



PROJECT

Grassy Port Infrastructure & Operational Review

CLIENT

Department of State Growth

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1. Executive Summary

1.1 Project overview

The Port of Grassy provides a vital component of the King Island supply chain, supporting ship unloading and loading of freight, livestock and passengers. The Department of State Growth engaged Burbury Consulting and ERA Planning and Environment to undertake an infrastructure study on the Port of Grassy, to better understand how King Island's industry and community use the port and identify opportunities for infrastructure and operational improvements.

A 2008 port infrastructure improvement study proposed significant investment to construct a new southern breakwater to extend the harbour and increase port capacity and protection, which was not progressed at the time. The Tasmanian Government has committed to revisiting and completing this study by engaging with key stakeholders and the King Island community to identify potential improvements to port infrastructure and operations.

A separate report outlines the project's consultation process and key findings. The key themes identified through the consultation included:

- Vessel suitability.
- Route suitability.
- Port and shipping operations.
- Port infrastructure.
- Governance and commercial partnerships.
- The King Island brand.
- Local community and economy.
- Community access and equity.

In terms of infrastructure and operations the key feedback included:

- A need for an all-weather port is viewed by the community as critical for the long-term sustainability of King Island's economy.
- Shipping companies highlighted that schedules are generally weather dependent given the nature of Bass Strait conditions, hence it is unlikely a need for increased protection for all weather conditions. However, improved operations during increased surge would benefit the loading and unloading of vessels when in port as well as extending hours of operation during periods of calmer (reduced surge) conditions.
- Improved ro-ro ramp infrastructure for full range of vessels and tides.
- Options for increased ship size capacity.
- Options for improved berth utilisation in good weather conditions including berth access and extended operational hours.

The above was considered key themes in development of infrastructure and operational improvements for the Port.

A review of TasPorts internal harbour wave recording instrumentation provided records of internal wave surge conditions exceeding 0.5m events (i.e. potential to restrict berth usage) on average up to 5 days per month (events and not duration). These conditions were assessed under wave hindcasting analysis which coincided with nominal offshore SW swell waves up to 5.5m in height, conditions highlighted by the shipping operators that would unlikely coincide with vessel transits to King Island. Internal wave condition events of 0.3m were recorded on average less than 3.3 days per month.

1.2 Infrastructure & Operational Options Review

Several infrastructure improvements were considered based on a review of the port as well as aiming to reflect community and stakeholder feedback.

The options analysis also considered the review of the scope and construction estimate for the southern breakwater and port expansion from the 2008 Port Feasibility Study. Our assessment of the proposal for the southern breakwater found that the estimate for rock was insufficient (possibly due to lack of understanding of the available rock size from the mine at that time) and requiring an increase in batter slope and breakwater formation to allow for the nominal rock size available from the G6 waste rock. This increased the construction estimate for the breakwater to well over \$140m and deemed difficult to justify based on port charges alone without a revised broader economic assessment revisiting work completed in 2008.

Additional infrastructure options considered included:

- Improved port protection and wharf structures:
 - Review of the southern breakwater for improved port protection (noted above).
 - New northeastern breakwater, harbour expansion and wharf for vessels up to 150Lm adjacent to G6 waste rock dump.
 - Extension of existing breakwaters to provide improvements to internal wave protection/conditions.
 - New internal berth with ro-ro wharf for up to 100m vessels with inner groyne protection for surge.
- Other infrastructure and operational options for improvements to existing wharf:
 - Improved fender protection to existing wharf and Ro-ro ramp.
 - Upgrade to ro-ro ramp for improved tidal access.
 - Installation of outer harbour wave buoy to correlate wave and identify early warning to internal wave surge risk exposure.
 - Development of shipping cooperative between service providers.
 - Upgrade to mooring and fendering to improve vessel response to surge.
- Operational improvements:
 - Probability exceedance analysis of wind, internal wave (surge) conditions combined with berth utilisation to understand operational condition review for the Port. This could be extended into a broader model that can assist with prediction of increased harbour surge based on weather observations and forecasts whilst using AI to refine and adapt the model. The benefits of this will provide another tool for monitoring and forecasting surge conditions within the harbour which may assist consideration of port limits for operating hours.
 - Refined harbour agitation study in conjunction with options review for surge/operational (extended breakwaters) improvements to understand potential benefits versus capital expenditure in consideration to the above operational condition review of the Port.
 - Increased berth access during calm weather conditions whilst utilising above inputs.
 - Formation of Strategic Partnership – among various businesses, organisations and companies (including shipping and TasPorts as well as key King Island organisations). This would take the form of a shipping alliance to collaborate to optimise operations and increase efficiency in freight handling, shipping, port operations and services. Such an alliance would allow the member companies to share assets such as vessels, containers, cargo holds, port facilities, services and routes leading to improved service provisions. Key features would include:

- Shared resources – pooling of vessel capacity, ship capacity/schedules, equipment and land-based facilities as well as labour.
- Cost optimisation – sharing resources will lead to operating cost reductions. Targeted alliance on infrastructure and operational improvements and investments.
- Service improvement – offers for more frequent sailings, faster/variable transit times and increased ship and port productivity and reducing waiting times for deliveries.
- Market influence – a collective approach can exert influence on port ownership/management on port charges and service reliability.
- Sustainability and environment costs – greater focus on decarbonisation and sustainable shipping practices.

Its almost 10 years since the Sea Road Mersey finished transits into Grassy which provided larger vessel capacity and accessibility into the Melbourne markets and in that time shipping generally has transformed exponentially. The shipping service into Grassy has been driven partly through government support but the market will adapt and adjust to meet demand and opportunities which is already occurring with the three shipping services as well as shipping routes that offer both Tasmanian and Victorian transits.

Any infrastructure or operational improvements needs to adapt to the market, service providers and improve berth and overall shipping and freight handling efficiency.

2. Introduction

The Port of Grassy (the Port) provides ship berthing and port operations for vessels to load and unload freight (for import and export) and is a vital component of the King Island supply chain. The Department of State Growth engaged Burbury Consulting and ERA Planning and Environment to undertake an infrastructure study on the Port of Grassy, to better understand how King Island's industry and community use the port and identify opportunities for infrastructure and operational improvements.

The objective of this project was to:

- Provide an opportunity for interested stakeholders to:
 - Reflect on the need for port expansion.
 - Voice port issues or concerns.
 - Suggest improvements to port operations.
- Document stakeholder feedback for consideration and response from TasPorts and Government
- Use the stakeholder feedback to prepare a list (and assessment) of potential Port improvements.

This review was undertaken in two phases:

- **Phase 1: Stakeholder and Community Consultation (refer separate report).**
 - The phase involved:
 - Stakeholder engagement workshop on background, process and outcomes.
 - Key stakeholder engagement interviews.
 - Business and industry briefings.
 - Online survey.
 - Community workshops.
- **Phase 2: Infrastructure and Operation Review (this report)**
 - Review of the existing port infrastructure and operations.
 - Review of stakeholder feedback on infrastructure and operational port improvements.
 - Review of the 2008 King Island Port Feasibility Study.
 - Development of port infrastructure and operation improvements including assessments.

A King Island Port Feasibility Study completed in 2008 proposed significant investment to expand the harbour and increase port capacity and protection through the construction of a new southern breakwater from Sandblow Point to Omagh Reef providing greater port protection and opportunity for a new berth to support larger ships. The project was not progressed due to the significant capital cost of the infrastructure, delay in opening of the scheelite mine and limited volumes moving through the Port.

The opening of the Dolphin Tungsten Mine by Group 6 Metals (G6 Metals) has presented a renewed interest in using the overburden from the mine to expand the Port or for improved port infrastructure for shipping operations.

The Government has agreed that this project should reflect and build on the 2008 GHD Report by:

- Undertaking consultation with key stakeholders.
- Identify key constraints and opportunities through the consultation and review the current situation within the Port.

- Undertaking analysis of limited options for infrastructure and non-infrastructure improvements to improve port operations, including consideration of hours of operation.

2.1 Project Scope Limitations

The Department of State Growth provided the following project scope inclusions and exclusions for this study.

Table 1 Project Scope and Exclusions

	Port Infrastructure	Port Operations
Included in scope:	Ro-ro ramp Wharf Breakwater/Clapham Sheds and storage Amenities Weigh bridge	Hours of operations Lighting Weather management Environmental (marine constraints) Seasonality
Excluded from scope:	Vessel suitability Freight routes Port charges	Port management Freight logistics analysis

2.2 Recommended Scope Extension

We note that the above exclusions were often initiated in the stakeholder engagement process and a key theme in the stakeholder report. From this feedback the Department of State Growth recommended an additional scope to cover these works separate to this study to build on previous freight and shipping study completed in 2013 and 2015. This is anticipated to include (and hence separate to this study):

- Forward freight demand.
- Shipping capacity to meet future freight task, including peaks.
- The optimal available model/route between King Island and a Victorian port, including potential Tasmanian freight demand for an alternative freight route to Victoria and consideration of alternative routes.
- Infrastructure and other requirements to secure a suitable roll on roll off berth at a preferred Victorian port.
- Revision of optimal vessels and freight configurations for a Victorian service- including alternative cattle transport models and cost estimates.
- Alternative market models, including greater integration of King and Flinders Island.
- Base load customer preferences and impacts of route changes on Tasmanian markets and suppliers/processors.
- Market regulation and role of government in influencing/determining an optimal service model, noting current competition and loss-making service.
- Government's capacity to effectively to engage and/or oversee delivery of commercial shipping services.

3. Port Background Information

3.1 Port Capacity

The Port is currently owned and managed by TasPorts. The predominant shipping service is provided by Bass Island Line through a weekly service with the MV John Duigan. Other shipping services are provided through Eastern Line Shipping and Bass Strait Freight.

The Port is an exposed port with operational limitations to berthing and mooring during south to south westerly extreme swell wave conditions. With the harbour entrance on southwestern side, the port and the berth are exposed to surge from these swell waves that penetrate the harbour.

The current operational parameters and limitations for Grassy Port as nominated by the TasPorts Harbour Master include:

- Maximum acceptable vessel length is 90 metres LOA.
- Vessels over 60 metres LOA must have a bow thruster.
- Vessels over 35 metres length overall (LOA) must have twin screw configuration.
- The maximum draft for the port is 5 metres.
- Maximum wind strength for vessels over 35 metres LOA is 25 knots.
- Surge height of 0.5m for limitation on berth access and operations (and subject to TasPorts and Ship Master review).
- Grassy is a daylight port only for vessels over 35 metres in length.

The existing port layout and infrastructure is illustrated below.

TasPorts through their metocean website provide publicly available wind and wave data outputs for King Island (Grassy Port) that provide realtime and historic readings for wind speed, gust, direction and significant wave height, maximum wave height, period and direction at and adjacent to the Port berth pocket. These conditions are monitored by TasPorts staff prior to and during shipping as well as ship masters on route to Grassy Port.

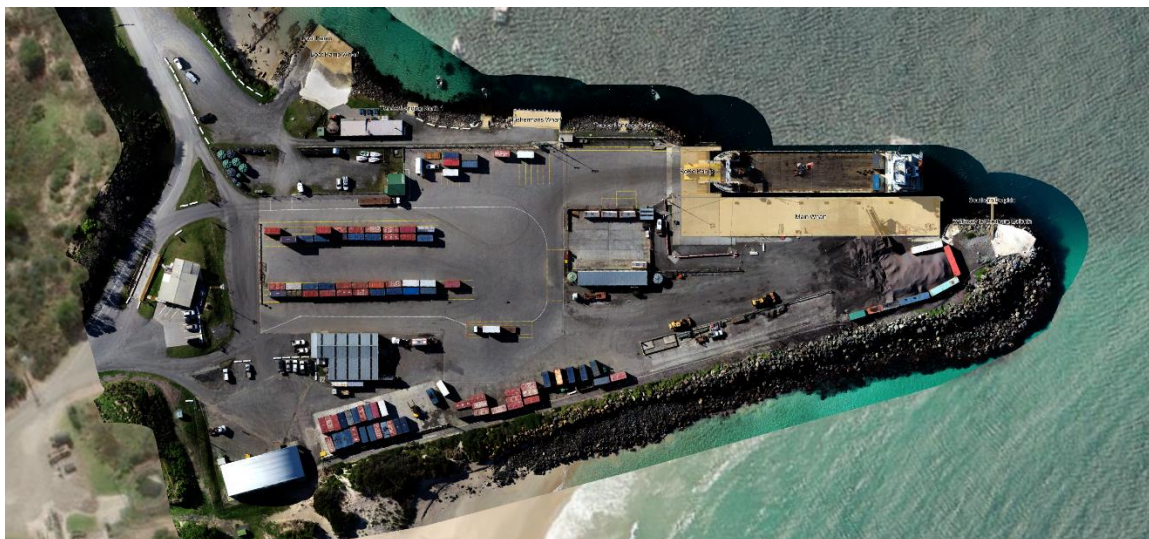
The port infrastructure includes (approximated from port information records):

- 80 lineal metre wharf and coping face with pneumatic fendering.
- Berthing and mooring dolphin 18m south of the existing wharf (previously used for SeaRoad Mersey ship).
- 14.5m wide roll-on and roll-off (Ro-ro) ramp with removable transition ramp.
- Stern dolphins for ramp with fender (not used for current ships).
- Mooring bollards.
- Container and storage yard (4,000 sq.m).
- Stock yard (1,200 sq.m).
- Workshops, storage sheds and port office.
- Small craft landing.
- Port breakwaters.
- Aids to navigation including leads and navigation lights.

Figure 1 Existing Grassy Port Extents



Figure 2 Existing Grassy Wharf



3.2 Recent Port Infrastructure Projects

TasPorts undertake regular port condition assessments for both Grassy and Currie maritime infrastructure including wharves, jetties, breakwaters, slipways and navigation aids. The most recent condition assessment was 2020 (next inspection forecast for late 2025) and TasPorts provided the following summary of the port infrastructure assets based on the WSCAM reporting and asset condition:

- Average estimated remaining life of port assets = 23.2 years
- Predicted modelling for potential capital expenditure requirements prior to 2030 due to condition and subject to further assessment:
 - Marine structures (wharf, piles, deck and ro-ro ramp): \$5m
 - Pavement works: \$150k.
 - Heavy mobile plant procurement: \$2.5m

TasPorts provided a summary of capital projects undertaken on King Island and specifically the Port during the stakeholder engagement phase. Whilst some of the community questioned the level of investment and maintenance on the Port by TasPorts the summary below shows that the infrastructure investment on capital projects (excluding maintenance and inspections) is over \$5.2m and nominally \$743k per annum (current).

