Service Project
Final Report

King Island Shipping

Department of State Growth

Tasmanian Government

Table of Contents

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Executive summary

Background

In response to the recent closure of the JB Swift abattoir on King Island, the Tasmanian Government and the King Island Council have entered into a Partnership Agreement, which, amongst other matters, has identified a project to analyse the options for a long-term, sustainable King Island shipping service. The community and economy of King Island is highly dependent on reliable shipping services at fair prices.

The current weekly general freight King Island shipping service is operated by SeaRoad as part of their regular Bass Strait service between Melbourne and Devonport. Future plans by SeaRoad to replace its existing fleet of vessels reaching the operational end phase of their lives will involve larger vessels for the Bass Strait trade. Larger vessels would be unable to call at Grassy given constraints related to the port infrastructure. SeaRoad has indicated that they are potentially interested in keeping the one Grassy-calling vessel to serve King Island.

Given this uncertain background, an analysis has been completed to identify and assess options for appropriate shipping solutions for King Island – the subject of this report.

The approach used in the analysis has included a mixture of consultations with stakeholders involved in the King Island trade, desk-top research, and shipping service cost modelling.

It is noted that a comprehensive review of Tasmanian's freight system is currently being undertaken by the Freight Logistics Coordination Team (FLCT). This is a jointly sponsored Federal and State Government exercise where the team comprises industry and peak group representatives. The work of the FLCT includes issues that are relevant to this review of King Island Shipping. This work was considered in completing this report.

Current and future King Island shipping freight demand

Current and future shipping freight demand on King Island is directly linked to the island's socio-economic situation and developments.

The population on King Island is around 1,600 persons (0.3% of the total Tasmanian population) and has been slightly declining over the last ten years.

The farming (cattle) and dairy-processing sectors are of key importance to the King Island economy. The island contains several mineral and primary industry resources ranging from scheelite (containing tungsten oxide) to mineral sands and kelp. Both mineral sands and kelp are currently exported to overseas markets. Visitors to the island (all by air) also contribute to the local economy.

The negative impact of the recent closing of the island's abattoir can be viewed against a number of potential new developments – two golf course complexes, Hydro Tasmania's TasWind wind farm project, a possible re-opening of the scheelite mine, the potential expansion of current mineral sands production, and the possibility of a new abattoir.

In the period 01/07/2012-31/03/2013, which is post the closure of the abattoir on King Island, the community and economy currently generated a shipping freight demand (including live cattle and empty containers) of around 600 tonnes per week (or around 70 TEU equivalent per week) inbound to the island, and an average of around 1,000 tonnes per week (or around 70 TEU equivalent per week) outbound[1]. Freight is shipped both to/from Victoria (including connections to overseas exports from King Island) and to/from mainland Tasmania. The volume of freight shipped between Victoria and King Island is currently 3 times greater than between mainland Tasmania and King Island. The averages in freight volumes mask incidences of seasonal peaks which require extra shipping capacity to meet demand (on occasion peaks of 50% more than weekly averages).

The King Island unitised trade currently represents 2.5% of the total Bass Strait unitised trade in terms of annual TEU volumes (including empty containers). Furthermore, the majority of the King Island 'non-cattle' trade is destined for or originating from Victoria (through the Port of Melbourne), which has implications for the routing of shipping services.

[1] These volumes of freight include cattle-on-the-hoof, other animals and cars. The TEU equivalents include the conversion of cattle-on-the-hoof, other animals and cars (these combined representing around 10 TEU inbound and 30 TEU outbound per week).

In terms of the next 20 years, King Island freight demand could follow one of several possible paths. A 'low' path would reflect a relatively pessimistic King Island economy, while a 'high' path would reflect a combination of growth in existing freight flows plus new freight from future projects going ahead. Future King Island freight demand could range from around 80 TEU to 145 TEU per week in each direction reflecting different economic conditions and partial mineral sands production, or a maximum of 300 TEU per week in each direction with containers used in the situation of fully licenced mineral sands production[2].

Benchmarking of comparative shipping services

Benchmarking of shipping services for other similar island and/or remote communities may provide some insights into possible vessel options, service-levels, operational performance, and costs. In general, comparisons are difficult to obtain and rely upon particularly regarding freight rates and shipping costs due differences in services, operators and cargo-owners. Hence, conclusions should be treated with caution.

The comparative analysis covered shipping services both in Australia and overseas, namely Flinders Island, Norfolk Island, Bass Strait (Victoria/mainland Tasmania), Lord Howe Island, Christmas Island, coastal New Zealand (North/South Island connections), and the Shetland Isles (Scotland, UK).

Review of the selected examples of shipping services shows variations in the types of vessels used (Roll-on/Ro-off, Lift-on/Lift-off, containership, general cargo and multi-purpose), levels of service provided, different ownership and support models, and different levels of freight rates for general cargo and livestock where shipped.

The comparative domestic and overseas analysis indicates that, on a cost per tonne basis, the King and Flinders Island shipping services are more costly that Bass Strait (Victoria/mainland Tasmania) services, but less costly than other Australian island services.

As common to other shipping services globally, King Island freight owners also pay different levels of freight rates according to freight volumes and regularity. The main

[2] There are operational shipping issues with mineral sands as they are heavy and require twice as much ship tonnes capacity as other King Island freight.

reasons for this are that Bass Strait services involve large volumes of freight with less empty container costs giving lower freight rates, while the other Australian island services reviewed involve longer shipping routes and less freight volumes which together increases shipping costs.

The closest non-Tasmanian comparison to the King Island shipping service, and its trade, is the Ro/Ro shipping service operated for the UK Shetland Islands. The Shetland Islands service has significantly lower freight rates than those for King Island and Flinders Island, but it should be noted that the Shetland Islands services receive a government subsidy (around 40% of revenue in 2005), as do some King Island and Flinders Island cargo-owners[3]. There is a far higher level of freight transported (almost ten times the King Island freight demand) which provides economies of scale and hence lower shipping costs.

Identification and analysis of shipping service options for King Island

The nature of the freight demand and route geography of King Island means that a number of potential shipping options could be modelled for cost, capacity and a required minimum weekly service frequency. This shipping service frequency and the need for a high-level of reliability are important considerations for businesses on King Island in order to minimise inventory costs.

The crewing of vessels on a Bass Strait King Island shipping service is required to be on a national wage basis according to national coastal regulations. The calling of a shipping service at Grassy on a Sunday is likely to have little additional wharf-to-wharf cost with a possible small impact on on-island transportation costs due to Sunday wage rates.

It needs to be recognised that costing an optimal shipping service is a difficult and approximate exercise. The modelled cost results need to be treated with caution. The most critical factor is the availability of a suitable vessel. There is divided opinion amongst stakeholders on whether the optimal vessel can be found. It is also very difficult to quantify associated business costs as they will depend on the nature of the business that runs the shipping service.

[3] It should be noted that not all freight is eligible for Tasmanian Freight Equalisation Scheme (TFES) support (see Appendix A – Glossary, TFES) and hence some freight bears the full cost of the shipping service as charged by the shipping line to the freight owner.

Given these caveats and the assumption-based approach used for the calculations, analysis of Bass Strait triangulated (with King Island call) shipping services versus King Island hub (dedicated) shipping services indicates that a triangulated shipping service with a single operator is the more cost effective solution due to the sharing of ship costs with non- King Island freight. Using a medium size landing craft (113 TEU, 2700 tonnes deadweight, 87 m length and 9 knots), and based on the study assumptions, total weekly shipping costs (vessel operating, fuel and port-related) for a triangulated service could be around $350,000 or $18 million per year. This optimal vessel is smaller than the currently calling m/v Searoad Mersey and is within the general 90m vessel length limit for Grassy.

In terms of differences in directions served and single versus double-calling, if the abattoirs remain on mainland Tasmania, then a Southbound Grassy call is the optimal direction for a Bass Strait triangulated service. If a 'hub' type service is operated, then it is more cost effective to have both a Northbound and Southbound call than just one call. If a single call had to occur for a 'hub' service then the Northbound (Victoria) direction is more cost effective due to the higher freight volume to/from Victoria (i.e. there is currently 3 times more freight than to/from mainland Tasmania).

In terms of differences in ship types and sizes, the analysis indicated that a medium size landing craft (113 TEU, 9-10 knots) provided the lowest cost shipping option followed by an older (10-15 year old) larger Ro-Ro type vessel (208 TEU). The exact ship sizes are limited by the port access at Grassy. These ship sizes, some with multiple sailings per week, can handle the weekly freight demand out to year 20 of the various future economic scenarios, but extra dedicated weekly sailings with mineral sands in containers will be required if mineral sands production reaches full licensed production.

Analysis of the costs of operating two separate shipping services (one for general freight, the other for cattle only) versus a single, combined shipping service indicates that the single operator, combined shipping service is significantly more cost effective for the overall freight task. This result emphasises the importance of not fragmenting the shipping of freight to/from King Island, including shipping some freight in bulk, otherwise increased shipping costs are likely to occur for the overall freight task. It is the case that levels of cost may vary for individual freight owners due to their specific supply chains and commercial arrangements.

The two port rotations of Melbourne-Grassy-Devonport and Geelong-Grassy-Burnie have a similar total shipping cost (i.e. vessel, fuel and port-related costs). This result does assume a common-level of stevedoring costs for all of the ports analysed. In practice, each port may have a different stevedoring cost. Operationally Burnie currently lacks Ro-Ro berth access (ramps) for a new shipping service – this will require relatively expensive capital investments by the port compared with the small size of the King Island trade. On mainland Tasmania, current availability of berth ramps may limit future port call choice to only Devonport and Bell Bay. Geelong has an ageing (unused) Ro-Ro stern-ramp, but it is likely to require upgrading.

There is potential to reduce shipping costs by further improving the re-use of empty containers given the current level of empties moving to/from King Island. For instance, freight costs for some King Island cargo-owners could be reduced by at least $500 per container if empty container pre-/re-positioning can be avoided. The various options available to further improve empty container efficiency are worth exploring. These options range from a better matching of inbound and outbound freight to using shipper-leased containers.

Vessel operating management considerations

Reviewing the various ship management operation options and the situation on King Island, it is reasonable to assume that a full community-backed service is an overly risky option. It is also unlikely that government support beyond the current federal TFES and limited state support for temporary market failures would be available.

Consequently, a commercial shipowner managing an operation with a King Island cargo-owner group buying vessel space (with some level of commitment to pay) could be a suitable approach to managing a future King Island shipping service in the event of the current service no-longer operating.

There will be a need to balance shipping service flexibility with reliability as some King Island cargo segments require high levels of vessel reliability. As service reliability increases, then it is likely that vessel capital and operating costs to provide the same freight capacity will also increase, i.e. there is a cost premium involved.

Availability of suitable vessels and operators

An important consideration in implementing any changes in the future will be the availability of suitable vessels and operators for a King Island service. The longer the lead-time for a new service, the more opportunity there is to construct, modify or source a suitable vessel.

Given the ability of King Island freight to pay the required price to provide a ship-operator with an adequate commercial return in providing a regular fixed-day weekly service and assuming freight levels remain constant and increase in the long-term, it is likely that there will be one or more operators interested in operating a new service. The tendering of a shipping contract or 'pooled freight' for King Island is likely to be more successful if the ending of the current main service is certain, and freight/charter guarantees are also offered to the market. The securing of a new operator may be a lengthy process.

Suggested next steps

There are a number of suggested next steps:

1. Development of a King Island Shipping Contingency Strategy
2. Plan for a possible freight buying group / co-operative
3. Explore the potential to further reduce empty container costs
4. Finalisation of the Draft King Island Shipping Policy
5. Exploratory discussions with SeaRoad on a future dedicated King Island shipping service with m/v Searoad Mersey.

1. Introduction

1.1. Background

In response to the recent closure of the JB Swift abattoir on King Island, the Tasmanian Government and the King Island Council have entered into a new Partnership Agreement. The Partnership Agreement has identified a number of high-priority activities aimed at addressing the closure of the meat processing facility and promoting sustainable economic activity on King Island.

Under the King Island Partnership Agreement, two projects addressing "freight and transport" have been identified. The first project, a review of the King Island Livestock Supply Chain, was completed in December 2012 by GHD. The second project, an analysis of a long-term, sustainable King Island shipping service, is addressed in this report.

The community of King Island is highly dependent on reliable shipping services at fair prices. For producers and businesses on the Island to remain competitive and sustainable, reliable and cost-effective transport connections with both domestic and overseas markets is absolutely critical.

The current weekly King Island shipping service operated by SeaRoad, connecting the island with Victoria and mainland Tasmania, operates with one vessel, m/v Searoad Mersey, which is reaching the end of its operational life. Searoad is understood to be considering replacing this vessel with a larger one sized to serve the Bass Strait trade, which could result in the cessation of the current weekly King Island shipping service operated by SeaRoad due to the inability of a larger vessel to access Grassy Port. SeaRoad has indicated that they are potentially interested in keeping m/v Searoad Mersey to serve King Island.

The weekly servicing of the island by SeaRoad is also complemented by an 'as needs' shipping service by LD Shipping. This service uses a small, landing-craft type vessel to predominantly carry cattle 'on-the-hoof' to mainland Tasmania.

Given the possibility of a future change in the SeaRoad vessel, there is an important need to identify and assess options for appropriate longer term shipping solutions for King Island.

The analysis of a long-term, sustainable King Island shipping service (this study) comprised of four main work tasks, namely:

- A freight demand analysis (current, and future with 5 and 20 year time horizons)
- Stakeholder consultations (provision of inputs into the analysis work)
- The benchmarking of comparative shipping services, and
- The identification and analysis of shipping service options.

It is noted that a comprehensive review of Tasmanian's freight system is currently being undertaken by the Freight Logistics Coordination Team (FLCT). This is a jointly sponsored Federal and State Government exercise where the team comprises industry and peak group representatives. The work of the FLCT includes issues that are relevant to this review of King Island Shipping. The FLCT's work to date was considered in completing this report.

