity to cover. These agreements would need to be reconsidered and renegotiated for the development of a regional phosphate supply chain using the PoK to be sustainable.

The requirements for mine rehabilitation (including the decommissioning and dismantling of key SSW assets, including processing, slurry pipeline, worker accommodation, and airstrip) were identified as potentially detrimental to economic development outcomes. These assets were identified as having substantial additional operating lives if properly adapted/maintained, and could lower the costs/barriers to development for future projects substantially.

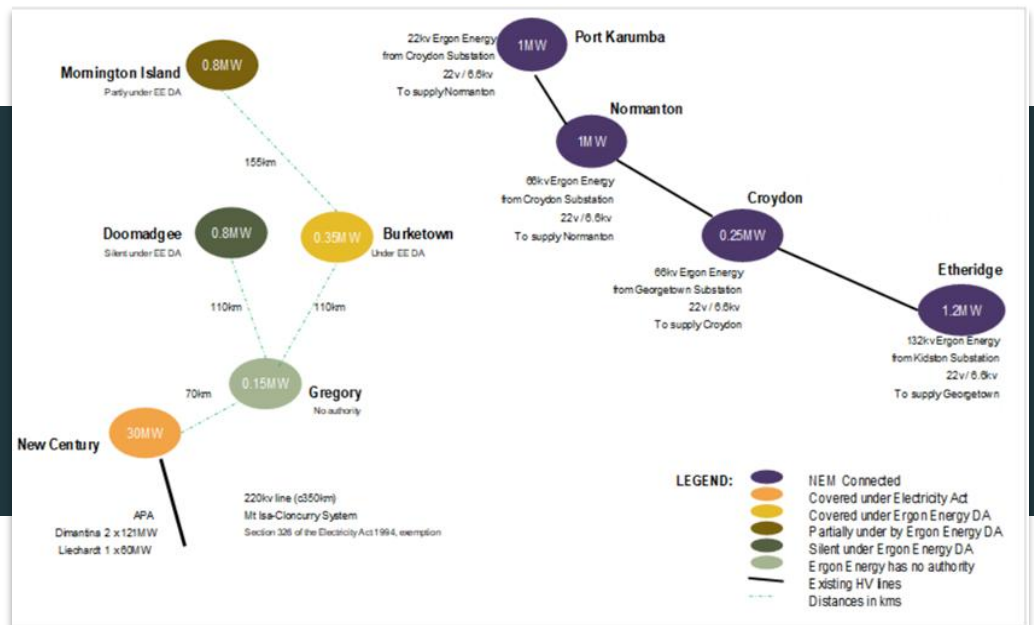
Loss of expenditure within the regional economy (e.g. Council rates, Gulf Communities Agreement, employment and local contractors) poses a significant detriment to the viability of Councils, local Indigenous organisations, regional employment and residents.

Market Outlook and Other Factors Impacting Development

There was substantial discussion around the current outlook and impact on economic development, including general global uncertainty and US trade policy impacting demand. It was understood that the regional supply chains needed to be as cost-efficient and robust as possible to maintain operations during the market down-cycle.

Despite the risks, there was a clear understanding of the economic potential for the Gulf Savannah region, with its strong positioning in resource and agricultural production as well as authentic outback tourism. Leading infrastructure was seen as the key enabler for the region in overcoming market challenges.

Project Highlight



Project Overview

Project

Regional Electricity & Energy Supply Proposal

Area of Interest

Regional Development

Sector

Energy Generation

Image

Regional Energy Supply Network: Mirabou Energy (2023)

A detailed analysis of local energy needs, future demand and infrastructure solutions was undertaken by Mirabou Energy (2023). The Regional Electricity & Energy Supply Proposal (REESP) highlights:

- The regional reliance on imported diesel for energy generation (estimated fuel imports circa 250 million litres p.a.
- The challenges of reliably supplying energy to households and industry.
- The renewable energy and transmission investments required to facilitate future growth and achieve net zero by 2050.

The analysis specifically highlights the energy needs of New Century (now SSW), requiring 30MW at Lawn Hill, which is connected to the North West system (Diamantina and Leichardt power stations) in addition to dewatering operations at the PoK (circa 3MW required, with 1MW able to be supplied via the grid and the remainder through on-site diesel generation).

A transition of the SSW supply chain through the PoK to resume exports of >1MT p.a. will require a major increase in energy requirements (currently under investigation by the PhosOne Joint Venture Partners), with continued reliance on diesel generation posing key challenges, including high financial costs, increased greenhouse gas emissions and environmental (noise) impacts.

As part of a broader suite of generation and network solutions at PoK and across the region, the REESP recommends solar micro-grids, improved connectivity to the electricity grid, and the establishment of the Gregory-Bidunggu centre as a renewable energy generation hub. Key aspects of the initial hub concept include:

- Between \$88 and \$149 million in transmission investment, including interconnection between Gregory, Burketown, Doomadgee and SSW (between 2024 and 2028).
- A single 20MW gas turbine generator supplied by road transport (approx. \$250 million).
- On-site hydrogen power generation system of 120MW (approx. capex \$280 million).

The Gregory-Bidunggu hub is expected to provide the building block of essential electricity services to the communities with focused industry outcomes, supplemented by proactively pursuing the production of renewable fuels for the region (target 2030). This aligns with Queensland Government objectives of developing biofuel capabilities across the State.

Reliable and sufficient energy supply to PoK, as identified in the REESP, is essential to its sustainable development, and is a significant risk for the PhosOne project. It is an issue that should be fully investigated at the Detailed Business Case stage, including possible investigation of renewable energy micro-grids.



Chapter 5

Future Development Scenarios



5 Future Development Scenarios

The following sections present future development scenarios for the PoK as the basis for the financial and economic analysis. The scenarios consider:

- Port throughput by commodity type and key demand sources.
- Key Infrastructure investments to support the supply chain.

5.1 Shortlisting of Opportunities

Building on an extensive literature review by GSD (2025a), which considered strategic works relating to the PoK dating back to 1983, a long list of opportunities was developed and is summarised in Table 5.1.

The long list was refined into future development scenarios during the stakeholder workshop (27th May 2025) and subsequently distilled through additional engagement, with the final confirmation presented to the project working group. The list was refined based on a range of factors, including technical viability, data availability, and market readiness.

Table 5-1: Options Long List

Long List	Included In Scenario/s	Notes
Resources		
Phosphate	1,2,3	Identified as a key short-term opportunity to utilise the PoK with identified proponents investigating exports through PoK.
Copper	-	One identified proponent (AEON Metals Walford Creek) is potentially considering the PoK along with alternative supply chains via the Port of Townsville.
Natural Gas	-	The region has notable natural gas resources in and around the region (on and offshore). No proponents were identified seeking to export gas via the PoK.
Uranium	-	Not permissible to mine/export under current legislation.
Agriculture & Fishing		
Live Cattle	-	While the PoK has historically exported live cattle, there are minimal ships globally that can enter the port (even with the proposed dredging options considered) and the increasing need for scale to be a viable option.
Broadacre Cropping	3	Potential export of broadacre crops via the PoK are considered as a longer-term economic development opportunity aligning with the aspirations of regional stakeholders.
Horticulture	-	The region has significant potential for high-value horticulture, including tree crops (avocados, mangoes, etc.). This analysis conservatively focuses on export of traditional broadacre crops with a longer shelf life and closer ties to the PoK.



Long List	Included In Scenario/s	Notes
		However, we note the substantial potential of higher-value crops to underpin agricultural expansion (for domestic or international markets).
Fishing Industry	-	While the fishing industry is not directly modelled within the scenarios, it remains a key regional sector and will benefit from proposed dredging works, enabling improved access for larger fishing vessels – could be further examined under a Detailed Business Case.
Aquaculture	-	The region has significant potential to produce high-value aquaculture. However, no advanced opportunities of sufficient scale or ties to the PoK were identified.
Regional Imports		
Sulphuric Acid	3	Opportunities to import elemental sulphur to supply potential industry demand (based on the identified gap beyond the capacity of the Port of Townsville) are considered at a high level within Scenario 3.
Diesel	-	Excluded from the Preliminary Business Case pending a detailed imports analysis - could be further examined under a Detailed Business Case.
Food and Consumables	-	Excluded from the Preliminary Business Case pending a detailed imports analysis - could be further examined under a Detailed Business Case.
Other Opportunities		
Defence Links	-	The Port of Karumba is strategically located as a key access point within Northern Australia. The potential synergies and benefits of development from the Department of Defence's perspective have not been considered further within this assessment - could be further examined in a Detailed Business Case.
Role During Extreme Weather Events		Identified as having a wet-season contingency role, with PoK acting as a staging point for barge resupply and short-term storage of essentials - could be further examined in a Detailed Business Case.
Slipway and Regional Maintenance Facility	-	Consultation has identified an opportunity for the development of a slipway and expanded boat maintenance facilities to be undertaken in the region. While this opportunity is not considered directly within this Preliminary Business Case, the additional activity facilitated through the sustainable development of the PoK would underpin the viability of (and need for) this development.
Transshipment Links with the Port of Weipa	-	Strategic opportunities for greater collaboration and transshipping between the Port of Weipa (international port status) and PoK exist; however, they remain at an early stage and have been excluded from modelling within this Preliminary Business Case – could be further examined in a Detailed Business Case.



Long List	Included In Scenario/s	Notes
Small Cruise Ship Tourism	3	Key stakeholders have identified that the addition of small cruise shipping is a key opportunity to broaden and diversify the regional tourism offer. This has been included as a long-term development opportunity within Scenario 3.

Source: GSD (2025a), REA

5.2 The Base Case

The Scenario

The Base Case assumes SSW's operations will close as currently planned by FY2027, with no transition of the site or assets to a new operator.

These impacts not only result in significant direct costs but also preclude the future use of the SSW infrastructure to facilitate new developments.

Infrastructure Investments

The closure triggers SSW's mine rehabilitation protocols, requiring the decommissioning/disassembly of associated infrastructure at Lawn Hill (including airstrip, processing plant, slurry pipeline, and worker accommodation) and dewatering/processing and export infrastructure at the Port of Karumba.

Port Throughput

Port throughput essentially ceases under the Base Case, without the dredging to enable operations. Some small volumes may still come through the port to support the Mornington Island community and for use by the fishing industry.

5.3 Scenario 1: Transition to PhosOne

The Scenario

Scenario 1 sees the SSW zinc tailings operation transition to the PhosOne project (1MT p.a. of phosphate) after a circa 18-month transition to refit the SSW facilities for the transport and processing of phosphate.

The PhosOne project is projected to have a substantial mine life (circa 50+ years) extending to beyond the end of the economic and financial analysis.

Infrastructure Investments

A range of infrastructure investments are identified as required to realise the Scenario 1 outcomes as identified in the infrastructure assessment undertaken by Civil IQ (see Appendix B). Key infrastructure items include:

- **Mine capital**

Estimated at \$700 million and will include required upgrades to processing and energy generation to support development, as well as additional pipeline infrastructure from the mine site to Lawn Hill.

- **Port upgrades**



Expanded dredging will be required to enable the projected 1MT of phosphate fines p.a. For this preliminary analysis, dredging is assumed to be required at circa -3.4m LAT at an initial cost of \$15 million based on advice from Ports North (noting that a detailed dredging analysis is currently underway by Ports North). Ongoing maintenance dredging is assumed to be required to maintain the channel depth at an approximate annual cost of \$4 million.

- **Energy infrastructure**

While investment in energy infrastructure was not estimated in this Preliminary Business Case, these investments will need to be mapped in a Detailed Business Case as the energy requirements for Scenario 1 are quadruple of the current SSW energy consumption.

- **Other infrastructure**

Other infrastructure, like accommodation to house an increased workforce, have not been estimated in this scenario, but should be considered in a Detailed Business Case.

Port Throughput

Port throughput increases under Scenario 1, with exports rising to an annual 1MT p.a. from FY 2029 and continuing throughout the 20-year analysis window.

5.4 Scenario 2: Regional Phosphate Supply Chain

The Scenario

Scenario 2 considers the potential for additional mining opportunities to also utilise the Port of Karumba, leveraging the investments made to unlock the PhosOne operations.

Two additional mine projects are incorporated into the analysis (for modelling purposes, these are assumed to occur in FY 2031):

- Avenir Makatea Pty Ltd/Chatham Rock Phosphate's Korella project, which has applied to export 200,000 tonnes p.a. from the PoK. We note this is a conservative volume given the limited detail available, with Korella's overall production projected to be potentially >2MT p.a. at full development. Korella's logistics are currently under assessment by Qube.
- The restarting of Centrex's Ardmere operations (with projected tonnages of 625,000 tonnes p.a. based on the Stage 1.5 expansion) utilising a new road supply chain to the PoK⁷ - though we note the new owners PRL Global are not currently considering the PoK for exports.

We note that additional mining export opportunities through the PoK exist, including:

- Aeon Metal's Walford Creek copper project, which is currently investigating pipeline transport and processing options. Our understanding, based on consultation with Aeon, is that exporting via the PoK would require using the SSW pipeline infrastructure. This is dedicated to PhosOne operations under the modelling scenarios, though it could potentially be utilised for multiple operations, subject to further investigations.
- Avinera's phosphate project located in the Northern Territory (near Tennant Creek) is reportedly considering export options via the PoK in addition to NT's Port of Darwin/Port of Bing Bong options. Due to data limitations and the potential alternative port options (and the mine's location outside the State of Queensland), Avinera's output has been conservatively excluded from the proposed scenarios.

⁷ Consultation for this project indicates that Centrex was in discussions regarding export options from the PoK prior to entering into voluntary administration in early 2025.



Table 5-2: Mining Operations Scenario 2

Operation	Proponent	Location	Commodity	Annual Throughput
Included Projects				
PhosOne	North West Phosphate Limited and SSW Joint Venture	130km northwest of Mount Isa	Phosphate	1MT
Korella Phosphate Project	Avenir Makatea Pty Ltd/Chatham Rock Phosphate	160km southeast of Mount Isa	Phosphate (Yellow phosphorus - used in the production of thermal grade phosphoric acid (purified phosphoric acid) for use in Lithium- Iron- Phosphorus batteries).	2.25MT (0.2MT p.a. currently being negotiated through the Port of Karumba)
Ardmore	Centrex/PRL Ardmore	120km south of Mount Isa	Phosphate	0.6MT
Potential Opportunities Not Included				
Wonarah Phosphate Project	Avenira Limited	300km east of Tennant Creek	Phosphate	Mine Management Plan lodged for 1.2MT extraction
Walford Creek Copper Cobalt Project	Aeon Metals Limited	340km north northwest of Mount Isa	Copper/Cobalt	Under Assessment

Source: REA

Infrastructure Investments

Scenario 2 utilises much of the same infrastructure upgrades present in Scenario 1 (with the supply chain infrastructure and transport upgrades now utilised by multiple proponents).

- Mine capital (estimated at \$750 million):
 - PhosOne \$700 million.
 - Centrex/Ardmore (allowance of \$20 million to restart operations).
 - Korella (allowance of \$30 million based on projected throughput (200,000 tonnes out of a total output of 2.25MT) and reported capex for known phosphate projects). We note that the Korella development and supply chain remain under investigation and that no capital cost estimates were provided by the proponent.
- Road upgrades (to enable road transport to the PoK from the identified mine sites): Estimated at \$341.2 million (see Appendix B for further commentary).
- Port Upgrades:
 - Assumed \$15 million for dredging with ongoing maintenance of \$4 million p.a., aligning with Scenario 1. Of note:
 - *The increased shipping/volumes under Scenario 2 may require an expansion of dredging beyond the investment of Scenario 1. This is currently under investigation by Ports North and is sensitivity tested through the financial and economic analysis.*



- *The proponents of Korella (Avenir Makatea Pty Ltd/Chatham Rock Phosphate) are currently pursuing a no dredging solution using dumb barges to transship product out of the PoK.*
- Common user facilities, including laydown areas and barge handling facilities for phosphate proponents: Estimated at \$70 million. We note that these facilities are under consideration by private phosphate proponents under a common user commercial arrangement and may not include Ports North's direct involvement.

Port Throughput

Port throughput rises to 1MT p.a. through the establishment of PhosOne operations, growing to just under 2MT p.a. with the inclusion of Korella and Ardmore production (however, noting that new owners PRL Ardmore do not propose to export through PoK).

5.5 Scenario 3: Long-Term Sustainable Development

The Scenario

Scenario 3 explores the longer-term/diversified economic development opportunities that could be unlocked through the PoK. Developments included within Scenario 3 include:

- The **new regional phosphate supply chain** as per Scenarios 1 and 2.
- **Export of regional broadacre agricultural production:** The opportunity for expansion of regional agricultural production has been incorporated into the analysis based on previous published studies and consultation with key regional producers, including:
 - The Etheridge Agricultural Precinct opportunity (RDA, 2024), which highlights production potential for circa 100,000ha of dryland cropping and 50,000ha of irrigation across a mix of high-value and broadacre crops. For modelling purposes, production focuses on broadacre cropping options suitable for export via the PoK:
 - *Cotton (16,667ha irrigated production): Establishment of a 200,000 bales p.a. operation adapted from PVW Partners (2021) assessment of regional potential with a centrally located gin for processing prior to export.*
 - *Chickpeas (33,333ha of irrigated production): A key broadacre crop option suitable for dryland or irrigated production and in strong demand for exports (predominantly to India).*
 - *Grains (100,000ha of dryland production): The region is a proven producer of grain and forage crops which are a strong fit for local production and potential export via the PoK.*
 - The Gilbert River Dam (Jacobs, 2020), which assesses the establishment of a 130,000ML allocations dam on the Gilbert River with the potential to irrigate 17,800ha.

We note that the region is capable of producing a broad range of cropping options (beyond those modelled) to meet market needs, maximise production value, and diversify production and market risks. The purpose of this assessment is to highlight the quantum of economic benefits and potential synergies with the PoK.

- **Establishment of a small cruise ship tourism industry:** The inclusion of cruise ship tourism is a natural synergy, diversifying the region's established self-drive market and offsetting some of the risk of road access closures during the shoulder and summer monsoon seasons (potentially extending the viable operating season for local providers). Noting significant product development is needed to facilitate Gulf cruise tourism, Scenario 3 allows for a small initial contingent of tourism (<100 PAX), with aspirational growth up to four tourism vessels per month operating over nine months (March-November) by 2037.
- **Establishment of regional imports through the PoK:** This Preliminary Business Case explored the potential for import of sulphuric acid (most likely in the form of elemental sulphur) to meet the needs of the regional mining



industry. Demand is driven by CRU International (2024) estimates using their most conservative scenario (operating projects only) and servicing a level of demand above and beyond capacity through the Port of Townsville (post export expansion) of circa 100kt of elemental sulphur p.a.

Regarding regional imports, we highlight:

- The limitations of the sulphuric acid analysis, given the potential for alternative regional solutions as highlighted in CRU International (2024), which may be competitive with imports through the PoK, given that alternative studies being led by the Queensland Government are currently underway. The purpose of this assessment is to highlight the potential opportunity (technical feasibility) of utilising the PoK, the associated infrastructure requirements, and potential economic benefits.
- The local community and industry are very dependent on imports (with key items highlighted through consultation, including food, fuel and other essentials), and the potential for imports through the PoK has substantial implications beyond sulphuric acid to supply the region's mining/fertiliser production industry. A full import analysis is recommended to be undertaken through the Detailed Business Case phase.

Infrastructure Investments

Infrastructure investments to unlock the Scenario 3 opportunities have been assessed by Civil IQ (see Appendix B) and include all of the works to unlock Scenarios 1 and 2, in addition to:

- **Road access upgrades:**
 - Upgrades to the Norman River Crossing and Gilbert River Bridge (combined \$200 million) to improve supply chain connections and reliability to the new and expanded agricultural production areas and the PoK, noting that flood resilience of the overall road network between Croydon and Normanton will also need to be addressed in stages to manage wet season impacts.
- **Port upgrades:**
 - Passenger terminal and linking bus terminal to enable small cruise ship tourism (\$7 million), noting that these are longer term infrastructure needs as initial small scale cruise ship tourism is likely to commence at low levels (one to several a year) and then growing in capacity year on year as experiences are developed.
 - Import wharf facilities to facilitate the import of elemental sulphur (\$60 million).
- **Water storage and on-farm irrigation capital:**
 - Gilbert River Dam at \$1.1 billion (adapted from Jacobs 2020).
 - On-farm capital expenditure allowances of \$5,000/ha for dryland and \$15,000/ha for irrigated cropping land (conservative allowances given the uncertainty relating to on-farm storage options in the Gilbert catchment (CSIRO, 2013; RDA, 2024)).
 - Regional cotton gin at an estimated \$42 million.

Port Throughput

Port throughput increases throughout the 20-year analysis window under Scenario 3, with exports rising from 1MT p.a. with the commencement of PhosOne to a diversified mix of phosphate (circa 2MT p.a.) and agricultural exports (200k bales cotton, 116kt chickpeas, 260kt grains) and small cruise ships plus imports (100kt sulphur) entering via the PoK.

Project Highlight



Project

Etheridge Agricultural Project

Area of Interest

Regional Development

Sector

Irrigation & Agriculture

Image

Regional Development
Australia Tropical North

Project Overview

Planning undertaken by Regional Development Australia Tropical North and Etheridge Shire Council has identified an opportunity to develop an Irrigation and Agricultural Precinct within the Etheridge Shire. The Precinct leverages previous work, including the Gilbert and Flinders Agricultural Resource Assessments (CSIRO, 2013) and the Gilbert River Dam Detailed Business Case (Jacobs, 2020) and proposes extensive dryland (100,000ha) and irrigated (50,000ha production cropping) as well as expanded beef cattle production on native pastures.

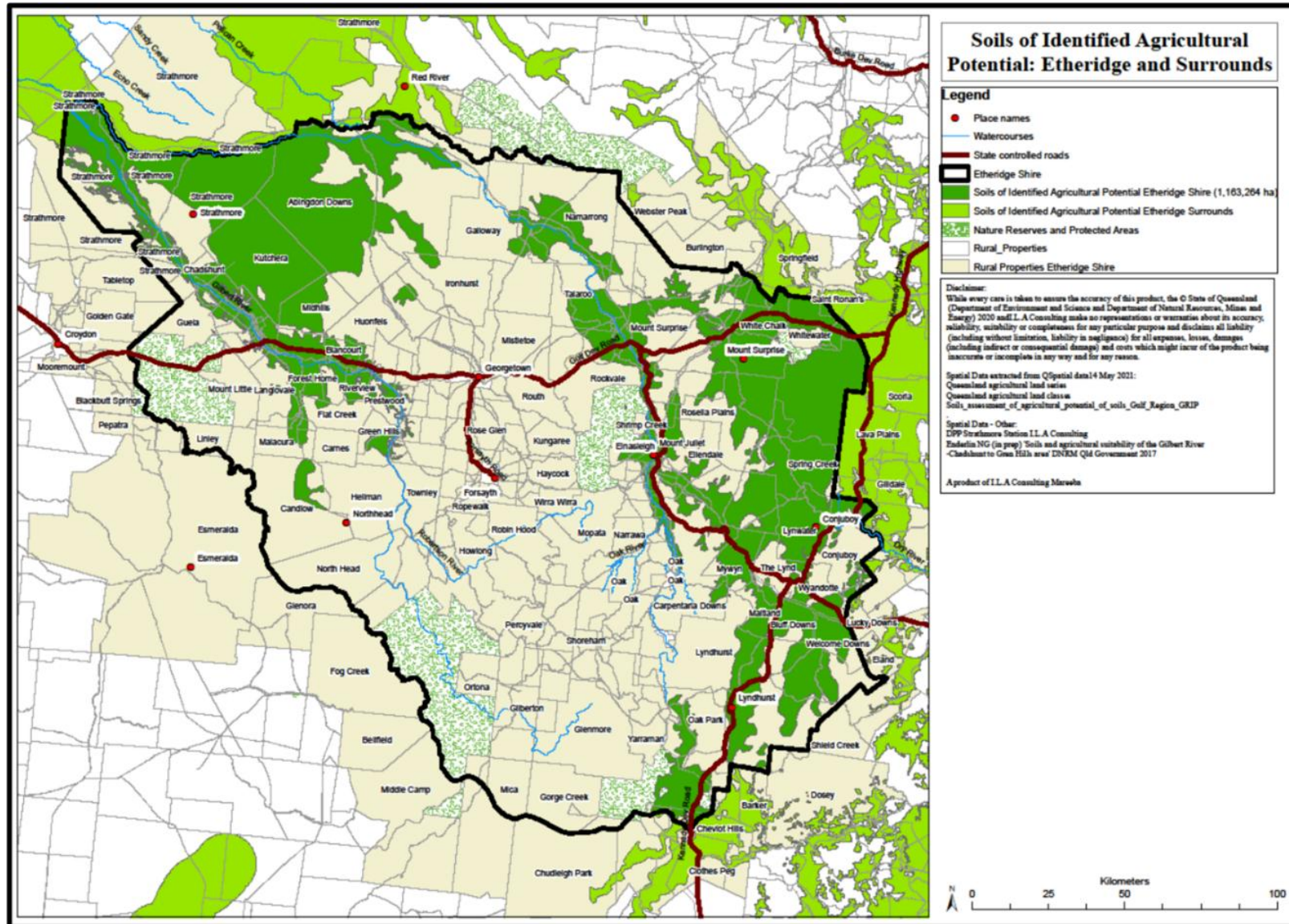
Key regional cropping opportunities include:

- Cotton (with a gin based in the region).
- Sorghum.
- Legumes.
- Cereals.
- Horticulture (mangoes, table grapes, and avocado).