Table 2 TasPorts Capital Projects Grassy Port (2019-2025)

TasPorts Project ID	Project	Date Completed	Approximate Value \$'000
8A0165	AtoN Upgrade	2025 underway	350+
8A0225	Bollard Upgrade	2025	1,700
8A0180	RoRo Ramp Surface Repairs (Stage 2)	2025	154
8A0166	Grassy Wharf Pile Wrapping	2024	325
9A0060	Oil Spill Response Equipment	2024	110
8A0167	Fuel Tank High Level Alarms	2024	189
8A0000	Hazardous Area Compliance	2022	124
8C7000	New equipment shed	2021	342
8A0005	RoRo Ramp Repairs (Stage 1)	2020	154
8A0008	Fisherman's Wharf	2020	625
6M8002	Asbestos Removal	2020	350
3A0041	Undergrounding of overhead power	2021	150
8M8000	Grassy Fertiliser Shed Demolition	2019	416
8A7000	Grassy RoRo Wharf Bollard Upgrade	2019	200
8A8000	Grassy Infrastructure Requirements for KI Services	2019	365
TOTAL CAPEX OVER PERIOD			\$5,204,000
AVERAGE ANNUAL CAPEX			\$743,000

TasPorts have also identified a number of future capital and maintenance infrastructure projects within the Port subject to detailed business case and approval including:

- Port entry and traffic management.
- Fuel depot fire fighting equipment.
- Bottom fill gantry conversion.
- Replacement of floating fenders.
- Replacement of fuel farm fire water tank.
- Replacement of lines boat low landing structures.
- Fuel ISO laydown yard vessel snap back protection.
- Wharf CCTV for berth and operational monitoring.

TasPorts highlighted limited major capital infrastructure project investment options for Grassy Port due to port throughput and low berth utilisation. The port utilisation was noted at around 10-20% with import/export of less than 1% of the total Tasmania shipping/port volumes.

A review of the available daylight hours for berth access and weekly utilisation was considered based on anecdotal advice with variable shipping activities noted below.

Table 3 Grassy Berth Utilisation

Ship visits per week	Summer Average Weekly Berth Utilisation	Winter Average Weekly Berth Utilisation
1	8%	11%
2	16%	23%
3	24%	34%

3.3 Grassy Port Vessel Characteristics

The characteristics of marine vessels that have operated within the Grassy Port are noted below for comparison.

Table 4 Grassy Port Vessel Characteristics

Marine Vessel	LOA (m)	Beam (m)	Draft (m)	Cruise (kn)	Gross Capacity (t) ⁽¹⁾	Deck Area (sqm) ⁽²⁾	Max livestock trailer capacity ⁽³⁾	Vessel Type	Operator
SeaRoad Mersey	119	18.5	5.5	15	7,930	1200	24	Ro-ro general freight, rear ramp	SeaRoad
Investigator 2	53	15	3	10	1,019	405	8	Heavy load carrier bow ramp	Bass Island Line
John Duigan	80	16	3.6	12	1,738	747	20	Heavy load carrier bow ramp	Bass Island Line
King Islander	63	14.6	3.5	9	1,413	350	8	Heavy load carrier bow ramp	Eastern Line
Statesman	53	10	2.3	8	876	Tbc	8	General cargo, bow ramp	Eastern Line
Matthew Flinders III	43	10	2.2	7.5	298	250	600 head	Stern ramp, general freight and livestock	Bass Strait Freight
Matthew Flinders IV	35	12	2.2	10	298	220	600 head	Stern ramp, general freight and livestock	Bass Strait Freight
Matthew Flinders IV extended	45	12	2.2	10	500	320		Stern ramp, general freight and livestock	Bass Strait Freight

(1) Vessel gross capacity for transit to King Island will be limited for stability and safe transit (reducing available gross capacity).

(2) Similarly available deck area will be limited for protection of cargo and provisions on deck for empty trailers, containers and ISO.

(3) Noting a difference between vessels on capacity to handle livestock through trailers or on the hoof.

The MV John Duigan, King Islander, Statesman and Matthew Flinders III are all current vessels utilising the Port. Over the period of this study both the MV John Duigan and King Islander averaged at least 1 sailing per week providing inbound and outbound freight capacity of nominally 3,000t per week.

4. Previous Port Studies

A number of previous port and shipping studies have been completed for King Island as well as government driven reviews and enquiries. These studies reflect the changing shipping services since 2017 and are summarised in the Figure 4 timeline below.

A summary of the key reports, findings and outcomes is provided below.

4.1 2008 Port Feasibility Study

King Island Ports Corporation and King Island Council commissioned a feasibility study in 2008 that recommended the expansion of Grassy Port with a new southern breakwater on the basis of the following key strategic elements:

Table 5 2008 Feasibility Review

Key Inputs from 2008 Expansion Study	Current Status	Comments
Opening of the Scheelite Mine and availability of rock for breakwater and increased port thruput	Currently operational	Increased import/export demand with mine opening and operations. Waste rock suitable for ocean filling is available at a cost of \$10/tonne (rock size limited and subject to quantities).
Existing limitations of Grassy Port	No change.	Relating to port access, exposure and surge and maximum vessel accessibility. Realtime weather data now readily available to shipping operators, masters and TasPorts.
Proposed cessation of Sea Road Mersey for weekly King Island shipping service.	Finished in 2017	Replaced with MV John Duigan as permanent weekly shipping service along with additional services through Eastern Line and Bass Strait Freight.
Importance of iconic "King Island" branding and dependency on shipping services	Retained and increased shipping demand with closure of abattoir.	Increased demand on livestock import/export through Tas & Vic.
Future upgrades of King Island Meatworks	Abattoir closed.	Currently live import and export of cattle required has increased handling requirements through the shipping services.
Increased vessel size capacity through new breakwater and wharf improving ship vessel capacity and port access.	NA	Proposed master plan has not progressed. No demand for increased vessel size with market providing vessels from 35m to 80m in length and Grassy Wharf suitable up to 90m LOA.

The preferred option presented in the report is provided below with the following key proposed scope:

- New southern breakwater from Sandblow Point across Omagh Reef (closing the southern channel access into the port).
- New turning basin for larger ship port access within the new breakwater lee.

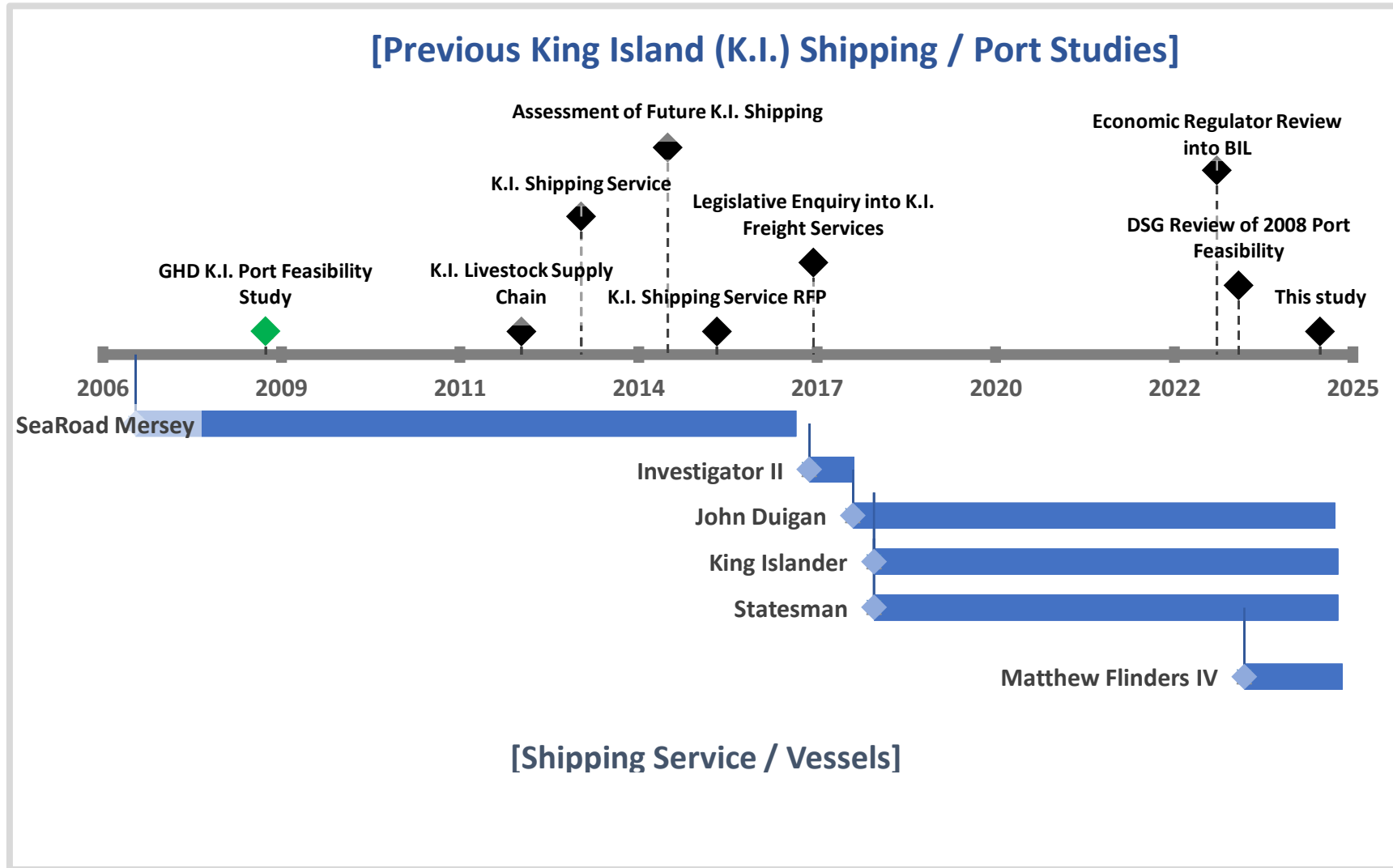
- Expanded port hardstand for bulk fuel, cargo and fertiliser storage sheds.
- New second berth with stern ramp for larger ro-ro ships for a design ship of 190m LOA.
- New workshops, offices and access roads.

Figure 3 2008 Port Feasibility Preferred Port Upgrade Option



The 2008 report provided a project estimate for the above of \$39.62m including \$28.4m for the breakwater with the material for the breakwater sourced at \$0 supply cost from the new scheelite mine (refer Section 5.3 of the report) and a nominal quantity of 1M tonnes of rock.

Figure 4 Previous Port & Shipping Studies



4.2 Summary of Historical Freight & Shipping Studies

Table 6 Summary of Key Previous Reports

Report	Author	Year	Key References / Context	Freight Review	Ship Review	Recommendations
Grassy Port Feasibility - SeaLink to the Future	GHD	2008	<ul style="list-style-type: none"> Feasibility of improving port infrastructure at Grassy to support freight services. 	<ul style="list-style-type: none"> Freight volumes modest with seasonal demands, Freight costs are high and impact business viability. Limited access to Victoria. 	<ul style="list-style-type: none"> Existing service with Sea Road Mersey (SRM) nearing end of service. Recommend medium size Ro-ro with capacity for mixed freight. Reliability, weather resilience and compatibility with Grassy Port 	<ul style="list-style-type: none"> Upgrade port infrastructure to improve port access and protection. \$40-60m upgrade with southern breakwater from mine rock supply allowing for larger vessel capacity to service KI.
King Island Livestock Supply Chain	GHD	2012	<ul style="list-style-type: none"> Closure of JBS (Sept '12) ~ 180 cattle head per day on island loss Impact on livestock movements by shipping. 	<ul style="list-style-type: none"> Options considered for supply chain with transport flow from King Is to Tas and Vic. Estimated 35,000 head of cattle movements p.a. 	<ul style="list-style-type: none"> SeaRoad weekly shipping provider. LD Shipping supporting livestock. Highlight on risk of peak demands, trailer management, high risk livestock movement, vessel efficiency. 	<ul style="list-style-type: none"> Risk mitigation measures for operators, agents, transport, processors, shippers and TasPorts. Increased sailings, collaboration policies for supply chains.
King Island Shipping Service Project	GHD	2013	<ul style="list-style-type: none"> King Island Partnership Agreement to access long term sustainable shipping solution. 	<ul style="list-style-type: none"> 2002 to 2012 trade remained consistent with: exports 31,200t and imports 36,400t 	<ul style="list-style-type: none"> Triangulated service is most cost effective Medium size landing craft 113 TTEU 9-10 knots optimal design vessel. 	<ul style="list-style-type: none"> Contingency strategy required. Establish freight buying group.

Report	Author	Year	Key References / Context	Freight Review	Ship Review	Recommendations
				<ul style="list-style-type: none"> Forecast trade for 2018 to 2030 Trade heavily aligned to Vic (3x volume for Tas) Freight range 80-145 TEU/week up to 300 TEU/wk with mines operational 	<ul style="list-style-type: none"> Larger Ro-ro vessels too large for Grassy Port. Combined service for cattle and freight more efficient Port infrastructure constraints in Vic 	<ul style="list-style-type: none"> Explore cost saving options for empty container/trailers. Engage with SRM on services. Consider tendering new service with guarantee on freight and charter. Investigate new purpose-built ship.
Assessment of Future King Island Shipping	Thomson Clarke Shipping	2015	<ul style="list-style-type: none"> Desktop study in response to SRM retirement for 2016. Review of shipping group preferred model. Review of shipping routes Review of vessels Review of operating and service models 	<ul style="list-style-type: none"> Annual freight volumes 64,500t p.a. Slight step increase in 2014 freight due to closure of island abattoir and mineral sands export. 2013/14 exports: 35,118 t 2013/14 Imports 29,404t Melb/Vic handles 80% inbound and 46% outbound freight from KI. 	<ul style="list-style-type: none"> Min. 2x weekly shipping service combined with ELS with vessel <90m and 5m draft. Need for redundancy in shipping services (more than one operator preferred). Need to work within existing infrastructure to avoid additional and unsustainable capital expenditure. Noted trade doesn't warrant large vessel operations (i.e. greater than 100m). 	<ul style="list-style-type: none"> Option 5 of purpose-built vessel deemed high risk and not recommended. Engage with SeaRoad and LD Shipping on continual services and collaborative solutions. Min 2x weekly service. Feasibility study to review volumes and growth, service frequency, vessel size and operating costs, review of shipment and supply chains.