1.2. Purpose of this report

This report covers the full set of work tasks.

1.3. Approach used

The overall approach comprised a mixture of desk-top research, analysis of historical shipments data provided for the project by Tasports (in confidence), consultations with stakeholders involved in the King Island trade, and vessel and shipping service cost modelling. Results and conclusions from historical trends, market demand forecasts, and feedback from consultations were used as inputs for shipping service cost modelling to provide insights into the profile of a sustainable and efficient shipping service for King Island.

1.4. Structure of this report

The structure of this report comprises the following:

- *Freight demand analysis* – presents and analyses King Island freight demand developments over a ten-year period and for the future (next 5 and 20 years) using a number of scenarios incorporating feedback from consultations
- *Benchmarking of comparative shipping services* – presents a comparison of other relevant island and coastal shipping services in Australia and overseas using benchmarks of the size of the freight task, vessel and route characteristics, and freight rates (where known)

- *Identification and analysis of shipping service options* – presents the service and vessel options and analyses the various shipping service options for King Island using cost modelling and various freight volume scenarios.

A Glossary is available as an Appendix at the end of the report.

2. Freight demand analysis

2.1. King Island socio-economic trends

The population on King Island, as recorded in the 2011 census, was 1,566 persons. This population number has been declining since the 2001 census, albeit slightly (at 1% per year). The King Island population represents 0.3% of the total Tasmanian population. There are a total of 878 dwellings on King Island.

The agricultural and farming sector is of key importance to the King Island economy with 66% of the island's land area farmed. The size of the cattle herd on the island is around 104,000 of which the vast majority (95%) is for meat. The dairy processing industry, in particular cheese production, is also of key importance to the economy. The island contains several mineral and primary industry resources ranging from scheelite (containing tungsten oxide) to mineral sands and kelp. Visitors to the island, some 8,500 per year (of which 40% are on holiday), also contribute to the local economy.

The King Island Power Station at Currie is also a freight user with diesel imported in tank containers to supply diesel generators.

The negative impact of the recent closing of the island's abattoir can be viewed against a number of potential new developments – two golf course complexes each potentially attracting a minimum of 20,000 visitors per year, Hydro Tasmania's TasWind wind farm project, a possible re-opening of the scheelite mine, the potential expansion of current mineral sands production, and the possibility of a new abattoir.

2.2. King Island current seaborne trades and historic developments

King Island seaborne commodities are currently routed in a number of directions, namely:

- Inbound route from Victoria (Melbourne) to King Island (Grassy)
- Inbound route from mainland Tasmania (Devonport) to King Island (Grassy)
- Outbound route from King Island (Grassy) to mainland Tasmania (Devonport and Burnie)
- Outbound route from King Island (Grassy) to Victoria (Melbourne).

The outbound route to Melbourne also includes the connection to international container shipping services for King Island exports (i.e. kelp to Europe and mineral sands to Asia).

Currently (after the closure of the abattoir on the island), the King Island seaborne trades comprise seven commodity groups, namely:

- Agricultural supplies (fertiliser and grain/stockfeed)
- Beef (meat)
- Dairy (cheese)
- Fuel
- General cargo (including international exports of kelp and mineral sands[4] via Melbourne)
- Live animals (mainly cattle in trailers and 'on-the-hoof'), and
- Vehicles.

With the exception of live animals shipped 'on-the-hoof', horse floats, wheeled equipment and vehicles, the various commodities are shipped as unitised freight (i.e. either in domestic or international containers or in domestic trailers).

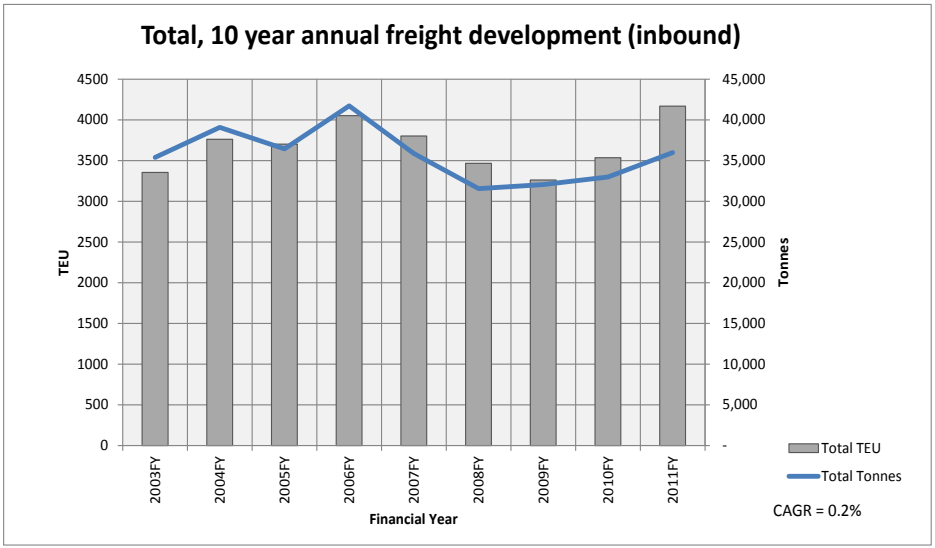
Within each commodity group, there are a number of individual commodities with their own supply chains. In addition, there are also empty containers (including livestock trailers) which are an additional cargo that needs to be shipped to either support the loading of outbound commodities on the island or resulting from the unloading of inbound commodities on the island.

Total inbound freight (including empty containers), originating from Victoria and mainland Tasmania, has varied between 32,000 to 42,000 tonnes per year or 3,300 to 4,200 TEU equivalents per year over the last ten years (see Figure 1). In FY2012/13 (to 31/3/2013), average weekly total inbound freight (including empty containers) was around 700 tonnes or around 70 TEU equivalent[5].

[4] Mineral sands are a dense, heavy commodity taking up around twice the tonnes capacity of a ship compared with other general cargo. This weight impact needs to be taken into account when calculating the required shipping capacity for King Island's total freight task.

[5] These volumes of freight include other animals and cars. The TEU equivalents include the conversion of other animals and cars (these combined representing around 10 TEU inbound per week).

Figure 1 King Island inbound freight trends, FY2003-2012

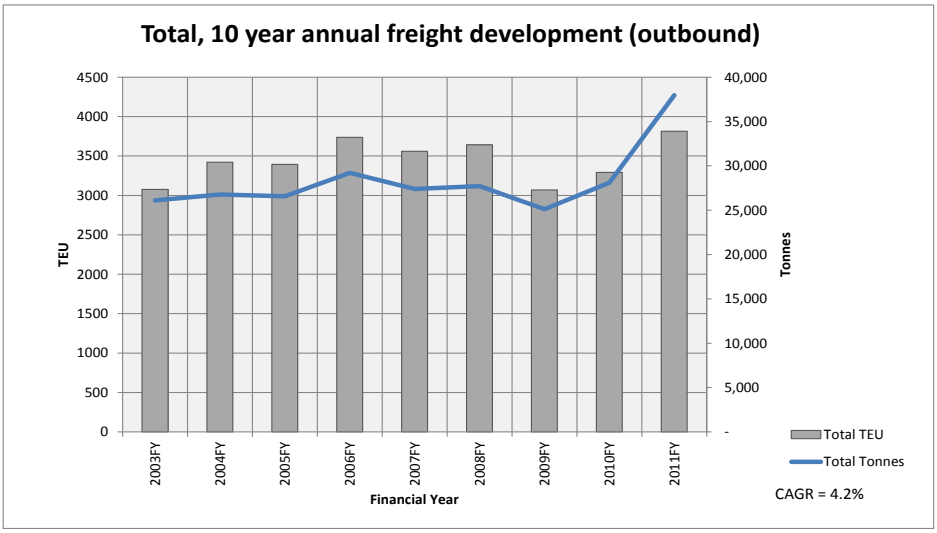


Source: GHD analysis / Tasports data (in confidence). Note: CAGR means Compound Annual Growth Rate.

Total outbound freight (including empty containers), destined for Victoria and mainland Tasmania, has varied between 25,000 to 38,000 tonnes per year or 3,100 to 3,800 TEU equivalents per year over the last ten years (see Figure 2). Average weekly total outbound freight (including empty containers) for FYs 2003-2011 ranges from around 480 to 730 tonnes or 60 to 70 TEU equivalent. However, in FY2012 (to 31/3/2013), average weekly total volumes have reached almost 1,000 tonnes (or around 70 TEU equivalent[6]) from a base of 480 tonnes in FY2009/10 caused by shipments of mineral sands.

[6] These volumes of freight include cattle-on-the-hoof, other animals and cars. The TEU equivalents include the conversion of cattle-on-the-hoof, other animals and cars (these combined representing around 30 TEU outbound per week).

Figure 2 King Island outbound freight trends, FY2003-2012



Source: GHD analysis / Tasports data (in confidence).

King Island overall trade amounted to around 63,000 tonnes (or around 5,000 TEU) of loaded freight in FY2011/12 and 52,000 tonnes (or around 4,000 TEU) for FY2012/13 (Q1-Q3). When empty containers (including empty livestock trailers) are included then these overall freight totals increase to around 74,000 tonnes (or around 8,000 TEU) for FY2011/12 and around 61,000 tonnes (or around 6,000 TEU) for FY2012/13 (Q1-Q3).

The King Island unitised trade currently represents only 2.5% of the total Bass Strait unitised trade in terms of annual TEU volumes (including empty containers). This relatively low share implies that a shipping service dedicated solely to King Island freight could not economically operate with the size of vessel currently calling weekly. Furthermore, the majority of the King Island 'non-cattle' trade is destined for or originates from Melbourne, which has implications for the routing of shipping services.

2.3. King Island potential future trade volumes

It is difficult to forecast with any accuracy total future trade beyond several years. The best approach to obtain an understanding of the long-term future situation is to test the effects of a number of possible future scenarios which may eventuate.

For the market demand part of the study, three possible future economy scenarios were assumed and modelled:

- Low - pessimistic economy
- Medium - business-as-usual economy, and
- High - optimistic economy.

The Low Economy Scenario indicates the King Island trade declining from around 70,000 tonnes of loaded freight for the base calendar 2013 (projected) levels to around 52,000 tonnes of loaded freight for subsequent years. This includes an assumption of mineral sands production ceasing.

The Medium Economy Scenario indicates the King Island trade increasing from around 70,000 tonnes of loaded freight for the base calendar 2013 (projected) levels to around 73,000 tonnes of loaded freight by Year 5 (2018), and 84,000 tonnes of loaded freight by Year 20 (2033). This includes an assumption of current mineral sands shipments growing at 1% per year resulting in a 4% increase by Year 5 and a 21% increase by Year 20.

The High Economy Scenario indicates the King Island trade increasing from around 70,000 tonnes of loaded freight for the base calendar 2013 (projected) levels to around 87,000 tonnes of loaded freight by Year 5 (2018), and 107,000 tonnes of loaded freight by Year 20 (2033). This includes an assumption of current mineral sands shipments growing at 2% per year resulting in a 8% increase by Year 5 and a 46% increase by Year 20.

There is significant upside potential to these trade volumes if the regular weekly shipping service is expected to cater for the full licensed production of mineral sands (i.e. up to 200,000 tonnes per year), but this situation presents weight issues for ship capacity compared with other freight – for instance the current main shipping service would be unable to accommodate this extra freight.

Based on the three scenarios, by Year 5 (2018), total weekly volumes (including empty containers) range from around 80 to 120 TEU in each direction (see Table 1). The inclusion of the full licensed production of mineral sands as containerised freight in the high economy scenario would add 174 TEU[7] per week extra in each direction (i.e. empty containers in and loaded containers out).

[7] Assuming 20 tonnes per 20ft container and around 180,000 tonnes per year of extra mineral sands. In practice, a container loading of 30 tonnes per container may be achieved resulting in less extra containers, i.e. around 115 TEU per week.

Table 1 Future weekly freight volumes for each economy scenario by Year 5 (2018)

Freight Demand Scenario:	Low	Medium	High
Year 5 (2018), Weekly volumes			
Inbound (to King Island)			
Loaded freight, Tonnes	*512*	*533*	*794*
Loaded freight, TEU	43	45	64
Empty containers, TEU	38	57	54
Total TEU (incl. empties)	**81**	**102**	**117**
Outbound (from King Island)			
Loaded freight, Tonnes	*488*	*867*	*884*
Loaded freight, TEU	48	67	64
Empty containers, TEU	33	35	53
Total TEU (incl. empties)	**81**	**102**	**117**
Head-haul Trade Direction (TEU)	Outbound	Outbound	None
Allow Extra for Seasonal peaks (%)	30%	30%	30%
Total TEU each-way with peaks	105	132	152
Max. Extra TEU - mineral sands	-	-	174

Note: TEU equivalents includes trailers (empty and with cattle). Head-haul trade direction refers to the greater of either the inbound or outbound loaded freight in TEU (if 'None' then inbound and outbound loaded freight is in balance).

Source: GHD analysis.

By Year 20 (2033), these total weekly volumes (including empty containers) increase from around 80-145 TEU in each direction assuming partial mineral sands production (see Table 2). The inclusion of the full licensed production of mineral sands as containerised freight in the high economy scenario would add 167 TEU[8] per week extra in each direction (i.e. empty containers in and loaded containers out).

At full licensed production of mineral sands, the volume of additional 'heavy' freight would create the need for either extra dedicated weekly vessel voyages, or a larger tonne capacity vessel, or separate bulk shipping.

[8] Assuming 20 tonnes per 20ft container and around 180,000 tonnes per year of extra mineral sands. In practice, a container loading of 30 tonnes per container may be achieved resulting in less extra containers, i.e. around 115 TEU per week.