The precinct concept aims to establish appropriate protocols, on a regional basis, covering water allocation, vegetation management, environmental clearances, native title and cultural heritage, as well as the implementation of best practice agricultural management.

Etheridge Shire Council has received government funding to progress this opportunity.

Figure 5-1: Etheridge and Surrounds Agricultural Soils



Source: Regional Development Australia Tropical North



5.6 Summary of Scenarios

Key projects, capital and operational items across the scenarios considered in this Preliminary Business Case are summarised in Table 5-3 below.

Table 5-3: Summary of Scenarios

Projects	Base Case	Scenario 1	Scenario 2	Scenario 3	Timing (FY)	Direct Project Capital	Additional Supply Chain Capital ¹	PoK Throughput (Full Production p.a.)	Annual Turnover (\$2025/26)
Phosphate									
PhosOne		✓	✓	✓	Cons: 2027 Ops: 2029	\$700M	PoK Dredging (3.4m LAT): \$15M	1MT	\$450M
Korella			✓	✓	Cons: 2029 ² Ops: 2031	\$30M	Laydown Area: \$35M Common User Facility – Export: \$70M Barge Handling Facilities: \$17.5M Road Upgrades \$335.8M	0.2MT (total production 2.25MT)	\$90M
Centrex/ PRL Ardmore ⁵			✓	✓	Cons: 2029 Ops: 2031	\$20M	Road Upgrades: \$5.4M	0.65MT	\$281M
Other Opportunities									
Regional Agricultural Expansion				✓	Roads: Cons 2030/2031 Agri: Cons: 2032 Ops: 2035	Gilbert River Dam \$1.1B On Farm Capital: \$1.25B Cotton Gin: \$42M	Gilbert River Bridge and embankment raise: \$100M Norman River Crossing of Gulf Dev Road: \$100M	200k bales cotton 116kT chickpea 260kT Grains	Cotton: \$137M ³ Chickpeas: \$99M Grains: \$109M
Small Cruise Ship Tourism				✓	Cons: 2036 Ops: 2037	N/A	Passenger terminal and linking bus terminal: \$7M	12,880 visitors (4 ships/month over 9 months @avg. 80 PAX) ⁴	Visitor Spend: \$3M
Regional Imports				✓	Cons: 2029 Ops: 2031	N/A	Import Wharf: \$60M	100 – 500kt Elemental Sulphur p.a.	Considered from a port revenue perspective

Notes: 1 Additional supply chain costs are only included with the first project within the scenarios to utilise the infrastructure (see Appendix B for further details). 2 Consultation with the Chatham Rock Phosphate indicates the project could potentially occur earlier and that the modelled timeframes should be considered conservative. 3 Includes ginning returns of \$80/bale in addition to grower returns. 4 Aspirational long-term industry target. 5 Noting that new owners, PRL Ardmore, do not currently plan to export via the PoK, the opportunity has been retained for illustrative purposes. Source: REA



Chapter 6

Financial Appraisal



6 Financial Appraisal

The following chapter provides a preliminary financial appraisal of the scenarios developed in Chapter 5. The analysis focuses on costs and revenues for Ports North as the primary proponent/State Government-owned agency relating to the PoK.

A level of consideration is also given to the financial implications for broader stakeholders involved with the PoK supply chain, being:

- Port costs for phosphate/mining, agriculture and other users.
- Road capital and ongoing costs (considering Council and State roads) given the triggering of road user agreements for key proponents.
- Royalty revenues unlocked through the facilitation of projects exporting through the PoK.
- Potential loss of productive assets and rehabilitation costs under the Base Case (would be incurred by SSW).

Long-term opportunities associated with agricultural & tourism development (e.g. Gilbert River Dam) are beyond the scope of this preliminary analysis and have not been assessed within the financial appraisal (noting that alternative business cases have been developed/are under investigation for this infrastructure).

6.1 Approach

Financial implications of the scenarios are assessed using a discounted cash flow (DCF) framework applying an analysis period of 20 years (starting FY 2027). The financial analysis is reported in nominal dollars with projected inflation of 2.5% p.a. (the mid-point of the RBA's 2-3% target band).

Costs and revenues are modelled from Ports North's perspective and reported in a total cost per annum and per tonne/cubic metre basis. Port outcomes are assessed based on no return on capital (reflecting the current charging structure) and three potential levels of capital subsidy (25%, 50%, 75%) for initial capital works to understand the flow-on implications for proponent supply chain costs and the State.

The cost of road upgrades are assessed using a standard discounted cash flow approach at a range of nominal discount rates (0%, 4%, 6% and 10%) and the equivalent cost per tonne exported for each scenario.

6.2 Assumptions

The scenarios are modelled as per the scenario costs outlined in Chapter 5 and summarised in Table 5.2. In addition, the following ongoing cost allowances have been included:

- **Port operating costs:**
 - Annual maintenance dredging of \$4 million.
 - Other operating costs (labour, administration, insurance, etc.) scale across the scenarios as volumes increase:
 - Scenario 1: \$0.7 million p.a.
 - Scenario 2: \$1.2 million p.a.
 - Scenario 3: \$2.2 million p.a.



▪ Road maintenance costs:

- Ongoing allowance equivalent to 1% of initial capital costs p.a. (or circa 20% of initial capital costs over the 20-year analysis, broadly aligning with Bureau of Infrastructure and Transport Research Economics (2023) reporting of maintenance costs equating to 20-40% of total roads lifecycle expenditure). We note that these costs will be negotiated, subject to road user agreements (given project volumes >50,000 tonnes p.a.) with DTMR and Council, respectively, with contributions from the project proponents.

Based on advice from the working group, potential supply chain infrastructure, such as the common user facilities and barge handling facilities/import wharf, are assumed to be privately developed/operated and not subject to further opex/cost recovery by Ports North. Though we note that the operating models for these infrastructure items are under investigation (at various levels) and are yet to be confirmed.

Further detailed analysis and consultation should be undertaken as part of the Detailed Business Case.

6.3 Financial Appraisal Results

Port Costs

To achieve cost recovery (annual nominal operating costs and 20-year recovery of initial dredging capital) requires an annualised payment of:

- \$6.6 million in Scenario 1 (PhosOne operations). This equates to a cost of \$7.6 per tonne of projected phosphate shipped over the 20-year analysis (incorporating initial capital development time and ramping up of operations to 1MT p.a.).
- \$7.2 million in Scenario 2 (Regional Phosphate Supply Chain) equating to an average cost of \$4.7 per tonne of phosphate across the PhosOne, Ardmore, and Korella projects.
- \$11.1 million in Scenario 3 (Long-Term Sustainable Development) equating to an average cost of \$4.5 per tonne of imports/exports (or cubic metre for cotton exports), with additional operating costs under Scenario 3 impacting the returns required.

Noting that Ports North is required to act commercially and dredging costs are funded by end users, this preliminary investigation has shown that subsidisation of the initial capital dredging costs between 25% and 75% is shown to have a modest impact on cost recovery outcomes, reducing payments by up to \$600,000 per year.

While the nature of this subsidy has not been explored in detail, it is noted that new incentives were introduced under the Mount Isa Transition Fund to reduce access charges on the Mount Isa-Townsville rail line, providing significant savings for emerging rock phosphate producers. In February 2026, the Queensland Government also announced a four year, 10 per cent subsidy on rail access charges for Mount Isa Line users to strengthen freight corridors and grow the North Queensland economy. A similar subsidy could be explored for phosphate exports through Karumba to diversify and strengthen Gulf supply chains and the North West Queensland economy.

Table 6-1: PoK Financial Appraisal Results

Capital Subsidy	0%	25%	75%
Costs p.a. (\$M)			
Scenario 1	\$6.6	\$6.4	\$6.0
Scenario 2	\$7.2	\$7.0	\$6.6
Scenario 3	\$11.1	\$10.9	\$10.5
Costs \$ Per Tonne/Cubic Metre Exported			



Scenario 1	\$7.6	\$7.3	\$6.9
Scenario 2	\$4.7	\$4.6	\$4.3
Scenario 3	\$4.5	\$4.4	\$4.2

Source: REA

Road Access Costs

Road access costs to PoK were initially scoped as being in-scope for Scenario 1 (PHOSONE) and were modelled for all scenarios. However at the time of preparing this report, road access to PoK was no longer in scope for Scenario 1. Due to the ongoing active industry investigations of resource projects in the region, and the importance of potential road upgrades to sustainable development of PoK in all scenarios, road upgrade and maintenance costs are still included in the preliminary investigation however they have been removed from the economic analysis of Scenario 1.

Road upgrade and maintenance costs over the 20-year analysis are presented in Table 6-2. Of note:

- Costs over 20 years equate to circa \$380-\$450 million to support the regional phosphate export supply chain (Scenario 2), rising to around \$600-\$720 million for Scenario 3 with the inclusion of the Norman River Crossing of Gulf Developmental Road and Gilbert River Bridge raising.
- This equates to a (levelised) per tonne exported cost from around \$23 up to \$72⁸ across the scenarios and depending on the discount rate applied.
- The mix of road upgrades is roughly evenly split between Local Government (at level causeway crossings, bridges and/or culverts) and State assets under Scenario 2. The mix changes to approximately 70/30 State/Local assets with the inclusion of the Norman River Crossing of Gulf Developmental Road and Gilbert River Bridge raising in Scenario 3. These road upgrades may also require Australian Government funding contribution under State-Federal funding obligations. While the estimated road costs have been realistically assessed, they have not been subject to the more detailed financial analysis and modelling that is required by PAF projects.

Table 6-2: NPV of Road and Bridge Upgrade Costs (20 Years)

Discount Rate	Scenario 1	Scenario 2	Scenario 3
NPV Total Costs (\$M)			
0%	N/A	\$453	\$718
4%	N/A	\$415	\$658
6%	N/A	\$402	\$637
10%	N/A	\$381	\$605
Cost Per Tonne			
0%	N/A	\$34.3	\$22.9
4%	N/A	\$45.2	\$28.8
6%	N/A	\$54.1	\$34.6
10%	N/A	\$71.5	\$44.3

⁸ PhosOne volumes are excluded as they are not reliant on road transport.



Discount Rate	Scenario 1	Scenario 2	Scenario 3
Road Ownership			
DTMR	N/A	50.2%	68.6%
Local Government	N/A	49.8%	31.4%

Notes: The road ownership value was calculated by Civil IQ based on available road ownership data. Due to the fact that Port recovery needs to run at 0%, this preliminary analysis uses 0%, 4%, 6% and 10% discount rates. It is noted that these differ from the usual Queensland Treasury discount rates. Further analysis will be conducted at the Detailed Business Case stage.

Source: REA

State Royalties Generated

The 1-1.8MT p.a. of phosphate will generate notable royalty revenues through production. Based on the current royalty rate, using the Mineral Resources Regulation 2013 formula yields a 20-year NPV of \$14-\$143 million (or an average of \$2-\$11 million in nominal payments per year over the analysis period).

We note that royalty rates under the current system will vary with price and the P₂O₅ content of the phosphate rock produced over the return period, and that the results presented should be considered indicative only.

Table 6-3: NPV of Royalty Revenues Generated (\$M)

Discount Rate	4%	6%	10%	Avg. Royalties Paid p.a. (2027-2046)
Low Price (AU\$130/t)¹				
Scenario 1	\$23.6	\$19.5	\$13.7	\$1.8
Scenarios 2 & 3	\$41.3	\$33.8	\$23.5	\$3.2
Base Price (\$230/t)				
Scenario 1	\$41.8	\$34.5	\$24.3	\$3.2
Scenarios 2 & 3	\$73.0	\$59.8	\$41.5	\$5.7
High Price (\$450/t)				
Scenario 1	\$81.8	\$67.5	\$47.6	\$6.3
Scenarios 2 & 3	\$142.8	\$117.0	\$81.2	\$11.1

Note: ¹ Prices are assumed to increase in nominal terms across each scenario at 2.5% p.a.

Source: REA

Opportunity Costs Under the Base Case

It should be noted that the Base Case (closure of SSW's operations as currently planned by FY2027 with no transition of the site or assets to a new operator) is not costless as it will trigger SSW's mine rehabilitation protocols, including the decommissioning and rehabilitation of infrastructure both at Lawn Hill (mine/processing, pipeline, workers camp and airstrip) and at the Port of Karumba (dewatering, export infrastructure).

These assets were developed at a nominal cost of \$2 billion (1997 -1999) and would be expected to cost well in excess of \$5 billion if undertaken in the current high-cost environment. While the assets will require substantial maintenance (being >25 years old), they are understood to have a potential operational life of more than the 20-year analysis window to support the PhosOne or alternative future resource developments.



The triggering of these rehabilitation requirements will preclude future use options and increase the potential development costs and hurdles for future projects.

6.4 Sensitivity Testing

Sensitivity testing of the financial appraisal results was undertaken using two methods:

- Monte Carlo simulation of key variables used in the financial appraisal.
- Testing of alternative dredging costs developed by Civil IQ (see Appendix B).

Monte Carlo Simulation

Sensitivity testing was undertaken using Monte Carlo simulation, which tests the impact of changes in input assumptions thousands of times based on a defined probability distribution. The simulation tested each of the variables in isolation with all other inputs held constant, with the results reported in the following table in terms of the modelled change in NPV resulting from the variance in the base assumptions at a discount rate of 6%. The final row of the table examines each assumption simultaneously to provide a 'combined' or overall sensitivity of the model findings to the assumptions used.

The sensitivity analysis modified the costs via individual PERT distributions with min and max values 40% higher and lower than the base values.

The table below outlines the distribution of a series of cost projections, allowing for a 10% confidence interval, with '5%' and '95%' representing a 90% probability that the cost will be within the range outlined in the table.

Given a 6% discount rate, the cost projections are as follows (90% confidence):

- **Scenario 1**
Port cost per annum will be between \$5.2 and \$8.0 million; its cost per tonne will be between \$5.9 and \$9.1.
- **Scenario 2**
Port cost per annum will be between \$6.9 and \$7.6 million; its cost per tonne exported will be between \$4.5 and \$5.0; and the NPV of the road costs required will be between \$302.3 and \$500.9 million.
- **Scenario 3**
Port cost per annum will be between \$9.3 and \$12.8 million; its cost per tonne (or per cubic meter, for agriculture where tonnes/cubic meter is <1) will be between \$3.8 and \$5.2; and the NPV of the road costs required will be between \$479.6 and \$794.6 million.

Table 6-4: Monte Carlo Simulation Results

Cost	5 th Percentile	95 th Percentile
Port Costs p.a. (\$M)		
Scenario 1	\$5.2	\$8.0
Scenario 2	\$6.9	\$7.6
Scenario 3	\$9.3	\$12.8
Port Costs \$ Per Tonne/Cubic Metre Exported		
Scenario 1	\$5.9	\$9.1



Cost	5 th Percentile	95 th Percentile
Scenario 2	\$4.5	\$5.0
Scenario 3	\$3.8	\$5.2
NPV Road Costs (\$M) 6% Discount Rate		
Scenario 1	N/A	N/A
Scenario 2	\$302.3	\$500.9
Scenario 3	\$479.6	\$794.6

Source: REA

Alternative Dredging Cost Scenarios

To further test the potential range of financial outcomes, alternative dredging costs have been considered, accounting for potential bottlenecks as tonnage and the number of operating vessels within the PoK channel increase. These costs are tested here as a potential 'worst case' scenario to consider the implications on project viability (see Appendix B for further details):

- Scenario 1: \$20 million initial dredging and \$8 million ongoing.
- Scenarios 2 and 3: \$112.5 million initial dredging and \$20 million ongoing.

We note that these costs are significantly higher than the base \$15 million initial + \$4 million ongoing estimates provided by Ports North. Ongoing analysis of options by Ports North indicates that a small dredging ship permanently stationed in the Gulf of Carpentaria, servicing multiple ports throughout the year, may result in notable synergies and cost savings.

The results of the higher dredging costs have a significant impact on the modelled 20-year costs, which increase to \$11.8-\$36.0 million per annum or a range of \$6.8-\$13.4/tonne.

Table 6-5: Alternative Dredging Costs

Indicator	20 Year Cost Recovery (No Capital Subsidy)
Port Costs p.a. (\$M)	
Scenario 1	\$11.8
Scenario 2	\$32.2
Scenario 3	\$36.0
Port Costs \$ Per Tonne/Cubic Metre Exported	
Scenario 1	\$6.8
Scenario 2	\$13.4
Scenario 3	\$10.8

Source: REA



Chapter 7

Economic Impact Assessment



7 Economic Impact Assessment

This chapter provides an Economic Impact Assessment (EIA) of the future development scenarios, considering the direct and flow-on impacts during development and once operational.

7.1 Modelling Approach

This section contains an analysis of the economic contribution of the future development scenarios to the regional and broader Queensland/national economies. The analysis applies a CGE modelling methodology to estimate the economic contribution of the sustainable development of the PoK.

CGE is a class of economic models that apply actual economic data to estimate how a catchment economy may react to changes in policy, technology or investment. Modelling is based on a series of interdependent equations relating to behaviour and accounting (based on neoclassical economic theory) that are linked to a Social Accounting Matrix (similar to Input-Output transaction tables) but expanded to include detailed trade data and employment data. The database is sourced from the Global Trade Analysis Project (GTAP) database from Purdue University but modified with Australian-specific data to the base year of 2023-24.

Purpose-built software is used to simultaneously solve these complex, non-linear equations, with all industries responding to the economic shock to reach a new equilibrium. The modelling applied in this assessment is dynamic (using the Tasman Global framework, with modelling support by Prime Research), allowing changes in the economy to be tracked from year to year. To achieve this, a baseline (without the sustainable development of the PoK) scenario is initially run and then compared to the impacts with the PoK capital expenditure and operating turnover & direct employment included.

The modelling accounts for key factors, including labour and capital, imports and exports, investment demand, and consumption, and allows for key economic constraints such as labour and input availability. An increase in demand will result in a corresponding change in price (e.g., wage increases).

The direct capital expenditure and operational turnover impacts identified in Chapter 5 (see Section 5.5) are used to shock the regional economy, with the results being compared to the base case scenario to estimate the impact within the regional and broader State/national economies. This process enables us to estimate the net direct and flow-on impacts of the delivery of the development scenarios across the regional and broader supply chains.

Impacts are considered across the following regions over the analysis period:

- Regional Catchment: For modelling purposes, the Gulf Savannah catchment is expanded to include the neighbouring LGAs of Cloncurry, McKinlay, Richmond & Flinders to ensure all potential mining & agricultural supply chain activity is incorporated into the regional catchment.
- Rest of Queensland.
- Rest of Australia.

The economic modelling in this chapter describes activity by examining the following types of impacts, as described in the following table.

**Table 7-1: Economic Impact Indicators**

Indicator	Description
Gross Product	The value of output after deducting the cost of goods and services inputs in the production process. Gross product (e.g. Gross Regional Product (GRP)/Gross State Product (GSP)/Gross Domestic Product (GDP)) defines a net contribution to economic activity.
Employment	Employment positions generated by the Project (either full-time or part-time, directly or indirectly). Employment is reported in terms of Full-Time Equivalent (FTE) positions (i.e. full-time person-years).
Wages	Estimates of regional wage levels compared to the baseline (due to direct & indirect impacts), measured in real terms.

Source: REA

Labour and Ownership Assumptions

In modelling the economic impacts, the following key assumptions were applied to capture the labour draw (impacting wages and net new employment) and retention of profits (impacting GRP). Labour sourced from outside of the local region is assumed to be on a Fly-In Fly-Out (FIFO) basis from their place of residence.

Table 7-2: Labour and Business Ownership Assumptions

Input	Gulf Savannah Region	Rest of QLD	Rest of Australia
Labour Mix			
Construction	10%	80%	10%
Operations (Resources)	10%	80%	10%
Operations (Agriculture & Tourism)	70%	20%	10%
Business Ownership			
Construction Businesses	15%	35%	50%
Operational Businesses	Agriculture: Australian owned (15% in-region, 35% rest of Queensland, 50% rest of Australia). Resources: 50% foreign, 50% Australian owned (distributed by population share).		

Source: REA

7.2 Model Results

Gross Product

Over the 20-year analysis period, economic activity from the construction and operation of the development scenarios are estimated to lift regional GRP by (applying a 6% real discount rate):

- Scenario 1 Transition to PhosOne: \$624 million (across Queensland these impacts increase to almost \$1 billion).
- Scenario 2 Regional Phosphate Supply Chain: \$1.1 billion (across Queensland these impacts increase to \$1.6 billion).

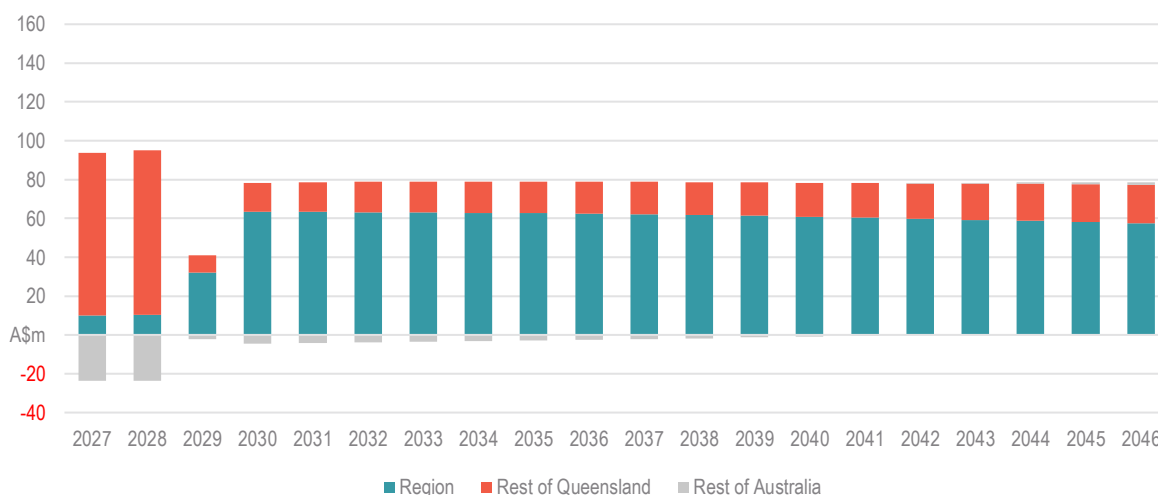


- Scenario 3 Long-Term Sustainable Development: \$1.8 billion (across Queensland these impacts increase to \$2.8 billion).