Report	Author	Year	Key References / Context	Freight Review	Ship Review	Recommendations
King Island Ship Service Market – Request for Proposal	DSG	2015	Tender for shipping service for King Island	<ul style="list-style-type: none"> • Growth scenarios provided: • Low: 52,000t p.a. • Medium: 73,000t p.a. (2018) up to 84,000t p.a. (2033) • High: 87,000t (2018) up to 107,000 (2033). 	<ul style="list-style-type: none"> • Noted Grassy Port limits to 90m LOA 5m draft, daylight hours operations, twin screw and bow thruster propulsion. 	
Legislative Council Enquiry – King Island Freight Services	Tas Govt	2017	<ul style="list-style-type: none"> • Review of suitable, reliable sustainable shipping service for King Island. • ~69,000t freight p.a. 	<ul style="list-style-type: none"> • Freight tasks are diverse and seasonal. • Freight costs have increased since loss of SR. 	<ul style="list-style-type: none"> • BIL commenced service with Investigator II on 7 April 2017. • Eastern Line Shipping also servicing King Island. • Capacity required for 100-140 TEUs • Covered cargo hold desirable. • Highlighted importance of direct link to Victorian ports as well as Tasmania. 	<ul style="list-style-type: none"> • Triangulated service between Tas & Vic to King Island. • Regular weekly service. • Flexibility for seasonal demands. • 100-140 TEU capacity ship with covered hold. • Improved fertiliser storage for seasonal demands. • TasPorts cease providing a shipping service when private operator can meet reliable, suitable and sustainable service with an appropriate vessel.

Report	Author	Year	Key References / Context	Freight Review	Ship Review	Recommendations
Tas Economic Regulator Review BIL	Tas Govt: Office of the Tas Economic Regulator	2023	<ul style="list-style-type: none"> Commissioned by Treasurer on concerns on pricing, reliability and market impact of BIL service. 	<ul style="list-style-type: none"> Freight task for KI is diverse, seasonal and well studied. BIL major freight is fertiliser, sand, general cargo, diesel, dairy and livestock. Trans-shipment via SeaRoad in Devonport to Melbourne increasing costs and delays. Air freight usage has risen for perishables and reliability. 	<ul style="list-style-type: none"> BIL operates at a loss: \$3-4m p.a. John Duigan suitability concern with frequent delays and limitations in Bass Strait. Stakeholders critical of suitability of JD. JD utilisation rate is low. Recommendation for expert review of vessel suitability and cost optimisation. 	<ul style="list-style-type: none"> Pricing schedule for BIL published for transparency. Review of JD suitability. TasPorts engage with KI stakeholders on fee structures and services. BIL pricing policies does not exceed costs but higher than main competitors.
Port of Grassy Review of Port Feasibility Study 2008	DSG	2023	<ul style="list-style-type: none"> Review of Grassy Port Masterplan (2008) 	<ul style="list-style-type: none"> Freight volumes have increased from 34,177t (2008) to 90,167t (2023) with peaks driven by mineral sands. Livestock, fertiliser, fuel and general cargo remain dominant. Berth utilisation remains low at 12-32% well below 	<ul style="list-style-type: none"> Current vessels: JD, King Islander and Matthew Flinders IV (3 operators). SRM retired in 2017 too large and incompatible with Grassy Port infrastructure. Larger Bass Strait shipping operators moved to larger and faster vessels (KI 	<ul style="list-style-type: none"> Current Grassy Port infrastructure meets demand. Port upgrade likely now estimated at \$87-100m Freight delays to weather acknowledged but not sufficient to justify large capital investment. Any future upgrades would require federal

Report	Author	Year	Key References / Context	Freight Review	Ship Review	Recommendations
				industry threshold of 60-70%.	unsuitable on that service). <ul style="list-style-type: none"> All-weather access remains limitation due to surge but delays are typically short (1-2 days) and often related to crew and cargo safety (livestock welfare). 	funding and review of BCR. <ul style="list-style-type: none"> Major capital investment would put upward pressure on maintenance costs and wharfage fees.

There are a number of key themes and assessment of the freight and shipping issues that have been well discussed and considered over the last 20 years through the changing shipping services.

The freight forecasting volumes have not necessarily been well predicted as noted from the above reports. Whilst this is not part of scope for this study we have reviewed in the context of ship operations and infrastructure and recognising that key assumptions from previous reports need to be possibly revisited.

The reporting does highlight consistency in vessel capacity for 100-120 TEU weekly capacity with minimum 2 shipping services per week and support of cooperative approach to shipping and freight services as well as the benefits on establishment of a triangulated service for King Island with Tasmania and Victoria.

5. Freight & Shipping Review

An overview of the port infrastructure and shipping requirements for the Port was considered (whilst out of scope) to understand the context of infrastructure and operational need through historical trends and projections. This assessment was based on desktop review through previous reporting, online research and stakeholder inputs.

5.1 Freight

In the last 12 years the freight thruput for the Port has grown on average 3.2% per annum in that time with high variability based on changes to outbound freight for livestock with the closure of the abattoir and then variability in mining exports and trade. Based on these major influences inbound and outbound freight is well in excess of previous freight forecasting undertaken in 2012. This needs to be revisited in the context of understanding demand, forecasting and shipping servicing requirements.

Table 7 Annual Freight

	2012	2013	2014	2015	2016	Average Annual 10 yrs to 2022	2023	2024	2018 GHD forecast*	2033 GHD forecast*
Inbound freight (t)	34,525	30,845	29,432	35,093	35,440	40,329	45,403	48,450	27,716	32,032
Outbound freight (t)	37,108	48,425	35,283	40,673	32,608	54,124	44,764	55,600	45,084	36,244
Total freight (t)	71,633	79,270	64,715	75,766	68,048	94,453	90,167	104,050	72,800	70,309

* forecast developed from 2012/213 King Island Shipping Service Project and recommended for review and re-projection.

Mining operators on King Island provided direct feedback on limitations to import of supplies and machinery in the early mine development and continual operations as well as export production forecasts. The current and future (short term) demand increases will likely be lead through mining production as well as seasonal impacts on farming.

5.2 Shipping

Shipping services through the period of study varied between 3-4 ship visits per week in May down to 1-2 ship service per week in June. The current services provide a level of committed sailings and adaptation to demand however its noted that feedback from the engagement indicated a 3-4 week waiting period on freight deliveries and issues in freight forwarding through and from Victoria.

As outlined above the shipping services are currently operated through:

- **Bass Island Line (BIL), John Duigan:**
 - providing weekly committed sailing (Tuesdays) with capacity for general cargo, livestock trailers, containers, fuel ISOs and machinery.
 - Operates Devonport – Grassy – Devonport.
 - Provides linkage to SeaRoad for Devonport – Melbourne services.
 - Gross capacity of 1,700t.

- **Eastern Line Shipping (ELS), King Islander and Statesman:**
 - Providing on demand service (nominally 1-2 per week) with livestock trailers and general cargo.
 - Operates Stanley – Grassy – Stanley; Stanley – Grassy – Port Welshpool (return); and Welshpool – Grassy – Welshpool.
 - Gross capacity of 1,400t
- **Bass Strait Freight (BSF), Matthew Flinders III/IV:**
 - On demand. providing general freight and livestock on the hoof (no trailers).
 - Developing new berthing to support operations from: Smithton – Grassy – Smithton; Smithton – Grassy – Port Anthony (return); and Port Anthony – Grassy – Port Anthony.
 - Gross capacity of 300t and 600 head of cattle.

The above freight summary review suggests a demand 1,000-1,200t capacity inbound and outbound freight per week plus the allowance for livestock and empty movement of containers, ISO and trailers. This suggests that combined capacity of the above shipping service every week and on-demand is more than adequate to support the freight tasks with contingent capacity.

The current and planned shipping operators provide King Island with a range of options including direct access to Tasmania and Victoria (eastern region) in conjunction with the broader shipping.

Figure 5 Shipping Service Routes



The above shipping routes provide a range of options for accessing both Tasmania and Victoria through metropolitan and regional areas.

Bass Strait is notorious for difficult wave conditions with swell influences from both westerly (predominant) and easterly directions. Strait Link, Sea Road and TT Line have all moved to larger faster ships (over 200m).

The lee of King Island provides a level of protection from westerly swell waves however from Hunter Island (NW tip of Tasmania) through to Grassy is directly exposed to swell from the Southern Ocean building over a long duration and distance. It's noted that vessel transit through this section of water can be limited due to sea state conditions and safety of ship, crew and freight.

Due to the demand for shipping for metropolitan ports it is difficult for regional ports to have direct access or meet the port costs and thrupt demands.

Bass Island Line attempted a Devonport-Grassy-Geelong route for a period but did not have sufficient freight demand or capacity to continue the service and meet operating and port costs.

Eastern Line Shipping utilizes a partnership with Storr Transport in Victoria to support freight movements from Port Welshpool to Melbourne. They run a weekly service through Grassy and to Port Welshpool or on demand.

Bass Strait Freight has a proposal for development of a new regional port in Smithton and Port Anthony which is currently underway and will provide capacity for freight and livestock movements to both northwest Tasmania as well as regional Victoria (for feedlots). Bass Strait Freight transport livestock on the hoof eliminating the need to transport empty trailers but introducing other controls for livestock handling within the port and is currently limited using the existing Ro-ro ramp at low tide within the Port.

6. Stakeholder Engagement

The feedback from the engagement

6.1 General Feedback

Table 8 Engagement Constraints & Opportunities – Grassy Port

Constraints:	Opportunities:
<ul style="list-style-type: none"> • Aging and outdated infrastructure. • Vulnerable to weather. • Internal harbour and berth surge from swell. • No infrastructure contingencies. • Need to enable larger vessels. • Direct shipping access to mainland (time and costs). • Daylight hour port operations. • Single ramp to suit varying vessels (limitations on tide). • Loading and unloading out of specification cargo. • Protection of cargo from seawater exposure through shipping transits. • Limitation on meeting seasonal challenges (seas, winds, drought, markets, etc.). • Cattle trailer and washdown locations. • Bass Strait weather conditions (transit and at Port). • Delays in receiving freight. • King Island is heavily dependent on freight through shipping or air services. • Fuel delivery in ISO containers. • Empty livestock trailer delivery limits import capacity (efficiency). • Livestock export to Victoria (feedlots and abattoirs). • Managing livestock transport with trailer and exposed barges. 	<ul style="list-style-type: none"> • Access to rock for reclamation or breakwater infrastructure through scheelite mine development. • Improved passenger and vehicle transport. • Future proofing for long term trends (larger ships). • Improved all-weather port access and operations. • Direct linkage to Victoria/Melbourne and/or triangulated shipping services • Increased port operations. • Broader shipping capacity (larger vessels). • Cooperative support between shipping services and users in improving operations and port access.

A broad range of stakeholder feedback was provided in the Stakeholder engagement report.

It was difficult to identify specific infrastructure or operational improvement options from the broader stakeholder engagement however the key constraints and opportunities combined with assessment of

the existing port infrastructures were considered in the development of infrastructure and operational improvement recommendations.

TasPorts and the current shipping operators provided more target feedback in relation to port infrastructure and operational improvement options:

6.2 Stakeholder User Feedback

6.2.1 Port & Shipping

TasPorts

- Berth utilization of Grassy is low at 11-14%.
- Infrastructure at the port supports the predominant shipping services.
- Infrastructure investment in the port in the last few years as noted in Section 3.2.
- No demand for fertilizer storage capacity.
- No demand for increased berth utilization.
- Growth in imports and exports is subject to current mining operations and livestock movements (seasonality or drought).
- Surge is a major risk to operations and consideration to limitations by the Clapham master.
- Night operations have been extended in summer periods to increase berth access but generally the unloading and loading of a vessel takes a full day (8 hours).
- Southern breakwater proposal capital and maintenance costs would require state or federal funding (i.e. income from wharfage could not substantiate the level of investment).
- Options to improve infrastructure at Stanley and Devonport to complement shipping services.
- Transit of livestock in poor sea conditions is not recommended and a limiting impact to shipping services.

Bass Island Line

- Currently BIL provides weekly shipping service (Tuesdays) with capacity to extend to two shipping services per week when demand requires it.
- Previous BIL triangulated services through Devonport-Grassy-Geelong showed promise but could not be maintained due to low volume. Devonport-Grassy-Devonport route that connects with Devonport-Melbourne/Geelong through the major freight operators.
- Stanley-Grassy-Stanley could improve transit (shipping) time but linkage to freight forwarding and JBS through Devonport is currently preferred transit route with limited port infrastructure to support both BIL and ELS out of Stanley.
- BIL identified that working relationship and shared support services with Eastern Line Shipping was resulting in a benefit to freight demand and port availability.

Eastern Line Shipping

- ELS operate from Stanley-Grassy-Stanley and Port Welshpool on a weekly basis (often twice weekly subject to demand).
- ELS has provided increased sailings subject to demand and will work with BIL in management of freight demand where possible.

- ELS note issues of surge and restricted daylight operations and improvement in these areas will significantly improve shipping services.
- ELS note improved data and awareness of weather and berth conditions (TasPorts and BoM data) ensures farmers, suppliers and ship masters (and ship operators) are more aware of shipping limits than in the past.
- ELS support infrastructure investment to manage surge but recognise freight demand is not sufficient to drive significant capital investment.

Bass Straight Freight

- BSF has commenced shipping operations from Bridport to Grassy to Port Welshpool with plans for infrastructure investment and development to provide a triangulated service from Smithton-Grassy-Port Anthony.
- BSF is also reviewing ship services and sizing to expand on the capacity of vessels to carry livestock (on the hoof), containers, fertilizer, bulk cargo and fuel (in bulk or ISO).
- BSF has operated a successful shipping service for Flinders Island with purpose-built vessels for port limits, island freight demand and operations at a significantly lower shipping cost base to King Island. Proposal to service King Island with similar model allowing for transport of livestock, general freight fertilizer and bulk fuel.
- BSF has challenges with operational inefficiencies at the Port of Grassy with limitations to port access to only daylight hours, fitting in behind two other shipping services (all wanting to service in calmer weather) and limitation on ramp compatibility with their ship.

7. Port Design Inputs

7.1 Design Considerations

The following design considerations were considered in the preparation of options for upgrading the Grassy Port Infrastructure.

The current port includes outer breakwater providing wave protection to the harbour with main wharf on the western side. Due to the orientation of the harbour and ocean swell conditions offshore the harbour experiences surge conditions internally that limit the operations at the berth.