Table 2 Future weekly freight volumes for each economy scenario by Year 20 (2033)

Freight Demand Scenario:	Low	Medium	High
Year 20 (2033), Weekly volumes			
Inbound (to King Island)			
Loaded freight, Tonnes	*512*	*616*	*955*
Loaded freight, TEU	43	50	76
Empty containers, TEU	38	66	67
Total TEU (incl. empties)	**81**	**117**	**144**
Outbound (from King Island)			
Loaded freight, Tonnes	*488*	*697*	*1,099*
Loaded freight, TEU	48	77	80
Empty containers, TEU	33	40	64
Total TEU (incl. empties)	**81**	**117**	**144**
Head-haul Trade Direction	Outbound	Outbound	Outbound
Allow Extra for Seasonal peaks (%)	30%	30%	30%
Total TEU each-way with peaks	105	152	187
Max. Extra TEU - mineral sands	-	-	167

Note: TEU equivalents includes trailers (empty and with cattle). Head-haul trade direction refers to the greater of either the inbound or outbound loaded freight in TEU.

Source: GHD analysis.

For the planning of future shipping solutions, account also needs to be taken of an additional buffer for seasonal peaks which historically have the potential to add 50% to some weekly shipments. Allowing for improved efficiencies in empty containers (better matching and less shipment) and the need to avoid paying for unused ship space, a desirable goal for a maximum buffer for seasonal peaks would be around 30% (as shown in Tables 1 and 2). In the case of a dedicated King Island shipping service, there is more flexibility to provide extra sailings in week to cover seasonal peaks beyond the 30% buffer in ship size.

Examination of the forecast weekly inbound and outbound freight flows suggest that there is the possibility to obtain some shipping efficiencies. In theory, this provides for the potential to reduce the number of inbound and outbound empty containers particularly when the same type of container equipment, owned by the same shipping line is used for both the inbound and outbound load, i.e. domestic general cargo containers.

3. Benchmarking of comparative shipping services

3.1. Background

The approach used for the benchmarking analysis is to compare the main shipping service for King Island with other relevant island or remote communities shipping services in both Australia and overseas, namely Norfolk Island, Lord Howe Island, Christmas Island, coastal New Zealand (North/South Island connections), the Chatham Islands (NZ), and the Shetland Isles (Scotland, UK).

There are other Australian island shipping services, such as to/from Kangaroo Island in South Australia, but these were not analysed as they are primarily passenger/car ferry services on short routes with limited freight capacity and not comparable to King Island's freight-only service.

In general, it is difficult to obtain direct comparisons, particularly with regard to freight rates and shipping costs, as routes, operations and commodity mixes/volumes vary considerably. This difficulty needs to be considered when interpreting the benchmarking of the King Island shipping service with other island shipping services.

The benchmarking considers a number of important aspects relating to service for shippers of freight:

- The scale and mix of cargoes catered for by the ships deployed on the route
- The cost of the shipping service (freight rates)
- The frequency of the shipping service
- The port-to-port transit times and speed of the ships
- The reliability of the shipping service in terms of on-time arrivals (schedule integrity)
- The flexibility of shipping capacity to cater for seasonal variations in freight volumes (namely 'peak' seasons)
- The requirements of the route in terms of ship solutions which are able to operate both safely and reliably given sea conditions and available port infrastructure.

Information for the benchmarking analysis was obtained from public domain sources as well as from discussions with King Island stakeholders.

Review of the selected examples of shipping services shows variations in the types of vessels used (Roll-on/Ro-off, Lift-on/Lift-off, containership, general cargo and multi-purpose), levels of service provided, different ownership and support models, and different levels of freight rates for general cargo and livestock where shipped.

The majority of the vessels deployed on the selected examples of shipping services are currently able to be accommodated in terms of length at the Port of Grassy on King Island. Vessels relying on shore-cranes would be unable to call at Grassy due to a lack of shore-cranes at the port.

3.2. Comparison with other relevant shipping services

The King Island shipping service has been benchmarked against the selected other island shipping services where freight rate data has been identified (see Table 3). The comparison (cost indexing) is based on comparing the freight cost per tonne for general cargo. The cost numbers should be treated with caution given the lack of visibility and differences between services and cargo-owners. The other key elements of service are also shown – government support, distance, sailing frequency, transit time, vessel type/size, capacity and trade volumes.

Table 3 Comparative analysis of island shipping services

Shipping Service Route	Supported by government	Distance (nm)	Annual trade volume (T)	Vessel types/size	Annual ship capacity (T)	Frequency (days)	Transit days	Freight cost* /T (A$)	Freight cost* /T Index
King Island	**Yes (TFES)***	135	74,000	1x Ro/Ro (190 TEU, Length 119 m)	50,000	Weekly	0.6-2	$190	100
Flinders Island	Yes (TFES)*	70	27,000	1 x Ro/Ro (375 dwt, Length 45 m) & 1 x Ro/Ro (Length 35 m)	37,000	Weekly	1	$190	100
Bass Strait (VIC / mainland Tasmania)	Yes (TFES)*	220	3,000,000	4x Ro/Ro (4,824-11,000 dwt, Length 119-184 m)	10,902,000	2 x Daily (12/week)	0.5	$120	63
Norfolk Island	No	760	13,500	1 x General cargo (2,433 dwt, Length 76 m)	55,000	Monthly	9	$395	208
Lord Howe Island	No	320	-	1 x General cargo (2,350 dwt, Length 80 m)	116,000	Fortnightly	5	$321	169
Christmas / Cocos Islands	No	1,400	7,208	1 x Multi-purpose (361 TEU, Length 100 m)	126,000	Monthly	9	$456	240
NZ Coastal	No	680	-	2 x Containership (660/698 TEU, Length 130/133 m)	1,974,000	Weekly	3	$76	40
NZ Chatham Islands	No	400	-	2 x General cargo (1,210 dwt, Length 42/67 m)	87,000	10-12 days	2	$271	142
UK Shetland Islands	Yes	190	700,000	2 x Ro/Ro (266 TEU, Length 122 m)	2,716,000	Daily	0.6	$43	23

(*) Freight cost for King Island and Flinders Island comprises indicative freight rate and applicable wharfage for the sum of a loaded (assuming 15 tonnes of cargo[9]) and empty 20ft container. Flinders Island indicative freight cost is for the Bridport/Lady Barron shipping route.

Sources: King Island indicative freight rates were sourced from consultations; other islands (including Flinders Island) were based on published indicative rates. Bass Strait freight rates were based on analysis of Centrelink TFES information, published fuel surcharges and an assumption on empty imbalance cost. Wharfage charges were sourced from publications by ports and ship operators. King Island, Flinders Island and Bass Strait (Victoria/mainland Tasmania) freight costs shown in the table are gross (i.e. any eligible TFES rebates for cargo-owners have not been deducted). The Shetland Islands freight costs are net of support received by the ship operator from the government.

Note: Container rates converted assuming 15T/container; exchange rates assumed as 1NZ$ = A$0.84 and 1UKP=A$1.67 (per 25/06/2013). Distances are approximates. Capacity is only for the Searoad Mersey calling weekly and includes space for other Bass Strait freight. King Island transit time is a range due to different northbound sailings possibilities versus one southbound per week.

Note: King Island, Flinders Island and Bass Strait freight costs include stevedoring due to Ro/Ro nature of operations. To make comparable with other routes, an assumed stevedoring cost (total $12 per T) has been added for non-Tasmanian routes.

[9] 15 tonnes per container (TEU) is a typical industry assumption for comparison purposes (the average of lightweight and heavy freight). As the individual container weight is not known for each service, it is appropriate to use a common standard weight for benchmarking purposes.

The comparative domestic and overseas analysis indicates that, on a cost per tonne basis (indexed with King Island at 100), the King and Flinders Island shipping services are more costly than Bass Strait (Victoria/mainland Tasmania) services, but less costly than other Australian island services (this is without any deductions for TFES rebates[10]). The main reasons for this are that the Bass Strait services involve much larger volumes with a better balance of trade (less empty container costs), while the other Australian island services reviewed involve longer shipping routes and less freight volumes which together increases shipping costs.

As common to other shipping services globally, King Island freight owners also pay different levels of freight rates according to freight volumes and regularity. A low-volume, infrequent shipper will pay a higher freight rate than a high-volume, regular shipper, or alternatively the high-volume, regular shipper receives a discount on standard rates.

It should be noted that the Christmas/Cocos Island and Norfolk Island services can operate with cheaper foreign crewed (flagged) vessels, while King and Flinders Islands (Bass Strait) are constrained to Australian crewed/flagged.

Differences in costs are also due to varying route lengths with a longer route likely to have a higher freight rate.

The NZ coastal container service has the advantage of large non-Ro/Ro vessels transporting large volumes compared with King Island and offering better economies of scale. The NZ coastal vessels (130/133 m length) are currently too large to enter the port of Grassy without an upgrade of the port infrastructure and would be unable to handle wheeled freight and livestock.

It is worth noting that the Chatham Islands (NZ) shipping service is a community service with the local 'Enterprise Trust' owning one vessel and a controlling 51% interest in the shipping company.

The closest comparison to the King Island shipping service, and its trade, is the freight Ro/Ro shipping service operated for the UK Shetland Islands. The Shetland Islands freight service, which also includes separate passenger ferry vessels operated by the

[10] It should be noted that not all freight is eligible for TFES support (see Appendix A – Glossary, TFES) and hence some freight bears the full cost of the shipping service as charged by the shipping line to the freight owner.

same company, has significantly lower freight rates, but it should be noted that the service is supported by subsidies from the Scottish Government[11] (representing around 40% of revenue in 2005) and there is a far higher level of freight transported which provides economies of scale.

The available comparisons for livestock freight cost[12] indicates that the assumed King Island cost per head of cattle of around $110 is more costly than for Flinders Island at around $80 per head. However, this is not a true comparison as the Flinders Island cattle freight cost is for 'on-the-hoof' shipment, while the King Island cattle freight cost is for cattle in trailers and includes the cost of shipping empty livestock trailers to King Island. To compare 'like-with-like', the cost of shipping empty livestock trailers to Flinders Island would also need to be added to the cost of $80 per head bringing the total cost closer to the King Island cost level. King Island cattle producers do have the alternative of shipping cattle 'on-the-hoof' (currently using LD Shipping) which avoids the cost of shipping empty livestock trailers.

The King Island cost of shipping cattle excludes a recently announced support arrangement by the State Government amounting to $30 per head for eligible cattle over a twelve-month period to help offset the impacts of the loss of the local abattoir for King Island cattle producers.

In addition to freight rates (including any wharfage charges), cargo-owners also have to pay for stevedoring charges at the load and discharge ports, as well as inland transport costs to/from the port. These costs can vary from port to port and inland transport costs will depend on distances to/from the port.

[11] According to the Auditor General for Scotland's report "Scottish Executive: the NorthLink ferry services contract (Dec. 2005)", the joint passenger and dedicated freight service was tendered by the Government as a 5 year contract with a basic subsidy paid to the service operator of A$77 million over 5 years which had risen to cumulative total A$105 million after 3 years (caused by inflation and special circumstances). The Government recognised that the service is a community 'lifeline' and is financially problematic to sustain by the market-place. However, the subsidy was structured to ensure that if excess profit occurred then a share returns to the Government and if service performance (reliability/punctuality) falls below threshold levels then the subsidy amount would be reduced. This form of operational subsidy is problematic for the Scottish Government due to European Community guidelines on state aid for maritime transport which seek to minimise state support except in special circumstances. The level of the subsidy for the Shetlands shipping service represented in 2005 around 40% of the combined passenger and freight revenue.

[12] The livestock shipping costs are gross freight rates before any eligible TFES rebates received by cargo-owners.

4. Identification and analysis of shipping service options

4.1. Background

The identification and analysis of shipping service options involved modelling possible shipping service options relating to different shipping volume scenarios, ship types, routings, port calls and service frequencies with comparisons on the basis of shipping costs per full TEU equivalent (indexed) and average vessel space utilisations.

4.2. Shipping volume scenarios

The shipping volume scenarios forming the shipping service demand comprise five – three of which relate to different economic environments, and two to the minimum and maximum volumes of freight which have been identified in the work. In all scenarios, it has been assumed that freight relating to the construction of the TasWind project requires a separate, specialised shipping service considered outside the scope of this study.

Table 4 Future freight demand scenarios used in shipping service modelling

Future Scenario definitions
• **Future Scenario 1 – 'Low Economic Environment'**. This scenario assumes that planned new development projects on the Island do not materialise (i.e. no new abattoir, wind farms, golf courses, or scheelite mining), the mining of mineral sands ceases due to poor commercial returns, and the population of the Island stabilises at current (2012 census) levels. The underlying growth of each remaining commodity is assumed to be flat over the 5 and 20 year forecasting period.
• **Future Scenario 2 – 'Medium Economic Environment'**. This scenario assumes a mirroring of the current (2012/13) freight demand situation on the Island with the population of the Island stabilising at current (2012 census) levels. The underlying growth of each existing commodity is assumed to be marginal at 1% per year over the 20 year forecasting period.
• **Future Scenario 3 – 'High Economic Environment'**. This scenario assumes that all planned new developments on the Island do occur (i.e. an abattoir operating at previous production levels with some outbound cattle shipments arrangements remaining, wind farms developed, two golf courses developed with associated tourism, and scheelite mining re-activated), existing production on the Island meets desired/full capacity levels, and the population of the Island grows in line with the planned new developments. In addition to the step changes in freight caused by the timing of new developments, the underlying growth of each existing commodity is assumed to be higher at 2% per year over the 20 year forecasting period.
• **Future Scenario 4** – **'Maximum Demand'**. This scenario assumes the maximum TEU equivalent volumes from scenarios 1-3 for each of the freight commodities. As a result, the maximum freight volume to/from King Island is able to be assessed over the 20 year forecasting period.
• **Future Scenario 5** – **'Minimum Demand'**. This scenario assumes the minimum TEU equivalent volumes from scenarios 1-3 for each of the freight commodities. As a result, the minimum freight volume to/from the island is able to be assessed over the 20 year forecasting period.