GRP impacts are projected to peak on reaching full operations in Scenario 2 (2032), while in Scenarios 1 and 3 impacts to Queensland are projected to peak through the construction phase (for mine/ agricultural irrigation water storage, on-farm, and bridge/road works) while regional activity peaks with full production achieved.

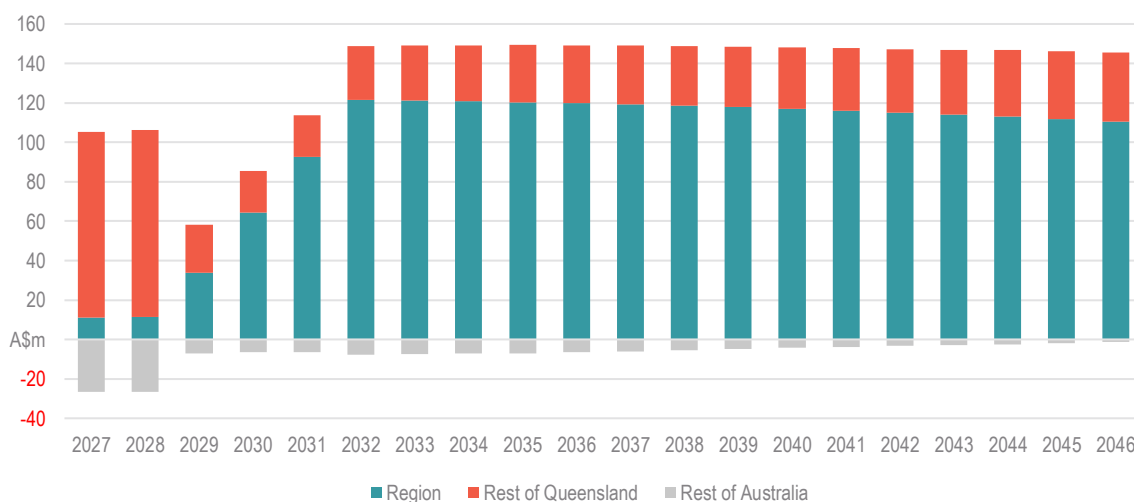
Importantly, each of the scenarios has a significant economic impact over the longer term (to the end of the 20-year analysis period in 2046).

Figure 7-1: Gross Product Impacts by Region (Scenario 1)



Source: REA

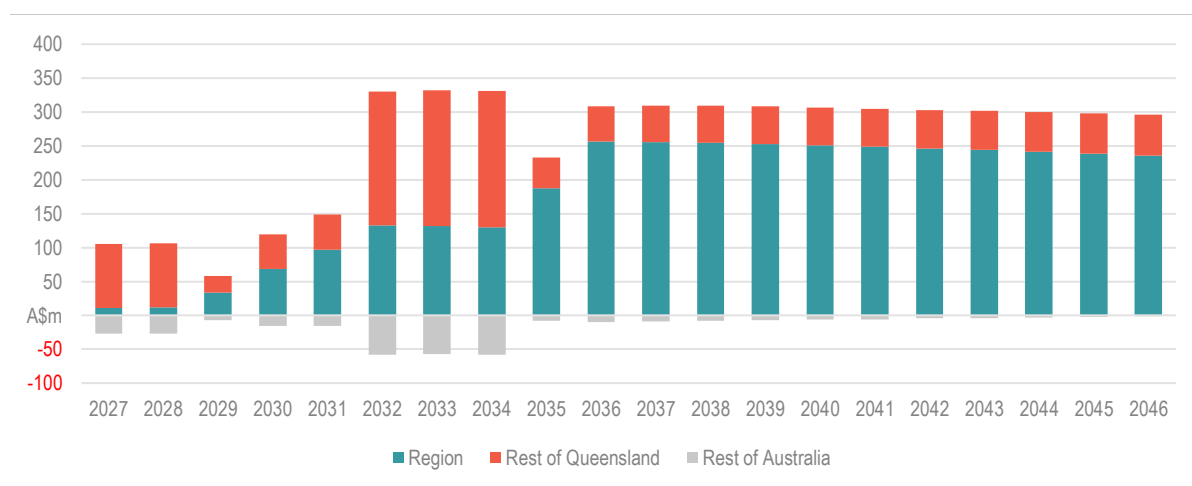
Figure 7-2: Gross Product Impacts by Region (Scenario 2)



Source: REA



Figure 7-3: Gross Product Impacts by Region (Scenario 3)



Source: REA

Table 7-3: Gross Product Impacts (Real \$M)

Region	Average p.a.	Total	Present Value (PV) @4% Discount Rate	PV @6% Discount Rate	PV @10% Discount Rate
Scenario 1					
Region	\$55	\$1,093	\$742	\$624	\$457
Rest of QLD	\$24	\$470	\$364	\$328	\$278
Rest of Aus	-\$4	-\$78	-\$71	-\$68	-\$64
Scenario 2					
Region	\$98	\$1,970	\$1,308	\$1,087	\$776
Rest of QLD	\$36	\$720	\$535	\$473	\$387
Rest of Aus	-\$7	-\$146	-\$119	-\$110	-\$95
Scenario 3					
Region	\$176	\$3,527	\$2,236	\$1,814	\$1,234
Rest of QLD	\$79	\$1,579	\$1,162	\$1,016	\$802
Rest of Aus	-\$17	-\$335	-\$268	-\$242	-\$201

Source: REA

Wages

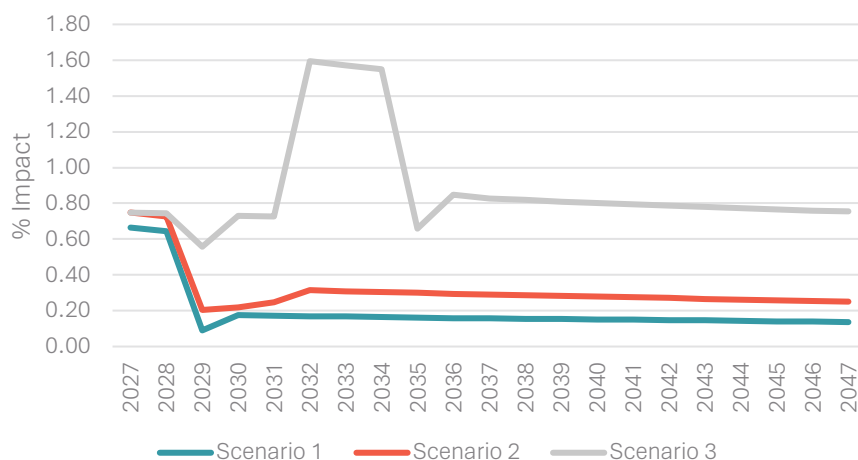
The influx of activity will have a notable impact on local wages in the regional economy. Figure 7-4 reports the estimated percentage difference between regional wages with and without the development scenarios. These wage impacts are expected to peak at the height of construction activity for each scenario, averaging between 0.2% (Scenario 1) and 0.9% (Scenario 3) higher than under the base case over the 20 year analysis.

Wage impacts from the scenarios across the rest of Queensland and Australia are projected to be modest/minimal over the analysis period (<0.05%). However, other projects (such as development for the 2032 Brisbane Olympics)



will significantly impact labour/wage outcomes in these regions, with flow-on impacts for the regional labour markets.

Figure 7-4: Real Wage Impacts (% Increase Above Base Case, Regional Catchment)



Source: REA

Employment

The Scenarios are projected to generate significant employment impacts, with the majority of labour sourced from the broader Queensland region:

- **Scenario 1 Transition to PhosOne**

2,967 FTE person years over the 20-year analysis period (306 in the region with 2,661 person years generated across Queensland incorporating FIFO arrangements).

- **Scenario 2 Regional Phosphate Supply Chain**

4,644 FTE person years over 20 years (490 in the region with 4,154 person years generated across Queensland incorporating FIFO arrangements).

- **Scenario 3 Long-Term Sustainable Development**

9,829 FTE person years over 20 years (1,226 in the region with 8,603 person years generated across Queensland, incorporating FIFO arrangements).

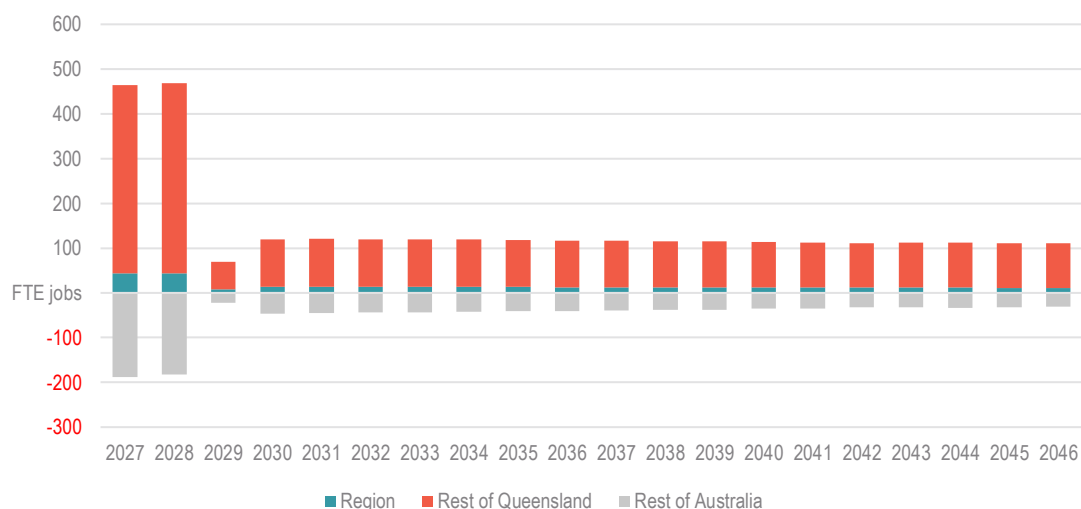
Peak labour requirements are estimated at 469 – 526 (in 2027) under Scenarios 1 and 2, respectively, and 1,171 (in 2032) under Scenario 3, coinciding with peak construction activity.

Despite the majority of economic activity occurring in the regional economy, the employment impact is mostly generated across broader Queensland (with the projects drawing significant labour from the wider State labour pool). However, given the region's population and labour force, local labour demand will represent a materially significant increase.

For the rest of Australia, the employment impacts are negative for the entire analysis period, with labour drawn to the region/Queensland to facilitate project delivery and operations.

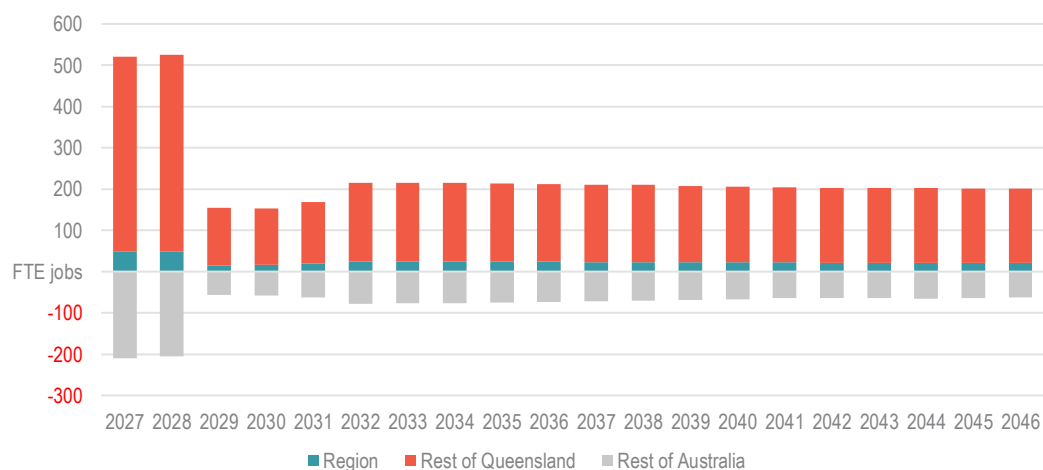


Figure 7-5: Employment Impacts (FTE) (Scenario 1)



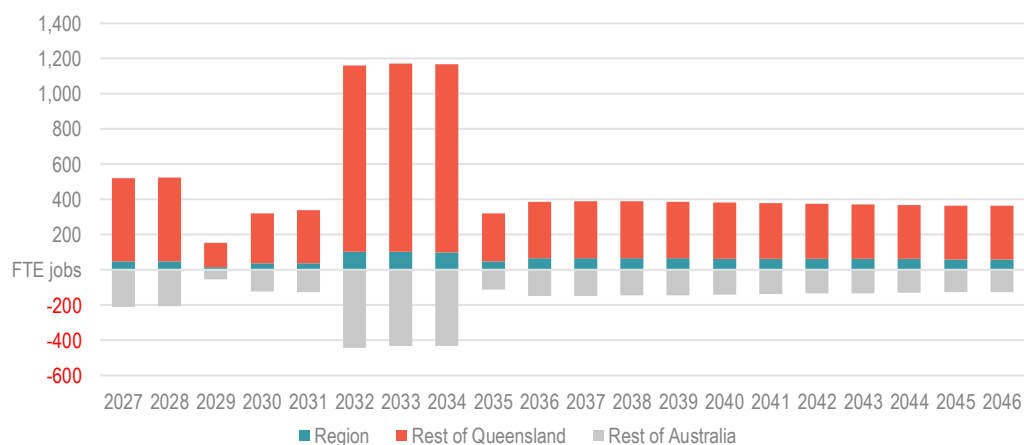
Source: REA

Figure 7-6: Employment Impacts (FTE) (Scenario 2)



Source: REA

Figure 7-7: Employment Impacts (FTE) (Scenario 3)



Source: REA

**Table 7-4: Employment Impacts (FTE Person-Years)**

Region	Peak Employment (Year)	Average Employee Years (FY 2027-46)	Total FTE Person-Years
Scenario 1			
Region	43 (2027)	15	306
Rest of QLD	426 (2027)	133	2,661
Rest of Aus	-187 (2027)	-52	-1,040
Scenario 2			
Region	49 (2027)	24	490
Rest of QLD	477 (2027)	208	4,154
Rest of Aus	-210 (2027)	-82	-1,638
Scenario 3			
Region	101 (2032)	61	1,226
Rest of QLD	1,070 (2032)	430	8,603
Rest of Aus	-444 (2032)	-183	-3,659

Source: REA

7.3 Housing and Social Infrastructure Requirements

It is important to consider the broader requirements for the community to support the economic activity under the scenarios (with consideration given to the existing SSW infrastructure and worker camps/housing at Karumba) to enable the transition to PhosOne operations.

For this analysis, we have applied a population multiplier of 1.8 (to allow for families/partners) for jobs allocated to local residents, and a multiplier of 0.5 for non-resident workers (to allow for rostering/etc). The analysis indicates a need for circa 60-160 dwellings in-region to support employment needs.

As the scenarios increase in scale and scope, they also begin to generate demand for health care as well as broader professional and education (e.g. schooling) services in-region. While the investment required is significant, the increased liveability of the region by having these additional housing supply and services will result in material community and economic development outcomes.

Table 7-5: Housing and Health Care Requirements

Factor	Scenario 1	Scenario 2	Scenario 3
Equivalent Population Impact (Average)	147	212	397
Housing (2.5 persons/dwelling)	59	85	159
Health Care (Benchmarks per 800-1,200 population)			
Doctors (General Practitioner)	0.11	0.17	0.38
Physiotherapists	0.09	0.14	0.32
Pharmacists	0.08	0.12	0.27
Psychologists	0.08	0.12	0.27
Dentists	0.06	0.10	0.22

Source: REA



Chapter 8

Cost Benefit Assessment



8 Cost Benefit Assessment

8.1 Approach

CBA is a widely applied tool in assessing the net benefit (or cost) that a project will have economically, socially, and environmentally. A CBA will consider the key measurable (as well as unmeasurable) benefits and costs of undertaking a project and produce several standard outputs. These outputs can be benchmarked and allow policy makers and the public to quickly assess the benefits of an individual project to society and its benefits relative to other projects.

This CBA was carried out using a discounted cash flow (DCF) approach to analyse all costs and benefits that would occur if the scenario were to proceed. In this sense, the net difference between scenarios and the Base Case are considered:

- **A Base Case ('without the project') scenario:**

Which assumes that the PoK is not upgraded and none of the initiatives presented within the scenarios proceed. Under the Base Case, SSW operations conclude, and the associated infrastructure is decommissioned, with the sites rehabilitated as per SSW's obligations.

- **With the project scenario:**

Which assumes that the PoK is upgraded and expanded to allow for the associated developments to occur (as defined in Chapter 5):

Scenario 1 Transition to PhosOne Operations.

Scenario 2 Regional Phosphate Supply Chain.

Scenario 3 Long-Term Sustainable Development.

The CBA considers the effect of real costs and benefits (which excludes inflation) over a period of 20 years (from FY 2027 to FY 2046) at a range of real discount rates (4%, 6%, and 10%).

The geographic boundary for this assessment is the State of Queensland.

In a CBA framework, decisions are made based on two criteria, Net Present Value (NPV) and the Benefit Cost Ratio (BCR). The NPV shows the difference between the present value of all future benefits and all future costs. The BCR is calculated by dividing the present value of future benefits by the present value of the future costs.

A project is deemed 'desirable' if the NPV is positive and the BCR is above '1'. In general, if the NPV is negative and the BCR is below '1', the Project is deemed as undesirable as the future costs will outweigh the benefits.

8.2 Definition of Costs and Benefits

The following costs and benefits have been included in the CBA.

Costs

- **Capital Costs:** Capital costs have been applied for each scenario as per the assumptions developed in Chapter 5 and are summarised in Table 8-1 below.

**Table 8-1: Capital Cost Assumptions**

Item	Scenario 1	Scenario 2	Scenario 3	Timing
Port Dredging	\$15M	\$15M	\$15M	2027-2028
Mine Capital	\$700M	\$750M	\$750M	2027-2030
Transport Upgrades	-	\$340M	\$541M	2027-2031
Agriculture	-	-	\$2.4B	2032-2034
Other Supply Chain Capital ¹	-	\$123M	\$185M	2027-2036
Total Capex	\$715M	\$1.2B	\$3.9B	-

Notes: ¹ Other supply chain capital includes:

Scenarios 2 and 3: Laydown Area: \$35M, Common User Facility – Export: \$70M, Barge Handling Facilities: \$17.5M.

Scenario 3 only: Passenger terminal and linking bus terminal: \$7M Import Wharf: \$60M.

Source: REA

■ Ongoing Costs:

Ongoing cost allowances have been included within the CBA as follows:

- PoK Costs: Maintenance dredging of \$4 million p.a. (all scenarios) and other ongoing costs:
 - Scenario 1: \$0.7 million p.a.
 - Scenario 2: \$1.2 million p.a.
 - Scenario 3: \$2.2 million p.a.
- Other Capex Maintenance: An allowance of 1% per annum of initial capex to reflect ongoing maintenance of the various capital assets⁹.

■ Environmental Costs:

Key aspects of the project scenarios (mining, port dredging, agriculture, and supporting infrastructure) are known to have associated environmental cost impacts which should be accounted for in the CBA (e.g. carbon emissions, impacts on marine life, inundated land, etc.) we note that data relating to specific environmental impacts is limited at this preliminary stage and will be considered in further detail within the Detailed Business Case. For this assessment, likely environmental impacts have been incorporated into the CBA as follows:

- **PoK Dredging:** Dredging works have the potential to negatively impact the surrounding marine habitat, with seagrass notably vulnerable to dredging activity. Environmental impacts can be direct (where marine habitat is directly removed via dredging) or indirect due to turbidity generated by the dredging activity (dredging works create a plume of sediment which can settle upon surrounding habitat, temporarily reducing their productivity).

This analysis estimates these impacts based on marine habitat valuations derived by Costanza et. al. (1997), which is itself a meta-analysis of credible valuation studies for benthic habitats. Costanza et. al. (1997) estimates have been applied in CBA analysis previously for major Queensland dredging projects at the Port of Gladstone and Abbott Point (see Economic Associates, 2009; 2015).

⁹ We note that applying net economic activity as the benefit nets out the assumed direct operating costs (excl. compensation of employees) of the various underlying projects based on transaction table relationships. Allowing for a modest additional maintenance allowance.

We note that applying net economic activity as the benefit nets out the assumed direct operating costs (excl. compensation of employees) of the various underlying projects based on transaction table relationships. Allowing for a modest additional maintenance allowance.



Estimated areas impacted by the Project during works are presented in the table below, applying an average rate of \$70,000 per ha for impacted seagrass (20% of impacted area) and \$15,000 for bare substrate (80% of impacted area)¹⁰. Indirect impacts estimated at a rate of 5-1 to direct impacts based on modelling for large dredging projects such as at the Port of Gladstone. The estimated areas are conservative given the location of seagrass and amount of seagrass cover around the site.

Indirect impacts of dredging typically last between 2-5 years after works are completed (GHD, 2009), and this analysis conservatively assumes the full impacts are felt for five years and then reduced to ~1/3 due to the ongoing works. Impacts have also been conservatively doubled to account for the marine disposal of dredged sediment

Table 8-2: Dredging Environmental Costs

Input	ha Impacted	Value (2-25/26 \$M)
Direct Impacts	42	\$1.1
Indirect Impacts	210	\$5.5
Disposal	x2 Direct Impacts	\$6.6
Total Cost (Years 1-5)	-	\$13.1
Total Costs (Years 6+)	-	\$4.4

Source: Costanza et. Al. (1997), Economic Associates (2009, 2015), REA

- **Agricultural Production:** The Detailed Business Case for the Gilbert River Irrigation Project (Jacobs, 2020) identified that up to 5,847ha of land within the inundation area would need to be cleared for the project. The clearing will need to be offset with environmental balances as per legislation. For this assessment, an allowance of \$5,000/ha for these offsets is applied under Scenario 3 prior to the projected dam construction for agricultural irrigation in 2032.
- **Mine Operations:** The phosphate mining operations considered within the scenarios can have notable environmental impacts, including on surface and ground water, disruption of native habitat and carbon emissions through development and ongoing operations. For this preliminary analysis, it is assumed that these impacts are appropriately managed and/or remediated as part of the operating and social license for these developments, though further investigation of potential environmental costs (and broader consideration of Environmental, Social, and Governance (ESG) factors for the underlying resource operations within the scenarios) is recommended for the Detailed Business Case.

Benefits

■ Additional economic activity to the State of Queensland:

A core beneficial impact is the additional economic activity unlocked through the development opportunities in each scenario. This benefit stream is modelled through the net economic activity generated for each scenario over the 20-year analysis period (estimated in Chapter 7).

¹⁰ Seagrass monitoring by JCU and Tropwater undertaken in 2023 identifies that seagrass meadows around the Port of Karumba remain in good condition despite ongoing dredging activity.

Seagrass monitoring by JCU and Tropwater undertaken in 2023 identifies that seagrass meadows around the Port of Karumba remain in good condition despite ongoing dredging activity.



- **Residual value of infrastructure:**

A residual value has been included to capture the value of long-life infrastructure investments beyond the 20-year analysis period. The residual value has been applied in the final year of the analysis using straight-line depreciation and the following asset lives:

Roads: 40 years

Buildings: 40 years

Bridges: 100 years

Mines: Excluded (to account for environmental/rehabilitation costs as discussed above)

Agriculture: Dams 100 years (on farm capital excl.)

Port Dredging: Excluded

Costs and Benefits Not Quantified

The following costs and benefits have not been quantified. These factors are highly positive overall, and would improve the net position of the scenarios vs. the Base Case if they were included:

- **Utilising existing infrastructure and avoiding decommissioning of SSW assets under the Base Case:**

Will result in the loss of circa \$2 billion (established in 1999) in assets to the region, in addition to the financial cost of decommissioning. The loss of these key productive assets would not only result in substantial financial costs but also preclude their use in future developments. The area around SSW's Lawn Hill site remains highly prospective, with global mining companies continuing to invest significantly in exploration for high-value resource commodities in the surrounding area.