Previous port studies (2008) have aimed at considering increased protection to the port to limit surge or to reconfigure the port for increased all weather protection. It is noted that due to the nature of the exposure of Grassy Harbour to the southern ocean and Bass Strait that large swell events will always result in surge conditions and in particular difficult navigating conditions on transit to the port which often are limiting factor.

Based on the stakeholder input, review of previous reporting and consultation with current operators we have identified a number of key considerations to design inputs for port infrastructure and operational improvements:

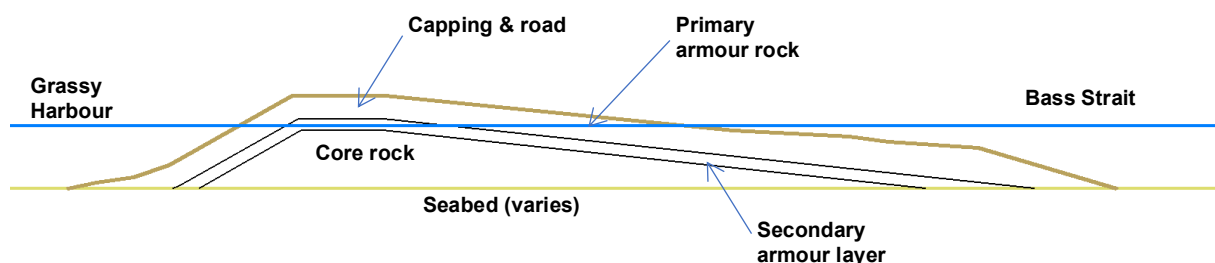
- Design vessel: broad range of vessels between 40-90m.
- Improved wharf protection where possible utilising rock available from the G6 mine for breakwater construction.
- Consideration to ramp improvements incorporating functionality for range of vessels as well as berth access with mooring and fendering.
- Depth and navigation for design vessels and port limits.

7.1.1 Existing Breakwater Design & Construction

The existing breakwater for Grassy Port was constructed in the 1970s and was formed as a berm breakwater with armour rock varying from 6-12tonne in size. The width and slope of the seawall is designed to allow for damage due to severe storm events whilst maintaining the integrity of the breakwater structure. The flatter toe batters and width on the seaward face of the breakwater allows for both construction staging and formation in severe conditions and erosion management.

A typical section for the breakwater is provided below.

Figure 6 Typical Section of Existing Breakwater



The seaward batter slope of the breakwater is significantly flatter than the internal harbour which is a function of the design of the armour rock size and breakwater to the design wave conditions.

For the purposes of this review, we have assumed design of any new breakwaters with similar design criteria adopted whilst confirming with G6 on rock size up to 6t can be achievable subject to volume.

7.1.2 Breakwater Designs

The concept designs for a new breakwater have been based on Van Der Meers method in accordance with the Coastal Engineering Manual (CEM) (US Corp).

Figure 7 Typical Berm for Deepwater Construction (CEM)

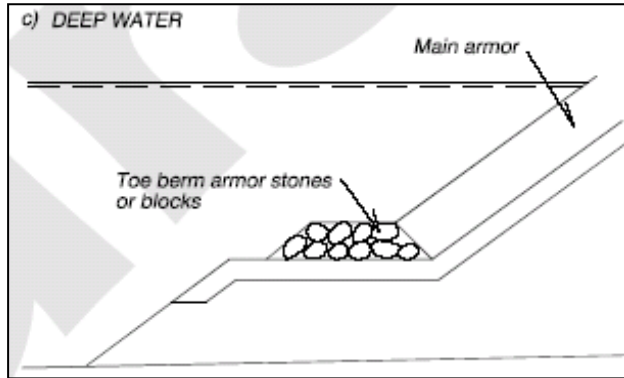
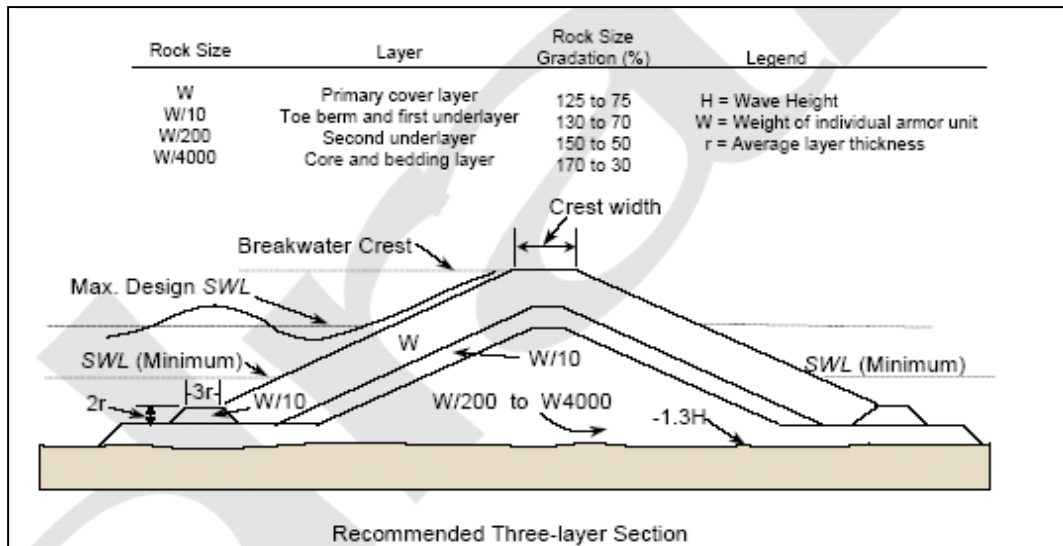


Figure 8 Typical Breakwater Construction (CEM)



7.1.3 Water Depths

The water depths within the Grassy Port and navigational channels are surveyed by TasPorts on a regular basis. Desktop inputs for water depths were used to develop and review infrastructure costs and quantities for infrastructure options.

7.1.4 Port Internal Wave Climate

As highlighted above TasPorts provide Metocean data for King Island through wave buoy and wind anemometer at the Port. The data can be downloaded but freely available in visual form for the public. Ship masters and TasPorts regularly use the data to monitor conditions are suitable for ship sailings/transit as well as surge and wind conditions at the berth within the Port.

An extract of a 7-day output last week is provided for reference. The data is available from <https://metocean.tasports.com.au/kingisland-standby>

A preliminary assessment of the wave data was undertaken to understand the number of events per month where wave records exceed 0.5m Hmax (maximum wave height) and 0.3m Hsignificant wave height.

Figure 9 TasPort MetOcean Output – Wind & Wave

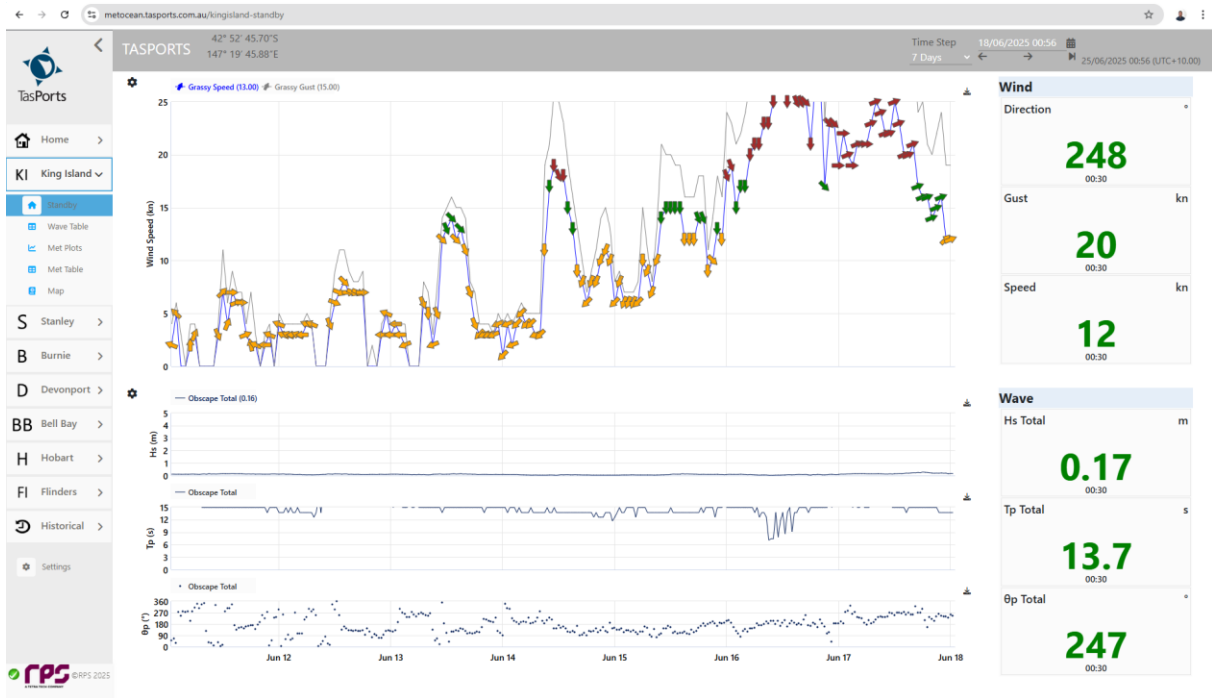


Figure 10 TasPort MetOcean Wind & Wave Device Locations

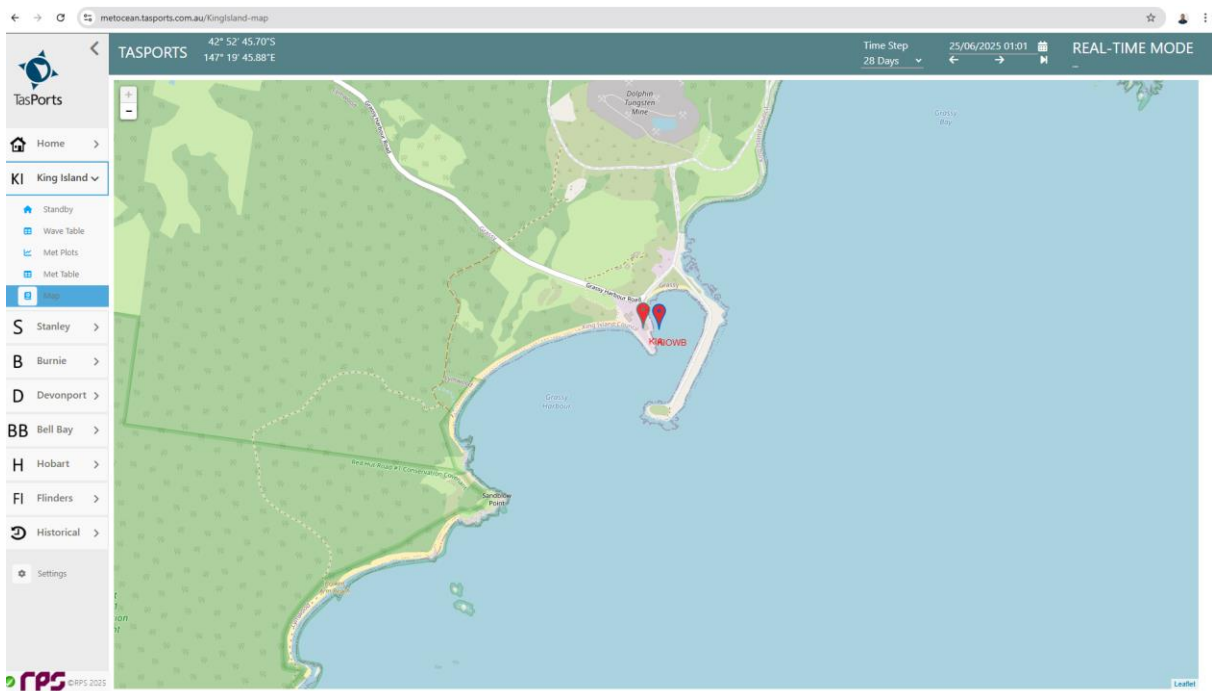


Figure 11 Directional Distribution of Waves, Port of Grassy

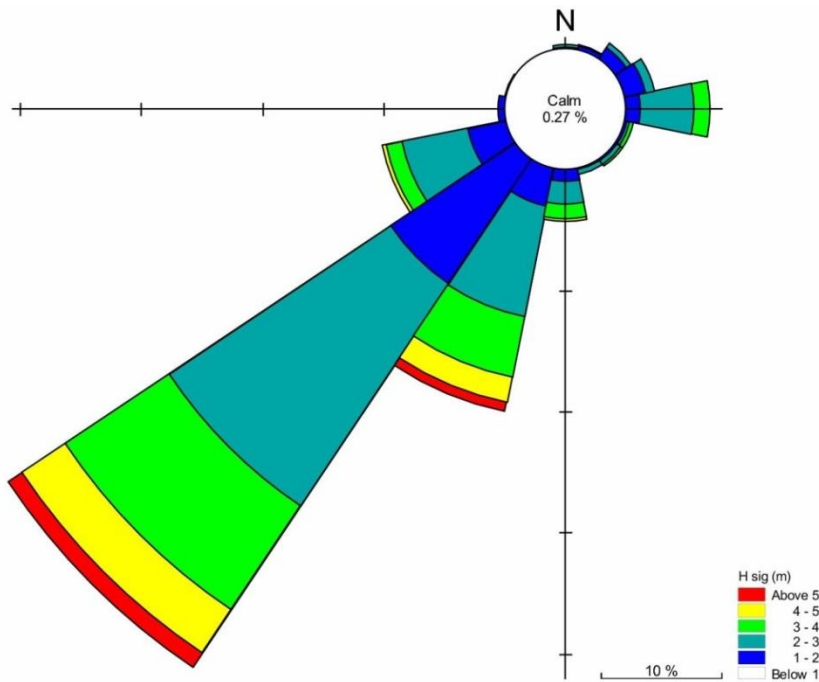


Table 9 Percentage Distribution of Significant Wave Height (offshore)

Wave Period (seconds)	Significant Wave Height (H_s m)						Total
	<1	1-2	2-3	3-4	4-5	>5	
<6	-	0.1	0.3	-	-	-	0.4
6-7	0.1	3.4	1.5	-	-	-	5.1
7-8	0.1	10.0	8.8	0.7	-	-	19.6
8-9	-	7.8	16.7	2.6	-	-	27.1
9-10	-	2.9	10.1	6.3	0.1	-	19.5
10-11	-	0.8	4.1	4.8	2.2	0.1	12.1
11-12	-	0.3	2.9	3.7	2.2	0.7	9.7
12-13	-	-	1.1	1.6	1.4	0.4	4.5
13-14	-	-	0.1	-	1.1	0.8	2.1
Total	0.3	25.3	45.6	19.7	7.0	2.1	100.0

The above summary of the wave height distribution offshore of the Port suggests that offshore waves are greater than 1m 99.7% of the time and greater than 3m 29% of the time with predominant wave conditions between 1-3m (70%).