4.3. Vessel type options

In order to analyse all potential King Island shipping service options, a number of vessel types and sizes were identified for analysis based on stakeholder consultation and the Benchmarking of Comparative Shipping Services report.

The vessels analysed ranged in size from approximately 40+ TEU to 200+ TEU equivalent, and included Landing Craft, Roll On/Roll Off (Ro-Ro), Lift On/Lift Off (Lo-Lo) and combined Ro-Ro/Lo-Lo ship types. Within the context of this study, the Landing Craft vessels were assessed for both a cattle-only type service, and mixed-cargo (cattle and general freight) operations.

4.4. Shipping service routings and frequencies

There are a number of options for the routings of services and ports called at, which have been analysed:

- Bass Strait triangulated (Victoria/mainland Tasmania with King Island call) service – the King Island call can be southbound, northbound or in both directions. Assuming no issues with access to a berth, the port calls can be Burnie, Devonport, or Bell Bay on mainland Tasmania and in Victoria Melbourne or Geelong (Hastings was excluded due to distance from current Melbourne markets/connections, and lack of current infrastructure . However, it is recognised that alternative cattle sale yards and abattoirs do exist in close proximity to Hastings at Pakenham as well as the possibility to store King Island export products at Hastings for onward distribution and international shipment)
- King Island hub (dedicated) service with the non-Grassy call either at a Tasmanian port (Burnie, Devonport, or Bell Bay) or a Victorian port (Melbourne or Geelong). The region not called at (either Victoria or mainland Tasmania) with King Island inbound or outbound freight is assumed to be served by transhipment and relay by another Bass Strait shipping service. When weekly King Island freight demand is met then the vessel is idle until the following week.

A minimum of a weekly service is considered required. This level of minimum frequency (with an associated high level of service reliability) is important for King Island businesses' as less frequent and less reliable shipping services result in the need to increase stocks of supplies and produced goods. Increased stock levels leads to

increased working capital requirements and an infrequent service may mean that some King Island products lose market share. As a result two types of service frequency have been analysed – fixed weekly (once per week, or twice per week to provide no risk of space issues during demand peaks), and variable/multiple sailings per week matched to freight demand.

4.5. Shipping service operating costs

Although this study focuses on 'high-level' shipping options (i.e. detailed operational planning and assessment is out-of-scope), there are two aspects of operating costs which require some discussion – 'cabotage' and crew costs, and the impact of Sunday-calling at the port of Grassy.

4.5.1. Cabotage and crew costs

Regular, dedicated domestic shipping services, which include the Bass Strait, are required by national regulations to have an Australian national crew. In the case of licenced foreign-flag vessels providing a domestic service, the crews are required to be paid Australian national wages (or for that portion of an overall voyage which transports domestic freight).

In addition, those international foreign-crewed vessels which call to Australia and carry some domestic freight under permits would be too large to call at King Island and the volume of cargo too small to regularly induce a voyage deviation if port access was not a constraint at Grassy.

Consequently, the crew cost component of the various Bass Strait shipping service options analysed in the study has been based on Australian national crewing and wage arrangements.

4.5.2. Sunday-calling at the port of Grassy

The current King Island main shipping service involves the m/v Searoad Mersey calling at the port of Grassy on Sundays in a southbound direction (i.e. from Melbourne en-route to Burnie). Given that Sunday is not a normal working day, the working of the vessel and freight transport operations performed on the day are exposed to overtime working arrangements, i.e. higher wage rates resulting in increased cost levels compared with weekday day-time operations.

The impact of a Sunday call, versus a weekday call, on vessel operating costs is small given the relative share of the overtime crew wage cost component within total vessel operating costs (including fuel). In addition, this additional cost is shared across both the non- King Island and King Island freight carried by the vessel.

According to TasPorts' schedule of charges, vessel port calling costs and cargo wharfage at Grassy are generally the same for all days of the week. It is likely that the current main shipping service receives some form of discount as a regular caller at the port of Grassy which would lower the cost base for the shipping service and ultimately the cost for freight owners.

Stevedoring, as performed by Tasports at Grassy, is a commercial arrangement and cost-levels are not public domain, so it is unclear as to any difference in stevedoring costs between Sunday and normal weekday working. Typically in other container ports in Australia, stevedoring is costed and charged as a 24/7 operation, i.e. same charge irrespective of the day of the week.

The largest impact to King Island freight owners of Sunday working is likely to be due to the employment of drivers on a Sunday for truck transportation to/from the port of Grassy. However, relative to total door-to-door transport costs per container or tonne of freight, this additional cost of Sunday versus normal weekday trucking is likely to be small.

It is also worth noting that a triangulated Bass Strait shipping service has less flexibility to avoid a Sunday call at any of the ports on the route, while a dedicated (hub) King Island shipping service has more flexibility to avoid a Sunday call.

4.6. Transport operating costs on King Island

Freight (including cattle) needs to be transported by truck between various locations on King Island and the port at Grassy. The cost of operating the truck fleet is fully carried by King Island freight owners / residents. An issue concerns the fixed costs of operating the trucks and the low use of the trucks during the week (i.e. currently limited to typically one day in the week being a Sunday to transport freight to/from the Sunday-calling SeaRoad shipping service).

The port calling frequency of the various shipping service options have an impact on the efficiency of the truck fleet and resulting transport costs on King Island. Multiple port calls per week at Grassy require a smaller truck fleet employed more often in the week than a single port call for the same total weekly freight volumes.

Hence, there is an economic trade-off between the savings of using a larger ship calling once per week and the savings of a reduced truck fleet on the island with multiple port calls per week by a smaller ship.

4.7. Analysis results using route and cost modelling

The analysis (modelling) of shipping cost covers the transportation of freight from quayside to quayside, i.e. it includes vessel costs at sea, the costs of a vessel calling at a port, the cost of a vessel in port, and port-related cargo costs (i.e. wharfage and stevedoring). Given that each shipper of freight has its own set of inland origins and destinations, the costs of inland transport to/from the origin and destination ports have not been included in the analysis as this would require extensive research of all supply-chains and the effect of alternative routings on total (door-to-door) supply-chain costs.

The detailed results of the shipping service cost modelling are shown in Appendix B which contains a series of 'scatter-plot' graphs showing various vessel and service options in terms of cost and vessel utilisations.

4.7.1. Triangulated versus hub shipping services

Analysis of Bass Strait triangulated (with King Island call) shipping services versus King Island hub (dedicated) shipping services indicates that a single operator triangulated shipping service is more than half the cost of a single operator hub (dedicated) King Island shipping service.

The main reason for the large cost advantage of the triangulated shipping service is that the vessel cost is shared between King Island and non- King Island freight, which also means that relatively larger vessels can be used with resulting economies of scale. The level of Bass Strait (non-King Island freight) assumed on the triangulated shipping services was set at 300 TEU per week, which is equivalent to around 5% of the total Bass Strait container trade (a relatively small and hence likely sustainable share).

With only one non- King Island port-call, the hub services are even more costly. This is due to relay[13] costs for full and empty containers having to be incurred where a Victorian or mainland Tasmania port is not called at, i.e. it is assumed that the freight still requires to be shipped to/from King Island.

This result also supports why the current shipping service to/from King Island is a Bass Strait triangulation service.

4.7.2. Differences in directions served and single versus double-calling

The Bass Strait triangulated services are able to serve King Island freight travelling northbound and southbound with just one call at Grassy – this is the most cost effective port rotation, but some freight needs to travel longer on the vessel by remaining on-board at the next port call after Grassy. This is likely to be an issue for some cattle from King Island requiring the quickest transit to abattoir to obtain premium prices. If the abattoir remains on mainland Tasmania, then a Southbound Grassy call is the optimal direction for a Bass Strait triangulated service.

In the case of hub (dedicated) King Island services, the cost modelling and analysis of freight flows shows that:

- Northbound and Southbound calling services (a type of "Butterfly" service[14] centred on Grassy with a Victorian and mainland Tasmanian port call) are the most cost effective as they avoid the need to relay freight on another Bass Strait service which is likely to be more expensive
- Given that the Victorian freight flows to/from King Island are greater than the mainland Tasmanian freight flows (currently around 3x more Victorian freight than mainland Tasmanian freight), an optimised "Butterfly" service would have more sailings Northbound in a week than Southbound
- In the case of a King Island service that only calls either Victoria or mainland Tasmania, the Victoria only calling service is more cost effective than the mainland Tasmania only calling service. This is caused

[13] Relay is where freight is carried between ports by another vessel due to the main vessel not calling at the final port.
[14] "Butterfly" service refers to a ship's route and port rotation where two voyage loops, each in a different direction, overlap at a particular port which is consequently called at twice per vessel roundtrip.

by currently 3 times more freight shipped between Victoria and King Island than between King Island and mainland Tasmania (including when all cattle are shipped in trailers). With no Victorian port call more freight needs to be relayed (transhipped) at mainland Tasmania giving a greater cost than in the reverse direction (see Appendix B for relay distribution cost assumptions and more details).

4.7.3. Differences in ship types and sizes

The analysis indicated that a medium size landing craft (113 TEU), operating at 9-10 knots, provided the lowest cost shipping option followed by older (10 and 15 year old) larger Ro-Ro type vessel (208 TEU).

A small landing craft type vessel (20 TEU) was found to be unable to provide a Bass Strait service due to insufficient volume capacity and, compounded by the higher probability of lost sailing days due to weather.

4.7.4. Separate general freight and cattle services versus combined

Analysis of the costs of operating two separate shipping services (one for general freight, the other for cattle only) versus a single, combined shipping service indicates that the single operator, combined shipping service is significantly more cost effective based on the model assumptions.

The modelling compared a Searoad Mersey type operation (the current situation) transporting cattle in trailers to mainland Tasmania along with other freight compared with a small landing craft type vessel operation (equivalent to LD shipping type) to both mainland Tasmania (Burnie / Stanley) and northbound to Geelong (assuming no navigational issues with the passage).

The cost level of a combined triangulated Ro-Ro service was modelled and then designated a cost index of 100 per full TEU. From this the equivalent cost index for a cattle only service was calculated with an index of 190-240 per full TEU equivalent. The cattle only service required 3 sailings per week to meet the weekly cattle demand to mainland Tasmania (assuming no return freight), while only one sailing per week was required for the combined service.

This result emphasises the importance of not fragmenting the shipping of freight to/from King Island. If this happens, then total shipping costs for King Island freight will ultimately be higher than if fragmentation did not occur.

If in the future, freight such as fertiliser, mineral sands and fuel are each shipped separately in bulk, then this would also have the effect of fragmenting the freight task with resulting cost increases for the remaining containerised general freight (including cattle in trailers).

In the current market-place, the difference between the costs of the two service options (i.e. combined versus fragmented) may be less due to a likely lower cost base for the landing craft operator.

The analysis also indicated that the use of a Lift-On/Lift-Off vessel (containership) for general freight with cattle on a separate service is also not cost effective when compared with a combined service carrying both general cargo and cattle. A further issue with a Lift-on/Lift-Off shipping operation concerns the carriage of cars and other wheeled livestock (such as horse-floats). These wheeled commodities require a Roll-On/Roll-Off (or landing-craft with ramp) solution and would need to share a separate cattle shipping service. Consequently, the Lift-On/Lift-Off vessel type was not pursued further in the analysis.

4.7.5. Port call alternatives

The analysis indicates that the two port rotations of Melbourne-Grassy-Devonport and Geelong-Grassy-Burnie have a similar total shipping cost (i.e. vessel, fuel and port-related costs). This result does assume a common-level of stevedoring costs for all of the ports analysed. In practice, each port may have a different stevedoring cost, particularly if the stevedoring company is different and the size of the operation varies. This would then influence the overall quayside-to-quayside cost and potential choice of port-calls based solely on cost.

The cost modelling of port-to-port alternatives assumes that all ports analysed are able to accommodate a new King Island shipping service. However, in reality, there are likely

to be some limitations to access to berths in a port for vessels with ramps (i.e. Roll-on/Roll-off ships and landing-craft).

A preliminary operational review of the Victorian and mainland Tasmanian ports analysed in the cost model for accommodating the main shipping service suggest that:

- Melbourne should be able to offer berth access (it is likely that all cattle will need to be in trailers, i.e. not on-the-hoof)
- Geelong currently has an unused (aging) Roll-On/Roll-Off berth with stern ramp-access at Corio Quay South, but would likely need to upgrade the facility given adequate commercial arrangements
- Burnie is currently not able to provide berth access as the ramp-access berth is in exclusive use (there is a possibility for a small landing craft to berth side-on and have access over the side, e.g. as evidenced by the recent offloading of King Island cattle on-the-hoof)
- Devonport and Bell Bay should be able to offer berth access for a vessel with a ramp (some upgrading may be required of existing facilities).

For Burnie to provide Ro/Ro vessel access in addition to the current Toll/ANL operation, TasPorts would need to construct a Ro/Ro ramp for vessel bow/stern access and this would require capital expenditure. Similarly, Geelong would likely need to upgrade the existing Ro/Ro ramp and this would require capital expenditure. Such berth upgrades at Burnie and Geelong are expensive and are unlikely to be able to be commercially supported solely by King Island freight volumes.

Berth access will require further investigation, and possibly involve commercial negotiations relating to necessary modifications and stevedoring provision, as part of the planning and development of any new King Island shipping service.

4.7.6. Impact of different shipping volume scenarios

Analysis of the Low, Medium and High 20 year future economic scenarios for King Island indicates that the medium size landing craft (113 TEU), Searoad Mersey type and large Ro-Ro type vessels on both triangulated and hub services are able to accommodate the weekly shipping volumes with multiple sailings per week required in some cases for the medium size landing craft.