- **Flow on benefits of infrastructure investments for other industries:**

Increased port depth will support other key regional industries (notably fishing) by allowing access to larger vessels. Other identified investments, including in a local slipway and boat maintenance facilities to enhance regional capacity, would also greatly benefit from both the infrastructure and increased activity associated with the scenarios.

- **Benefits of an increase in business confidence:**

Each of the future scenarios will underpin business and investment confidence in the GSD region and likely support future rounds of investment as a key growth catalyst. Investment in the Scenarios will underpin the current period of growth in the Gulf Savannah region and support sustainable economic development.

- **Increased community benefits and social amenity:**

The scenarios will underpin continued significant payments to local Councils and Traditional Owners, which will underpin a broad range of benefits to the regional community. Under the Base Case, these payments would cease, notably increasing the potential burden on other ratepayers and State/Federal funding sources. The Scenarios will also underpin employment and population growth, as well as demand for services and social infrastructure:

Development will increase demand for local housing for key workers, which will likely require additional investment. Worker housing will need to be considered within the accommodation strategy for individual project proponents.



▪ Potential additional operational and compliance requirements:

Including the implementation of Biosecurity Australia services to enable agricultural exports via the PoK under the Long-Term Sustainable Development (Scenario 3).

8.3 Results

Results of the CBA are summarised in Table 8.3 below. At the central discount rate of 6%:

▪ Scenario 1:

Returns a NPV of \$104.8 million with a BCR of 1.1 (indicating a present value return of \$1.1 for every dollar of cost) and an Internal Rate of Return (IRR) of 8.0%.

▪ Scenario 2:

Returns a NPV of \$190.1 million with a BCR of 1.1 (indicating a present value return of \$1.1 for every dollar of cost) and an IRR of 7.9%.

▪ Scenario 3:

Returns a NPV of -\$262.5 million with a BCR of 0.9 (indicating a present value return of \$0.9 for every dollar of cost) and an IRR of 4.7%.

The CBA highlights that both Scenarios 1 and 2 deliver net socioeconomic benefits to the State of Queensland compared to the Base Case. Scenario 2 returns the highest NPV, with substantial further benefits from new mining operations unlocked due to the increased infrastructure investment over Scenario 1.

Scenario 3 returns the largest gross Present Value of Benefits, of around \$3.3 billion at a 6% discount rate. These benefits are subject to substantially higher costs, causing the project to fall below break-even, with a BCR of 0.9.

Table 8-3: CBA Results

Discount Rate	PV Costs (\$M)	PV Benefits (\$M)	NPV (\$M)	BCR
Scenario 1				
4%	\$948.0	\$1,193.3	\$245.4	1.26
6%	\$908.2	\$1,012.9	\$104.8	1.12
10%	\$848.3	\$764.9	-\$83.4	0.90
Scenario 2				
4%	\$1,513.3	\$1,965.6	\$452.3	1.30
6%	\$1,455.2	\$1,645.3	\$190.1	1.13
10%	\$1,366.3	\$1,205.2	-\$161.1	0.88
Scenario 3				
4%	\$3,887.5	\$4,070.1	\$182.6	1.05
6%	\$3,560.0	\$3,297.5	-\$262.5	0.93
10%	\$3,041.4	\$2,267.9	-\$773.4	0.75

Note: Refer to Appendix F for detailed results
Source: REA



8.4 Sensitivity Testing

Monte Carlo Simulation

Sensitivity testing was undertaken using a Monte Carlo simulation, which tests the impact of changes in input assumptions thousands of times based on a defined probability distribution. The simulation tested each of the variables in isolation with all other inputs held constant, with the results reported in the following table in terms of the modelled change in NPV resulting from the variance in the base assumptions at a discount rate of 6%. The final row of the table examines each assumption simultaneously to provide a 'combined' or overall sensitivity of the model findings to the assumptions used.

The sensitivity analysis modified the:

- Costs: PERT distribution with 90th percentile values 40% higher and lower than the base values.
- Benefits: Normal distribution with a standard deviation of 0.2.

The table below outlines the distribution of the NPVs based on variation in the underlying costs and benefits of the project. It allows for a 10% confidence interval, with '5%' and '95%' representing a 90% probability that the cost will be within the range outlined in the table.

Given a 6% discount rate, the cost projections are as follows (90% confidence):

- Scenario 1's NPV is between -\$260.5 and \$484.7 million, with 67.4% of the 5,000 iterations' NPVs being positive.
- Scenario 2's NPV is between -\$400.1 and \$797.2 million, with 70.7% of the 5,000 iterations' NPVs being positive.
- Scenario 3's NPV is between -\$1,461.1 and \$961.2 million, with 37.6% of the 5,000 iterations' NPVs being positive.

The results indicate that the results of Scenarios 1 and 2 are relatively sensitive within the parameters tested, while Scenario 3 (including broader agricultural and tourism opportunities) is substantially more sensitive to changes in underlying assumptions (particularly the capital costs and additional economic activity).

Table 8-4: Monte Carlo Simulation

Cost/Benefit (\$M)	NPV (\$M) 6% Discount Rate	
	5 th Percentile	95 th Percentile
Scenario 1		
Costs		
Capital Costs	-\$59.2	\$277.8
Opex	\$74.0	\$134.0
Environmental Costs	\$81.2	\$127.8
Benefits		
Additional Economic Activity	-\$223.5	\$423.1
Asset Residual Values	\$84.8	\$124.9
Combined	-\$260.5	\$468.5
Scenario 2		
Costs		
Capital Costs	-\$108.8	\$484.7



Cost/Benefit (\$M)	NPV (\$M) 6% Discount Rate	
	5 th Percentile	95 th Percentile
Opex	\$145.2	\$232.9
Environmental Costs	\$167.1	\$213.1
Benefits		
Additional Economic Activity	-\$323.0	\$718.5
Asset Residual Values	\$162.4	\$218.5
Combined	-\$400.1	\$797.2
Scenario 3		
Costs		
Capex	-\$1,031.0	\$520.5
Opex	-\$362.0	-\$166.4
Environmental Costs	-\$285.4	-\$239.7
Benefits		
Additional Economic Activity	-\$1,153.2	\$667.3
Asset Residual Values	-\$411.8	-\$108.8
Combined	-\$1,461.6	\$961.2

Source: REA

Alternative Dredging Cost Scenarios

As per the financial analysis undertaken in Chapter 6, CBA outcomes were further sensitivity tested to account for the potential alternative (higher) dredging costs, addressing identified potential bottlenecks as tonnage and the number of operating vessels within the PoK channel increase across the scenarios.

These costs are tested here as a potential alternative scenario to consider the implications on project viability (see Appendix B for further details):

- Scenario 1: \$20 million initial dredging and \$8 million ongoing.
- Scenarios 2 and 3: \$112.5 million initial dredging and \$20 million ongoing.

These increases have a material impact on the CBA results, with the largest proportional impact being in Scenario 2. Despite this increased cost, Scenario 1 retains a positive BCR at the central 6% discount rate, while Scenarios 2 and 3 return a negative NPV under the additional dredging costs.

Table 8-5: Sensitivity Impacts (Port Dredging)

Scenario	6% Discount Rate	
Indicator	NPV (\$M)	BCR
Scenario 1	\$59.0	1.06
Scenario 2	-\$68.1	0.96
Scenario 3	-\$520.6	0.86

Source: REA



Chapter 9

Key Findings



9 Key Findings

This Preliminary Business Case has assessed the potential future opportunities for the strategic development of the PoK. This has included the near-term extension of operations through the transition of SSW zinc tailings processing to the PhosOne joint venture producing up to 1MT p.a., broader medium-term regional phosphate projects and facilitating longer-term agricultural, tourism, and import demand through the port.

All of the scenarios assessed are shown to have potential socio-economic merit for the region and the broader State of Queensland (though they are sensitive to the discount rate applied and the variability of key costs and commodity prices). The critical service needs include maintaining and expanding the channel dredging and key road/bridge upgrades to enable and enhance access to the port for key producers.

The main hurdles revolve around the capacity to pay of these private sector operators, given the profitability of phosphate (a typically high-volume, lower-value commodity), and broadacre agriculture. Therefore, an appropriate funding subsidy will likely be required to unlock the development potential of the PoK. This analysis indicates that a similar level of subsidy (equivalent to \$10/tonne) as previously offered to junior phosphate users along the Mount Isa to Townsville line would substantially underpin the viability of the supply chain, including channel dredging and road upgrades/maintenance. A subsidy would strengthen and diversify North West Queensland freight corridors and supply chains, and grow the North West Queensland economy.

The Preliminary Business Case has also (qualitatively) identified the substantial opportunity costs of inaction (under the base case scenario), which results in the loss of billions in SSW's productive infrastructure, and currently the most cost-effective way to export via the port year-round. The loss of pipeline, processing, export, and other operational infrastructure would impact not only the current PhosOne opportunity but future development opportunities in the region.

9.1 Key Findings/Recommendations

It is recommended that the sustainable development of the PoK move to a detailed assessment¹¹, with a focus on an investment-ready analysis of development requirements to support Scenario 1: Transition to PhosOne operations. Key to the detailed assessment will be the delivery and funding/cost recovery model for the continued operation of the PoK.

At the time of preparing this Preliminary Business Case, it is noted that:

- Several industry investigations are underway, and the results of these investigations should guide any detailed assessment
- Funding to commission the detailed assessment has been approved, and GSD will work with Carpentaria Shire Council to progress these works.

In addition to being the most progressed scenario and having the advantage of utilising the existing SSW infrastructure, the channel dredging to enable Scenario 1 will also support the future realisation of the broader/long term industry opportunities identified in Scenarios 2 and 3. In turn, the realisation of additional projects over time (beyond PhosOne) are shown to spread the cost recovery burden and financial sustainability of the PoK-based supply chain.

¹¹ Either a Detailed Business Case under the Queensland PAF, or an alternative framework suitable to support an informed investment decision.



Key aspects of the Detailed Business Case would include:

- Provision and review of current maintenance dredging permits and Environmental Authorities with the State and Federal Governments.
- Confirmation and agreement of maintenance dredging declared depths and requirements, including all approvals in coordination with Ports North, associated key stakeholders, and State and Federal Government requirements and legislation.
- Confirmation and agreement of capital dredging depths and requirements in coordination with Ports North and key stakeholders, in line with State and Federal Government requirements and legislation.
- Provision and review of current environmental activities, including seagrass, water, sediment, turtles and dugongs, and biosecurity.
- Development of significant State and Federal Government environmental assessments and approvals.
- Confirmation and agreement of shipping and vessel sizes for all Port of Karumba activities, and analysis of potential alternative export operational approaches for PoK.
- Confirmation and agreement of road vehicle sizes and travel frequency.
- Targeted geotechnical Investigations, factual and interpretative reporting for Port of Karumba laydown area, material sources and quarries, and road locations.
- Assessment and verification of road networks and accurate determination of scopes for unsealed and sealed roads, including condition assessments, reconstruction, widening, raising, geometry, causeways, and culverts/bridges.
- Determination of agreed flood immunity vision with DTMR, Local Government and key stakeholders as required.
- Undertake flood modelling for agreed crossings and floodplains to determine flood immunity requirements and proposed raising and widening of roads, culverts, causeways, bridges etc.
- Documentation of assumptions and limitations associated with development of engineering, infrastructure and cost estimates.

The detailed assessment will benefit from the results of analysis currently underway, including Ports North's Dredging Options analysis, the PhosOne Bankable Feasibility Study, and Chatham Rock Phosphate's feasibility works to provide certainty on key modelling inputs, the viability of underlying operations, and cost certainty in the financial commitments required from all parties.

9.2 Risk Assessment

Development of major greenfield projects in a remote region is, by its nature, subject to significant development, financial, logistical, and operational risk. As shown by Centrex recently entering voluntary administration, phosphate production is inherently sensitive to price movements and logistics costs.

To realise the benefits of the modelled scenarios, PoK will need to unlock a supply chain that is both cost-effective and reliable to support operators through the ups and downs of commodity cycles. A summary of the key project risks identified at this preliminary stage is provided in the table below.



Table 9-1: Key Project Risks

Risk	Likelihood	Consequence	Mitigation
World Phosphate Prices Further deterioration in world phosphate prices (and/or appreciation in the Australian dollar) would impact the viability of near-term developments.	Moderate	High	A similar subsidy for exports utilising the Mount Isa to Townsville line (reported \$10/tonne) would underpin port and road user costs and support operations. Port and road agreements could be tied to viability through the current AUD price to help de-risk development.
Macroeconomic Uncertainty The global economy is currently subject to significant economic, trade and policy uncertainty, which will all impact key commodity markets.	Moderate-High	Moderate-High	Maximising the efficiency of the supply chain will be the key to underpinning viable operations through commodity cycles.
Capital Cost Increases Capital costs are subject to potential increases. Notably, Civil IQ (see Appendix B) has identified a potential need for additional expansion of works and dredging as volumes increase, potentially reaching as high as \$35-\$190 million. Potential cost variation/escalation extends to all capital items considered within the scenarios. The potential downtime in dredging between the end of SSW zinc tailings operation and the commencement of PhosOne may also increase capital requirements.	High	Moderate-High	Detailed dredging options analysis currently underway by Ports North. Further detailed cost estimation.
Energy Costs and Availability Transitioning SSW operations to 1MT p.a. + of phosphate will require a substantial expansion in energy requirements. SSW currently require circa 3MW of energy, with only 1MW provided from the grid. PhosOne may require quadruple the amount of energy (i.e. approx. 12 MW). Generation and grid capacity at Karumba is currently highly constrained.	High	Moderate-High	Expansion of local energy capacity as per the Regional Energy and Electricity Supply Project (Mirabou Energy, 2023), including potential renewable energy micro-grids or utilising solar energy from the Normanton Solar Farm.
Labour and Skilled Labour Constraints While national unemployment is now trending upwards, very strong demand still exists for skilled construction labour. Given the remote location, the availability and costs of labour will be a key risk through construction and operations.	High	Moderate-High	Regional labour and skills attraction and promotion. Retention of existing SSW operational labour force.



Risk	Likelihood	Consequence	Mitigation
Regulatory and Access Risks Unlocking the scenarios will require development and environmental approvals at the local, State and commonwealth level, including a potential capital dredging of the PoK.	Low-Moderate	High	Regulatory support for proponents to unlock development through the PoK.
Renegotiation of First Nations and Council Agreements Transitioning from higher value zinc production to phosphate will potentially require substantial reductions in payments which are key for local communities.	Moderate	Moderate-High	Bankable Feasibility Study currently underway by PhosOne.
Supply Chain Closures due to Weather/Flooding Even with the proposed upgrades, access to the PoK will be constrained by road through the monsoon season. This will impact both construction and ongoing operations.	High	Moderate-High	Incorporate mitigation into operational models (e.g. slurry pipeline, stockpiling).
Timing And Funding For Supply Chain Upgrades Broader supply chain infrastructure is identified as significant (particularly for road-based transport of commodities). Funding and timing for these developments will potentially have a significant bearing on overall project delivery and supply chain reliability.	High	Moderate-High	Confirmation of funding and timing for broader supply chain upgrades and incorporation into overall project delivery.

Source: REA

9.3 Project Organisation and Governance Arrangements

This preliminary investigation into the Port of Karumba Sustainable Development was funded by the Queensland Government under the Remote Area Board Program. GSD project managed this project, and conducted a desktop review and extensive stakeholder engagement to scope potential sustainable development opportunities for the Port of Karumba. GSD engaged REA and Civil IQ to deliver the Preliminary Business Case.

As the PoK is a critical regional asset, this Preliminary Business Case considered the financial viability of various development scenarios, the economic impacts through development and once operational, and the long-term socio-economic benefits it will provide to the Gulf Savannah community and increased exports from the North West Minerals Province.

To the extent possible within the available time and budget, this Preliminary Business Case should be regarded as a preliminary strategic investigation to explore progression to the next stage of investigation and planning. While this Preliminary Business Case is guided by the Queensland Government Project Assessment Framework (PAF) based on a preliminary evaluation, it should not be considered as meeting all of the requirements of the PAF and therefore is not strictly for investment purposes.

It should be noted that this Preliminary Business Case has been scoped and developed simultaneously with several active investigations by industry on potential resource developments in the region, which has required this preliminary investigation to remain agile and to change focus as the active industry investigations progress. For



example, the economic impacts were partially reassessed late in this preliminary investigation (i.e., December 2025/January 2026) to address a redefined focus of Scenario 1.

At the time of preparing this report, these industry investigations remain ongoing and all reasonable effort has been made to ensure this report accurately reflects the current position of the industry investigations.

Governance arrangements for the delivery of this preliminary analysis included the GSD Board overseeing delivery by GSD and REA/Civil IQ, a steering committee involving representatives from the GSD Board, Carpentaria Shire Council, Ports North, Sibanye Stillwater/PhosOne JV, Queensland Government, and other representatives as required. Local Indigenous representatives were invited to join the steering committee.

The draft Preliminary Business Case was reviewed by the steering committee and key stakeholders and their feedback incorporated into the Preliminary Business Case. Once the Preliminary Business Case is approved, GSD will work with regional stakeholders to scope a Detailed Business Case. Funding for a detailed analysis has been provided to Carpentaria Shire Council, pending finalising of this Preliminary Business Case.

Private sector and industry are currently investigating several projects that could utilise the Port of Karumba. This Preliminary Business Case will assist proponents as they continue to investigate their projects.

For the private sector proponents, governance arrangements are not expected to be altered significantly through the realisation of the project scenarios, with Ports North responsible for governance & operation of the PoK and broader infrastructure requirements negotiated between project proponents and public infrastructure agencies.

The proponents will also need to work with these agencies and the Gulf community's traditional owner groups (Waanyi, Mingginda, Gkuthaarn and Kukatj) for access and operational requirements to unlock the various developments underpinning the scenarios.

9.4 Procurement Considerations

Preliminary evaluation under the PAF requires consideration of potential procurement strategies, including traditional delivery or a potential Public-Private Partnership (PPP). For this Preliminary Business Case, procurement for dredging is currently being assessed by Ports North, which will involve the contracting of a suitably qualified and experienced contractor to undertake long-term dredging of the PoK.

There is potential to consider alternative no dredge solutions, such as that applied at the Port of Bing Bong in the Northern Territory. These options would be considered within a Detailed Business Case, based on the outcomes of the Ports North dredging options analysis. Delivery of broader supply chain infrastructure (e.g. roads/common user infrastructure) will be subject to negotiation between project proponents and public infrastructure providers once private sector investigations are finalised.

9.5 Next Steps

Realising the sustainable development of the PoK will require significant support from a broad range of stakeholders.

Funding for a Detailed Business Case has been provided to Carpentaria Shire Council. To the extent possible within the available budget, timeframe, and terms and conditions of the funding, GSD will work with Carpentaria Shire Council and funding partners to scope the Detailed Business Case based on Scenario 1.

Key actions over the next 12 months to progress the opportunity based on Scenario 1 are outlined in Table 9-2.

**Table 9-2: Action Plan**

Action	Responsible Stakeholder	Timeframes
Confirm Scope, Funding and Procurement Arrangements for Detailed Business Case	GSD	Apr 2026
Complete Dredging Options Study and identify remaining gaps to be addressed	Ports North (GSD/Steering Committee)	Apr 2026
Confirm scope, funding and procurement to undertake supporting analyses to underpin Detailed Business Case assumptions: - Energy analysis - Import Analysis - Fuel Analysis - Non-Dredge Port Options	GSD	Apr 2026
Complete Bankable Feasibility Study and key financial needs to be considered in the Detailed Business Case	PhosOne	Apr 2026
Confirm revised agreements for Council rates and First Nations Land Use	PhosOne (local Councils, Traditional Owner groups)	June 2026
Complete Detailed Business Case in line with the Queensland PAF or alternative investment framework	Appointed party/consultant	Dec 2026

Source: REA

Based on the outcomes of this Preliminary Business Case, the following indicative scope has been developed for a Detailed Business Case, aligning with the PAF based upon an available budget of \$500,000 as outlined in Table 9-3. The steering committee and regional stakeholders will determine the final scope of the detailed analysis.



Table 9-3: Detailed Business Case Indicative Scope

Task	Description	Mar 2026	Apr 2026	May 2026	Jun 2026	Jul 2026	Aug 2026	Sep 2026	Oct 2026	Nov 2026	Dec 2026	Budget Allowance (Excl. GST)
Confirm the outcome sought	Review and re-confirm the project options and delivery models to be evaluated in the Detailed Business Case.											\$3,000
Confirm the project options and delivery models to be evaluated	Confirm the options and delivery models from the preliminary business case and select those that should be evaluated in greater detail. Criteria for selection: cost, benefits, risk, and ability to meet the outcome sought. This project stage will be informed by supporting works including the PhosOne Feasibility Study, Ports North Dredging Options Analysis, and RailPhos Feasibility Study (when available).											\$4,500
Confirm project organisation and governance arrangements	Confirm project organisation and governance arrangements for this project stage based on those from the preliminary stage.											\$4,000
Conduct a detailed comparative evaluation of the options and delivery models	The small number of options nominated for more detailed comparative analysis during this stage should be evaluated to identify the project option most likely to provide the best value for money outcome. This will include: - Detailed analysis of preferred dredging depth and program (based on Ports North advice) and associated environmental impacts. - Quantity surveyor costing of shortlisted options (P90 costs to be applied). Targeted geotechnical investigations, factual and interpretative reporting for Port of Karumba laydown area, material sources and quarries, and road locations.											\$200,000



Task	Description	Mar 2026	Apr 2026	May 2026	Jun 2026	Jul 2026	Aug 2026	Sep 2026	Oct 2026	Nov 2026	Dec 2026	Budget Allowance (Excl. GST)
	- Assessment and verification of road networks and accurate determination of scopes for unsealed and sealed roads, including condition assessments, reconstruction, widening, raising, geometry, causeways, and culverts/ bridges. - Determination of agreed flood immunity to industry leading practice requirements, or lesser agreed flood immunity with DTMR, Local Government and key stakeholders as required. - Undertake flood modelling for agreed crossings and floodplains to determine flood immunity requirements and proposed raising and widening of roads, culverts, causeways, bridges etc. - Documentation of assumptions and limitations associated with development of engineering, infrastructure and cost estimates.											
Detailed risk analysis	The detailed risk analysis will involve the following activities: - Identification – comprehensively identifying and documenting the risks to which each option could be exposed. - Assessment (qualification and quantification) assessing materiality, likelihood and consequences of the risks occurring. - Allocation – identifying the parties likely to be best able to manage the risks. - Mitigation – developing strategies to mitigate the risks. - Workshop draft risk analysis with key industry and government stakeholders.											\$30,000



Task	Description	Mar 2026	Apr 2026	May 2026	Jun 2026	Jul 2026	Aug 2026	Sep 2026	Oct 2026	Nov 2026	Dec 2026	Budget Allowance (Excl. GST)
	These activities will be undertaken to produce the following outputs and outcomes: - Detailed risk analysis for each option. - Documentation of the information generated in a comparative analysis. - Reflect the risks in the value of costs and benefits considered in the financial and economic analyses. - Summary demonstrating how each risk has been factored into a cost or benefit in the financial and economic analyses.											
Detailed financial and economic analyses	Detailed analysis will include: - Financial analysis to identify and assess the financial impact of each option on the government. - Detailed economic analysis to identify all of the costs and benefits associated with each option. - Review, verify and further develop the sensitivity analysis on the options being evaluated. - To produce these outputs for the PoK Detailed Business Case further investigation into infrastructure requirements and costs must be conducted alongside operating models to produce accurate, quantifiable measures of costs and benefits (financial and economic).											\$160,000
Conduct market sounding	Validate assumptions relating to private sector involvement in the options through market sounding.											\$25,000
Consider legislative requirements	Consider any relevant legislative requirements associated with each option: - Environmental.											\$10,000



Task	Description	Mar 2026	Apr 2026	May 2026	Jun 2026	Jul 2026	Aug 2026	Sep 2026	Oct 2026	Nov 2026	Dec 2026	Budget Allowance (Excl. GST)
	- Planning. - Cultural Heritage. - Native Title.											
Consider whole-of-government policy issues	Assess each option to identify whole-of-government policy issues, noting consideration of the strategic government priorities.											\$4,000
Consider regulatory issues	Detailed analysis of regulatory requirements, risks and constraints.											\$4,000
Public interest assessment	For options that have a direct impact on the community, complete a more detailed public interest assessment.											\$4,500
Consider procurement and delivery strategies	Consider at least two procurement/delivery strategies and complete a comparative analysis to nominate a preferred procurement option for further assessment in the supply strategy development stage.											\$20,000
Recommend a preferred option and delivery model	Recommend the preferred option to be implemented.											\$6,000
Develop a project implementation plan for the preferred option	Consider and document issues associated with the implementation of the preferred option.											\$15,000
Seek approval to proceed	Develop a submission to the appropriate decision makers seeking: - Funding approval for project delivery. - Approval to proceed. - Allocation of appropriate resources.											\$10,000

Source: REA



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Appendices



Appendix A Situational Analysis

The following analysis reviews the key demographic and economic statistics for the Gulf Savannah region and the key influencing macroeconomic trends to provide context for the Preliminary Business Case and economic development opportunities through the PoK.