Table 10 Percentage Distribution of Significant Wave Height & Direction (offshore)

Peak Wave Direction	Significant Wave Height (H_s m)						Total
	<1	1-2	2-3	3-4	4-5	>5	
N	-	0.1	0.1	-	-	-	0.3
NNE	-	0.3	0.1	-	-	-	0.4
NE	-	1.1	0.4	-	-	-	1.5
ENE	-	1.8	0.7	-	-	-	2.5
E	-	1.2	4.4	1.4	-	-	7.0
ESE	-	0.1	0.3	0.3	-	-	0.7
SE	-	0.1	0.4	0.1	-	-	0.7
SSE	-	0.1	0.4	-	-	-	0.5
S	-	1.1	1.9	1.2	0.1	-	4.4
SSW	-	3.0	9.3	5.1	2.2	0.7	20.3
SW	0.3	12.3	22.1	10.3	4.4	1.4	50.7
WSW	-	3.3	5.5	1.4	0.3	-	10.4
W	-	0.5	-	-	-	-	0.5
WNW	-	0.1	-	-	-	-	0.1
Total	0.3	25.3	45.6	19.7	7.0	2.1	100.0

Based on above the table the outer breakwaters will experience wave heights between 2-3 metres 46% of the time with 86% of waves in the south to westerly quadrant. Easterly waves are between 1-4m in 7% of the time but predominantly seasonal (summer).

Previous modelling undertaken by GHD for the port feasibility (2008) indicated that for a 3m offshore wave the internal wave climate at the existing wharf will vary between 0.30m (8.5s period) and 0.64m (14s period waves) highlighting benefits of an awareness to the key wave parameters that impact surge within the Port (greater than 8s and up to 14s influences surge more than waves less than 8.5s). Its highlighted above in Table 9 Percentage Distribution of Significant Wave Height (offshore) Table 9 that wave conditions are less than 9s 50% of the time. The modelling in the 2008 report indicated that the new breakwater would provide a nominal 80% reduction on surge at the berth.

Figure 12 SW wave height for 3m & 8.5s period

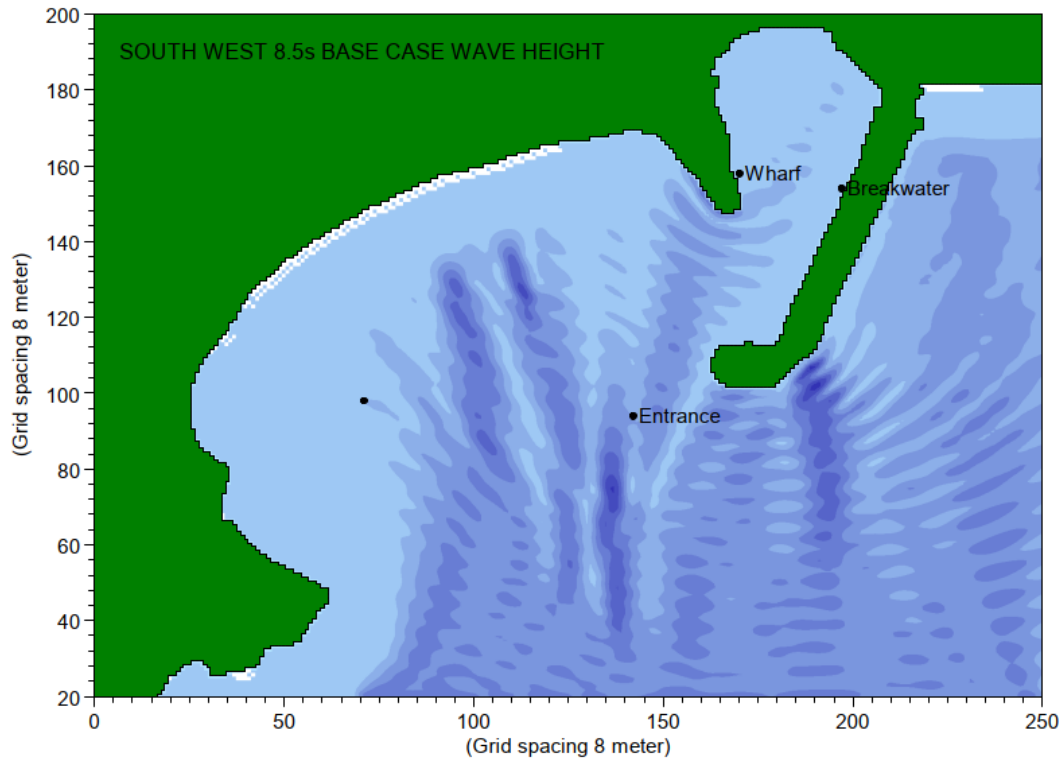


Figure 13 SW wave coefficient for 3m & 8.5s period

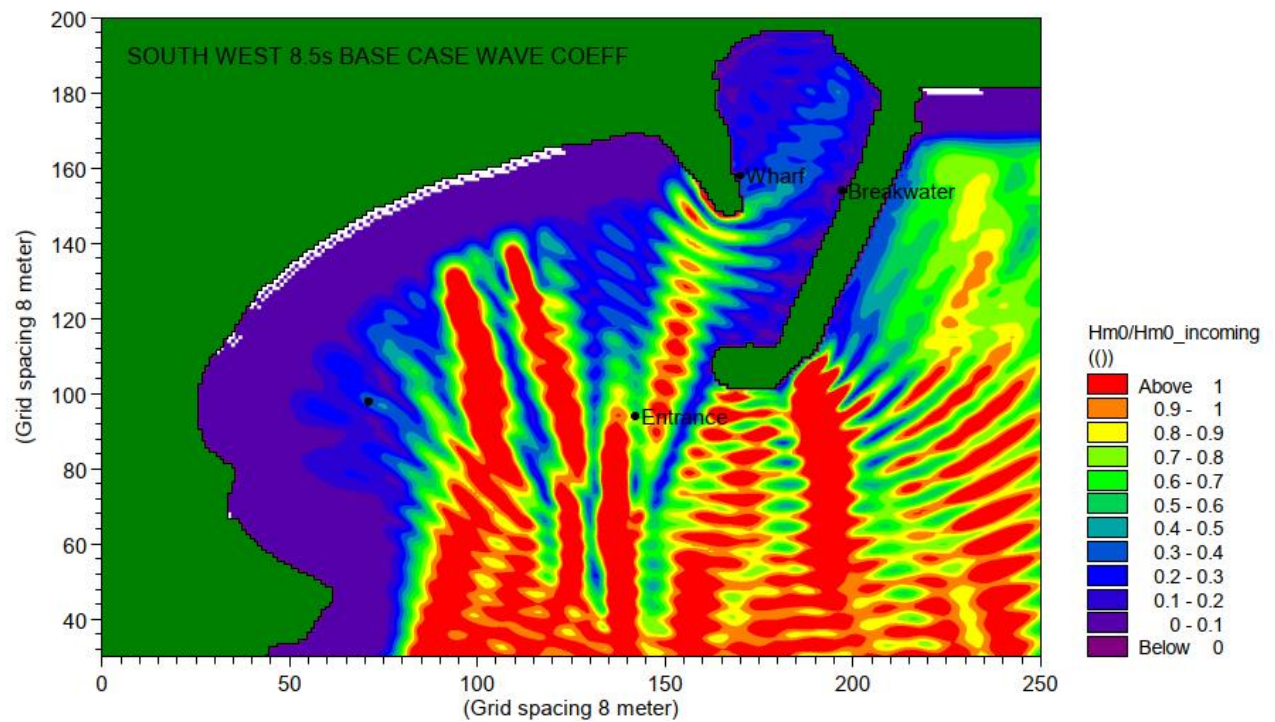


Figure 14 SW wave height for 3m & 14s period

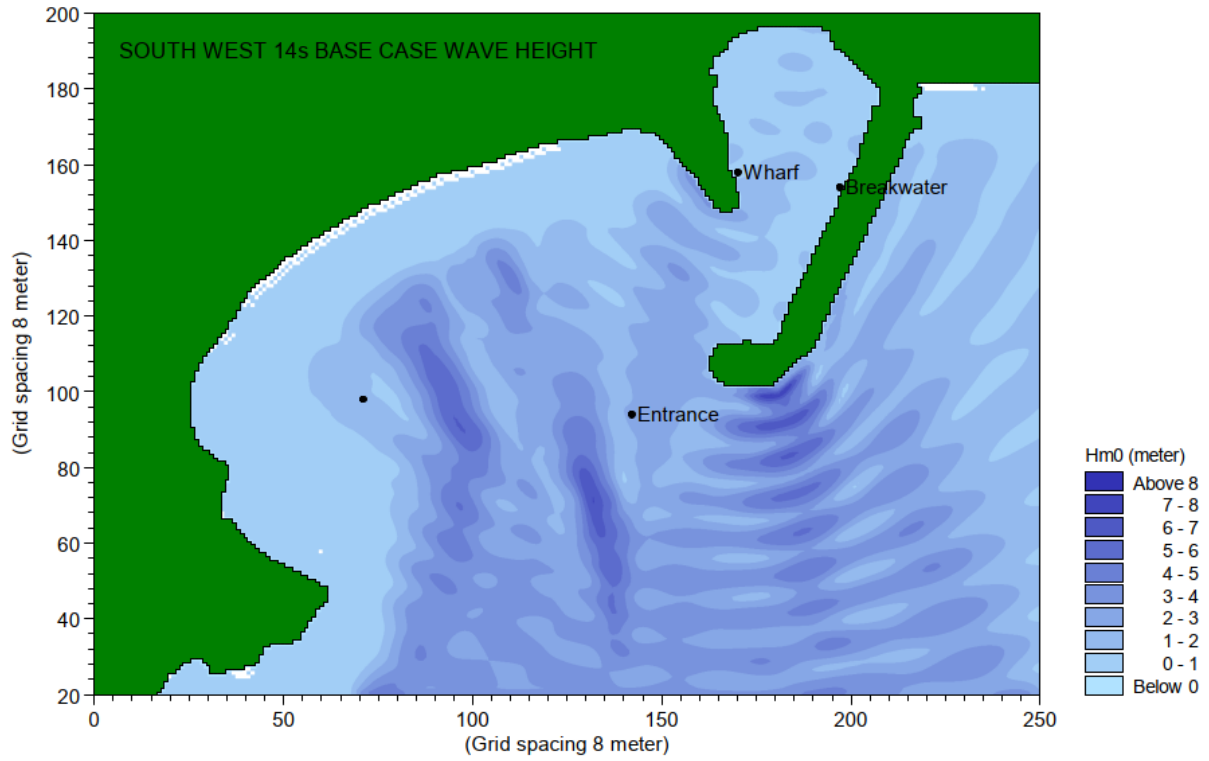
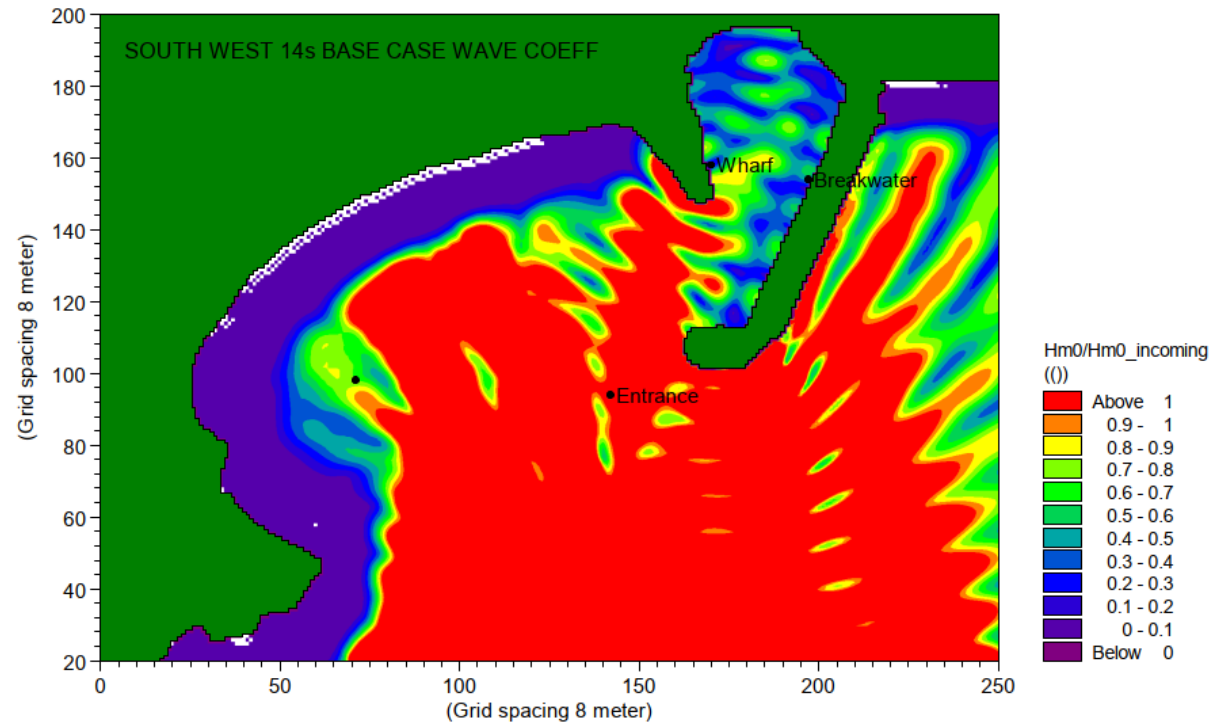


Figure 15 SW wave coefficient for 3m & 14s period



8. Port Upgrade Infrastructure Options

The following key feedback themes were considered as priorities in assessing port infrastructure and operational options for improvement at the Port.

- All-weather port (improved port conditions).
- Improved surge conditions.
- Improved ro-ro ramp infrastructure for full range of vessels and tides.
- Options for increased ship functionality.
- Extending hours of operation during periods of calmer (reduced surge) conditions.
- Options for improved berth utilisation in good weather conditions including berth access and extended operational hours.