However, if mineral sands were to reach full licenced production with shipment in containers then two extra dedicated sailings per week for the medium sized landing craft (based on tonnes carrying capacity) would be required given the size constraints on larger vessels calling at Grassy.

4.7.7. Modelling shipping cost levels versus market rates

Caution needs to be applied when comparing modelled cost levels with market shipping rates as the latter are subject to supply/demand, cost allocation approaches (fulls and empties, other freight), profit margins and cost bases of vessel operators. For the purposes of the analysis, the modelling assumed that all full containers are linked to an empty container movement. In practice, some re-use of empty domestic containers is occurring on King Island.

4.7.8. Empty container costs and potential for future cost reductions

There is potential to reduce shipping costs by further improving the use of empty containers given the current level of empties moving to/from King Island, namely:

- Using empty international shipping containers moving from Melbourne to King Island for the carriage of domestic freight from Victoria to King Island (this typically has to be negotiated with the international shipping lines)
- Improved matching of inbound and outbound domestic containers of the same type (this requires a King Island freight group to plan container matching and negotiate with the ship operator who also supplies the containers)
- Improved use of empty non-working refrigerated domestic containers from Victoria and Tasmania for the carriage of domestic 'ambient-temperature' freight inbound to King Island (this requires negotiation with the ship operator who also supplies the containers), and
- Operating a pool of domestic containers leased or owned by a King Island freight group with container monitoring and matching (this is a costly option exposed to variations in freight levels and likely to be limited to a small share of the containers used on King Island).

Freight costs for some King Island cargo-owners could be reduced by at least $500 per container if empty container pre-/re-positioning can be avoided. Achieving further

efficiencies and cost savings is a difficult and complex task given the dynamics of the various supply chains and the requirements for different container types.

It is recommended that the potential to further reduce empty container costs for King Island freight are explored in more detail at a later stage.

4.8. Implications for a future shipping service

4.8.1. Possible operational issues with some ship types

As mentioned previously, the cheaper landing craft type vessels are in practice likely to have a higher probability of operational impacts when deployed on the Bass Strait during all seasons, particularly if they are sourced as river (sheltered water) type craft of 5-9 knots. Landing craft with a fully-laden speed of 9-10 knots should be the minimum to operate on the Bass Strait.

In terms of the minimum size of vessel that can reliably cross the Bass Strait in all seasons, it should be noted that LD Shipping's landing-craft m/v Statesman currently operates on occasion across the Bass Strait and the Ro/Ro vessels of former Southern Shipping operated between Port Welshpool and Flinders Island. All these vessels are smaller than the ones proposed in this study.

The need for twin-screw vessels with a bow-thruster calling at Grassy, as required by TasPorts, will limit the availability of vessels for future charter or purchase. However, this is not an issue if a future vessel is a new-build.

An equivalent more operationally robust vessel type could be a high-powered offshore supply vessel design modified to provide on-deck protection of cargo. The cost of such a vessel is likely to be somewhere in between the cost of an equivalent capacity landing craft and a Ro-Ro vessel. The alternative, which is similar in design to the modified supply vessel, is a new-build small Ro-Ro vessel with a stern-ramp.

The largest size of vessel which can call and lay-over at the harbour in the port of Grassy is the m/v Searoad Mersey which has a length of 118 metres, beam of 19 metres, fully-laden draught of 5.3 metres, and a deadweight of 4,824 tonnes. Any vessel new to Grassy longer than 90 metres would need to obtain special permission from TasPorts to enter the harbour at Grassy.

4.8.2. Lowest cost economics dependent on sharing of shipping capacity

The modelling showed that the Bass Strait triangulated service options provide the least shipping cost or better economics. However, this is dependent on the sharing of

shipping capacity, i.e. the space on the vessel not used by King Island freight earns revenue from other freight.

Additionally, it is critical that King Island freight demand on this service is guaranteed, and that Bass Strait freight is considered secondary or opportunistic based on surplus capacity. On the other hand, there is a risk that the King Island freight could become more costly to ship if other (non-King Island) freight volumes decline or smaller vessels are introduced (reduced ability to generate economies of scale).

There will be a point at which a lower utilisation of the triangulated vessel provides a similar or higher cost level to operating a hub (dedicated) King Island service.

4.8.3. Optimal shipping service configuration and indicative cost

It needs to be recognised that costing an optimal shipping service is a difficult and approximate exercise. The modelled cost results need to be treated with caution. The most critical factor is the availability of a suitable vessel. There is divided opinion amongst stakeholders on whether the optimal vessel can be found. It is also very difficult to quantify associated business costs as they will depend on the nature of the business that runs the shipping service.

Given these caveats and based on the operational, cost and forecast demand assumptions used in the model, the analysis indicates that the optimal port-to-port shipping service for King Island (excluding any inland transport cost considerations for freight) has the following profile for the stated demand (equivalent to Year 5 of the future Medium economic scenario):

- Single operator with a medium-sized landing craft vessel (113 TEU, 2700 tonnes deadweight, 87 m length, and 9-10 knots)
- Triangulated port rotation of either Melbourne-Grassy-Devonport or Geelong-Grassy-Burnie
- 2 sailings per week to accommodate 115 TEU of King Island freight and 300 TEU of non- King Island Bass Strait freight to achieve cost sharing and higher vessel capacity utilisation

- Total calculated shipping cost (vessel operating, fuel and port-related) of around $350,000 per week or around $18 million per year which equates to around $830 per loaded TEU.

This optimal vessel is smaller than the currently calling m/v Searoad Mersey and is within the general 90m vessel length limit for Grassy.

If the optimum King Island shipping service only carried King Island freight (i.e. no freight between mainland Tasmania and Victoria), then the impact would be a service of one sailing per week costing around $205,000 per week (or around $11 million per year) which equates to almost $1,800 per loaded TEU.

For a Burnie port call to eventuate, there would need to be investment made by TasPorts in a Ro/Ro ramp to allow vessel access. However, if an investment was not made by TasPorts and Toll/ANL continue to exclusively use the existing Ro/Ro berth then the Tasmanian port call would have to be either Devonport or Bell Bay.

5. Vessel operating management considerations

5.1. Options for operating a shipping service

There are a number of options for the provision of a shipping service as viewed from the perspective of cargo-owners and government, namely:

- Commercial, experienced shipowners operating in a competitive market-place providing a common-user service using either own or chartered-in vessels
- Commercial, experienced shipowners competing for exclusive government tendered cargo access with or without some form of government guarantees, compensations in the event of market failures, vessel purchase or operational cost subsidies
- Community funded and managed operation with or without government support using either purchased or chartered-in vessels, and
- Shipowner managed operations with cargo-owners contracting as a group with the ship operator offering fixed freight rates (vessel slot costs plus a margin) and the cargo-owners pooling the use of containers to minimise empty container costs.

5.2. Benefits and risks of vessel operating management options

Vessel ownership and management is historically a commercially risky business with market volatility, high capital and cash-flow requirements. Bass Strait shipping has seen ship operators come and go. With the development of open-access to global markets, governments are generally less inclined to support the direct subsidisation of business operations including the provision of transport services. There is however a recognised role for government support, or intervention, when temporary or continued market failure occurs.

Community ownership and/or operation of shipping services is generally a high risk venture as all the costs, operational risks, trade fluctuations, and possible long-term charter commitments are borne by the community which may be small and have insufficient financial resources to cover all risk eventualities. However, the benefit of a community operation is that it can be operated at cost recovery lowering shipping costs provided the operation has access to efficient procurement and experienced staff/vessel manning.

The ‘middle-road’ of a commercial shipowner managing an operation with a cargo-owner group buying vessel space has a reasonable balance between ‘fair’ shipping

costs and community risk provided that space commitments can be adjusted at reasonable intervals depending on freight demand.

5.3. Suitability to the King Island situation

Reviewing the various ship management operation options and the situation on King Island, it is reasonable to assume that a full community-backed service is an overly risky option. It is also unlikely that government support beyond the current federal TFES[15] and limited state support for temporary market failures would be available.

A commercial shipowner managing an operation with a King Island cargo-owner group buying vessel space could be a suitable approach to managing a future King Island shipping service in the event of the current service no-longer operating. This would be different to the current King Island situation as presently each freight-owner contracts with SeaRoad for shipping on an "as required" basis.

Based on examples overseas, one way to 'pool freight' is to form an incorporated non-profit-making freight buying association with importers and exporters as its members. The association then tenders and contracts with a shipping line to provide the shipping service based on a common set of freight rates and commercial terms for all the members of the association. In order to obtain best freight rates, there is often a requirement to provide minimum space-use guarantees to the shipping line over a defined period with agreed financial penalties for unused space.

There will be a need to balance shipping service flexibility with reliability as some King Island cargo segments require high levels of vessel reliability. As service reliability increases, then it is likely that vessel capital and operating costs to provide the same freight capacity will also increase, i.e. there is a cost premium involved.

[15] It should be noted that not all freight is eligible for TFES support (see Appendix A – Glossary, TFES) and hence some freight bears the full cost of the shipping service as charged by the shipping line to the freight owner.

6. Availability of vessels and operators for King Island

An important consideration in implementing any changes in the future will be the availability of suitable vessels and operators for a King Island service. Availability will also be a function of timing as shipping markets and the supply of vessels are both dynamic and global – a favourable global market for one type of operator may make inactive vessels scarce or expensive to purchase/charter for deployment in other markets. A good current example is offshore supply vessels, which are in demand and relatively expensive to purchase before any required modifications are made for a King Island type shipping service.

Another aspect of availability concerns the lead-time to establish a new shipping service. If the lead-time is, for example, a minimum of twelve months and the preferred vessel type is relatively small and simple in design (i.e. a medium-sized landing-craft) then a new vessel could be constructed in time for commencement of the new shipping service.

If the lead-time is short, for example weeks or months, then a new shipping service would need to be established using either a chartered or purchased suitable vessel (if available) or an existing nearby shipping service would need to be temporarily extended to cover the route (e.g. the Flinders Island shipping service).

In terms of vessels, availability is also limited by size, type and navigational constraints for King Island. Suitable vessels, new to Grassy, need to be:

- not more than 90 to 100 metres in length
- either landing-craft, Roll-on/Roll-off, or an equivalent vessel which can modified (e.g. an offshore supply vessel with ramp and some deck modifications), and
- adequately powered to allow for Bass Strait crossings particularly in winter months, and sufficiently manoeuvrable to visit the port of Grassy (e.g. twin-screwed and fitted with a bow-thruster).

Currently in Australia and outside of Tasmania, there are few suitable vessels which are available as most are deployed on services. Landing-craft are generally used in

Northern Australia to serve remote communities, and Roll-on/Roll-off vessels tend to be combined with passenger transportation for ferry services (e.g. Kangaroo Island, cross Port Phillip Bay, and WA and Queensland routes to nearby islands). A greater supply of suitable vessels is likely to be found in Asian shipping markets, but their condition and need for upgrading to Australian coastal operations would need to be closely considered.

The availability of operators is very much dependent on the financial viability of a shipping service and whether freight volumes remain constant or increase in the long-term. If King Island freight is able to pay the required shipping rates to make the service financially sustainable, and freight volumes are certain, then existing operators in Australia with significant experience could possibly be interested to operate a new King Island shipping service, particularly when combined with Bass Strait shipping operations. There are also possibly some Australian logistics companies who may consider extending their current land-based service offering to include coastal/Tasmanian shipping.

The tendering of a shipping contract or 'pooled freight' for King Island is likely to be more successful if the ending of the current main service is certain, and freight/charter guarantees are also offered to the market. The securing of a new operator may be a lengthy process.

If SeaRoad decided to keep m/v Searoad Mersey operational, which SeaRoad have expressed potential interest in doing, then a dedicated, existing vessel would be available to the King Island trade.

7. Suggested next steps

There are a number of suggested next steps:

1. Development of a King Island Shipping Contingency Strategy to guide a response in the unlikely event of the cessation of the main King Island shipping service
2. Development of a plan to guide the establishment of a possible freight buying group / co-operative
3. Explore the potential to further reduce empty container costs for King Island freight
4. Finalisation of the Draft King Island Shipping Policy (King Island Council)
5. Explore with SeaRoad the possibility of a future dedicated King Island shipping service with m/v Searoad Mersey.

APPENDIX A. Glossary

The following is a list of terms and abbreviations used in the report.