Demographic Profile

Population

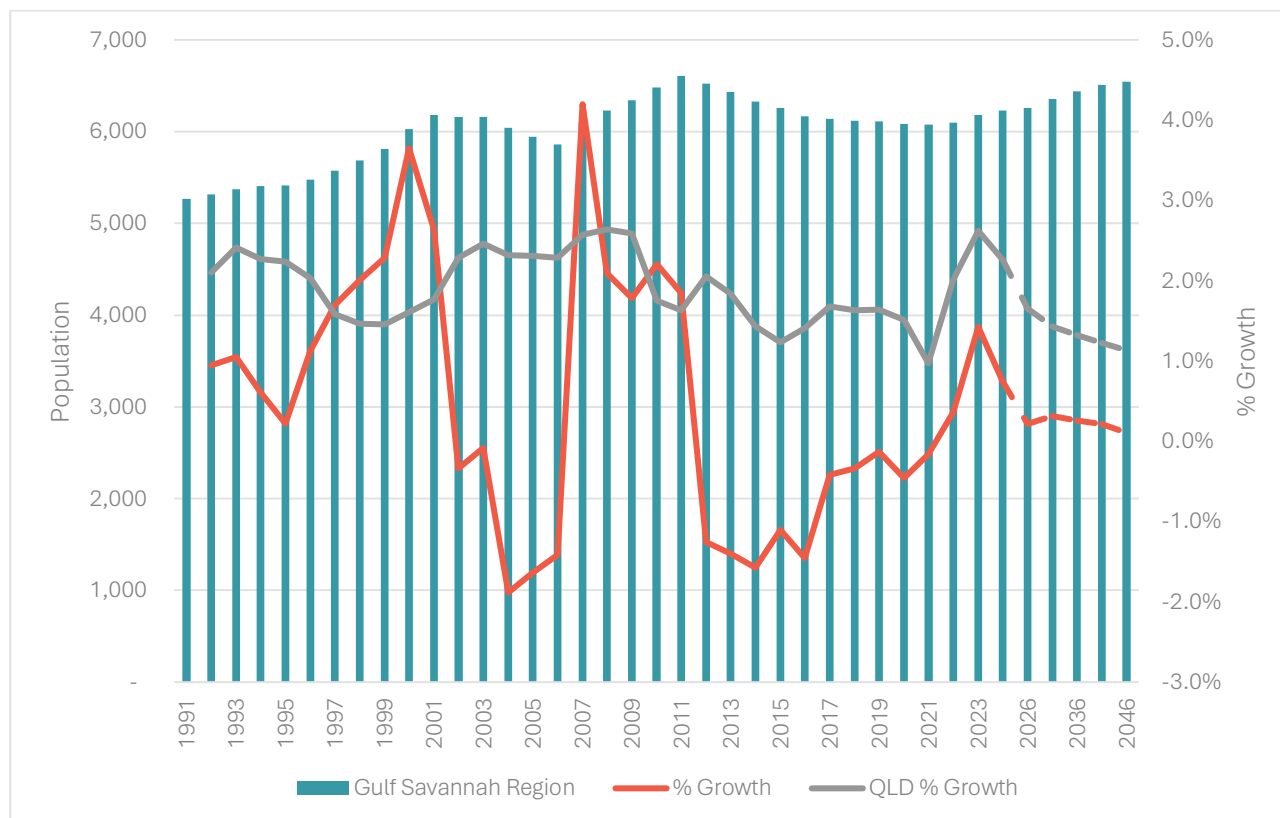
The Gulf Savannah region currently hosts an estimated population of 6,230 (as of June 2024). Population growth has been volatile over the past 30 years, with:

- Periods of significant growth spikes (including 3.6% in 2000 and over 4% growth in the 2007 pre-GFC mining boom).
- Periods of prolonged population decline (negative population growth every year from 2011 to 2021, bottoming at -1.6% in 2016 following the closure of Century Mine the year prior).

In a positive sign, the region has returned to population growth in the post-COVID period, averaging 0.8% p.a. over the past three years. Over 2024 all of the LGAs within the region experienced either stable (Croydon's population remained flat at 270) or positive growth (ranging from 0.1% in Etheridge to robust growth of 1.4% in Burke Shire).

The regional population is projected to continue to grow modestly, reaching just over 6,540 persons by 2046 (0.2% p.a.).

Figure A-1: Historical and Projected Population



Source: QGSO (2025)

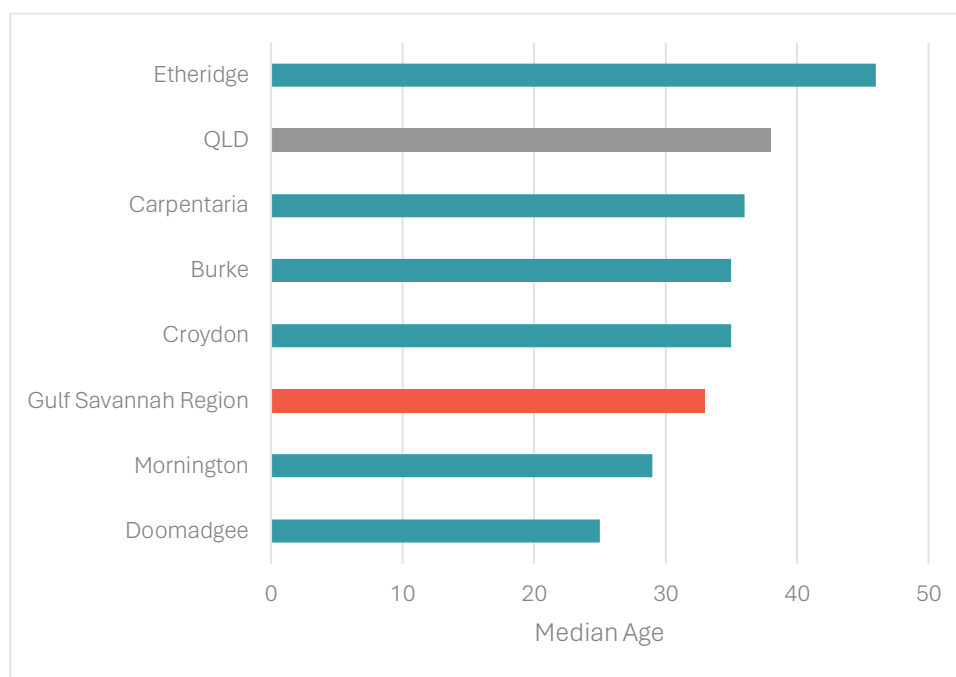


Age

The Gulf Savannah region has a relatively young demographic (median age of 33 years compared to 38 years across Queensland), driven by mining employment, and younger ages across the regional First Nations communities.

The age profile varies notably across the regional LGAs, with Etheridge having much older demographics associated with the agricultural industry and the young First Nations communities of Mornington and Doomadgee.

Figure A-2: Median Age (2021)



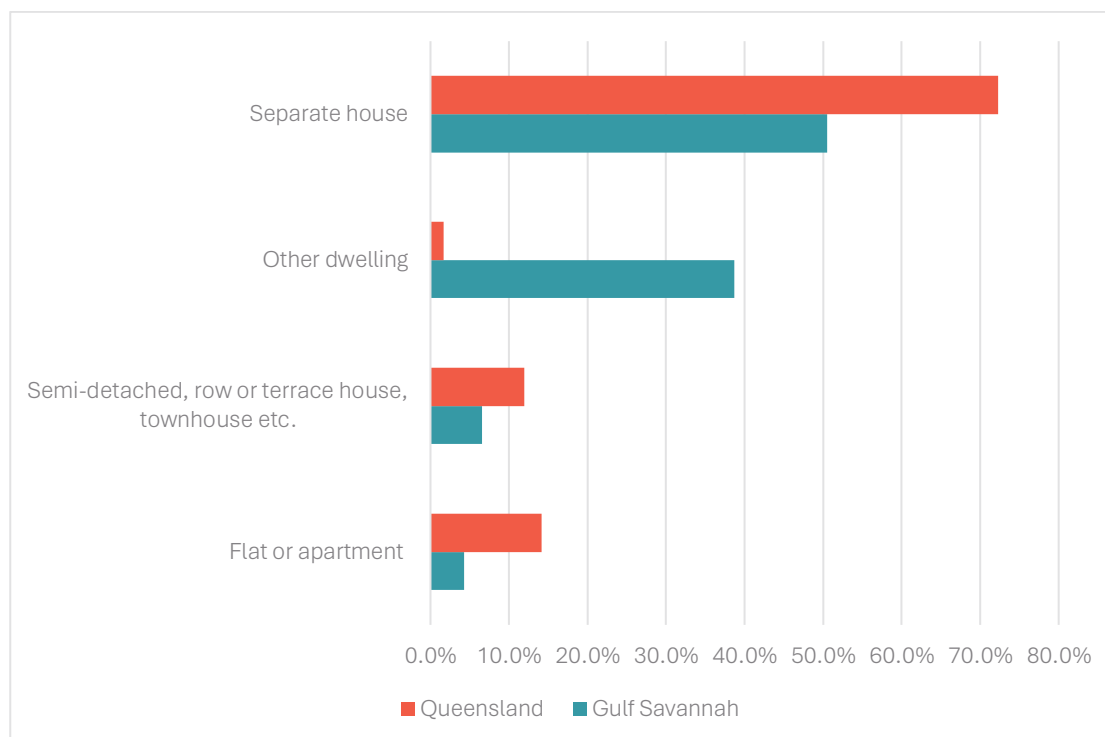
Source: ABS (2022)

Housing Mix

The regional housing mix is characterised by a very high share of other dwellings (predominantly persons living in caravans), with the vast majority of fixed housing stock being separated/detached dwellings relative to the Queensland average.



Figure A-3: Housing Mix (2021)



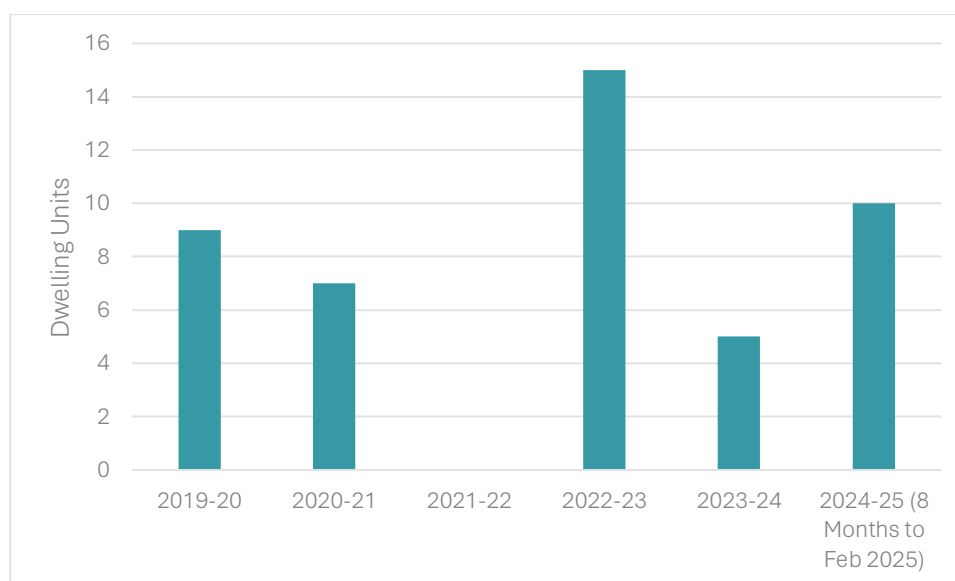
Source: ABS (2022)

Building Approvals

The Gulf Savannah region has averaged 7.7 dwelling approvals per annum since 2019-20, including a positive 10 dwellings approved over the eight months to February 2025 and consistent with the region's return to population growth post COVID.

Like many areas in Australia, the region is currently experiencing a housing shortage, including significant additional community housing supply required in Doomadgee (2021 Census reported average 4.2 persons per dwelling) and Mornington Island (3.5 persons per dwelling) to alleviate overcrowding.

Figure A-4: Gulf Savannah Region Dwelling Approvals



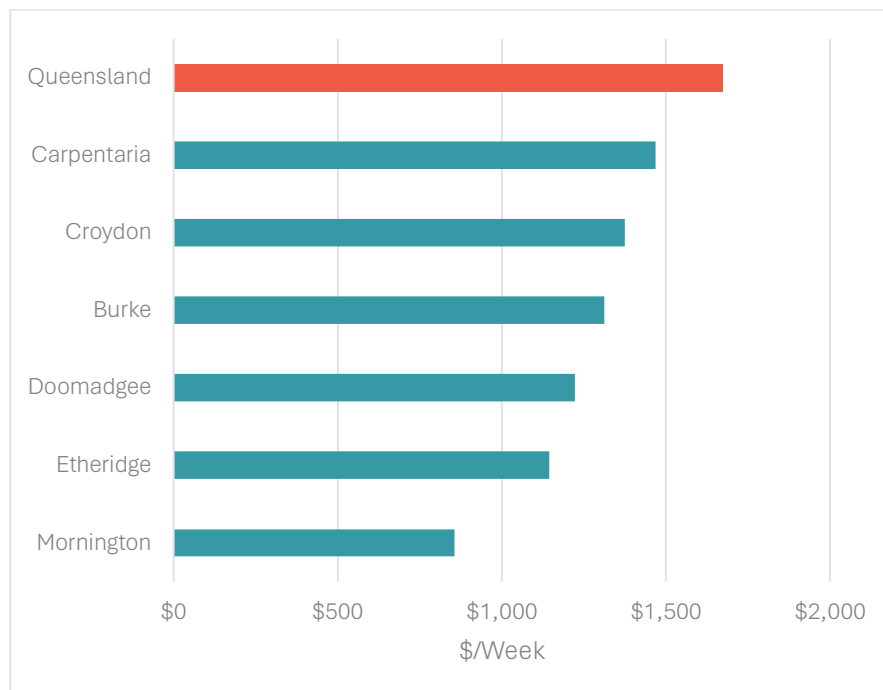
Source: QGSO (2025)



Household Incomes

Household incomes across the region are generally lower than the Queensland average and range from \$885/week in the First Nations community of Mornington Island to \$1,469/week in Carpentaria, with higher paying mining employment underpinning the relatively stronger median household income.

Figure A-5: Median Household Income (2021)



Source: ABS (2022)

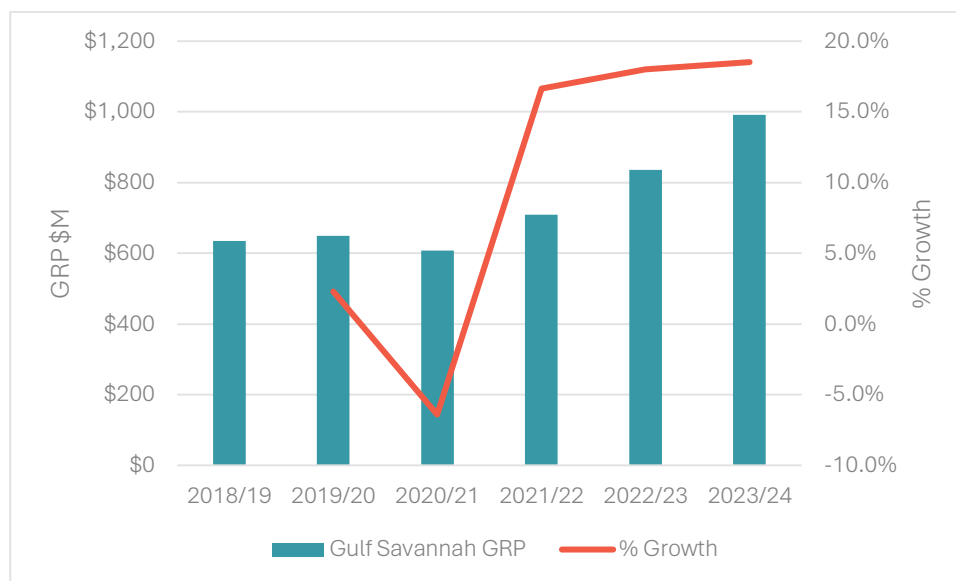
Economic Profile

Gross Regional Product

The Gulf Savannah region registered Gross Regional Product (GRP) of \$992 million over 2023/24. Growth has been robust, averaging nearly 18% per annum since the end of COVID restrictions in 2020/21 driven by strong beef prices and production, and the restarting of the Century Mine tailings retreatment operation.



Figure A-6: Gross Regional Product (Real \$2022/23)

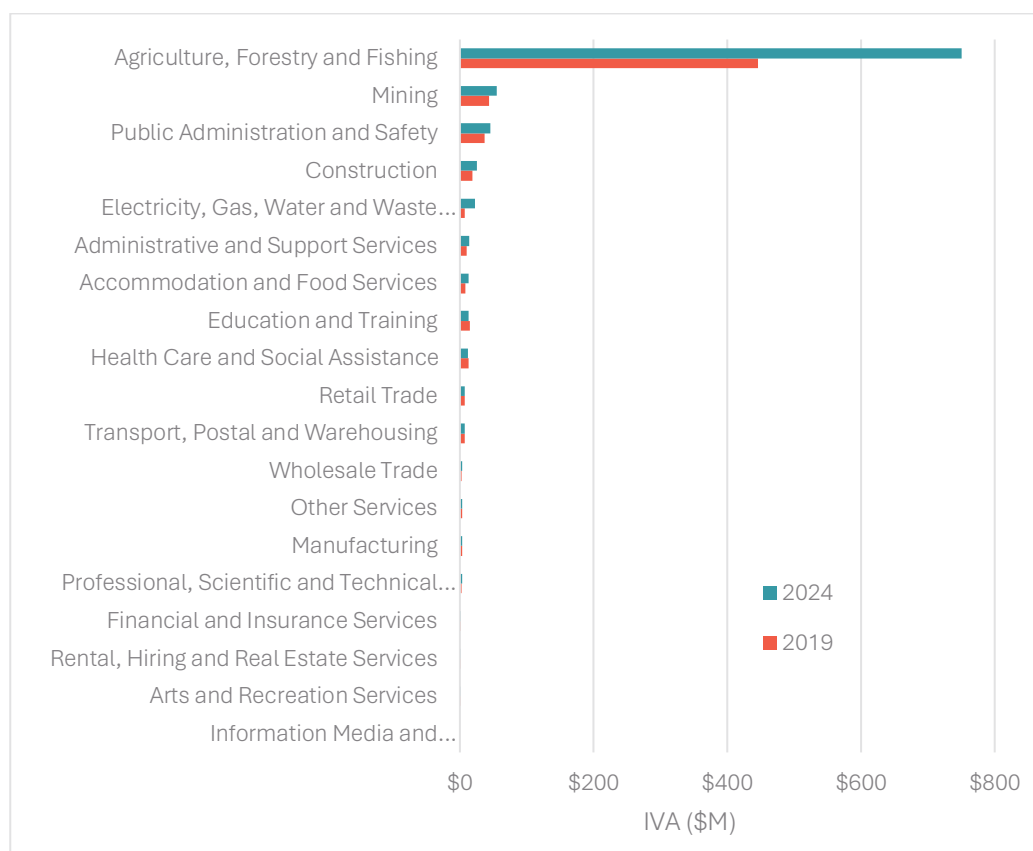


Source: NIEIR (2025)

The Gulf Savannah region economy is dominated by the agriculture, forestry and fishing industry (being a major beef cattle producer and hosting an extensive commercial fishing industry), contributing over three-quarters of Industry Value Added (IVA) in 2023/24.

Mining contributed \$56 million (2.5% of IVA) while public administration and safety contributed \$45 million (2.1%) to IVA (with Government being a key regional service provider).

Figure A-7: Industry Value Added (2018/19 and 2023/24)



Source: NIEIR (2025)



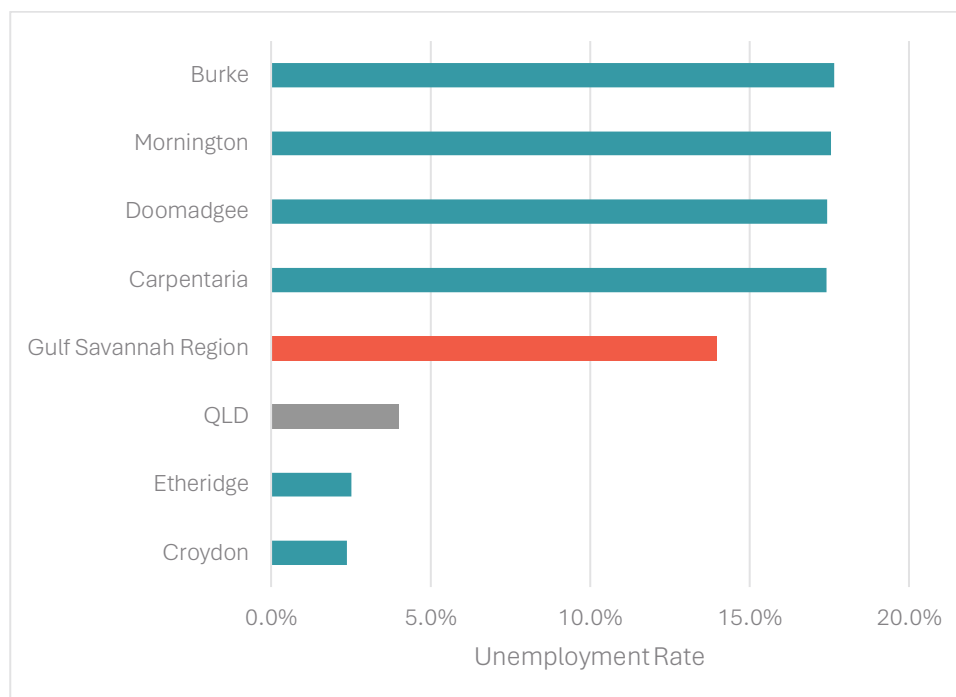
Labour Market

The Gulf Savannah region hosts an estimated labour force of circa 2,600 with an unemployment rate of 14%, well above the QLD average of 4.0%.

Levels of unemployment vary significantly across the regional LGA's with estimated unemployment rates of >17% across Burke, Carpentaria, Doomadgee and Mornington Island and very low unemployment (circa 2.5%) across the agricultural centres of Croydon and Etheridge.

Care should be taken in interpreting the local unemployment data, given the small sample sizes that estimates are based upon. Time series data is not reported due to periodic non-reporting of statistics for some LGAs.