8.1 Option 1 – Breakwater from Sandblow Point 950m (2008 Feasibility)

This option is based on the 2008 Feasibility Study layout with a 950m lineal breakwater from Sandblow Point across Omagh Reef providing protection from the prevailing weather. This would enable construction of a larger wharf facility adjacent to the Grassy Wharf if required but generally improve the surge conditions at the berth through the outer breakwater. It's noted that the entrance will still be exposed to the incoming surge and hence internal harbour conditions will still result in surge at the berth. A review of the concept design, rock volumes and costs was undertaken for this option.

Figure 16 Option 1 Layout



Advantages

- Increases berth access for larger draft vessels (subject to TasPorts review).
- Improves flexibility of berth usage and navigation.
- Will reduce surge inside the harbour up to 80% and less than port limits for greater range of operational capacity.

Disadvantages

- Navigation of larger vessels may still require berthing assistance (tugs).
- Requires large volume of rock quantity and construction cost.
- Significant risk to damage during construction.
- Vessels still subject to wind limits.
- Will require lengthy approvals and impact assessments on length of the breakwater and for works associated with marine dumping, new roads, land ownership, etc.

Estimated Construction Costs

- Rock supply volume = 1.8M tonne
- **Total project estimate = \$140m**

8.2 Option 2 – Eastern Breakwater & New Wharf

This option was considered in the 2008 Feasibility Study but due to the proposed scheelite mine reclamation had to be orientated further into deeper water and hence a significant construction cost for the breakwater (length and depth). The scheelite reclamation proposal has since changed allowing for a revised design approach.

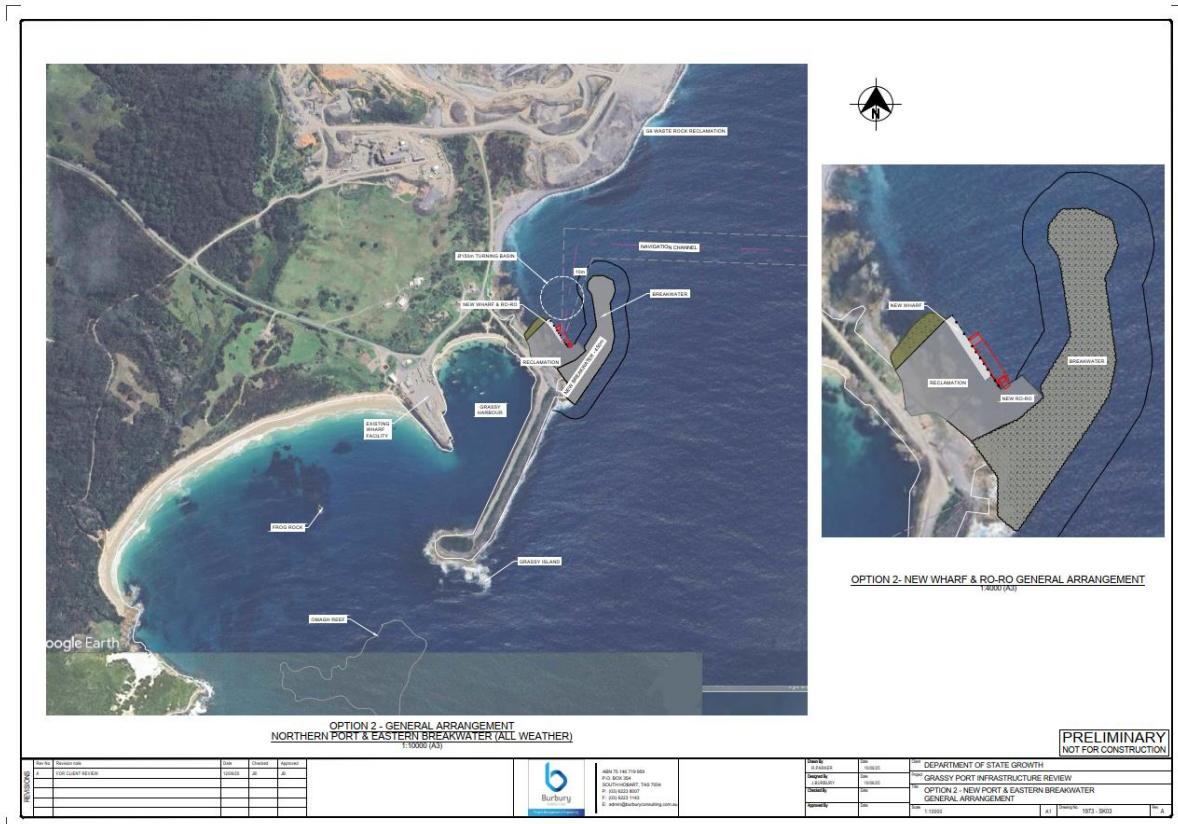
The design approach for this option is utilising the natural protection of the existing breakwater and construction of a new breakwater to the north east to protect against prevailing conditions. The extension will be subject to waves along the existing breakwater and the south to east quadrants and likely result in agitated wave conditions at the harbour entrance beam on to the ships transiting into the harbour (significant proportion of time).

Whilst the east to northerly winds are more seasonal, the return on the breakwater is required to protect the head from waves and provide adequate wave protection from those wind and wave conditions to maintain an “all weather” port.

This proposal would require a significant amount of rock from the G6 mine and to work with them on integrating the layout with planned/approved waste rock reclamation.

The proposal would require a new port, wharf and ro-ro ramp resulting in a significant level of investment but developed for a comparative assessment to Option 1.

Figure 17 Option 2 Layout



Advantages

- Provides increased vessel size access to Grassy Port with new wharf and Ro-ro.
- Maintains expansion within port planning area and zoning overlays.
- Will have reduced surge and harbour oscillation compared to existing wharf and Grassy Harbour (lee protection of existing breakwater and new harbour entrance).
- Wharf located on similar alignment to existing wharf (berthing management).
- Increase under keel clearance at berth and navigation.
- Can be constructed from existing port area with access and roads available reducing transport costs.
- Has protection in the lee of the existing breakwater reducing risk of damage during construction and reduced wave climate exposure.

Disadvantages

- More significant seabed slopes along the breakwater length hence stability and volume of rock is important design aspect.
- Still requires significant level of investment and rock quantity for construction.
- Risk of damage during northerly to easterly weather, however records and models indicate probability is low.

Estimated Construction Costs

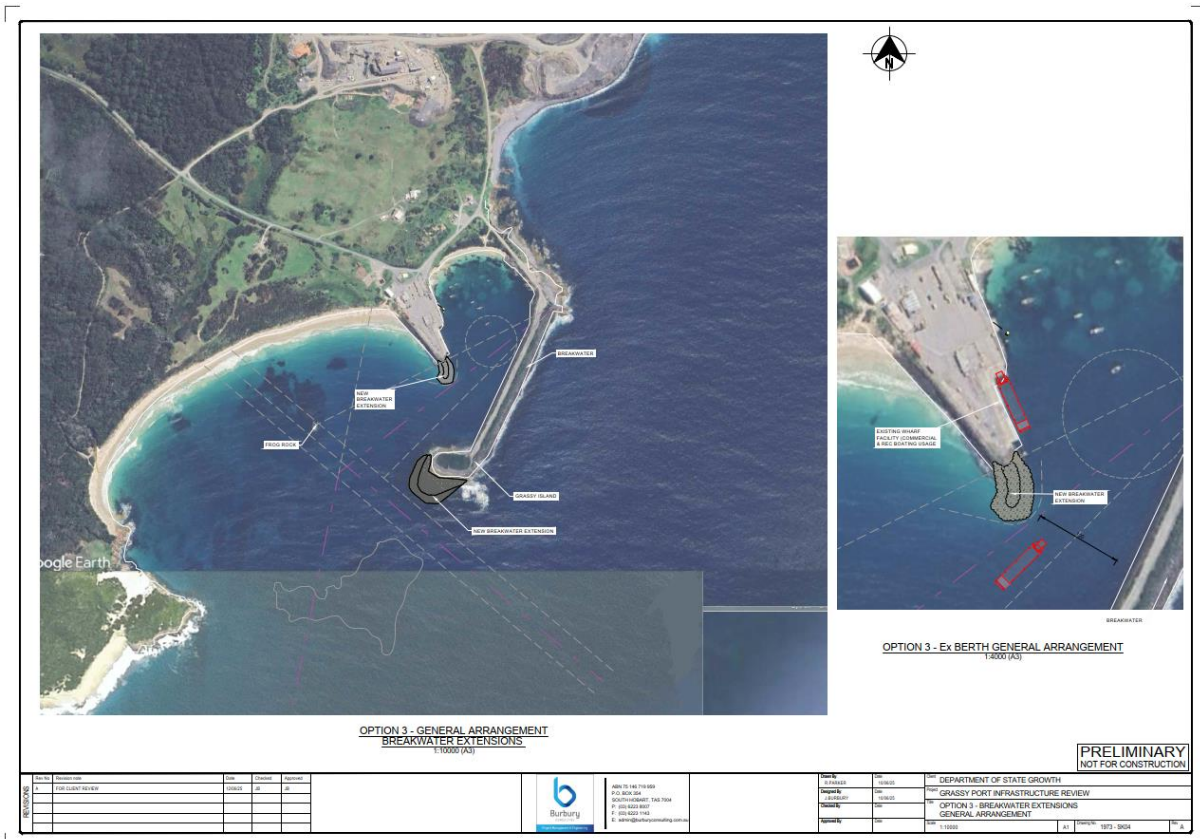
- Rock supply volume = 1.2M tonne
- Breakwater & reclamation construction estimate = \$80m
- Wharf (and other works) construction estimate = \$30m
- **Total project estimate = \$110m**

8.3 Option 3 – Extension to Existing Breakwaters

This option proposes a minor extension to the existing Grassy Island breakwater and port breakwater with the aim to reduce wave energy entrance within the Port. The proposed extents have been developed to minimise impact on existing navigation and reduction in rock volumes (likely a limitation on production of large rock quantities).

There are shallow rock reefs on the outer of Grassy Island that would enable backend tipping and formation of an extension to the breakwater without extending significantly to deep water which is a trade off on level of protection. This option is aimed at producing a measurable reduction in surge at the berth and requires a more advanced level of wave modelling to understand the actual benefits (not included for this study).

Figure 18 Option 3 Layout



Advantages

- Increase on port protection from breakwater extensions.
- Maintains existing port infrastructure so adaptable to future port plans.

- Will reduce surge at the berth pocket (say 10-30%).

Disadvantages

- Will not increase limitations on vessel lengths.
- Encroachment on navigation (reduced entrance width).
- Still requires level of investment on internal Ro-ro ramp and wharf to improve operations.
- Potential impact on penguin habitat on existing breakwaters.

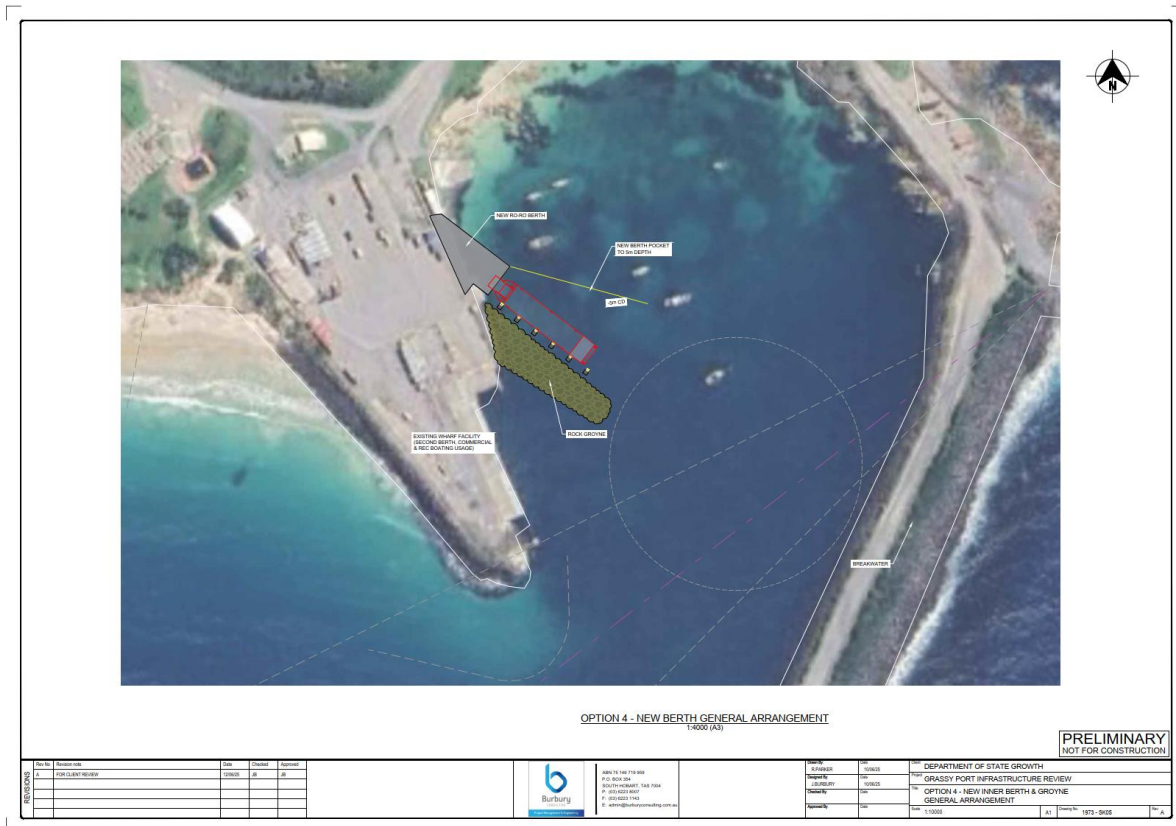
Estimated Construction Costs

- Rock supply volume = 60,000 tonne
- Breakwater construction estimate = \$5.5m
- Other works (nav aids, approvals, engineering, construction, contingency, etc.) = \$2.5m
- **Total project estimate = \$8m**

8.4 Option 4 – New Inner Berth with Groyne Protection

This option proposes a new inner berth for smaller vessel Ro-ro in conjunction with a new inner groyne to improve surge conditions at the berth. The groyne and orientation of the berth proposed to maximise protection at the proposed new wharf utilising rock from the G6 mine. The proposal would require dredging of the berth pocket to achieve adequate depth and construction of a new wharf or dolphins and Ro-ro ramp for access to the existing Port hard stand.