Bass Strait	Shipping and trade route connecting mainland Australia (Victoria) with mainland Tasmania.
Butterfly	Butterfly service refers to a ship's route and port rotation where two voyage loops, each in a different direction, overlap at a particular port which is consequently called at twice per vessel roundtrip.
CAGR	Compound Annual Growth Rate expressed as a percentage for a specified time period.
Cu.m	Cubic metre (volumetric measure).
DIER	Tasmanian government Department of Infrastructure, Energy and Resources.
DWT	Deadweight tonnes of a ship (cargo, bunkers and stores weight capacity measure).
GT	Gross tonnage of a ship (enclosed volumetric measure).
Head-haul	Head-haul trade direction refers to the greater of either the inbound or outbound loaded freight in TEU (if no head-haul then inbound and outbound loaded freight is in balance).
Km	Kilometre.
Lo/Lo	Lift-on / Lift-off design of ship allowing craned handling of cargo.
M	Metre.
Nm	Nautical mile.
Relay	Relay, and the costs associated with it, refers to the situation when freight is carried between ports by another vessel due to the main vessel not calling at the final port.
Ro/Ro	Roll-on / Roll-off design of ship allowing wheeled handling of cargo.
T	Tonnes (metric).
TEU	Twenty-foot Equivalent Unit as a measure of a shipping container.
TFES	Tasmanian Freight Equalisation Scheme. Factors taken into consideration when determining whether a particular claimant is eligible for assistance include: • the type of goods, including whether the goods are 'high density',

	refrigerated, or transported in a packaged or loose form; • the origin and end use of the goods, with particular rules for the mining, agriculture, forestry and fishing industries; and • the destination of the goods, including whether goods will be transported to other Australian states, exported overseas or returned to Tasmania. In general, TFES ineligible goods are those that are overseas imported and exported, materials and equipment for constructing buildings, and fuel and lubricants.
TFLCT	Tasmanian Freight Logistics Coordination Team

APPENDIX B. Shipping Option Scatter Plots

Model result scatter plot for triangulation shipping service options

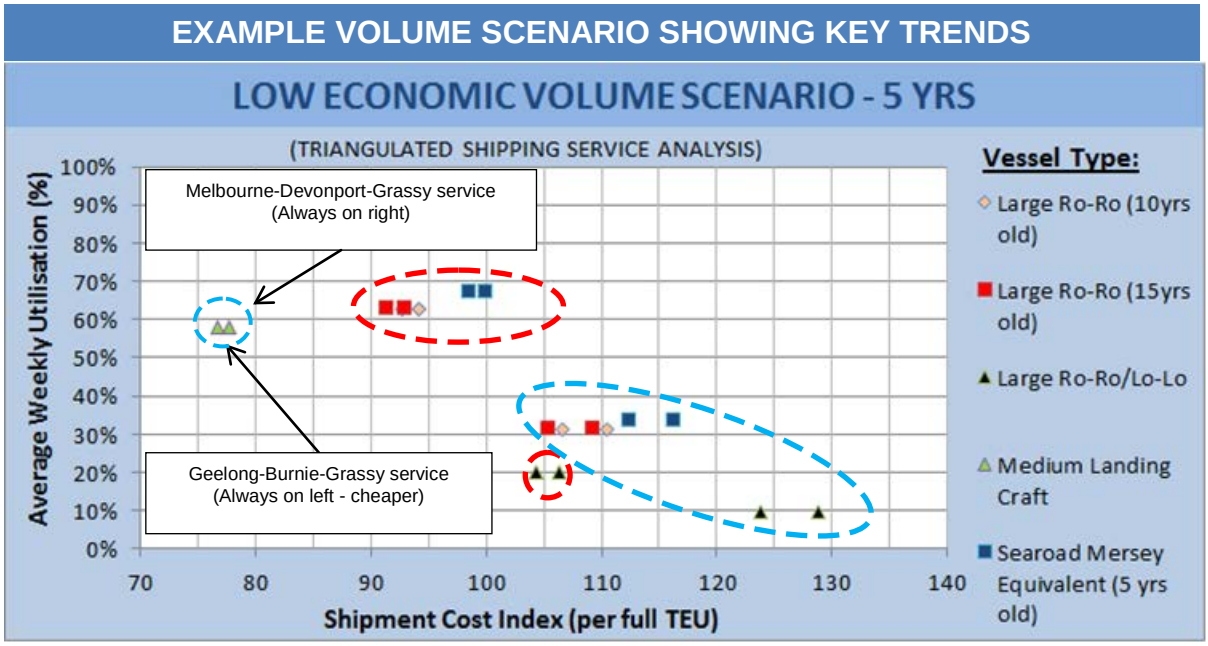
Assumptions:

The triangulated shipping service option assessment assumes that each of the vessels picks up a Bass Strait trade of 300 TEU per week (which is approximately 5 percent of current Bass Strait trade volume), and that the shipping costs are shared between the King Island and Bass Strait freight. This was done in order to analyse the potential advantages presented by a triangulated service as opposed to a dedicated service only servicing King Island trade.

Common trends:

The plots produced by the analysis looked at a range of future volume scenarios and out of this emerged a number of common trends.

The medium landing craft with a TEU capacity of 113, operating at 9-10 knots, was found to be capable of servicing the entire freight volume (inclusive of Bass Strait volume) only when it completed two runs per week; however, this option also proved to be the cheapest. In general, a fixed twice weekly service was found to halve the utilisation of a fixed single weekly service, but cost slightly more due to increased fuel consumption and berthage costs. The 10 year old Large Ro-Ro vessel was found to be more expensive than the 15 year old Large Ro-Ro, due to the increased financing costs associated with a higher purchasing price; and a King Island - Geelong - Burnie service was found to be slightly cheaper (1% less) than a King Island – Melbourne – Devonport service.



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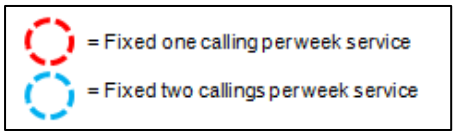
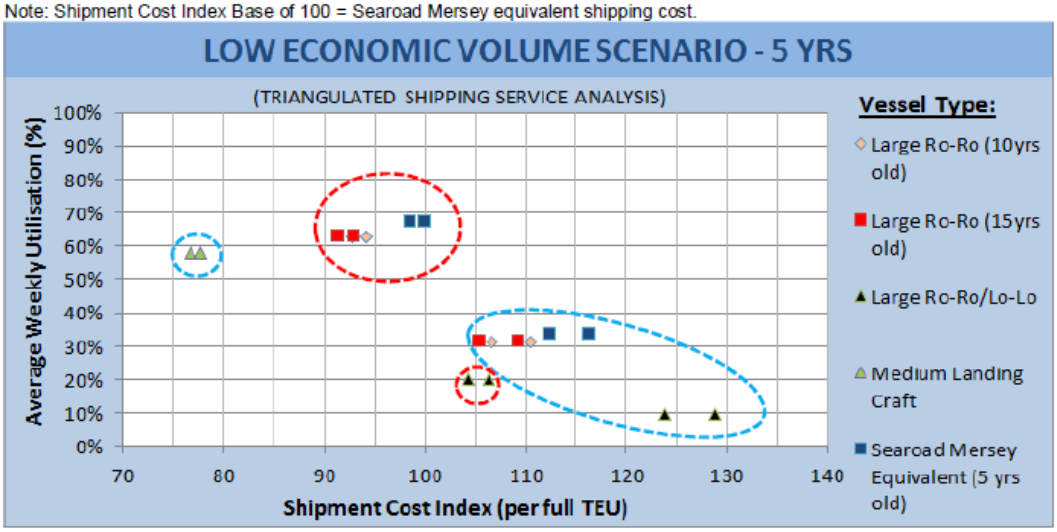
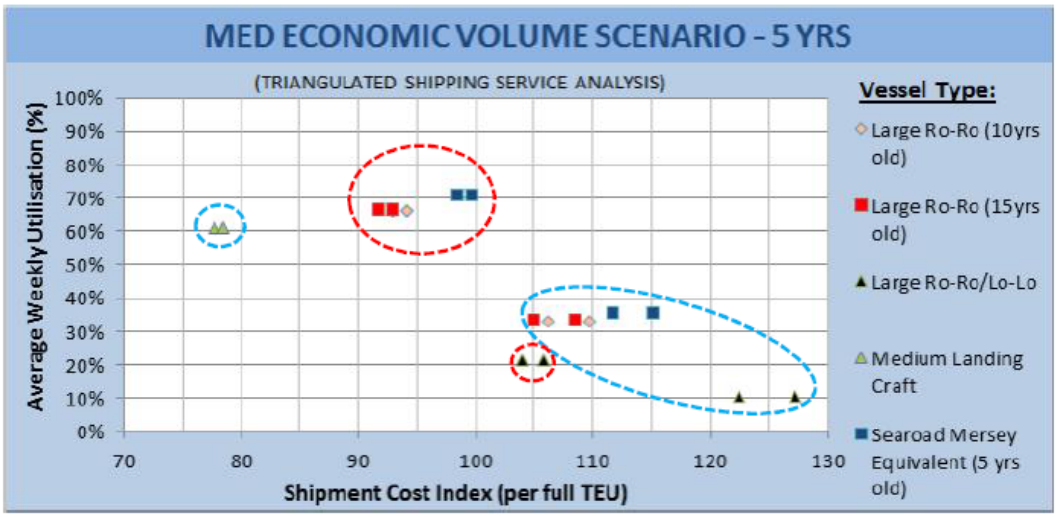
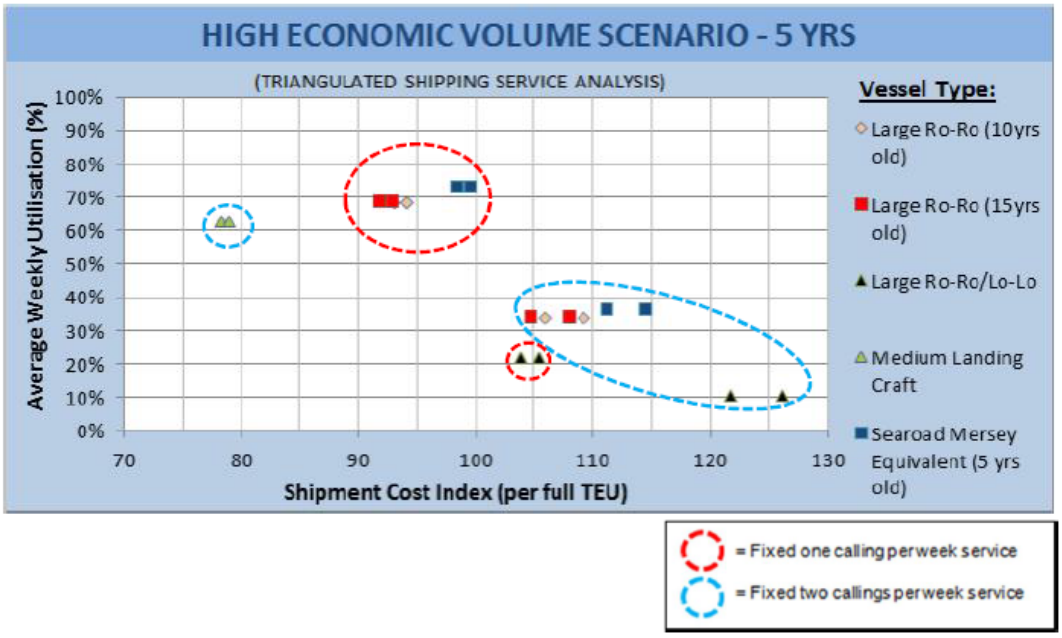


Note: Shipment Cost Index Base of 100 = Searoad Mersey equivalent shipping cost.







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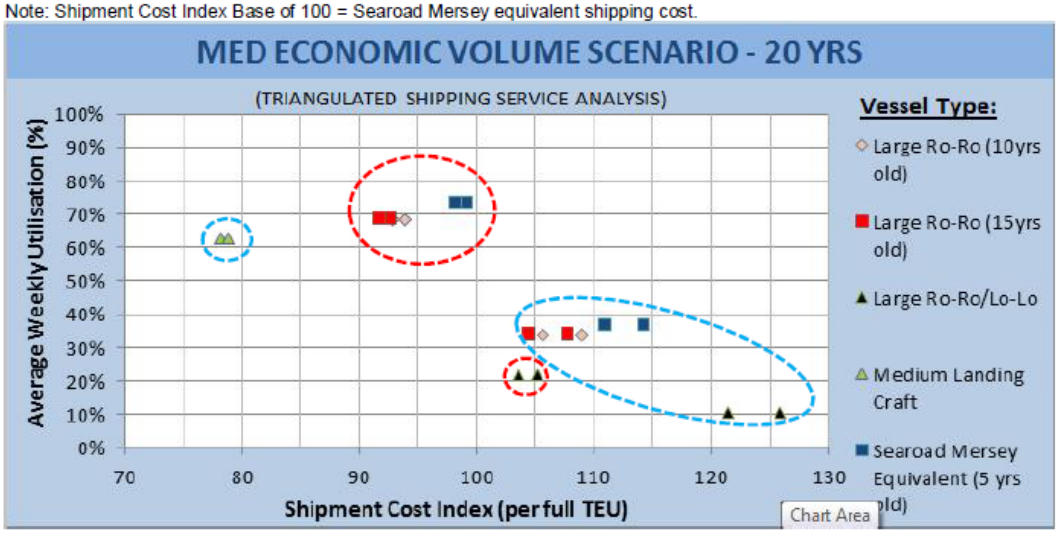