Figure A-8: Unemployment Rate (December 2024)



Source: QGSO (2025)

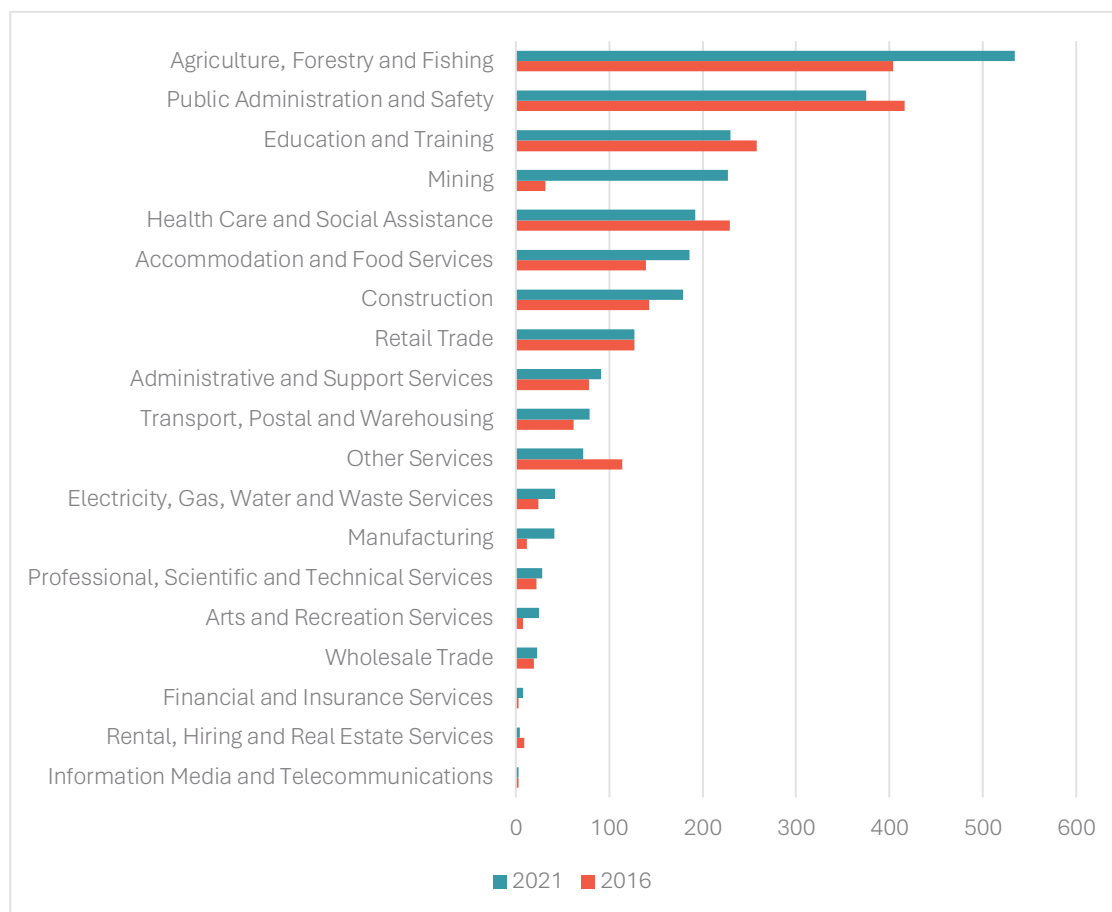
Employment By Industry

Key employment industries within the Gulf Savannah region include:

- Agriculture, forestry and fishing (21.7% of employment in 2021, growth of 5.7% p.a. since 2016).
- Public administration and safety (15.2% of employment, decline of 2.1% p.a.).
- Education and training (9.3% of employment, decline of 2.3% p.a.).
- Mining (9.2% of employment, growth of 48.0% p.a. having recovered from near zero levels with the introduction of New Century tailings processing operations).



Figure A-9: Gulf Savannah Region Employment by Industry Place of Work (2021 & 2016)



Source: ABS (2017, 2022)

Employment by Occupation

Occupations within the region are weighted towards labourers (22.0% of Gulf Savannah vs. 10.3% Queensland) and managers (16.9% of Gulf Savannah vs. 12.7% Queensland) with both occupations reflective of the strong regional agricultural & fishing industry employment.

Professional and technician/trade worker employment (while lower than the State average) still represent a significant share of the overall occupational mix, while machinery operators and drivers are strongly represented regionally with jobs based around agriculture, fishing, mining and port operations.



Figure A-10: Employment by Occupation (Place of Work, 2021)



Source: ABS (2017, 2022)

Tourist Visitation

The Gulf Savannah region is a notable outback tourism destination and part of the Savannah Way tourism route, stretching 3,700km from Broome in Western Australia to Cairns. The region has a host of natural attractions including Lawn Hill National Park, Gulf of Carpentaria Marine Park, Undara Volcanic National Park, and the Riversleigh Fossil Site in Burke.

The First Nations communities of Doomadgee and Mornington Island are known for their rich cultural heritage and internationally acclaimed artworks in addition to the unique natural assets. Burke Shire is also renowned for its rich cultural heritage tourism. Other notable regional attractions include gold fossicking in Etheridge Shire and built attractions including the Les Wilson Barramundi Discovery Centre at Karumba, and some of the best camping and fishing experiences in Australia.

Visitation to the region is highly seasonal, with 80% of visitors to the Gulf Savannah arriving between April and October (GSD, Savannah Way & TTNQ, 2024) during the cooler months and avoiding the summer monsoon.

Post COVID the region has attracted approximately 105,000 overnight visitors¹² p.a. who stayed over 535,000 nights with >90% of visitation being domestic travellers. Estimated average visitation has remained modestly below pre-COVID levels (-8% for visitors and -15% for nights) with cost-of-living pressures and the reopening of international travel options impacting the domestic visitor market.

Domestic visitors have greatly increased expenditure in the region (>60% increase in spend per night) in the post COVID period, consistent with the significant cost increases over the period.

¹² Day trips to the region are not reported in the national visitor survey.



Table A-1: Gulf Savannah Region Tourist Visitation (Calendar Year)

Indicator	Pre COVID Avg (2016-2019)		Post COVID Avg (2021-2024) ¹	
	Domestic	International	Domestic	International
Visitors ('000)	107	6	99	5
Visitor Nights ('000)	576	56	488	48
Avg Stay (Nights)	5	9	5	10
Avg Spend Per Trip	\$620	\$883	\$916	\$770
Avg Spend Per Night	\$115	\$94	\$186	\$74

Note: ¹ International visitation is based on the average of two years (2023-2024) due to data limitations during and post COVID.

Source: TRA (2025)

Regional Imports and Exports

Analysis of Gulf Savannah imports and exports was undertaken using regionalised transaction tables (in this case the ABS 2022-23). National tables were used and regionalised by REA to reflect the Gulf Savannah region based on employment by industry using the Flegg Location Quotient method.

Key regional exports include beef cattle (incl. the previous live exports through the PoK) and non-ferrous metal ore mining (zinc via the New Century tailings processing operation). The main regional imports include construction services (trades), health care, food and retail items which need to be brought into the remote region.

The top five import and export sectors for the region are highlighted in Table A.2.

Table A-2: Gulf Savannah Regional Imports and Exports (2021-22)

Rank	Sector	(\$M)
		Regional Exports
1	Non-Ferrous Metal Ore Mining	\$208
2	Sheep, Grains, Beef and Dairy Cattle	\$200
3	Public Administration and Regulatory Services	\$59
4	Employment, Travel Agency and Other Administrative Services	\$35
5	Heavy and Civil Engineering Construction	\$28
		Regional Imports
1	Construction Services	\$406
2	Health Care Services	\$298
3	Retail Trade	\$269
4	Food and Beverage Services	\$227
5	Public Administration and Regulatory Services	\$217

Source: ABS (2024), REA

Macro and Regional Trends

Numerous global and national economic trends influence the Gulf Savannah economy. Major current macroeconomic factors impacting the regional economy include:

- **Food security and demand for agricultural produce:**



Food security is a pressing challenge in the 21st century, driven by decades of global population growth, climate change, geopolitical conflicts, and economic inequality. The demand for agricultural produce is projected to continue to rise significantly, while climate-induced disruptions such as droughts, floods, and shifting growing seasons threaten the stability of global food production.

The implications for the agricultural industry are profound. To meet growing food demands sustainably, the sector must undergo a transformation, embracing innovation and resilience. This includes unlocking new production areas and practices including precision agriculture, biotechnology, and sustainable farming practices that increase yields while minimizing environmental impact. Additionally, the industry and public sector must invest in infrastructure and logistics to reduce food loss and ensure equitable distribution.

The Gulf Savannah region is well placed to support Australian and global agricultural production (beyond extensive beef cattle grazing), with investment in leading infrastructure the key to unlocking industry development.

- **Energy transition and demand for critical minerals:**

The global transition to renewable energy is accelerating as nations seek to reduce greenhouse gas emissions and combat climate change. Generational investment in renewable energy technology including solar and wind generation is at the forefront of this transition within the region and across the broader North West Minerals Province.

The clean energy transition depends on the availability of critical minerals such as vanadium, lithium, cobalt, nickel, and rare earth elements, which are essential for manufacturing batteries, magnets, and other components. The North West Minerals Province has an abundance of critical minerals and is a key driver of regional investment over the coming five to ten years.

- **Temporary inflation and cost-of-living relief:**

Inflation has fallen since its peak in 2022 to 2.4%, sitting within the target rate of the Reserve Bank of Australia's (RBA's) (2-3%). This follows 11 consecutive quarters of above target inflation, that saw the highest price growth in decades. The RBA responded to this fall in February, cutting rates by 25 basis points to 4.1%, following 13 increases since May 2022, pointing to subdued growth in private demand and wage growth (RBA, 2025). Even though inflation has fallen, many households are still under financial pressure.

- **Tight labour market conditions:**

Labour market conditions remain tight, with an unexpected tightening toward the end of 2024 that has continued into 2025. The national unemployment rate remained at 4% in February, down from 4.1% in October of 2024. The participation rate remains high, vacancies remain elevated (though much lower than their 2022 peak), and average hours worked has trended upward. The outlook for the labour market remains uncertain, though tightness appears to be a feature that won't be alleviated, at least not in the short-term, with a range of employers reporting labour as a constraint (RBA, 2025).

- **Tempered economic growth and uncertainty:**

Despite a recent modest improvement from the low point of 0.8% in the September quarter to 1.3% in the December 2024 quarter (ABS, 2025a), real output growth remains weak with private domestic demand recovering a little more slowly than earlier expected, and there is uncertainty around the extent to which the recovery in household spending in late 2024 will persist. Overall, the outlook for inflation, unemployment and economic growth remains uncertain, with recent data giving mixed signals about the state of the economy (RBA, 2025).



- **Population growth and declining birth rates:**

National fertility rates have been declining and reached an all-time low of 1.5 babies per woman in 2023, well below the required level for replacement of around 2.1. The long-term implications for future growth, labour availability, and increased aged care responsibilities for the community, as well as on key resource and agricultural commodity markets, are yet to be fully realised.

National population growth has decreased since September 2023, with both births and net overseas migration having declined. Net overseas migration still contributes more to population growth by far (circa. 380,000 vs 104,000). With the decline in both sources of population growth, annual population growth fell from the September 2023 high of 2.5% to 1.8% in September 2024. The growth is projected to gradually ease at an annual average of between 1.2% and 1.7% until June 2032, which would continue to support domestic demand and labour supply while reducing the current chronic housing pressures.

- **Global Economy:**

Business and consumer sentiment has weakened in some countries, economic policy uncertainty has increased (particularly in trade), labour markets remain tight, and inflation remains a lingering issue globally leading to moderate growth projections (OECD, 2025). Growth is expected to hold steady at 2.7% in 2025-26, below the historical (2000-2019) average of 3.7% (World Bank, 2025). While the U.S. economy is showing resilience, other major economies face downward revisions, contributing to an uneven recovery.

Global inflation is projected to decline gradually to 4.2% in 2025 and to 3.5% in 2026, but policy uncertainties and structural constraints pose risks to sustained global expansion (IMF, 2025).

For Australia, this low-growth environment could weaken demand for key exports, such as resources and agricultural products. Additionally, Australia has not received trade concessions in the U.S.'s new set of tariffs, notably failing to receive an exemption on steel and aluminium exports. While ongoing monetary policy adjustments worldwide may impact financial markets and investment flows.

- **Global Tensions and Conflict:**

Rising global tensions, including the Israel-Hamas war, the ongoing Russia-Ukraine conflict, and growing U.S.-China strategic competition, are creating economic uncertainty and disrupting trade and supply chains. The Israel-Hamas war has escalated instability in the Middle East, affecting global oil prices and shipping routes, particularly through the Red Sea, where Houthi attacks have disrupted trade flows.

The war between Russia and Ukraine has greatly disrupted global supply chains. This led to a surge in oil and gas prices in 2022, contributing to Australia's increased costs for transport, logistics, and businesses reliant on fuel. Input costs for Australian farmers and subsequently domestic food prices have also risen, as both Ukraine and Russia are major global suppliers of wheat and fertilisers. While the Russia-Ukraine war has provided some opportunities for Australian exports (as Europe sought alternatives to Russian gas), it has contributed to high inflation and greater economic uncertainty. Ceasefire talks are progressing in Riyadh, Saudi Arabia, though the outcome of these talks is highly uncertain.

Political tensions with China, including key defence agreements in the Solomon Islands and the presence of Chinese warships in Australia's Exclusive Economic Zone also impact the outlook for relations with one of Australia's largest and most important trading partners and a key source of international visitation.

- **Remote working and workforce automation:**

The COVID-19 pandemic has fundamentally reshaped the landscape of work, accelerating trends towards remote working and automation. This has led to a shift within the housing market toward areas of (relative) affordability and strong lifestyle attraction, with destinations like Cairns, Sunshine Coast, Fraser Coast and Gympie seeing among the highest levels of in-migration (CommBank and RAI, 2025).



We may see further impacts locally as investment in automation is a major trend for many key regional industries, including agriculture, mining, and construction. Rapid advances in Artificial Intelligence (AI) are also creating significant opportunities and disruption within a broad range of professional services industries (as well as opportunities for increased service levels in remote communities), the implications of which will take notable time to fully understand.

Overall, the Gulf Savannah region is well placed given the prevailing national and international macroeconomic trends, though with notable risks and uncertainties regarding the short-term outlook.



Appendix B Infrastructure Assessment

Civil IQ has completed the Infrastructure Assessment for the Port of Karumba (PoK) Preliminary Business Case as documented within this section. Civil IQ's agreed scope of works for the project (undertaken as of September 2025) included:

- Based on the future development scenarios, Civil IQ identified the required supply chain infrastructure to operate through the PoK. Areas of investigation included:
 - Road and rail access (with consideration given to flood mitigation, bridge/road widening, heavy vehicle/ Over Size Over Mass (OSOM) access).
 - Port side common user infrastructure.
 - Dredging and other channel works.
- Broader needs for the development of new industries (e.g. broadacre agriculture/aquaculture) not directly related to the PoK were discussed at a high level.
- Based on the assessment, high-level order of capital costs were developed to realise each of the future development scenarios.

The basis of the assessment was determined from numerous meetings with Gulf Savannah Development (GSD), Regional Economic Advisory (REA), key proponents and key stakeholders associated with the sustainable development of the Port of Karumba, throughout May to June 2025. The assessment has been undertaken as desktop study with reference to available information, data, studies and similar sources.

The Infrastructure Assessment has been developed to input into the Infrastructure Needs Scenarios developed for the project as summarised below, and overall, as shown in Figure B-1 and summarised in Table B-1.

- **Port of Karumba Infrastructure:**
 - Ongoing and expanded dredging program.
 - Expedition cruise ships long term.
 - Laydown area.
 - Common user facilities (export).
 - Barge handling facilities.
 - Import Wharf.
- **Road Infrastructure:**
 - Norman River Crossing.
 - Walkers Creek Crossing.
 - Flinders River/ Walkers Bend.
 - Remaining 21 km of the Burke Developmental Road between Cloncurry and Normanton – 10 km section that remains unfunded.
 - Gilbert River Bridge raising.
- **Mining and Resources:**
 - PhosOne (North West Phosphate/ Sibanye Stillwater).
 - Chatham Rock Phosphate.
 - Avenira Limited (Northern Territory)



- Centrex.
- Walford Creek.

Figure B-1: Overall Map of Infrastructure Assessment Extents

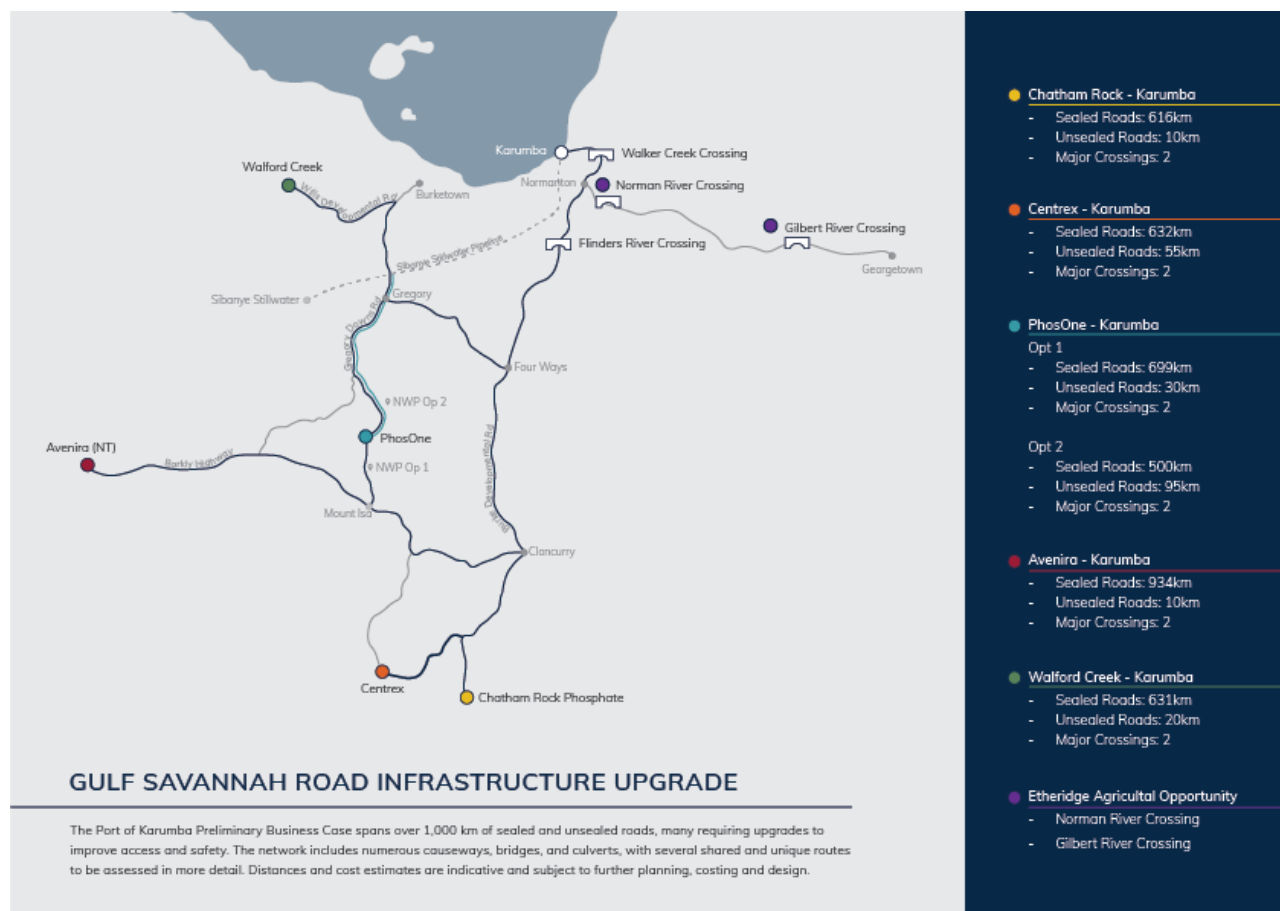




Table B-1: Infrastructure Assessment Summary

Infrastructure Item	Associated with Project								
	PhosOne Paradise South	Chatham Rock Phosphate Korella	Avinera	Centrex/PRL Ardmore	AEON Metals Walford Creek	Expedition Cruise Ships	Regional Agricultural Development	Regional Imports	High-Level Costing
Port Infrastructure									
Dredging -3.4M LAT	✓								\$19.6M
Dredging -5.4M LAT		✓	✓	✓	✓	✓	✓	✓	\$112.5M
Laydown Area		✓	✓	✓	✓				\$35M
Barge Handling Facilities		✓	✓	✓	✓				\$10-\$15M
Common user facilities (export)		✓	✓	✓	✓		✓		\$65-\$75M
Import Wharf								✓	\$45-\$77M
Passenger Terminal & Bus Terminal						✓			\$6-8M
Road Infrastructure									
Unknown Road – 85km - Assumes new road for full length - Assume unsealed build		✓							\$170M
Unknown/ Unsealed Road – 10km - Assumes new road in part - Assume unsealed build					✓				\$7.3M



Infrastructure Item	Associated with Project								
	PhosOne Paradise South	Chatham Rock Phosphate Korella	Avinera	Centrex/PRL Ardmore	AEON Metals Walford Creek	Expedition Cruise Ships	Regional Agricultural Development	Regional Imports	High-Level Costing
Burke Developmental Road – 10km - Road widening with seal		✓	✓	✓	✓			✓	\$13M
Burke Developmental Road - Flinders River Crossing – 300m - Surrounding roads to be raised and widening		✓	✓	✓	✓			✓	\$100M
Burke Developmental Road - Walker Creek Bridge – 95m - Bridge and embankment raise by 2m		✓	✓	✓	✓		✓	✓	\$53M
Duchess Dajarra Road – 45km - Treat with 100mm thick Gravel Resheet to improve wearing surface - Assume gravel source can come from Council's gravel pits - Assumes no heavy rebuild due to black clays - Assumes no major rebuild needed				✓					\$5.4M
Gilbert River bridge and associated embankment raise - Approximately 300m based on assessment of Queensland spatial data							✓		\$100M



Infrastructure Item		Associated with Project								
		PhosOne Paradise South	Chatham Rock Phosphate Korella	Avinera	Centrex/PRL Ardmore	AEON Metals Walford Creek	Expedition Cruise Ships	Regional Agricultural Development	Regional Imports	High-Level Costing
Norman River Bridge and associated embankment raise										
- Approximately 400m based on assessment of Queensland spatial data								✓		\$100M



Port of Karumba Infrastructure

The basis of assessment and high level costings for port side common user infrastructure, dredging and other channel works at the Port of Karumba (PoK) are provided in this section.

Overview

Karumba is situated in the south-east corner of the Gulf of Carpentaria at the mouth of the Norman River and is 530km west of Cairns. The port services the Sibanye Stillwater Century Mine. Karumba also provides a trawler base for the prawn and fishing industry and a community port for servicing townships in the area.

PoK's existing entrance limits ship size to 100m overall length. A formal assessment by Maritime Safety Queensland (MSQ) shall be conducted before any vessel is granted approval to enter the port. There has historically been a Department of Home Affairs approved Maritime Security Plan (MSP) in place to facilitate security regulated shipping however this was cancelled on the cessation of international livestock exports. A new MSP can be reintroduced if required to support security regulated shipping. Ports North require individual vessels or property to be the responsibility of the vessel owner. Figure B-2 shows the PoK limits and locations of several environmental receptors identified as associated with the PoK. The dredged component of the channel is around 7 kilometres long, 60 metres wide (toe-to-toe) and has a gazetted minimum depth of 3.4 metres below Lowest Astronomical Tide (LAT). The total channel length, including sections that do not require regular dredging to achieve the gazetted depth, is 12 – 15 kilometres long up to the wharves and SSW's facility. The width of the channel varies through the river system and is sufficient to accommodate present vessel movement.