Figure 19 Option 4 Layout



Advantages

- Increase on port protection from inner groyne.
- Maintains existing port infrastructure so adaptable to future port plans and support dual berthing occupancy (for calm conditions only).
- Will reduce surge at the berth pocket (say >30%).
- May be undertaken in conjunction with Option 3 for improved existing berth conditions however the inner groyne will increase surge conditions at the existing berth.

Disadvantages

- Will not increase limitations on vessel lengths.
- Encroachment on navigation (reduced entrance width).
- Still requires level of investment on internal Ro-ro ramp and wharf to improve operations.
- Impacts existing moorings and commercial landing wharf (option to allow for existing wharf access).

Estimated Construction Costs

- Rock supply volume = 20,000 tonne
- Breakwater & reclamation construction estimate = \$2.5m
- New berth and Ro-ro ramp for 100m vessels = \$10m

- Dredging = \$2.5m
- Upgraded fendering to existing wharf for adapted usage = \$0.5m
- Other works (nav aids, approvals, engineering, contractor margin, contingency, etc.) = \$6m
- **Total project estimate = \$21.5m**

8.5 Other Infrastructure & Operational Options

- Other infrastructure and operational options for improvements to existing wharf:
 - Improved fender protection to existing wharf and Ro-ro ramp.
 - Upgrade to ro-ro ramp for improved tidal access.
 - Installation of outer harbour wave buoy to correlate wave and identify early warning to internal wave surge risk exposure.
 - Development of shipping cooperative between service providers.
 - Upgrade to mooring and fendering to improve vessel response to surge.
- Operational improvements:
 - Probability exceedance analysis of wind, internal wave (surge) conditions combined with berth utilisation to understand operational condition review for the Port. This could be extended into a broader model that can assist with prediction of increased harbour surge based on weather observations and forecasts whilst using AI to refine and adapt the model. The benefits of this will provide another tool for monitoring and forecasting surge conditions within the harbour which may assist consideration of port limits for operating hours.
 - Refined harbour agitation study in conjunction with options review for surge/operational (extended breakwaters) improvements to understand potential benefits versus capital expenditure in consideration to the above operational condition review of the Port.
 - Increased berth access during calm weather conditions whilst utilising above inputs.
 - Formation of Strategic Partnership – among various businesses, organisations and companies (including shipping and TasPorts as well as key King Island organisations). This would take the form of a shipping alliance to collaborate to optimise operations and increase efficiency in freight handling, shipping, port operations and services. Such an alliance would allow the member companies to share assets such as vessels, containers, cargo holds, port facilities, services and routes leading to improved service provisions.
 - Key features of a cooperative shipping alliance would be:
 - Shared resources – pooling of vessel capacity, equipment and land-based facilities, technological standardisation.
 - Cost optimisation – by sharing resources, achieve reductions in operating costs.
 - Service improvement – offering more frequent sailings, faster transit times, increased port productivity, 24/7 port operations.
 - Network coverage – expansion of the overall network of the alliance members.
 - Market influence – a collective approach can exert influence on port ownership/management on port charges and service reliability.

Table 11 Other Upgrade Options and Costs

Item	Scope	Estimated Project Costs (ex GST)
1	Improved fendering and mooring for side and stern ramp	\$4m
2	Upgrade to Ro-ro ramp for increased tide access	\$8m
3	Installation of outer ADCP for wave monitoring	\$500k
4	Wave and wind probability exceedance modelling and operational port conditions review and program	\$200k
5	Update to shipping and freight forecasting study (2035)	\$100k

9. Multi-Criteria Analysis of Options

A multi-criteria analysis (MCA) of the presented options was undertaken in conjunction with DSG for agreement on the criteria and weightings.

For the purposes of comparative analysis the options considered in the MCA included:

Table 12 Summary of Options for MCA

Option	Description of Scope	Capital Cost
Do nothing	Business as usual with installation of additional monitoring, wave revies and shipping freight forecast studies.	\$800k
Option 1 – Southern Breakwater	900Lm breakwater to south to improve surge and wave protection	\$140m
Option 2 – Eastern Port	New port & eastern breakwater	\$110m
Option 3 – Extend existing breakwater	Extension of existing breakwaters to increase port protection (minor).	\$8m
Option 4 – New inner berth	New inner berth with groyne, ro-ro and dredging	\$21.5m
Option 5 – Existing Berth fender and ramp upgrades	Upgrade on fendering, mooring and ramp of existing berth	\$12m

The MCA criteria and weightings include:

Table 13 MCA Criteria & Weightings

	Criteria	Calculated Weight
A	Capital Cost	19%
B	Ongoing Operational Cost	8%
C	Return on Investment	15%
D	Commercial Benefit	11%
E	Community Benefit	6%
F	Operational Improvement	10%
G	Shipping and Navigational Safety	9%
H	Environmental Risk	11%
I	Constructability Risk/Resources	4%
J	Economic Benefit	8%

Table 14 MCA Summary Results

Criteria	Weight	Do Nothing Business As Usual +Wave Instruments & Reviews	Option 1 Southern Breakwater	Option 2 Eastern Breakwater & Port	Option 3 Extend Existing Breakwaters	Option 4 New Inner Berth	Option 5 Improved Fendering and Ro-ro Upgrade
Total Score		50.0	53.1	49.1	60.0	57.4	56.7
Weighted Score		5.4	4.6	4.4	5.3	5.2	5.1
Rank		1	5	6	2	3	4
Comment		Due to Capital Cost this option ranks the highest. Its noted scores poorly across criteria but improves on weighted score.	Similar to Option 2 performs poorly due to Capital Cost	Least preferred option	Preferred infrastructure upgrade option combined with least cost. The actual berth benefit needs to be considered for this option to ensure operational benefits are realised as well as review of operational and environmental impacts for the proposal	Scores high on the criteria but due to Capex versus Option 5 weighted score provides for a higher ranking	Option considers investment on existing assets for operational improvements.

Detailed scoring is presented in Appendix B.

10. Recommendations

A comprehensive review of King Island Grassy Port stakeholders, stakeholder feedback, historical studies, port infrastructure and options for improved operational and infrastructure for Grassy Port was undertaken.

A separate stakeholder report is provided including executive summary on key themes and issues.

As outlined within the report the trade forecasts for King Island need to be more accurately considered for development of demand, confirmation of most suitable ship and review of economic drivers for investment.

The following recommendations are proposed to guide future investment and operational improvements at Grassy Port:

10.1 Governance and Collaboration

- **Establish a King Island Shipping Alliance:**

- Facilitate a strategic partnership among TasPorts, shipping operators, and key King Island stakeholders to coordinate schedules, share assets, and optimize freight handling (including forward demands). This cooperative model can reduce costs, improve service reliability, and strengthen market influence.

- **Revisit Freight Forecasting and Service Modelling:**

- Commission an updated freight and shipping study to reflect current demand trends, seasonal variability, and emerging market opportunities. This should inform future infrastructure planning and service procurement.
- This should also seek to identify and encourage mainland connection for a triangulated service between Tasmania and Victoria to King Island (key stakeholder theme and previous recommendation on all historical King Island Shipping and port studies).

- **Maintain Transparent Engagement with Stakeholders:**

- Continue regular consultation with community, industry, and service providers to ensure infrastructure and operational decisions remain responsive to evolving needs and constraints.

10.2 Strategic Infrastructure Investment

- **Prioritise incremental upgrades over major capital works:**

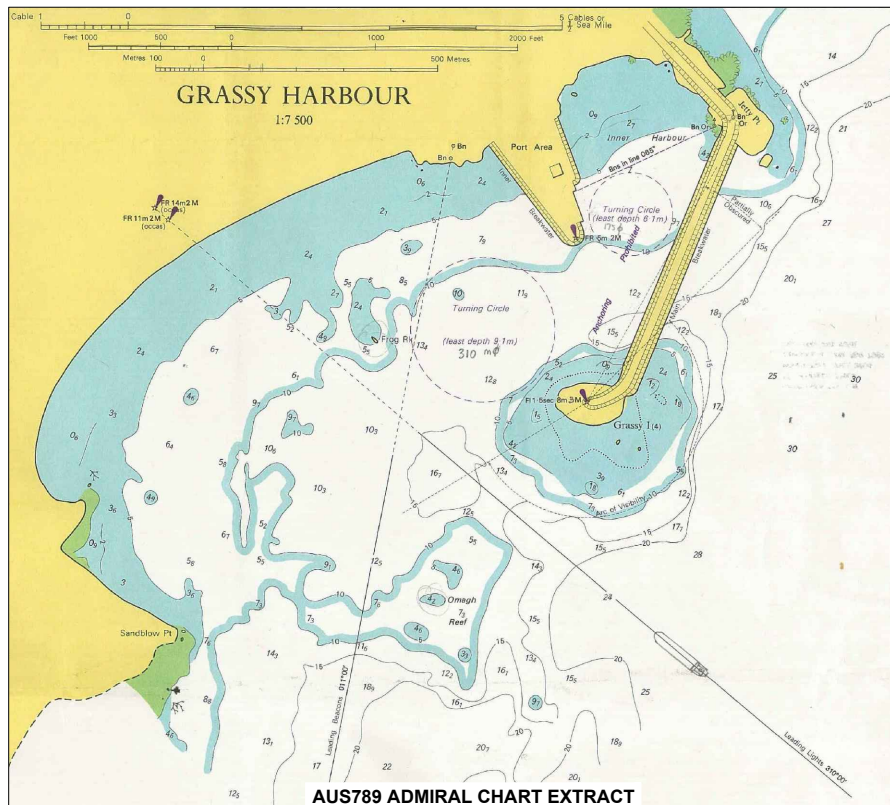
- The grassy Port has relatively low berth utilisation and freight volumes such that large scale investment and maintenance cannot be easily funded through port operations.
- The current shipping service with 3 operators is providing a broad range of options for freight movement however recognized limitations still exist in meeting seasonal freight demands (livestock and fertilizer) as well as increased reliance on imports and exports for mining activities on King Island (including growth).
- Options for inner berth infrastructure increases and operational improvements have been identified needing further design and modelling to understand incremental benefit on port operations.
- Collaboration with Group 6 metals on rock source (quantity and size) availability for breakwater construction options.

- Review recommended infrastructure options shipping study (above) and individual business case.

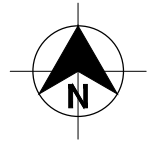
10.3 Operational

- **Implement real time surge forecasting with monitoring:**
 - Install outer harbour ADCP for wave and current measurement to correlate offshore conditions with TasPorts internal harbour and berth ADCP to support proactive operational planning and enhance navigational safety.
 - Develop predictive model integrating wind, wave and surge data to support dynamic berth access decision making and support operational controls.
- **Review port operational limits:**
 - In combination with increased monitoring and infrastructure upgrades for port review limits on port operating hours to allow for broader flexibility on port access and utilisation.
- **Upgrade ro-ro ramp and fendering infrastructure:**
 - As infrastructure improvement and highlighted as future investment of TasPorts bringing forward upgrades on fendering, mooring and ramp infrastructure will see a benefit on berth efficiency for a broader range of vessels. Similarly to above recommendations this should be undertaken in context of shipping and freight review to ensure infrastructure meets the future demands.

Appendix A – Concept Sketches



AUS789 ADMIRAL CHART EXTRACT



PORT ACCESS (TASPORTS PORTS PROCEDURES):


THE CURRENT PARAMETERS FOR GRASSY PORT :

- GRASSY IS A DAYLIGHT PORT ONLY FOR VESSELS OVER 35 METRES IN LENGTH.
- MAXIMUM ACCEPTABLE VESSEL LENGTH IS 90 METRES LOA.
- VESSELS OVER 35 METRES LOA MUST HAVE PILOTAGE.
- VESSELS OVER 35 METRES LOA MUST HAVE TWIN SCREW CONFIGURATION.
- VESSELS OVER 60 METRES LOA MUST HAVE A BOW THRUSTER.
- SPRING TIDE RANGE IS 1.4m.
- THE MAXIMUM DRAFT FOR THE PORT IS 5 METRES.
- THE MINIMUM DYNAMIC UNDER KEEL CLEARANCE IS 0.6m.
- THE MINIMUM STATIC UNDER KEEL CLEARANCE ALONGSIDE BERTH IS 0.3m.
- MAXIMUM SURGE FOR VESSEL AT BERTH 0.5m (SUBJECT TO HARBOUR MASTER AND VESSEL MASTER ASSESSMENT).
- MAXIMUM WIND STRENGTH FOR VESSELS OVER 35 M LOA IS 25 KNOTS.
- HARBOUR MASTER INSTRUCTION 22-26: VESSELS OVER 35m ARE NOT PERMITTED TO REMAIN AT BERTH OVERNIGHT 08/04/2022.