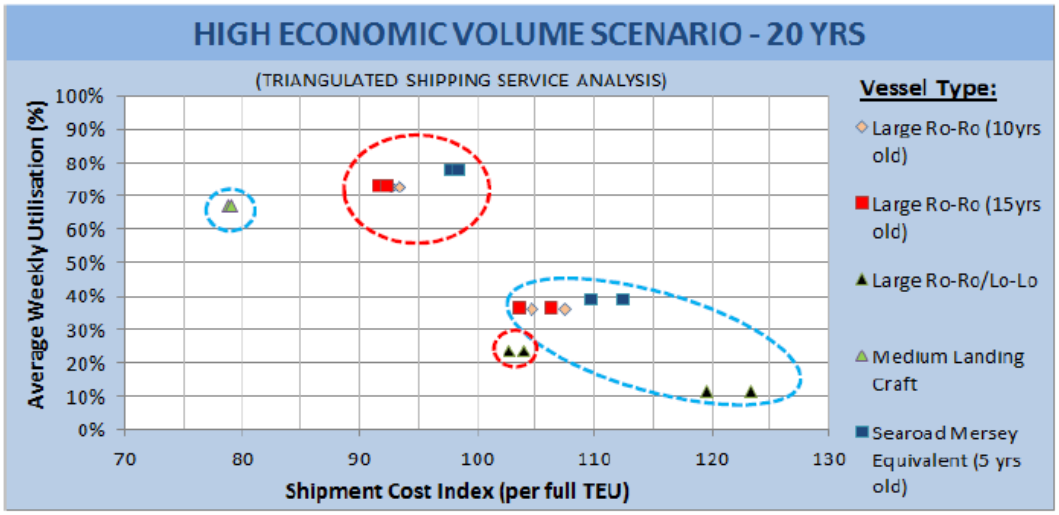

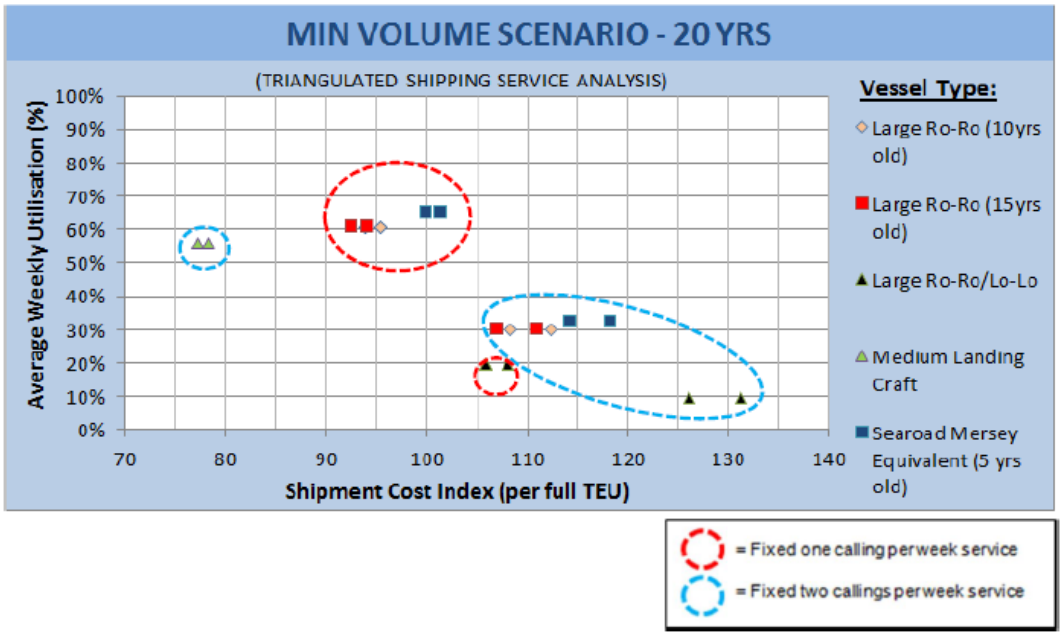

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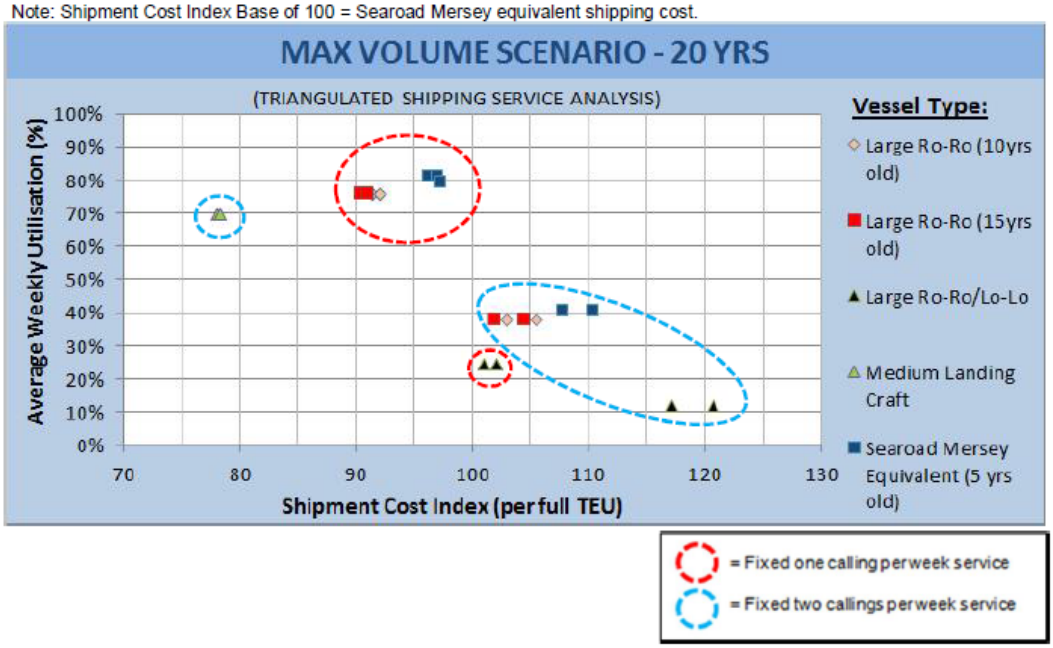


Model result scatter plot for hubbing shipping service options

Assumptions:

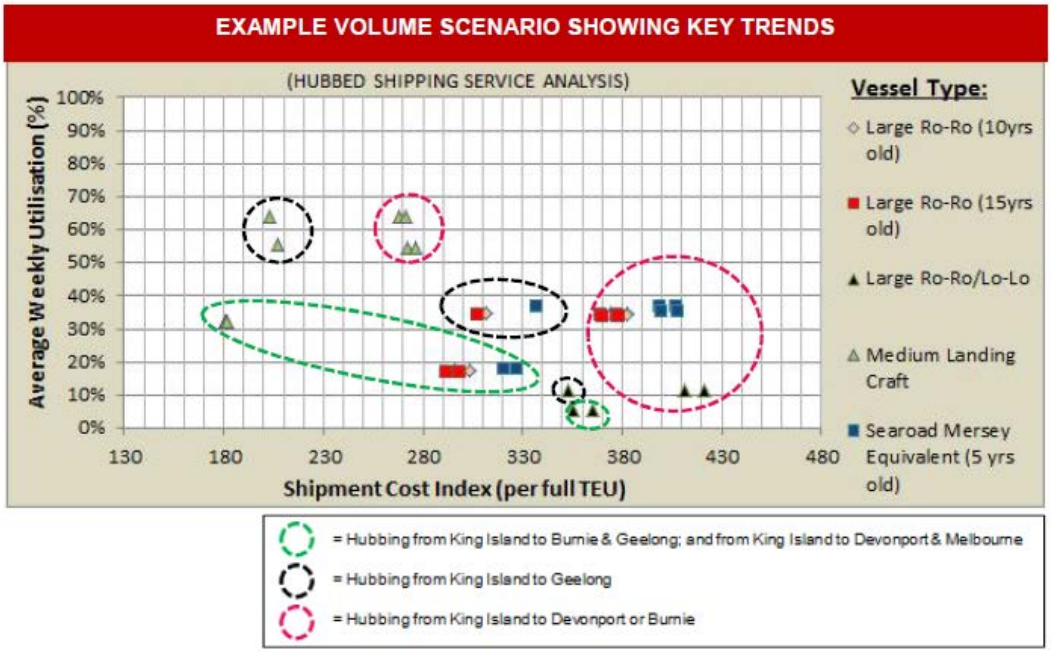
The hubbing shipping service option assessment undertaken assumes a dedicated King Island service and incorporates no additional volume on top of forecast King Island export and import trade. A number of port combinations were explored and for each of these combinations both a fixed service operating once a week and a demand driven service were analysed. In the cases where the service only travelled northbound or southbound to Victoria (Geelong) or Tasmania (Burnie or Devonport), a relay charge of $1500 per full TEU and $500 per empty TEU (both including double-handling charges and estimated shipping cost) was charged to a percentage of the cargo requiring to be transported across Bass Strait.

The percentage of cargo assumed to be relayed across Bass Strait was calculated based upon trade ratios experienced in the 2011-12 financial year on King Island and these are shown in the table below. The table defines how much King Island freight and empty containers would be required to be relayed if the service did not call at either mainland Tasmania or Victoria.

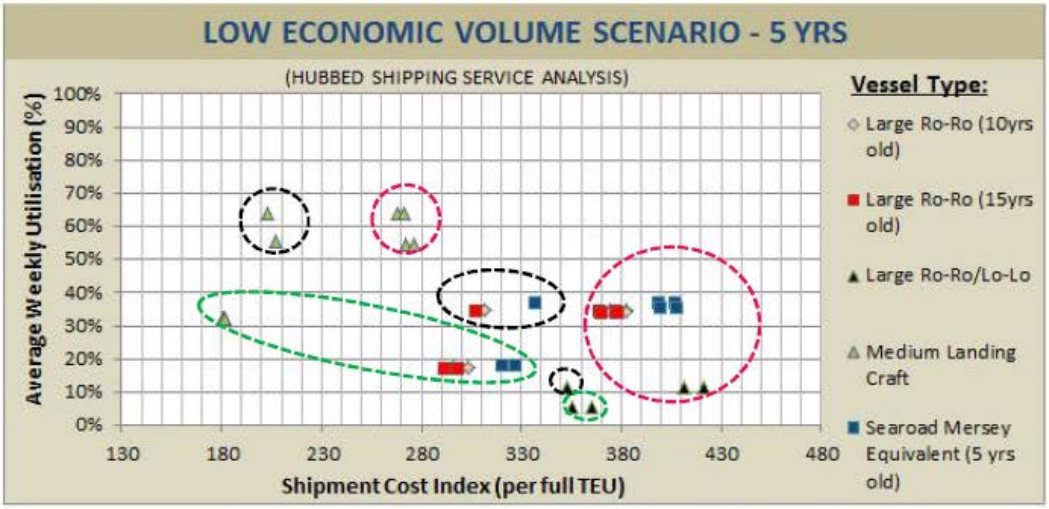
RELAY DISTRIBUTION	
Percentage of full TEU volume exported to and imported from VIC/TAS in 2011FY	
Vic =	71%
Tas =	29%
Percentage of empty TEU volume exported to and imported from VIC/TAS in 2011FY	
Vic =	85%
Tas =	15%

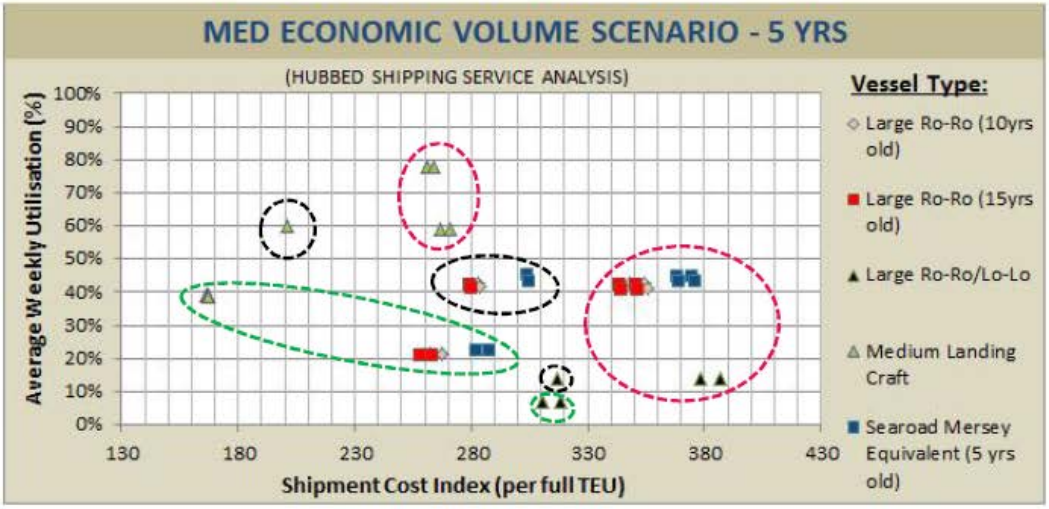
Common trends observed:

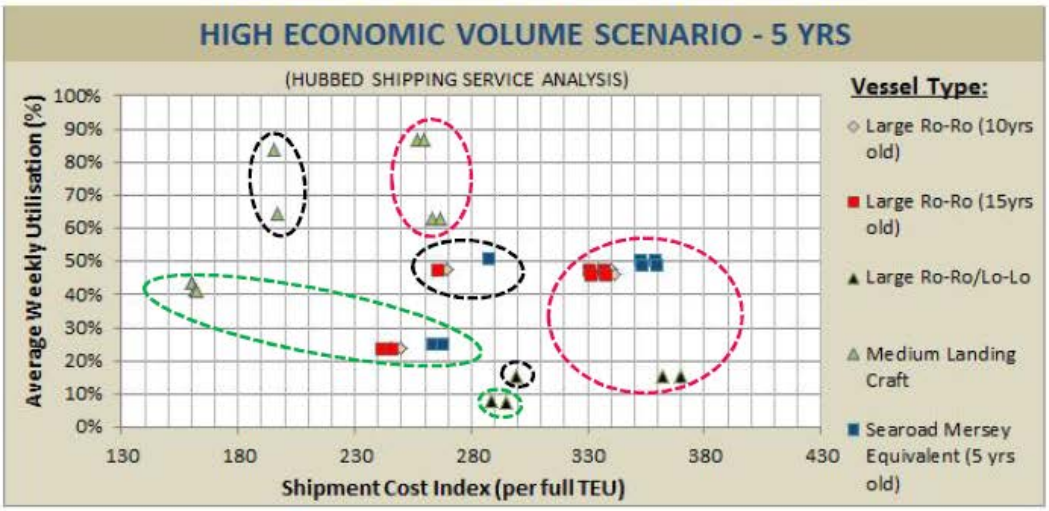
The plots produced by the shipping service analysis looked at a range of future volume scenarios and out of this emerged some common trends. The most notable trend observed was relative to the trade ports selected, where it was found that Hubbing from King Island to Burnie and Geelong or Devonport and Melbourne was the cheapest hobbing option due to reduced relaying costs. Hubbing to Geelong on its own was the next cheapest option due to the higher proportion of trade being exported to and from Victoria, resulting in lower relay charges. Hubbing from King Island to either Devonport or Burnie on the other hand was found to be the most expensive option, due to excessive relay costs. In terms of vessel costs the medium landing craft was again found to be the cheapest option. Finally, the average utilisation for a fixed one calling per week service was found to be either the same or higher than a demand driven service, as it rolled volume over in peak demand as opposed to being served in that week by an additional voyage.