Figure B-2: Environmentally Sensitive Receptors and PoK Limits



Source: DTMR Port of Karumba First Strike Oil Spill Response Plan

Department of Transport and Main Roads - Maritime Safety Queensland, and specifically the Cairns Maritime Region issued a Notice to Mariners on 12 July 2024 for the declared depths shown in Table B-2.



Table B-2: PoK Declared Depths (Source: Cairns Maritime Region)

	Design Depth (Metres)	Actual Depth (Metres)
Entrance Channel	-	2.2*
Mobil/Trinity wharf	-	6.3
Raptis Wharf	-	5.3
Ruby Marine Wharf	-	5.3
Gulf Freight Services Wharf	-	6.2
Karumba Cold Stores Wharf	-	6.2
Seaswift/Shell Wharf	-	6.2
Karumba Livestock Loading Wharf	-	5.4
Gulf Freight Services Ramp/Wharf	-	4.6
MMG wharf	-	4.2

*New or revised entry.

Ongoing and Expanded Dredging Program

This assessment has assumed that maintenance dredging shall be undertaken to -3.4m Lowest Astronomical Tide (LAT) depth (final specifications require confirmation from Ports North, MSQ and potential users) in the entrance channel. Ports North is currently reviewing achieving -3.4m LAT for 1M tonnes per annum exports working under tidal restrictions, noting that the PoK experiences a tidal range of 4.85m.

Assuming -3.4m LAT is maintenance dredging boundary, or the boundary that separates maintenance dredging from capital dredging and assuming maintenance dredge is placed to sea with a high-level cost estimate of \$35/m³ in situ. Capital dredging to enhance the channel is possible and requires moderate to significant environmental approvals and supporting studies. Consequential amendments to existing maintenance approvals would follow a capital campaign to accommodate ongoing maintenance volume forecast of the enhanced channel geometry. Allowing for approvals, studies and dredging (including pond construction) at a high level cost estimate of \$100/m³ in situ. This costing does not include offsets, contingency or costing associated with seeking approvals to lengthen the timeline of the current high-level contract.

From the workshop, Panamax vessels were stated as key to acquiring economies of scale in Phosphate supply chains. Panamax vessels are 294m long, 12m long with a 32.2m beam. A Panamax vessel cannot fit into the PoK and it is not feasible to dredge to an extent that allows these vessels entry to the port. Instead, these vessels, if utilised at the Port of Karumba, would require transshipment of cargo via smaller vessels, while themselves remaining in deeper waters.

Assuming Ports North dredge to -3.4m LAT that gives a draft of approximately 8m depth on high tide. This is understood to yield approximately 1M tonnes per annum. If depth is extended by 2m to -5.4m LAT declared, this will allow mid tide departures or arrivals, and/or higher cargo tonnage to an estimated 2+ M tonnes per annum. A detailed navigation study is required to allow a true appreciation and full requirements of the dredging required to allow vessels of a range of throughputs and sizes to be assessed.

It is assumed that the channel and Norman River are at the same depth and equal to the declared dredge depth. This assumption is to be reviewed against navigational charts to confirm if too conservative. Basis of high-level costing is below:

- Maintenance dredging cost to maintain at - 3.4m LAT:
- Dimensions of dredged corridor: 60m x 7km x 1.2m depth¹³ = 504,000m³.
- Assume an additional 55,000m³ for swing basin volume.

¹³ Channel dimensions provided by Ports North.



- Utilising $\$35/\text{m}^3 = \19.6M .
- Assumes that the sea disposal maintenance approval permits the campaign.
- Capital dredging cost to get from -3.4m LAT to -5.4m LAT:
- Pro rata volume 928,668m³.
- Assuming capital dredging brought to land = \$92.9M based on \$100/m³ in situ (potential option to dispose of capital dredging at sea).
- Total to achieve -5.4m LAT = **\$112.5M**.

Expedition Cruise Ships Long Term

There are several factors that will impact the costing and scenarios, including:

- Vessel size impacts the ability for the vessel to enter the harbour, or if a transfer vessel, to permit excursions for passengers is required. Additionally, controls, wharf berthing, dredging (noting PoK would need to expand both channel depth and width to allow these vessels) and mooring requirements. This aspect will also trigger pilots and MSQ controls being required.
- International or regional cruise (international triggers Border Force, Customs, etc).
- Receival infrastructure for bus and other providers to meet cruise passengers and transport to local attractions.

It is assumed for the immediate to mid-time period, that the following scenario is adopted:

- Depending on the size of the cruise vessel ($\geq 100\text{m}$ length – unknown displacement), it is required to moor in open water and a transfer vessel is used.
- The transfer vessel (smaller coastal) will transfer between an approved anchoring location and offloading small craft facility with associated requirements for Work Health and Safety (WHS) and environmental approvals requirements to be met to load and unload passengers.
- Cruise passengers have been previously cleared by Customs and/or Border Force, or these agencies can clear on Cruise vessel before people board the transfer vessel.

The high-level estimated cost for a long-term passenger terminal and linking bus terminal is **\$6-8M**. There is an opportunity that this infrastructure could also be used for emergency transfer for the region for food and station (animal) supplies.

Laydown Area

For determination of laydown area requirements, it is assumed at least 2M tonnes per annum will be transferred through the facility. Assuming 4m high stockpiles with up to 1V:3H batters will be stored at any one time; this yields a storage area of around 20ha.

There is very limited geotechnical data available from a review of available information sources. A review of geological mapping in the vicinity of the laydown area is shown in Figure B-3. From overview, it is anticipated that variable conditions are evident with the potential for soft soils.

Figure B-3: Karumba Geology Map



Source: Queensland Globe

For a 600mm thick reinforced bridge using imported rocky fill with a cost of \$1,100/m², this results in a high-level cost estimate of **\$35M**. This costing assumes import of suitable materials can be sourced within 100kms of the PoK. This costing is based off recent construction costings for the Wind Farm Laydown Area at the Port of Townsville.

Common User Facilities (Export)

The assessment of common user facilities at PoK assumes traditional concrete wharf and piles construction methods to be applied.

A high-level cost estimate of **\$60-\$70M** is provided based on recent example for construction costs of \$40.7M for Berth 4 at the Port of Townsville in 2018. PoK is more remote in comparison to Port of Townsville, and a concrete batching plant will be a high risk which are reasons for additional cost as well as inflation. The wharf allows for crane rail and top side infrastructure support

The above costing does not include conveyor or ship loader infrastructure. The cost of this infrastructure can vary significantly depending on functionality needed. Reference to Glencore in 2013 invested \$40M for conveyor ship loading facility at the Port of Townsville.

Additional costs associated with services (fire, water, communications, security etc) with an allowance of an additional **\$5M** as a high-level cost estimate. It should be noted that the majority of lands around the POK are privately owned and an agreement (or transfer of ownership) would need to be undertaken to enable the development of common user infrastructure.

Barge Handling Facilities

For this assessment, two potential options for barge handling facilities, each with their advantages and disadvantages:

- Barge ramp and access with conveyor.
- Barge unloading and offloading structure.



Assuming an unloading facility with shallow berth pocket (not requiring significant dredging) is undertaken, a high-level cost estimate of **\$10-\$15M** is determined. This costing excludes loading infrastructure, conveyor etc and it is assumed that the proponent will purchase this infrastructure.

Import Wharf

The assessment of an import wharf can vary significantly between a pipeline, manifold with dolphin and fending structures (fuel, concrete slugs, etc), to full concrete wharves. The structures themselves could vary from **\$40M - \$70M** depending on the commodity. Additional costs associated with services (fire, water, communications, security etc) with an allowance of an additional **\$5M - \$7M** as a high-level cost estimate.

Road Infrastructure

The basis of assessment and high-level costings for road infrastructure for each location are provided in this section.

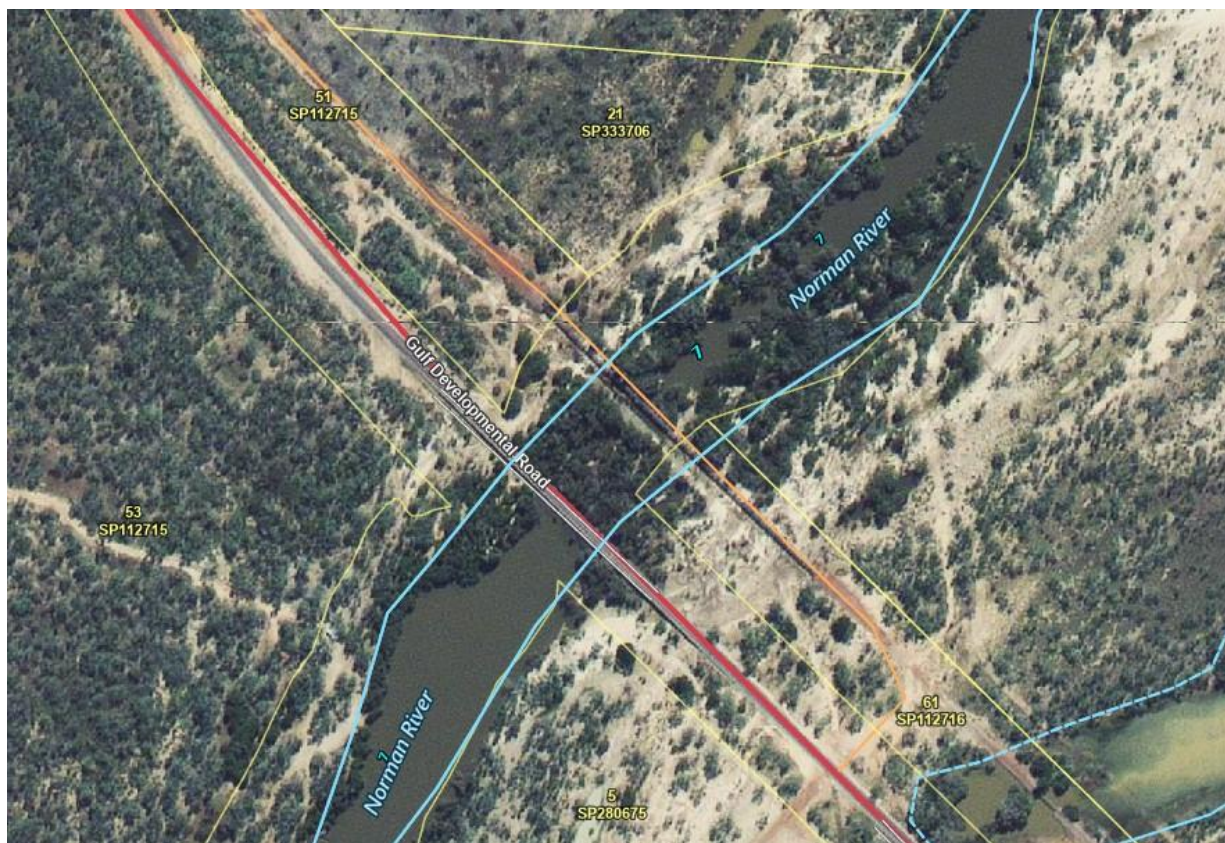
Norman River Crossing

Assessment of the Norman River bridge crossing on the Gulf Developmental Road was targeted at achieving improved flood immunity. The Norman River Bridge location to GDA2020 latitude and longitude is:

- Latitude: -17.854
- Longitude: 141.134

The Norman River Bridge crossing is shown in Figure B-4.

Figure B-4: Norman River Bridge Crossing



Source: Queensland Globe



The Norman River Bridge and associated embankment raise is approximately 400m based on assessment of Queensland spatial data. Development of costings is subject to flood modelling and assessment of the flood immunity to be achieved, which will have significant impacts on costings. Reference to costing for the Mitchell River Crossing upgrade is \$80M (email Matthew Kelly dated 30/5/2025) as a similar order of magnitude project construction costing. This is used as the basis for the high-level costing with allowance for an additional 25% contingency.

High-level cost estimate - \$100 M (ex GST)

Walkers Creek Crossing

Assessment of the Walker Creek Bridge was targeted at achieving improved flood immunity. The Walker Creek Bridge location to GDA2020 latitude and longitude is:

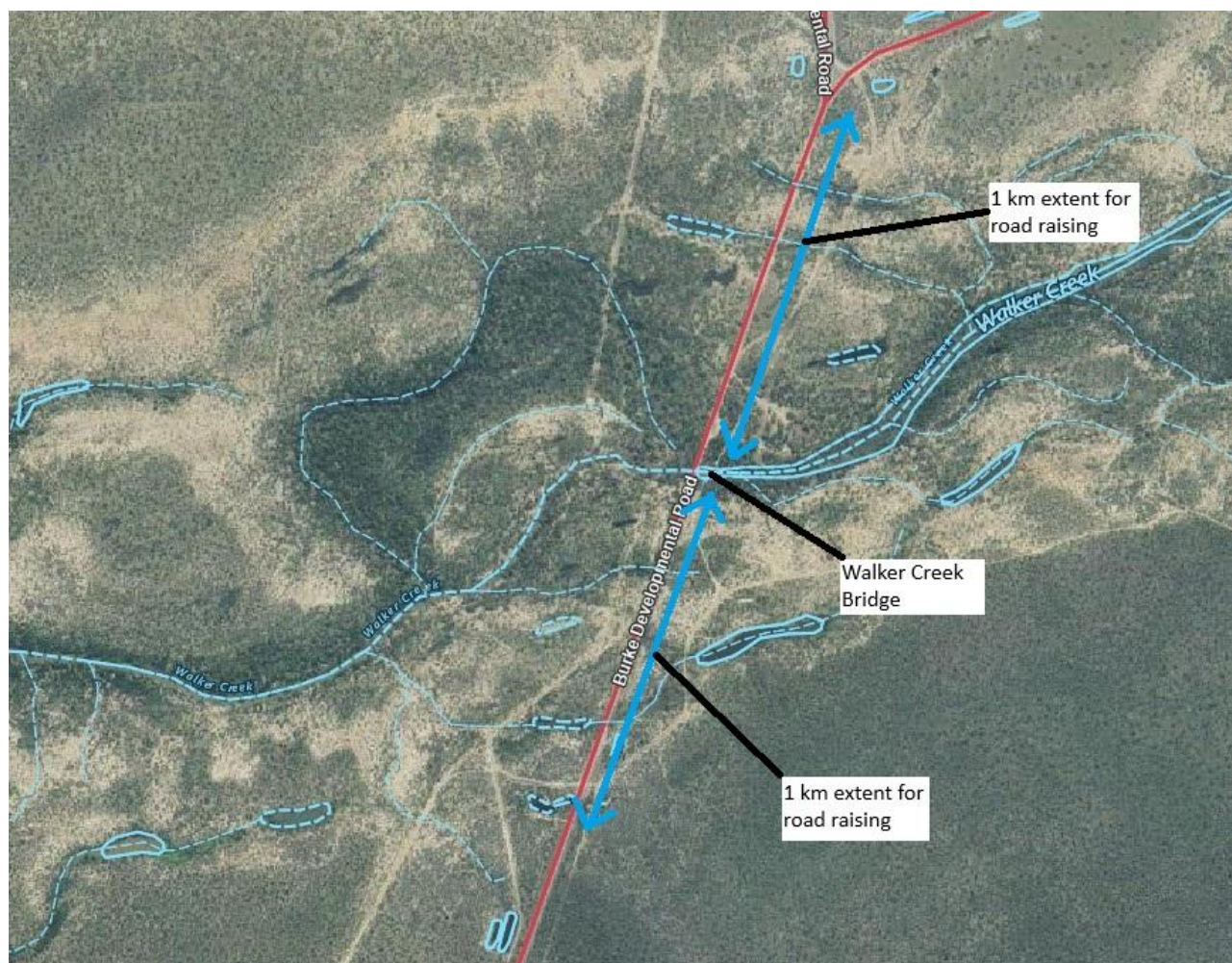
- Latitude: -17.472.
- Longitude: 141.179.

There is not available historic information of flood levels or similar data to inform the assessment for raising of the Walker Creek Bridge. Walker Creek is a tributary of the Norman River with its confluence approximately 30km downstream.

There is minimal information and data available from Queensland spatial, therefore, assumptions associated with the proposed road and bridge raising works are below:

- 1km on northern side of Walker Creek Bridge at intersection with Karumba Developmental Road to be raised by 2m.
- 1km on southern side of Walker Creek Bridge through extents of floodplain and associated gullies as shown in Figure B-5 to be raised by 2m.
- 95m bridge raising of the Walker Creek bridge by 2m.

Figure B-5: Walker Creek Bridge Road Upgrades



Source: Queensland Globe

The assessed description of works associated with high-level costing includes:

- Haulage from commercial quarry assumed at Cloncurry for supply of suitable road construction material.
- Assumed road and bridge raising works require raising of 2.0m for full lengths.
- Raising of 2km of the Burke Developmental Road, and 95m bridge length to RL:4.0m AHD.
- Assumed 1V:3H batters and 6m road seal with shoulders.
- No allowance for culvert extensions.
- Pro rata costings applied from Norman River upgrade.
- 30% contingency for regional and remote supply of materials.

High-level cost estimate - \$53 M (ex GST).

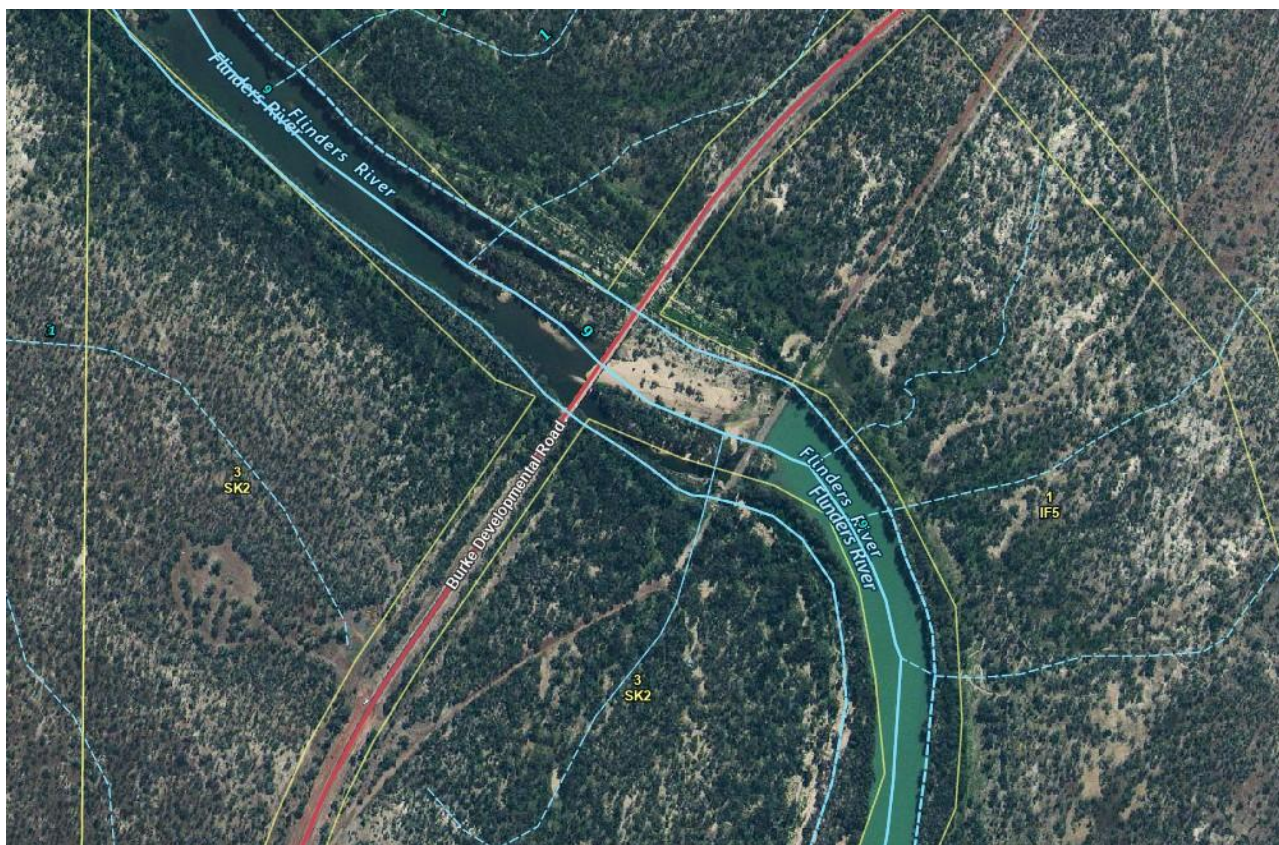
Flinders River Crossing

Assessment of the Flinders River Bridge crossing on the Burke Developmental Road was targeted at achieving improved flood immunity. The Flinders River Bridge location to GDA2020 latitude and longitude is:

- Latitude: -18.162.
- Longitude: 140.856.

The Flinders River bridge crossing is shown in Figure B-6.

Figure B-6: Flinders River Bridge Crossing



Source: Queensland Globe

The Flinders River Bridge and associated embankment raise is approximately 400m based on assessment of Queensland spatial data. Development of costings is subject to flood modelling and assessment of the flood immunity to be achieved, which will have significant impacts on costings. Reference to costing for the Mitchell River Crossing upgrade is \$80M (email Matthew Kelly dated 30/5/2025) for reference as a similar order of magnitude project construction costing. This is used as the basis for the high-level costing with allowance for an additional 25% contingency.

High-level cost estimate - \$100 M (ex GST)

10 km section that remains unfunded section of Burke Developmental Road

From the outcomes of ongoing upgrade works on the Burke Developmental Road in recent years, there is a 21km stretch remaining of upgrade works to be undertaken, with a 10km section of upgrade works (i.e. widening to two lanes) that remains unfunded between Cloncurry and Normanton. This 10km section is the focus of this assessment.

The precise location of the 10km section is not known between Cloncurry and Normanton, therefore, assumptions for costings have been made regarding length. The assessed description of works associated with high-level costing includes:

- Haulage from commercial quarry assumed at Cloncurry for supply of suitable road construction material.
- Assumes widening built onto existing sealed road 6 m road seal with shoulders.
- No allowance for road raising noting Burke Developmental Road has numerous at grade causeways, crossings, bridges and/ or culverts.
- 30% contingency for regional and remote supply of materials.

High-level cost estimate - \$13 M (ex GST)

Gilbert River Crossing

Assessment of the Gilbert River Bridge is associated with achieving improved flood immunity. The location to GDA2020 latitude and longitude is:

- Latitude: -18.199.
- Longitude: 142.876.

The Gilbert River bridge crossing is shown in **Error! Reference source not found.** B-7.

Figure B-7: Gilbert River bridge crossing



Source: Queensland Globe

The Gilbert River bridge and associated embankment raise is approximately 300 m based on assessment of Queensland Spatial data. Development of costings is subject to flood modelling and assessment of the flood immunity to be achieved, which will have significant impacts on costings. Reference to costing for the Mitchell River crossing upgrade is \$80M (email Matthew Kelly dated 30/5/2025) for reference as a similar order of magnitude project construction costing. This is used as the basis for the high level costing with allowance for an additional 25% contingency.

High level cost estimate - \$100 M (ex GST)

Mining and Resources

The basis of assessment and high-level costings for mining and resources infrastructure for each location are provided in this Section.