SITE PLAN ARRANGEMENT
1:4000 (A3)

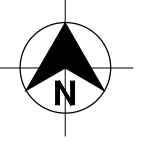
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Rev No	Revision note	Date	Checked	Approved
A	FOR CLIENT REVIEW	12/06/25	JB	JB



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Designed By: J.BURBURY	Date: 10/06/25	Project: GRASSY PORT INFRASTRUCTURE REVIEW
Checked By:	Date:	Title: GRASSY WHARF - EXISTING PORT
Approved By:	Date:	Scale: 1:4000
		A1 Drawing No: 1973 - SK01
		Rev: A



**OPTION 1 - GENERAL ARRANGEMENT
SANDBLOW POINT BREAKWATER & NEW WHARF**
1:10000 (A3)

PRELIMINARY
NOT FOR CONSTRUCTION

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A	FOR CLIENT REVIEW	12/06/25	JB	JB

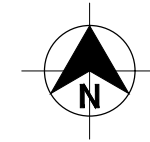


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Approved By:		Date:	

Client:	DEPARTMENT OF STATE GROWTH
Project:	GRASSY PORT INFRASTRUCTURE REVIEW
Title:	OPTION 1 - SOUTHERN BREAKWATER GENERAL ARRANGEMENT
Scale:	1:10000
A1	Drawing No. 1973 - SK02
Rev	A



OPTION 2- NEW WHARF & RO-RO GENERAL ARRANGEMENT
1:4000 (A3)

OPTION 2 - GENERAL ARRANGEMENT
NORTHERN PORT & EASTERN BREAKWATER (ALL WEATHER)
1:10000 (A3)

PRELIMINARY
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Rev No	Revision note	Date	Checked	Approved
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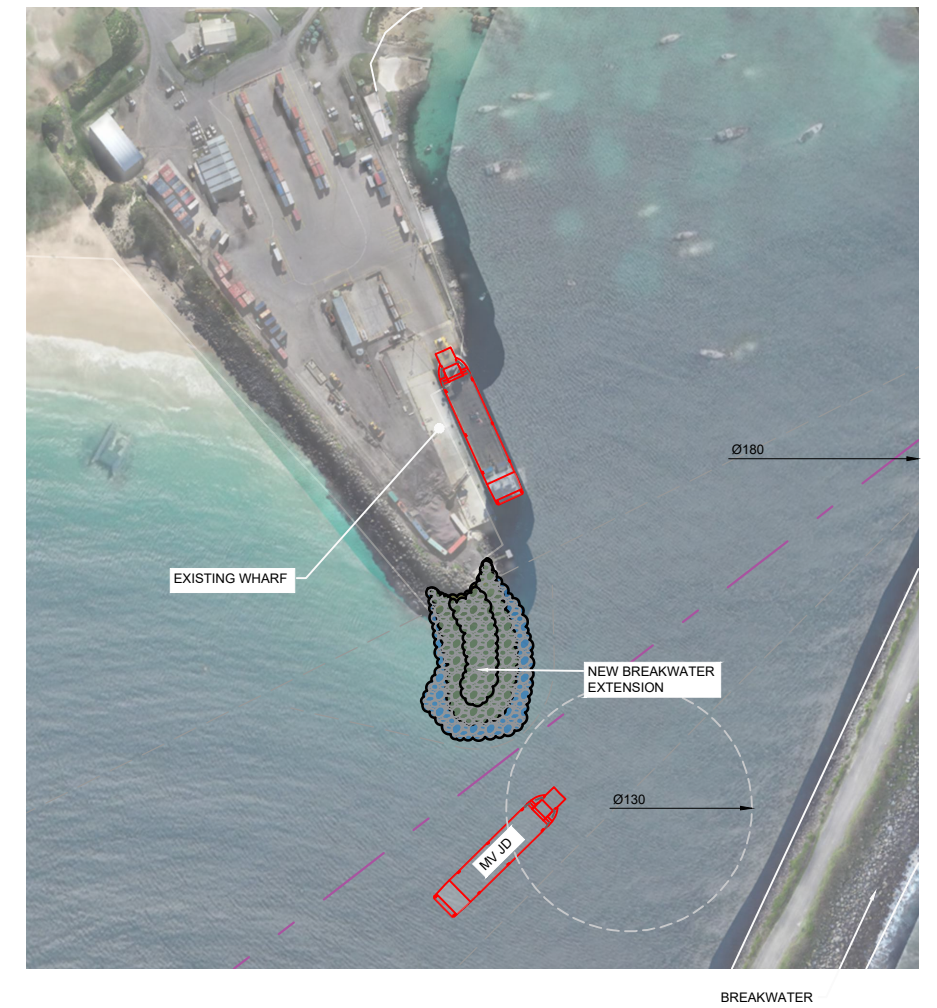


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Checked By:	Date:	Title: OPTION 2 - NEW PORT & EASTERN BREAKWATER GENERAL ARRANGEMENT
Approved By:	Date:	Scale: 1:10000
A1		Drawing No: 1973 - SK03
		Rev: A



**OPTION 3 - GENERAL ARRANGEMENT
BREAKWATER EXTENSIONS**
1:10000 (A3)



OPTION 3 - Ex BERTH GENERAL ARRANGEMENT
1:4000 (A3)

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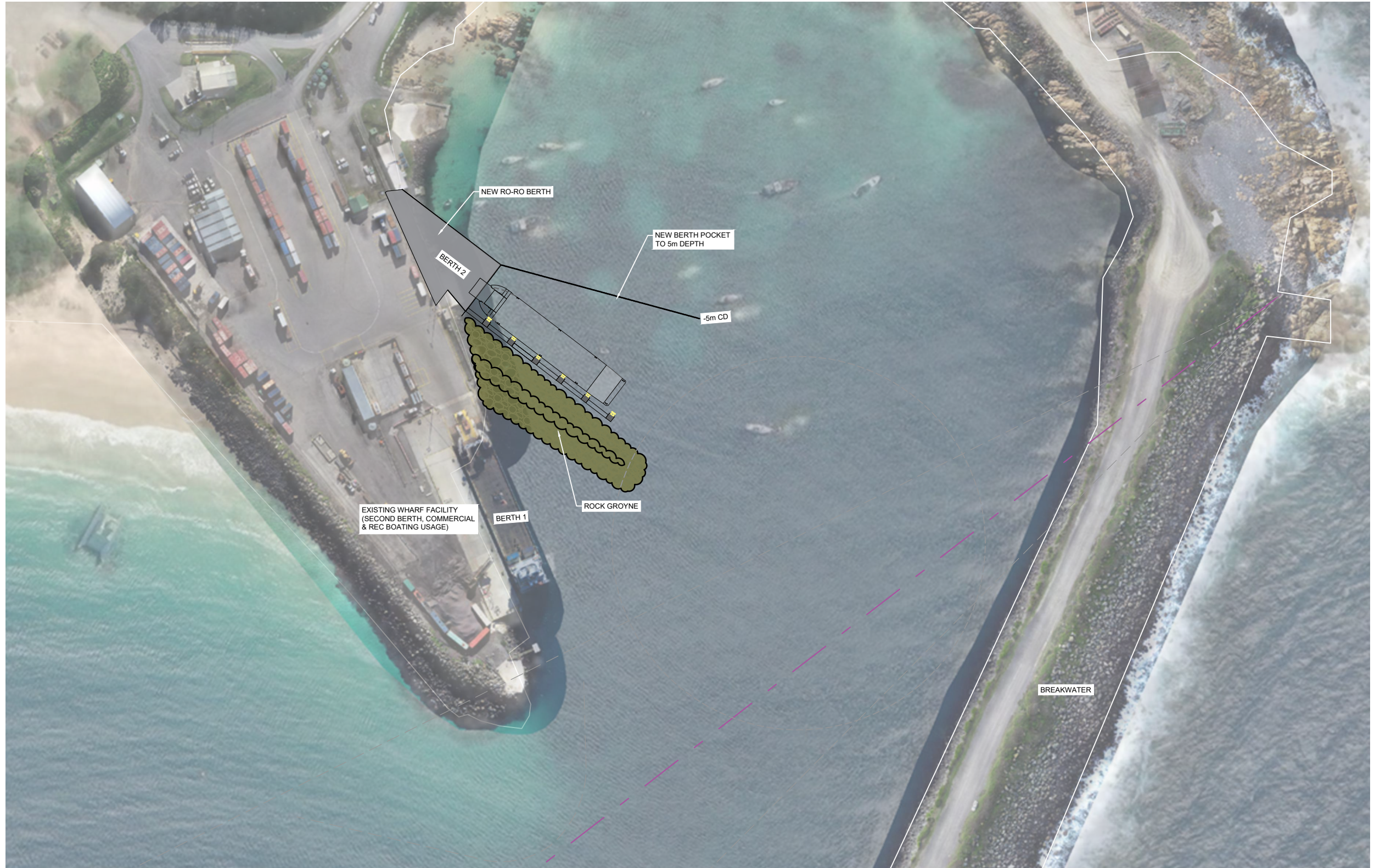
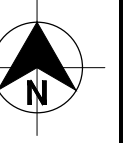
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Approved By:	Date:

Client: DEPARTMENT OF STATE GROWTH	Project: GRASSY PORT INFRASTRUCTURE REVIEW
Title: OPTION 3 - BREAKWATER EXTENSIONS GENERAL ARRANGEMENT	
Scale: 1:10000	A1 Drawing No: 1973 - SK04
Rev: A	



OPTION 4 - NEW BERTH GENERAL ARRANGEMENT
1:4000 (A3)

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Client:	DEPARTMENT OF STATE GROWTH
Project:	GRASSY PORT INFRASTRUCTURE REVIEW
Title:	OPTION 4 - NEW INNER BERTH & GROUYNE GENERAL ARRANGEMENT
Scale:	1:10000
A1	Drawing No. 1973 - SK05
Rev	A

Appendix B – MCA

Concept Design: Preliminary Options Analysis

Project Title:	Grassy Port Review
Project No.:	1973
Compiled By:	James Burbury
Date:	1/07/2025
Revision:	8

Criteria	Weight	Do Nothing Business As Usual + Wave Instruments & Reviews	Option 1 Southern Breakwater	Option 2 Eastern Breakwater & Port	Option 3 Extend Existing Breakwaters	Option 4 New Inner Berth	Option 5 Improved Fendering and Ro-ro Upgrades	Comment		
1	Capital Cost	19%	Description							
			\$800,000	\$140,000,000	\$110,000,000	\$7,700,000	\$20,000,000	\$12,000,000		
			10.0	0.1	0.1	1.0	0.4	0.7		
Description										
2	Ongoing Operational Cost	8%	No significant change from current practices.	Increased asset will require more greater investment to maintain but improved access for shipping and frequency	Enhanced facilities will require greater investment by TasPorts to maintain (second port) and still exposure from SW and NE.	Enhanced facilities will require greater investment by TasPorts to maintain but in same area as existing assets.	Enhanced facilities will require greater investment by TasPorts to maintain but in same area as existing assets. New berth will offset future maintenance for existing	Enhanced facilities will require greater investment by TasPorts to maintain but should be offset by increased lease costs	Consider design life of assets, required maintenance for structures based on existing condition	
			Score							
			8.0	5.0	4.0	6.0	7.0	7.0		
Description										
3	Return on Investment	15%	No change from current ROI	Expectation is that ROI will be minimal unless the costs of funding the upgrades can be secured from Federal and State funding	Expectation is that ROI will be minimal unless the costs of funding the upgrades can be secured from Federal and State funding	Expectation is that ROI will be minimal unless the costs of funding the upgrades can be passed on to new shipping operators.	Expectation is that ROI will be minimal unless the costs of funding the upgrades can be passed on to new shipping operators.	Expectation is that ROI will be minimal unless the costs of funding the upgrades can be included in lease costs or funding brought forwards by TasPorts.	Combination of the revenue likely to be generated from the option together with the capital cost of the option	
			Score							
			5.0	2.0	2.0	5.0	5.0	5.0		
Description										
4	Commercial Benefit	11%	No change, minor wave data benefit.	Improved commercial benefit for longer term commitments for island business/industry and shipping continuity.	Improved commercial benefit for longer term commitments for island business/industry and shipping continuity.	Minor benefit to existing.	Improved commercial benefit for longer term commitments for island business/industry and shipping continuity.	No change.	The opportunity that the option gives TasPorts in context of commercial negotiations with customers or other commercial opportunities	
			Score							
			2.0	7.0	8.0	4.0	7.0	2.0		
Description										
5	Community Benefit	6%	No change for local community	Broader community support likely	Improved safe harbour may lead to community support but likely less than Option 1 given relocation of port.	Improved breakwater infrastructure fits with community support, utilising existing rock source and minor port improvement	Likely to have broad community support for improved conditions but loses fishermen's berth.	No major change to port conditions as essentially asset replacement brought forward.	Community engagement and improvement through facilities and/or shipping benefits	
			Score							
			0.0	8.0	6.0	8.0	6.0	6.0		
Description										
6	Operational Improvement	10%	No significant change, minor improvement with data.	Provides significant improvement for operations at berth with improved surge for greater operational periods. No change to existing wharf and ro-ro.	Provides for improvement in SW surge due to orientation. New berth can increase tidal access and berth facilities.	Provides improvement for surge to increase operational period. No change on existing berth.	Second berth will be more protected in surge for greater period. Existing berth will be worse due to groyne. Greater tidal operational improvement.	No change to operations in surge. Better tidal access and berthing and mooring conditions.	The ability for the option to be implemented and the operational impact it may have on customers and TasPorts both during and after construction	
			Score							
			5.0	8.0	8.0	6.0	8.0	6.0		
Description										
7	Shipping and Navigational Safety	9%	No change from current practices	Enclosure of the port expected to improve marine operations within port during heavy weather events. Still exposed to SW on outside of entrance.	Major change to shipping with easterly approach beam on to SW weather.	Slight adjustment to shipping and navigation into port with extended breakwater.	No significant impact to navigation within the port when compared to current configuration. Some minor improvement in wave climate expected at second berth	No significant impact to navigation within the port when compared to current configuration	What the option changes with regard to shipping and navigational safety to the berths and within the port generally	
			Score							
			2.0	9.0	6.0	7.0	8.0	8.0		
Description										
8	Environmental Risk	11%	No change from current practices	Reclaim and disturbance of the seabed expected. Portion of reclaim will be outside existing footprint of port lease area. Highest environmental risk due to proximity of port boundary and existing reef	Reclaim and disturbance of the seabed expected. Portion of reclaim will be outside existing footprint of port lease area. Highest environmental risk due to proximity of port boundary and existing reef	Minimal change from current practices and within existing port boundaries.	Minimal change from current practices and within existing port boundaries. Reclaim, dredging will increase risk for approvals.	Minimal change from current practices and within existing port boundaries.	The risk of potential delays to the project (due to approvals) due to the extent of works or the type of works required by each option	
			Score							
			8.0	4.0	4.0	9.0	5.0	10.0		
Description										
9	Constructability Risk/Resources	4%	No change.	Significant quantity or large rock required as well as new construction roads. Limit on available large rock from mine and extent subject to mine waste rock. No plant on island to deliver.	Significant quantity or large rock required as well as new construction roads. Limit on available large rock from mine and extent subject to mine waste rock. No plant on island to deliver.	Small quantity of rock, likely available as well as plant for scale of build.	Small quantity of rock, likely available as well as plant for scale of build. Limited dredging capabilities.	Works would need to consider infrastructure upgrades to existing assets and management of shipping during works. Import of materials to island.	What risks are present in terms of the risk of being able to deliver the option within the required timeframe or budget expectations, island capabilities, resources available, etc.	
			Score							
			10.0	3.0	3.0	8.0	5.0	6.0		
Description										
10	Economic Benefit	8%	No change to current economic benefit	Economic benefit to be established but expectation is that improved port and shipping	Economic benefit to be established but expectation is that larger laydown will provide more throughput and may provide opportunity for increase in vessel	Economic benefit to be established but expectation is that minor	Economic benefit to be established but expectation is that minor	Economic benefit to be established but expectation is that minor	How the option supports and economic benefit	
			Score							
			0.0	7.0	8.0	6.0	6.0	6.0		
Description										
Total Score			50.0	53.1	49.1	60.0	57.4	55.7		
Weighted Score			5.4	4.6	4.4	5.3	5.2	5.1		
Rank			1	5	6	2	3	4		