EXAMPLE VOLUME SCENARIO SHOWING KEY TRENDS
(HUBBED SHIPPING SERVICE ANALYSIS)
Average Weekly Utilisation (%)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
130
180
230
280
330
380
430
480
Shipment Cost Index (per full TEU)
Vessel Type:
Large Ro-Ro (10yrs old)
Large Ro-Ro (15yrs old)
Large Ro-Ro/Lo-Lo
Medium Landing Craft
Searoad Mersey Equivalent (5 yrs old)
= Hubbing from King Island to Burnie & Geelong; and from King Island to Devonport & Melbourne
= Hubbing from King Island to Geelong
= Hubbing from King Island to Devonport or Burnie

Note: Shipment Cost Index Base of 100 = Searoad Mersey equivalent shipping cost.







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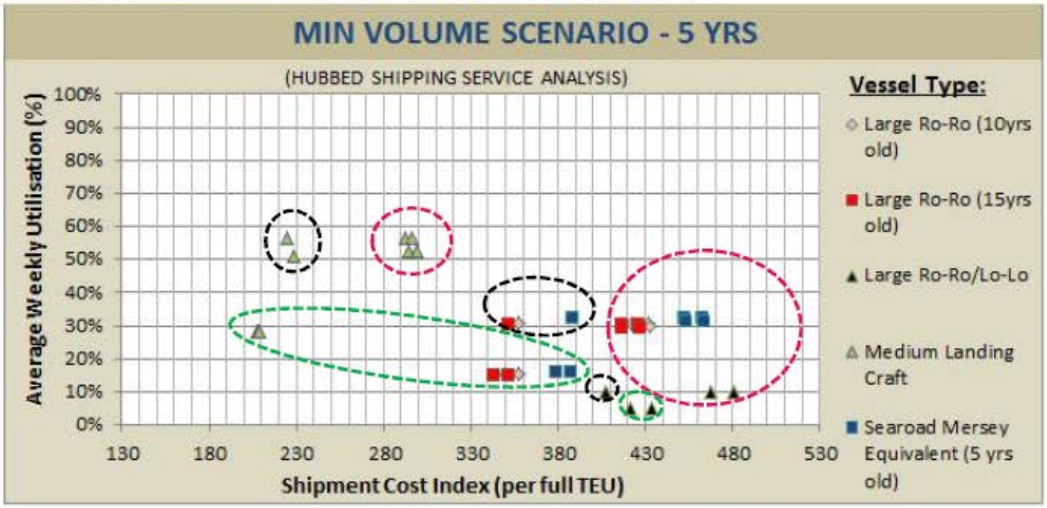
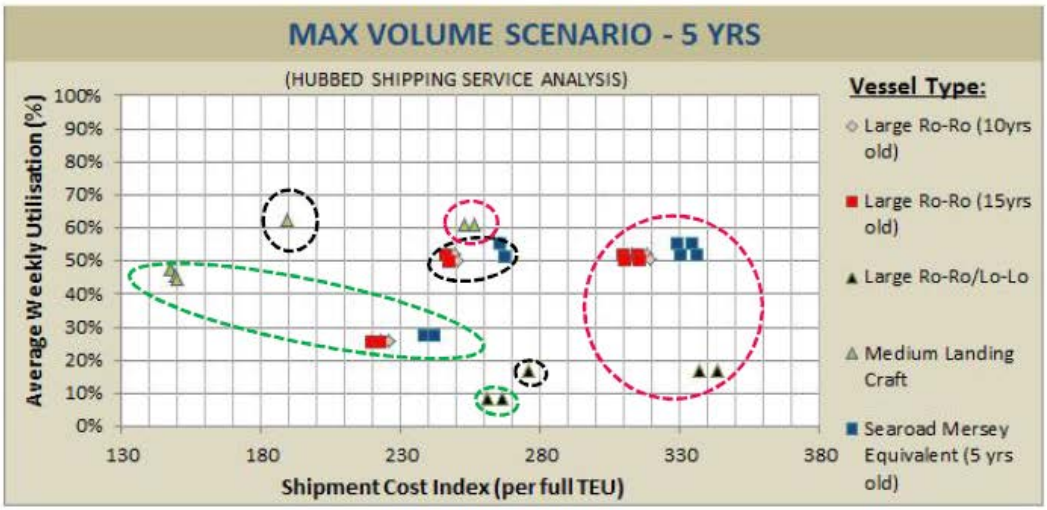
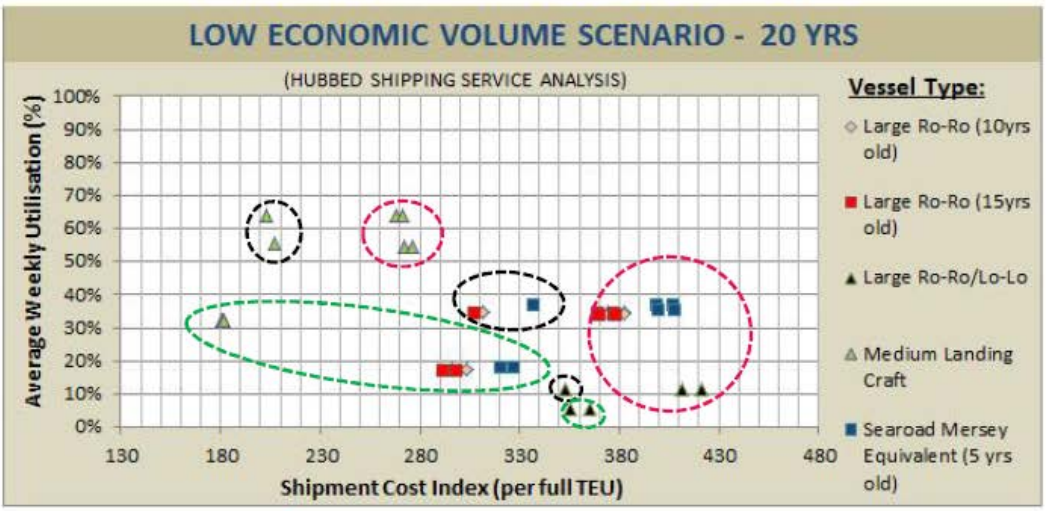




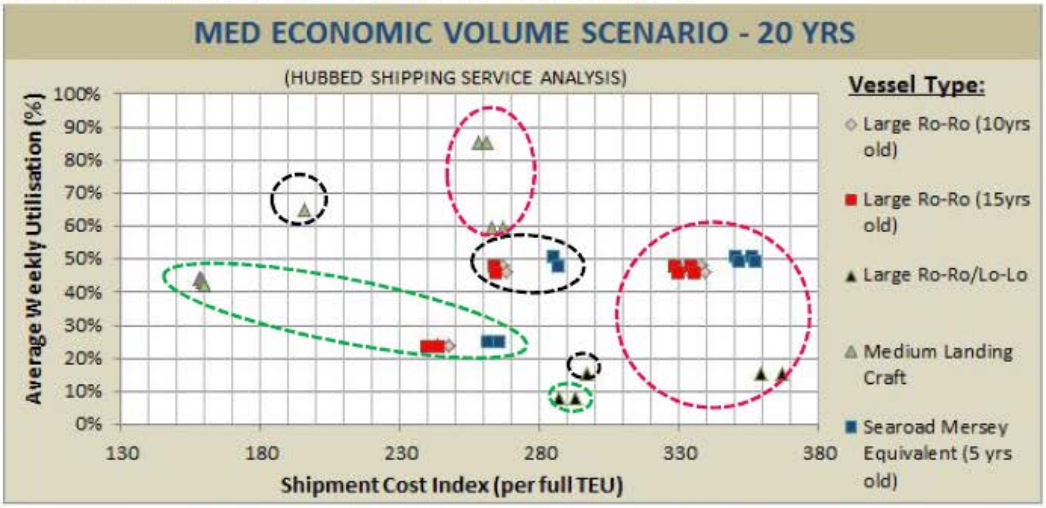


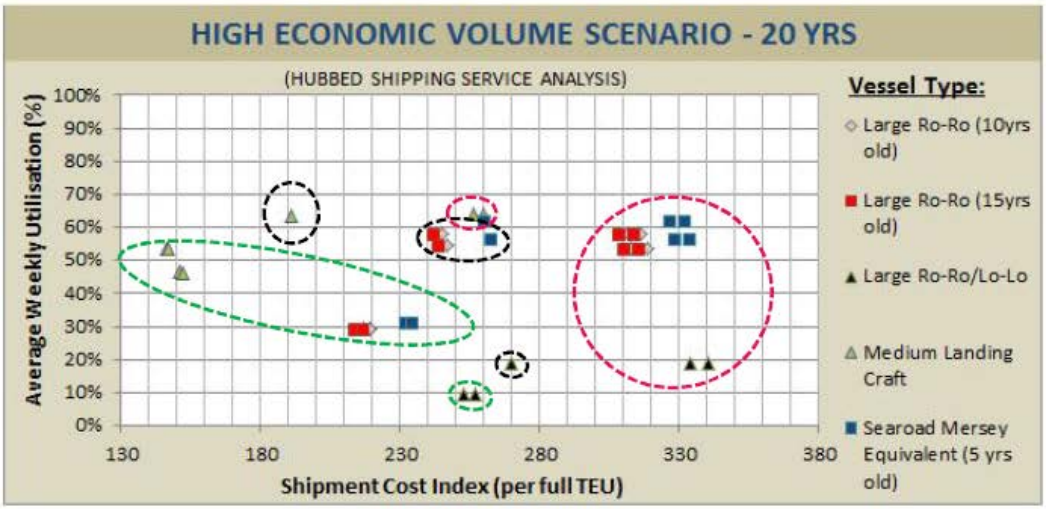
= Hubbing from King Island to Burnie & Geelong; and from King Island to Devonport & Melbourne

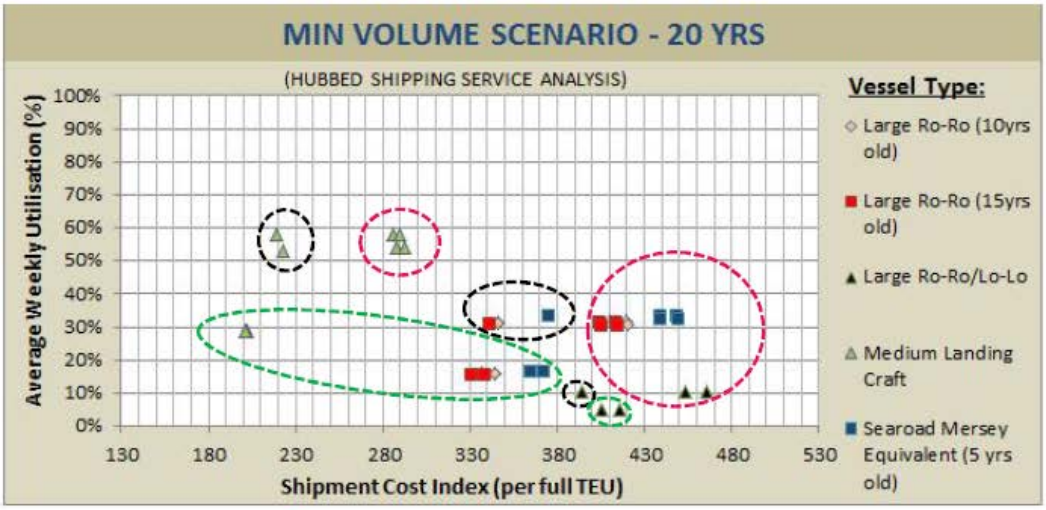
= Hubbing from King Island to Geelong

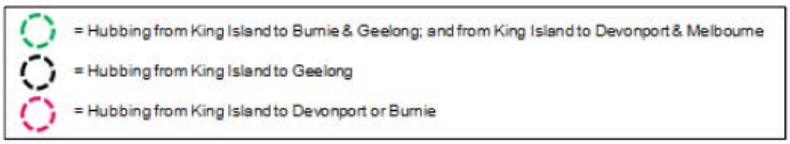
= Hubbing from King Island to Devonport or Burnie

Note: Shipment Cost Index Base of 100 = Searoad Mersey equivalent shipping cost.









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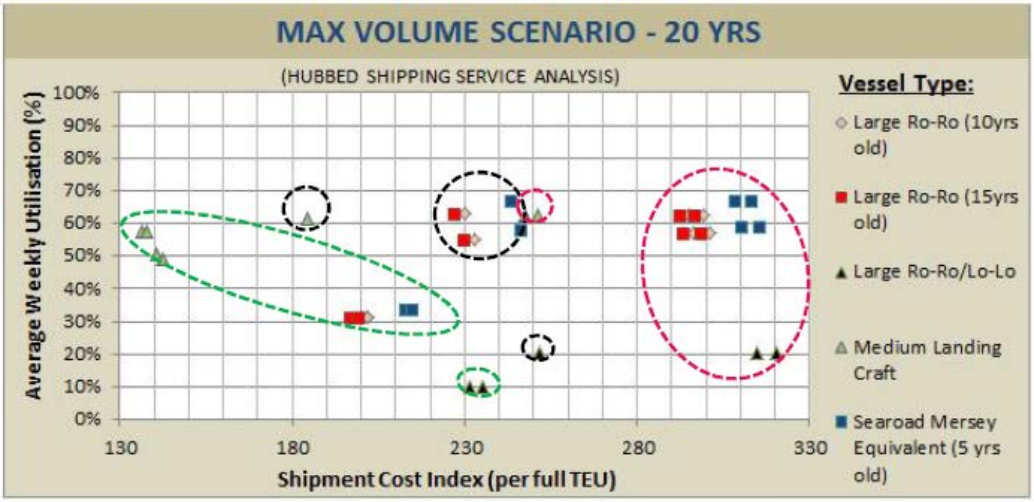

= Hubbing from King Island to Burnie & Geelong; and from King Island to Devonport & Melbourne

= Hubbing from King Island to Geelong

= Hubbing from King Island to Devonport or Burnie

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