PhosOne

Assessment of the PhosOne site is based around potential transport of lumped phosphate by road to the Port of Karumba (though not currently proposed under the current operating model, allowances for additional road upgrades are incorporated into Scenarios 2 and 3 along with the broader phosphate supply chain). The mine

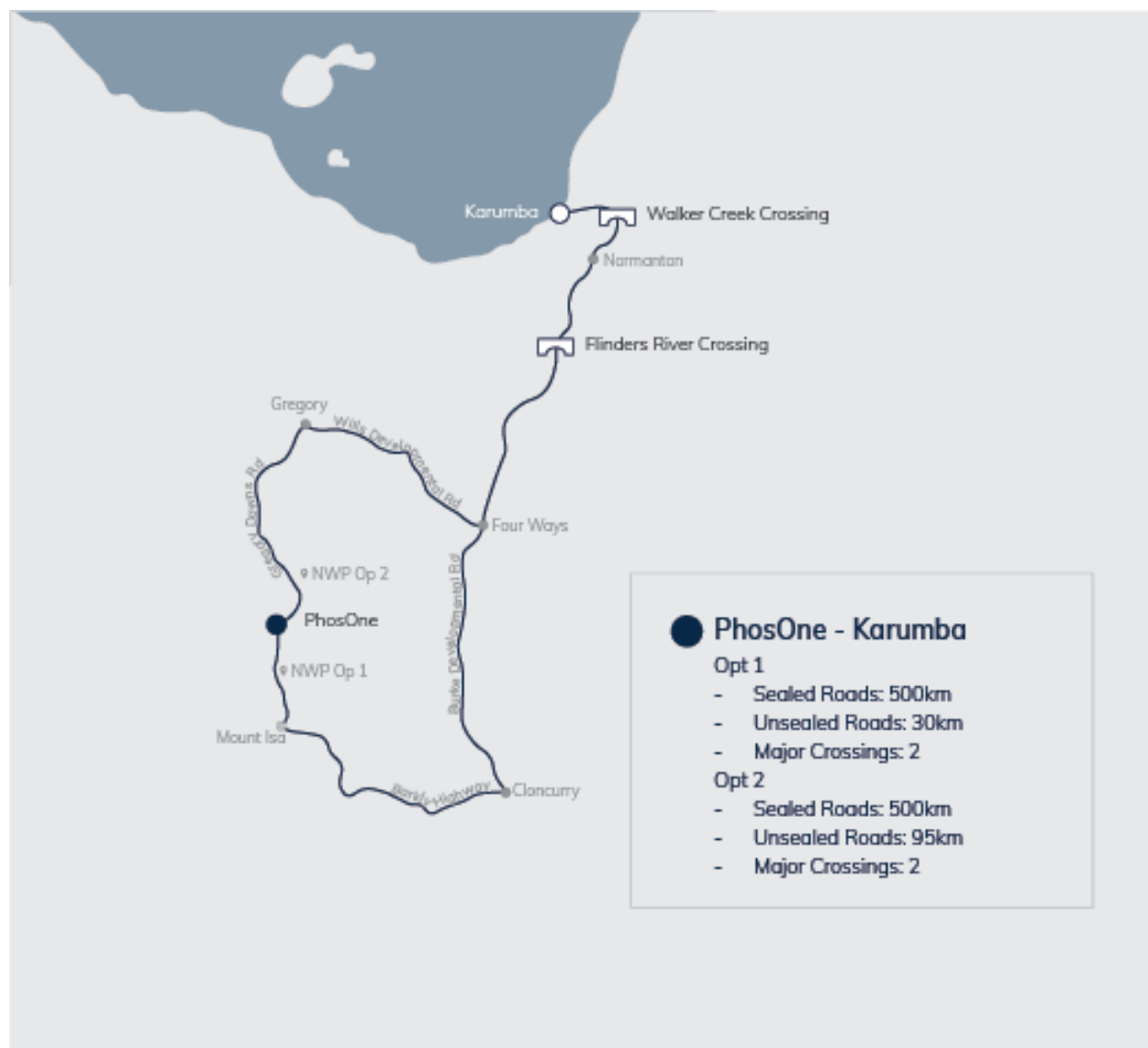


location to GDA2020 latitude and longitude is:

- Latitude: -19.789.
- Longitude: 139.068.

From the outcomes of the assessment, PhosOne is located adjacent to Lady Loretta Mine. The assessment looks at two options for infrastructure as shown in **Error! Reference source not found.** B-8.

Figure B-8: PhosOne Road Infrastructure Upgrades – Option 1 and 2



For Option 1, the route for access to the Port of Karumba is described below:

- Unknown/ unsealed road – 55km.
- Barkly Highway – 193km.
- Burke Developmental Road – 411km.
- Karumba Developmental Road – 40km.

A summary of the road upgrade requirements with assumptions are provided in Table B-3. This assessment references construction works and associated high-level costings for common sections of roadway to road upgrades from the previous sections.

**Table B-3: PhosOne – Option 1 Assessed Road Upgrade Works**

Road and Length (km)	Construction Works	High-Level Costing
Unknown road – 20km unsealed	Unsealed road treat with 100mm thick Gravel Resheet to improve wearing surface Assume gravel source comes from Council's gravel pits. Assumes no heavy rebuild due to black clays. Assumes no major rebuild needed	\$2.4M
Burke Developmental Road – 10km	Road widening with seal	\$13M
Burke Developmental Road - Flinders River Crossing – 300m	Surrounding roads to be raised and widening	\$100M
Burke Developmental Road - Walker Creek Bridge – 95m	Bridge and embankment raise by 2m	\$53M
Total High-Level Costing		\$168M

In coordination with PhosOne, the preferred road transport route has been included in this assessment as Option 2. For Option 2, the route for access to the Port of Karumba is described below:

- Unknown/ unsealed road – 84km.
- Gregory Downs Camooweal Road – 84km.
- Wills Developmental Road – 146km.
- Burke Developmental Road – 230km.
- Karumba Developmental Road – 40km.

Table B-4: PhosOne – Option 2 Assessed Road Upgrade Works

Road and Length (km)	Construction Works	High-Level Costing
Unknown Road – 85km	Assumes new road for full length Assume unsealed build	\$170M
Burke Developmental Road – 10km	Road widening with seal	\$13M
Burke Developmental Road - Flinders River Crossing – 300m	Surrounding roads to be raised and widening	\$100M
Burke Developmental Road - Walker Creek Bridge – 95m	Bridge and embankment raise by 2m	\$53M
Total High-Level Costing		\$336M

Chatham Rock Phosphate

Assessment of the Chatham Rock Phosphate site is based around transport of lumped phosphate by road to the Port of Karumba. The Chatham Rock Phosphate Mine location to GDA2020 latitude and longitude is:



- Latitude: -21.858.
- Longitude: 139.986.

From the outcomes of the assessment, Chatham Rock Phosphate is located east of Dajarra, and adjacent to Phosphate Hill covering approximately 1,600ha within Chatsworth Station. The transport route for assessment is shown in Figure B-9.

Figure B-9: Chatham Rock Phosphate Road Infrastructure Upgrades



The route for access to the Port of Karumba is described below:

- Duchess Phosphate Hill Road – 55km.
- Cloncurry Duchess Road – 100km.
- Barkly Highway – 10km.
- Burke Developmental Road – 411km.
- Karumba Developmental Road – 40km.

A summary of the road upgrade requirements with assumptions are provided in Table B-5. This assessment references construction works and associated high level costings for common sections of roadway to road upgrades.



Table B-5: Chatham Rock Phosphate – Assessed Road Upgrade Works

Road and Length (km)	Construction Works	High-Level Costing
Burke Developmental Road – 10km	Road widening with seal	\$13M
Burke Developmental Road - Flinders River Crossing – 300m	Surrounding roads to be raised and widening	\$100M
Burke Developmental Road - Walker Creek Bridge – 95m	Bridge and embankment raise by 2m	\$53M
Total High-Level Costing		\$166M¹

Note: ¹ Includes cost items already costed for PhosOne.

Avenira Limited (Northern Territory)

Assessment of the Avenira site is based on transport to the Port of Karumba. The Avenira Mine location to GDA2020 latitude and longitude is:

- Latitude: -19.981
- Longitude: 136.622

From the outcomes of the assessment, Avenira is located adjacent to the township of Wunara in the Northern Territory. The transport route for assessment is shown in **Error! Reference source not found.** B-10.

Figure B-10: Avenira Road Infrastructure Upgrades



The route for access to the Port of Karumba is described below:

- Barkly Highway – 483km.
- Burke Developmental Road – 411km.
- Karumba Developmental Road – 40km.

A summary of the road upgrade requirements with assumptions are provided in Table B-6. This assessment references construction works and associated high level costings for common sections of roadway to road upgrades as described previously.

Table B-6: Avenira – Assessed Road Upgrade Works

Road and Length (km)	Construction Works	High-Level Costing
Burke Developmental Road – 10km	Road widening with seal	\$13M
Burke Developmental Road - Flinders River Crossing – 300m	Surrounding roads to be raised and widening	\$100M



Road and Length (km)	Construction Works	High-Level Costing
Burke Developmental Road - Walker Creek Bridge – 95m	Bridge and embankment raise by 2m	\$53M
Total High-Level Costing		\$166M¹

Note: ¹ Includes cost items already costed for previously identified projects.

Centrex Ardmore

Assessment of the Centrex site is based on transport to the Port of Karumba. The Centrex location to GDA2020 latitude and longitude is:

Latitude: -21.669.

Longitude: 139.268.

From the outcomes of the assessment, Centrex is located within the Ardmore outlier on the eastern edge of the Georgia Basin approximately 23km north of Dajarra. The transport route for assessment is shown in Figure B-11.

Figure B-11: Centrex Road Infrastructure Upgrades





The route for access to the Port of Karumba is described below:

- Diamantina Developmental Road – 31km.
- Duchess Dajarra Road – 65km.
- Cloncurry Duchess Road – 121km.
- Barkly Highway – 10km.
- Burke Developmental Road – 411km.
- Karumba Developmental Road – 40km.

A summary of the road upgrade requirements with assumptions are provided in Table B-7. This assessment references construction works and associated high-level costings for common sections of roadway to road upgrades.

Table B-7: Centrex – Assessed Road Upgrade Works

Road and Length (km)	Construction Works	High-Level Costing
Duchess Dajarra Road – 45km	Treat with 100mm thick Gravel Resheet to improve wearing surface Assume gravel source can come from Council's gravel pits Assumes no heavy rebuild due to black clays Assumes no major rebuild needed	\$5.4M
Burke Developmental Road – 10km	Road widening with seal	\$13M
Burke Developmental Road - Flinders River Crossing – 300m	Surrounding roads to be raised and widening	\$100M
Burke Developmental Road - Walker Creek Bridge – 95m	Bridge and embankment raise by 2m	\$53M
Total High-Level Costing		\$171M¹

Note: ¹ Includes cost items already costed for previously identified projects.

Walford Creek

Assessment of the Walford Creek site is based on transport to the Port of Karumba. The Walford Creek location to GDA2020 latitude and longitude is:

- Latitude: -17.757.
- Longitude: 138.434.

From the outcomes of the assessment, the transport route for assessment is shown in Figure B-12.

Figure B-12: Walford Creek Road Infrastructure Upgrades



The route for access to the Port of Karumba is described below:

- Unknown/ unsealed road – 31km.
- Doomadgee Westmoreland Road – 45km.
- Doomadgee Road – 70km.
- Wills Developmental Road – 200km.
- Burketown Road – 45km.
- Burke Developmental Road – 229km.
- Karumba Developmental Road – 40km.

A summary of the road upgrade requirements with assumptions are provided in Table B-8. This assessment references construction works and associated high-level costings for common sections of roadway to road upgrades.

Table B-8: Walford Creek – Assessed Road Upgrade Works

Road and Length (km)	Construction Works	High-Level Costing
Unknown/ Unsealed Road – 10km	Assumes new road in part Assume unsealed build	\$7.2M
Burke Developmental Road – 10km	Road widening with seal	\$13M



Road and Length (km)	Construction Works	High-Level Costing
Burke Developmental Road - Flinders River Crossing – 300m	Surrounding roads to be raised and widening	\$100M
Burke Developmental Road - Walker Creek Bridge – 95m	Bridge and embankment raise by 2m	\$53M
Total High-Level Costing		\$173M¹

Note: ¹ Includes cost items already costed for previously identified projects.

Next Steps

The Infrastructure Assessment undertaken as part of the Port of Karumba Preliminary Business Case has been developed based on a desktop assessment of available information and data, and from the outcomes of meetings and workshops to identify the potential needs of key stakeholders and proponents for this project.

Progression of this project to a Detailed Business Case level of assessment and documentation requires a more comprehensive assessment across all criteria associated with developing the Port of Karumba and associated infrastructure requirements. The project shall generally meet the requirements of 'Stage 3, Detailed Business Case Guide, Business Case Development Framework, Release 3.1, Queensland Government, 2024'. Key considerations for engineering and design shall include:

- Analysis of all key inputs.
- Design and operating principles.
- Design complexity.
- Interdependencies of design elements.
- Use of benchmarking data.
- Sequencing requirements.
- The level of resources/effort used to inform design and cost estimates.
- Assurance activities.
- The assessment of risk and uncertainty including sensitivity analysis.

The following specific overarching activities are required to be undertaken and addressed as part of the Detailed Business Case:

- Provision and review of current maintenance dredging permits and Environmental Authorities with the State and Federal Governments.
- Confirmation and agreement of maintenance dredging declared depths and requirements including all approvals in coordination with Ports North, associated key stakeholders, and State and Federal Government requirements and legislation.
- Confirmation and agreement of capital dredging depths and requirements in coordination with Ports North, associated key stakeholders, and State and Federal Government requirements and legislation.
- Provision and review of current environmental activities including seagrass, water, sediment, turtles and dugongs, and biosecurity.
- Development of significant State and Federal Government environmental assessments and approvals.
- Confirmation and agreement of shipping and vessel sizes for all Port of Karumba activities.
- Confirmation and agreement of vehicles sizes and frequency.

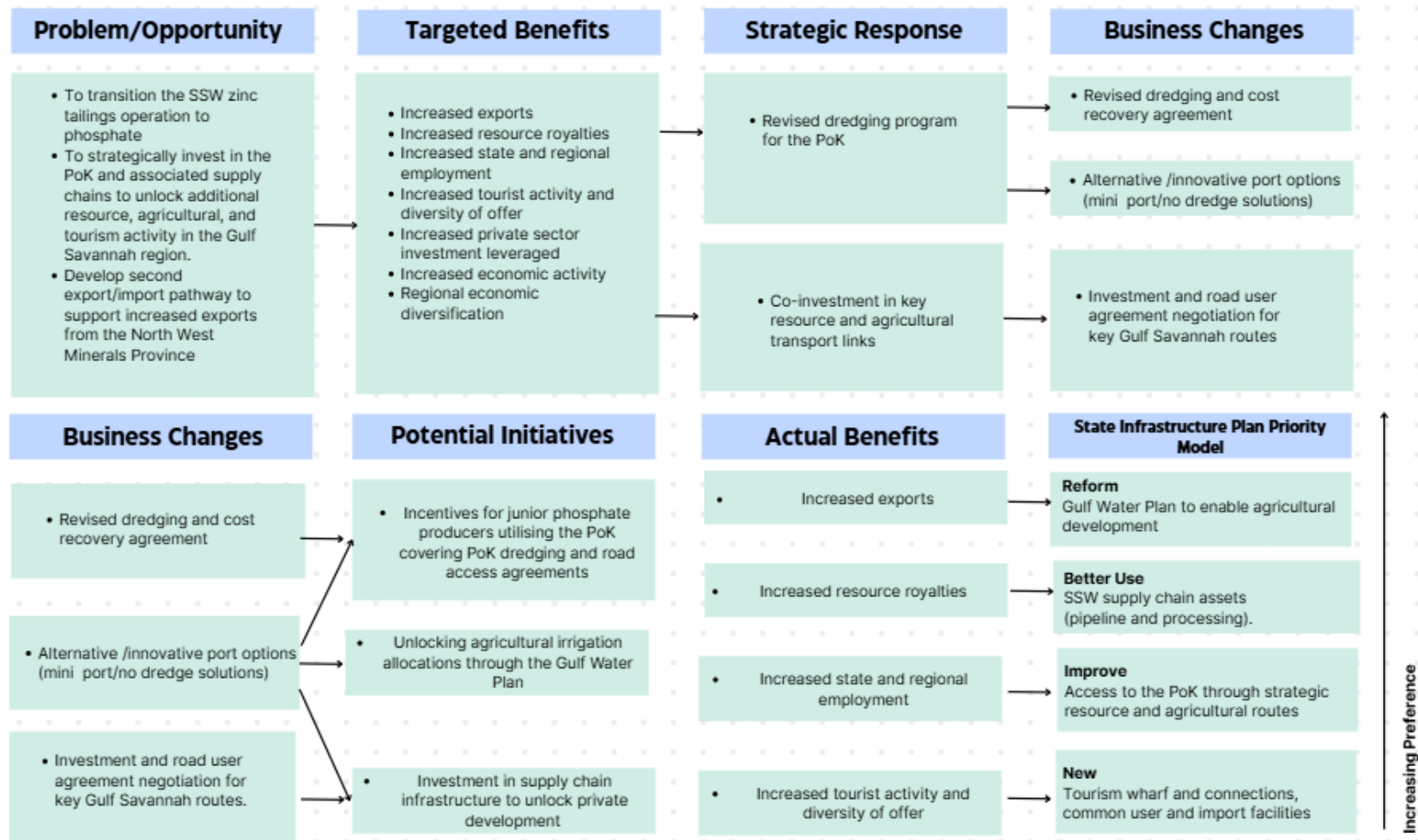


- Targeted geotechnical investigations, factual and interpretative reporting for Port of Karumba laydown area, material sources and quarries, and road locations.
- Assessment and verification of road networks and accurate determination of scopes for unsealed and sealed roads, including condition assessments, reconstruction, widening, raising, geometry, causeways, and culverts/bridges.
- Determination of agreed flood immunity to industry leading practice requirements, or lesser agreed flood immunity with DTMR, Local Government and key stakeholders as required.
- Undertake flood modelling for agreed crossings and floodplains to determine flood immunity requirements and proposed raising and widening of roads, culverts, causeways, bridges, etc.
- Documentation of assumptions and limitations associated with development of engineering, infrastructure and cost estimates.



Appendix C Investment Logic Mapping

Figure C-1: Investment Logic Map



Source: REA



Appendix D Benefits Management Plan

The PAF Guidelines require a preliminary benefits management plan for the identified viable options. Each of the scenarios (excl. the Base Case) will produce a similar benefits profile, at increasing scales from Scenarios 1 – 3.

A potential high level Benefits Management Plan is summarised in Table D-1 below, utilising six easy to measure and capture indicators which reflect the flow of economic benefits generated by the sustainable development of the Port of Karumba to various key stakeholder groups within the community and government.

Table D-1: Benefits Management Plan

Economic Benefits	Overview	Measurement Unit	Indicator Taken From	Responsible Entity
Port Throughput	Port volumes are a key and easy to track indicator of the regional economic activity supported through the PoK.	Tonnes p.a.	FY 2029 (projected start of PhosOne operations)	Ports North
State Royalties	Phosphate royalties paid is one key indicator of the public value created from the economic activity supported through the PoK.	\$ paid p.a.	FY 2029 (projected start of PhosOne operations)	Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development
Direct Jobs Created	Direct jobs created through the PoK supply chain are a critical indicator of the economic value to the GSD region created through the sustainable development of the PoK.	FTE jobs by: Construction vs. ongoing. Local vs. FIFO	FY 2027 (projected start of construction works)	PhosOne (and subsequent proponents), Ports North.
Port Revenues	Revenues paid to Ports North (through cost recovery) are a key indicator of value for money from public investment.	\$ paid p.a.	FY 2029 (projected start of PhosOne operations)	Ports North
Payments to Traditional Owners Under the Gulf Communities Agreement	Payments to the Traditional Owner groups represent a key measure of benefits flowing to the First Nations community.	\$ paid p.a.	FY 2029 (projected start of PhosOne operations)	PhosOne (and subsequent proponents)
Rates payments to local Council's	Continued payment of Council rates beyond the SSW tailings processing is a key measure of the economic benefits of the Scenarios flowing to the local community.	\$ paid p.a.	FY 2029 (projected start of PhosOne operations)	PhosOne (and subsequent proponents)

Source: REA



Appendix E Public Interest Assessment

The PAF Guidelines require a preliminary consideration of public interest matters, for projects which have a direct impact on the community, including:

- Its effectiveness in meeting the service requirement.
- Its impact on stakeholders.
- Accountability and transparency.
- Public access and equity.
- Consumer rights.
- Human rights.
- Security.
- Privacy.

We note that the scenarios developed largely relate to private business operations and the associated (road and port) supply chain infrastructure required. By meeting the service requirements for a continued and expanded functioning supply chain through the PoK, the broader community will benefit through the economic activity and employment unlocked as a result of the regional development initiatives (including phosphate, agriculture, tourism, and regional imports). Improved social amenity, regional resilience, connection to family and country, decreased isolation for community and business, and increased liveability are all key public interest considerations.

The proposed dredging works and road/bridge upgrades are expected to meet the service requirements of operators, given the market sounding undertaken for this Preliminary Business Case and separately by Ports North regarding dredging options. There remain key potential bottlenecks, as identified by Civil IQ (Appendix B), that may require significant additional capital works as volumes increase.

The sensitivity testing undertaken for this Preliminary Business Case highlights that net socio-economic benefits to the State of Queensland remain positive, even on the most conservative side of capital needs, dependent on the cost recovery mechanisms and the commercial viability of the underlying resources and broader developments.

Given the private beneficiaries of the scenarios, requirements for accountability and transparency will need to be considered and factored into the infrastructure cost recovery agreements to ensure value for money on public investments: these could be in line with incentives offered along the Mount Isa to Townsville line for junior phosphate producers.

Broader public interest factors, such as public access and equity, consumer rights, human rights, security, and privacy, should be minimal as they relate to the scenarios and are covered within the governance and operational models of the respective parties (Ports North, DTMR, Local Councils, project proponents).



Appendix F Detailed Cost Benefit Analysis Results

Table F-1: Cost Benefit Analysis Results

Cost/Benefit (\$M)	Discount Rate			
	Undiscounted	4%	6%	10%
Scenario 1				
<i>Costs</i>				
Capex	\$715.0	\$701.3	\$694.8	\$682.5
Opex	\$213.3	\$144.2	\$121.0	\$88.4
Environmental Costs	\$131.5	\$102.5	\$92.3	\$77.5
Total Costs	\$1,059.8	\$948.0	\$908.2	\$848.3
<i>Benefits</i>				
Value Added	\$1,562.6	\$1,105.7	\$951.9	\$734.7
Asset Residual Value	\$184.7	\$87.7	\$61.0	\$30.2
Total Benefits	\$1,747.3	\$1,193.3	\$1,012.9	\$764.9
NPV	N/A	\$245.4	\$104.8	-\$83.4
BCR	N/A	1.26	1.12	0.90
IRR	8.0%			
Scenario 2				
<i>Costs</i>				
Capex	\$1,228.7	\$1,199.1	\$1,185.2	\$1,159.3
Opex	\$313.6	\$211.8	\$177.6	\$129.4
Environmental Costs	\$131.5	\$102.5	\$92.3	\$77.5
Total Costs	\$1,673.8	\$1,513.3	\$1,455.2	\$1,366.3
<i>Benefits</i>				
Value Added	\$2,689.6	\$1,843.1	\$1,560.0	\$1,163.0
Asset Residual Value	\$258.1	\$122.5	\$85.3	\$42.2
Total Benefits	\$2,947.7	\$1,965.6	\$1,645.3	\$1,205.2
NPV	N/A	\$452.3	\$190.1	-\$161.1
BCR	N/A	1.30	1.13	0.88
IRR	7.9%			
Scenario 3				
<i>Costs</i>				
Capex	\$3,873.6	\$3,310.5	\$3,079.2	\$2,694.3
Opex	\$735.6	\$474.5	\$388.4	\$269.5
Environmental Costs	\$131.5	\$102.5	\$92.3	\$77.5
Total Costs	\$4,740.7	\$3,887.5	\$3,560.0	\$3,041.4



Cost/Benefit (\$M)	Discount Rate			
	Undiscounted	4%	6%	10%
<i>Benefits</i>				
Value Added	\$5,106.2	\$3,398.3	\$2,829.7	\$2,036.5
Asset Residual Value	\$1,415.4	\$671.8	\$467.8	\$231.4
Total Benefits	\$6,521.6	\$4,070.1	\$3,297.5	\$2,267.9
NPV	N/A	\$182.6	-\$262.5	-\$773.4
BCR	N/A	1.05	0.93	0.75
IRR	4.7%			

Source: REA



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